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Circular economy practices of SMEs: do business survivability and supply chain finance matter?

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Abstract

Paper aims: Businesses are facing a challenge to transform their supply chain operations and contribute to sustainable development through circular economy practices. Whilst the transformation takes time and requires financial resources, many businesses like small and medium sized enterprises (SMEs) in developing world are struggling to survive and need to set priorities. This work aims to understand whether and how business survivability (SRV) and supply chain finance (SCF) can drive circular economy practices (CEP) amongst SMEs in an emerging country.

Originality: We contribute by offering a novel perspective of need hierarchy and showing that SRV is a critical driving factor of CE adoption amongst SMEs in the developing world.

Research method: We survey 515 SMEs from a diverse range of industries in Indonesia, one of the largest emerging economies in the world, and analyse the data using Partial Least Squares Structural Equation Modeling (PLS-SEM).

Main findings: This research shows that SRV is a critical driving factor of CE adoption amongst SMEs in Indonesia. Whilst higher SRV could increase chances to access SCF, non-financial support from SC actors is needed to make the financing effective and to motivate SMEs to adopt CEP. Without SCF, SMEs could adopt CEP when their business performs well. Otherwise, their focus is on surviving their business operations.

Implication for theory and practice: Our research challenges current research in developed countries showing that CE practices could affect SME performance and business survival. We provide evidence on the opposite argument and extend the applicability of Maslow's hierarchy of needs theory in the business context.

Keywords

Circular economy practices. Supply chain finance. Business survivability. Hierarchy of needs. SMEs,

1. Introduction

The idea of circular economy (CE) has been booming in recent years (Kirchherr & Van Santen, 2019) and considered as a way to tackle climate change (Colucci & Vecchi, 2024). An extensive number of studies have discussed the topic and conducted systematic literature reviews on CE related phenomena (e.g. Geissdoerfer et al., 2017; Kirchherr et al., 2017; Merli et al., 2018). From a system perspective, Suárez-Eiroa et al. (2019, p. 958) define CE as

> [...] a regenerative production-consumption system that aims to maintain extraction rates of resources and generation rates of wastes and emissions under suitable values for planetary boundaries, through closing the system, reducing its size and maintaining the resource's value as long as possible within the system, mainly leaning on design and education, and with capacity to be implemented at any scale.

In practice, CE minimises raw materials as inputs and wastes as outputs, maintains the usefulness and durability of raw materials or products, and reintegrates products that have reached the end of their lifecycle (Suárez-Eiroa et al., 2019).

Despite its significant contribution to the reduction of wastes in the current economic system, the concept of CE has faced criticisms due to its lack of empirical studies, lack of practicality, and significant bias towards more developed rather than developing countries (Kirchherr & Van Santen, 2019). In fact, due to their weak environmental regulations, developing countries produce a significant amount of wastes and have been used as destinations for solid waste pollution transfer from developed countries (e.g. Liu et al., 2018). Moreover, CE practices have not been widely adopted by SMEs in developing countries (Luthra et al., 2022; Sohal et al., 2022), given the fact that SMEs represent the biggest portion of businesses worldwide and are key contributors to the world's economic development (Dey et al., 2022), which could potentially lead the way towards CE implementation (Colucci & Vecchi, 2024).

For many SMEs in developing countries, CE practices might be risky to be implemented due to their limited nature of financial and non-financial resources (Garengo et al., 2005; Keizer et al., 2002; Laforet & Tann, 2006; Vargo & Seville, 2011; Woschke et al., 2017). Many SMEs might have low business survivability, which can be defined as the ability to maintain the business operations, not closing it down or not exiting from its industry. SMEs of that nature could run on a survival mode, i.e. operating with very low entrepreneurial orientation, no technology investment, barely minimum skills, and no organisational structure (Morris et al., 2018). They lack access to banks or other financial service providers (The World Bank, 2023), so they need to rely on supports from their supply chain partners to help ease their financial burden and cope with uncertainty they might face when adopting the new CE-driven business model (Zheng et al., 2021). For example, financially stronger and more sustainable supply chain actors could facilitate trade credits as one of the most commonly used supply chain finance (SCF) (e.g. paying raw materials or products in credit without additional costs nor interests) (Gelsomino et al., 2016; Huang et al., 2022; Jia et al., 2020), so that SMEs can source more expensive sustainable materials or products. Similarly, SMEs could provide the SCF facilities to help their customers embrace the CE practices.

Despite the growing interest in this phenomenon, empirical research examining the relationships between business survivability, SC finance, and CE practices of SMEs in developing countries is currently lacking. The extant literature does not currently provide empirically grounded answers to the following research questions: Does business survivability affect CE practices of SMEs in developing countries? Does SC finance matter and if so, how does it relate to CE practices of the SMEs? To answer these important research questions, we survey 515 SMEs in Indonesia, one of the largest emerging economies in the world. Indonesia has over 270 million people, the fourth most populous country in the world after India, China, and the US (Worldometers, 2023a). Indonesia is also amongst the top 10 CO2 emissions producers in the world, producing over 530 million tons of CO2 emissions in 2016 (Worldometers, 2023b). In addition, Indonesia represents a low-income context which provides an important yet different perspective to understand the dynamic of sustainability transition (Fathoni et al., 2021; Korsunova et al., 2022; Yi & Liu, 2015).

We also choose Indonesia because it has been suggested that CE transition in this country could have significant impacts on the national economy. UNDP (2021a) estimates that, compared to business as usual, in 2030 CE practices in Indonesia could potentially contribute to additional GDP of Rp. 593-638 trillion, 18%-52% reduced wastes, reduced CO2 emissions by 126 million tonnes, reduced water use by 6.3 billion cubic meters, 4.4 million jobs, and almost 9% annual household savings. Indonesia also exemplifies an emerging economy, in which 99% of businesses are driven by SMEs, absorbing 96.9% of the national workforce (Coordinating

Ministry of Economic Affairs, 2022). In 2021, there were 64.2 million SMEs in Indonesia, contributing 61.07% to Indonesia's GDP and 14.37% to export market (Coordinating Ministry of Economic Affairs, 2021).

We organise our paper as follows. Introduction to the research has been presented in the first section. The following section covers hypothesis development of the research. We then present the methodology used in this research in Section 3, followed by results and discussion in Sections 4 and 5 respectively. Finally, we conclude the paper in Section 6.

2. Hypothesis development

Our hypotheses are mainly inspired by Maslow's hierarchy of needs as a theoretical underpinning of this study. According to Maslow's hierarchy of needs theory, humans have five needs, i.e. physiological, safety, social, esteem, and self-actualisation needs, which form a hierarchy and structured as a pyramid (Maslow, 1943; Cui et al., 2021; Ryan et al., 2020; Janker et al., 2019; Udo & Jansson, 2009). Physiological needs are at the bottom of the pyramid, and they refer to basic needs for survival including water, foods, clothing, sleep, shelter, and mobility. When these basic needs have been satisfied, safety needs such as resources, health, employment, stability, and security should be achieved. Social needs will then be fulfilled with love, family, relationships, friends, and belongingness, followed by esteem needs which include self-confident, respect, recognition, achievement, and self-worth. Finally, self-actualisation is at the top of the pyramid, which is related to problem solving, creativity, morality, and acceptance of facts.

Whilst this theory has been used to explain individual needs that motivate human behaviour, Maslow's perspective can be applied in the corporate setting. One of the first work of relevance in translating Maslow's hierarchy of needs theory from individual to organisational contexts is Tuzzolino & Armandi (1981), who have published their work in *Academy of Management Review*. They argue that corporate social responsibility is a form of self-actualisation for organisations and that the action is driven by physiological, safety, affiliation, and status needs. Advocating the use of Maslow's hierarchy of needs theory and elaborating Tuzzolino & Armandi's (1981) framework, Mileski & Franklin (2017, p. 32) proposes the humanisation of corporations and argues that the complexity of corporations shows human-like behaviours and characteristics because "corporations internally are made up many individuals pursuing multiple goals which create internal complexity". Therefore, human, which could be represented by individual managers' personal values, could naturally influence the business operations, including the decision to pursue corporate social responsibility (Hemingway & Maclagan, 2004; Scott & Davis, 2007). The theory can also be extended to understand SMEs' behaviour and motivations for success (Stoll & Ha-Brookshire, 2012). Given the size of their business, SMEs' operations are usually controlled entirely by owners and/or directors/managers, so that SMEs' needs and individual needs of the leaders are not separable (Hisrich et al., 2008; Stoll & Ha-Brookshire, 2012). Botana & Costa Neto (2014) uses a case of micro and small enterprises within the Brazil's graphic industry and find that the theory can be applied in the business context, with high similarity between Maslow's original text and the enterprise phenomenon.

Lussier (2019) argues that the theory can be translated in business management studies. Practically, the theory can be used to design management training and work structures in companies by understanding motivating needs of employees, including higher pay, more responsibility, as well as psychological and professional growth (Lussier, 2019). Harris et al. (2014, p. 13) have used Maslow's hierarchy of needs theory to understand the intertwined relationship between community and small businesses, suggesting that the theory could help economic developers "better anticipate the needs of small businesses in their community, thus a collaborative environment can exist promoting small business growth and an appealing location for new firms". Maslow's hierarchy of needs theory is also useful in understanding motivational needs of small businesses under uncertain conditions such as post-COVID-19 pandemic (Ertel, 2021). SMEs could grow and contribute to economic development when the population meet their basic survival needs, so that they can focus on higher-order needs including self-actualisation in the form of innovation and entrepreneurship (Lee & Sims, 2023).

2.1. Business survivability, firm performance, and CE practices of SMEs

In a business context, it is likely that surviving businesses are capable to innovate, adapt, and offer viable products to the market for a certain period of time (Cefis & Marsili, 2006; Ortiz-Villajos & Sotoca, 2018; Banbury & Mitchell, 1995; Audretsch, 1995). Even if they do not have enough capital, such as the case of SMEs, innovation can be initiated through bricolage or improvisation (e.g. using any resources or materials at hand) (Duymedjian & Rüling, 2010), which can be an important way to mobilise available resources to enhance CE practices (Klein et al., 2023). CE represents a big innovation that the world currently needs (Sehnem et al., 2022;

Suchek et al., 2021) and surviving the business means that this kind of innovation could be an opportunity for SMEs that should not be missed. We therefore hypothesise that:

H1: Business survivability is positively associated with CE practices of SMEs

SMEs can run in a survival mode with little income that is just enough to fulfil daily needs for the owners and their family (Morris et al., 2018). These SMEs have no capacity or capability to invest to develop the business that is driven by urgent needs and operate in a market with many competitors and competitive prices (Morris et al., 2018). However, Morris et al. (2018) suggest that this type of business can transition to better and more stable states, towards businesses with lifestyle, managed growth, or aggressive growth characteristics. More stable business could mean that SMEs are performing well (Clampit et al., 2022), indicating that business survivability could have a positive impact on firm performance. Good performing firms could further explore opportunities to adapt to their business environment by effectively and efficiently manage and mobilise required resources (Andersén, 2011; Lin and Wu, 2014). Good performance could also mean that the business runs well and is profitable, so that firms need to keep up with their good work of fulfilling customers' demand using more and more resources. As the required resources deplete, firms will start to think about how to regenerate them to maintain their performance and follow environmentally friendly strategies such as applying cleaner production principles, which could enable the implementation of CE practices (Sousa-Zomer et al., 2018). Using these arguments as a basis, without fulfilling the safety needs (i.e. good business performance), SMEs might not be motivated and confident to adopt CE practices because they simply lack resources to develop their business, explore new opportunities, and commit to risky and radical innovations such as CE (Woschke et al., 2017). This argument is in line with Ghisellini et al. (2016), who suggest that maintaining performance stability is required as one of antecedents of CE practices.

These arguments are in line with Maslow's hierarchy of needs theory, which suggests that safety needs including stability are required when basic survival needs have been met (Maslow, 1943; Ryan et al., 2020; Udo and Jansson, 2009). In the organisational context, Tuzzolino and Armandi (1981, p. 23) translate Maslow's hierarchy of needs theory and postulate that safety need can emerge in the form of "consistent profit profile or growth". In a corporate setting, the safety need could also be represented by "a stable dividend policy or target payout ratio" (Tuzzolino and Armandi, 1981, p. 23). For SMEs, safety needs refer to maintaining financial performance, managed business/operational growth, and meeting sales targets (Stoll & Ha-Brookshire, 2012). All the criteria suggest that fulfilling safety needs refers to maintaining a good business performance, which could serve as a driver for "increased safety-need satisfaction by reducing environmental uncertainty" (Tuzzolino & Armandi, 1981, p. 23).

Whilst serving as a safety need, good business performance could also provide a self-esteem need to adopt CE, which could be considered as a self-actualisation need by SMEs. Tuzzolino and Armandi (1981) suggests that in a corporate setting, self-esteem or status needs could slightly overlap with safety needs. In this case, good performance could be used as a measure of the company's "standing relative to others". This argument is also supported by Stoll and Ha-Brookshire (2012) in the context of SMEs in which good performance could lead to having a sense of achievement, strength, and confidence manifested into brand recognition and respect, reassessment of business strategy, and expansion into a new market. Tuzzolino and Armandi (1981) illustrate the connection between good performance and self-esteem with examples of different measures of industrial leadership such as price leadership, market share, corporate image, patent position, and other financial ratios such as total capitalisation, bond rating, stock beta, and earning multiple which are used by companies as indicators of their status and are fed by good corporate performance.

Moving on, the consideration of CE as a self-actualisation need is based on the argument that practicing CE is part of being good global citizens (Nguyen, 2023; Valkonen & Loikkanen, 2020), which characterises a self-actualisation need of SMEs that aspire to "offering great products that would help consumers feel that they are making positive impact in the world" (Stoll & Ha-Brookshire, 2012, p. 158). CE has also been linked to corporate strategies. Morea et al. (2021) find that CE has been practiced by corporates and is integrated in the CSR report. As such, CSR can be used as a catalyst for circular economy (Morea et al., 2023). Tuzzolino & Armandi (1981) clearly argue that for corporates, CSR is a form of self-actualisation after all needs have been met, as they need a sense of purpose and to serve higher cause to compensate negative impacts they contribute to the environment. As such, the CSR includes "making sizable commitments to restore the ecosystem", saving energy use, urban renewal, and making effort on environmental improvement due to pollution and "poor waste disposal practices or carelessness" (Tuzzolino & Armandi, 1981, p. 24), all of which are closely related to circular economy practices. Based on the above substantiation, we therefore formulate the following hypotheses:

H2: Business survivability is positively associated with firm performance of SMEs

H3: Firm performance is associated with CE practices of SMEs

H4: Firm performance mediates the relationship between business survivability and CE practices of SMEs

2.2. Business survivability, supply chain finance, and CE practices of SMEs

Higher business survivability could mean that SMEs require stronger financial support as they move towards more stable business development. Huyghebaert (2006) suggests that firms with high survivability, such as the case of firms surviving the start-up stage of a business, usually build up a reputation and might develop a relationship with banks to provide financing for their business. However, some firms are at high risk of failure, limiting their access to bank loans, so that they need to rely their financing on their suppliers which are considered more lenient than banks (Huyghebaert, 2006). It is true in the case of many SMEs which do not have access to financing from banks (The World Bank, 2023).

Whilst there are many types of SCF instruments (Huang et al., 2022; Chakuu et al., 2019), trade credit is one of the most associated with SCF. It works by facilitating supply chain actors so that the payment of products to suppliers or from customers can be paid in credit, postponed, or discounted within a certain period. Whilst research linking business survivability and SC finance has been lacking, reflecting on Maslow's hierarchy of needs, SC finance could be considered as a mechanism to fulfil a safety need after the basic need of business survivability has been met. Whilst financial security has been considered an important indicator safety need for SMEs (Stoll & Ha-Brookshire, 2012), one of the key concepts of SC is "integration" and that access to SC finance could represent an integrated process, i.e. a smooth financial flow between SC actors (Fabbe-Costes & Jahre, 2008; Qiao & Zhao, 2023; Martin & Hofmann, 2017). In the organisational context, Tuzzolino & Armandi (1981) suggest that SC (vertical) integration could be considered a way to reduce the corporates' environmental uncertainty, which satisfy a "two-tiered safety need" within Maslow's hierarchy of needs theory. As such, we hypothesise that:

H5: Business survivability is positively associated with SC finance of SMEs

Despite its pivotal role, research linking SCF and CE practices has also been scant. Whilst Patra et al. (2024) have conducted a systematic literature review on circular SCF, they do not specifically and explicitly link SCF and CE practices. Instead, they broadly define circular SCF as "practices and transactions that lessen harmful impact of products to the society in addition to producing a positive impact on the overall economic, environmental and social advantages for all the stakeholders". Referring to Geissdoerfer et al. (2017), this definition leans more towards broader sustainability concept rather than CE. Nevertheless, Zhou et al. (2018) suggest that SCF in the form of purchase credit can incentivise suppliers to use more environmentally friendly materials.

Practically, CE adoption requires changes in companies' business models and processes, incurring costs of investment and working capital, which cannot be easily provided by SMEs. In addition, transition to CE requires the involvement of all supply chain actors as they take critical parts to ensure the CE-based value delivery to end customers (Batista et al., 2023). Larger companies with stronger capital within the supply chain might be the ones feeling the pressure to transition to CE and need to collaborate with smaller supply chain actors to enable CE practices (Atasu et al., 2021; Veleva & Bodkin, 2018). They could therefore help smaller non-bankable companies as their suppliers or customers to comply with CE principles even if they need to provide financing to the SMEs. As such, SCF could enhance CE practices of SMEs. Accordingly, we hypothesise that:

H6: SC finance is positively associated with CE practices of SMEs

SCF could play a critical role in the relationship between business survivability and CE practices. Changing business models and processes to CE might be risky for many SMEs because they need to acquire new customers or educate existing ones who might not be aware of CE-based products and processes. CE practices require working capital to ensure SMEs' daily operations and shortage of capital and lack of external financing, including SCF, to operate CE could lead to bankruptcy (Zheng et al., 2021). As such, being able to survive might not be enough to motivate SMEs to adopt CE practices. With SC finance, SMEs might be more confident to innovate, thus increasing the chance to adopt CE practices with less fear of failure. Therefore, SC finance might mediate the relationship between survivability and CE practices.

In Maslow's hierarchy of needs perspective, as it relies on the SMEs' relationship with their SC members to secure the financing, SC finance could fulfil a safety need and at the same time be considered as a mechanism to fulfil a social need, which could lead to the fulfilment of a self-esteem and therefore self-actualisation (CE practices) needs. Whilst the mechanism of fulfilling a safety need has been explained before, SC finance requires stable relationships between SC actors (Jia et al., 2020; Qiao & Zhao, 2023; Martin & Hofmann, 2017) and that maintaining such relationships is part of a satisfied affiliative (social) need in a corporate setting (Tuzzolino & Armandi, 1981). Moreover, a classical supply chain theory suggests that "it is supply chains rather than companies that compete" (Fynes et al, 2005; Christopher & Towill, 2001) and that good SC relationships could help companies lead in a highly competitive environment (Fynes et al, 2005), thus increasing their self-esteem or standing relative to others. When these needs have been satisfied, they could be motivated to apply CE practices as part of their self-actualisation effort. Based on this substantiation, we formulate the following hypothesis:

H7: SC finance mediates the relationship between business survivability and CE practices of SMEs

2.3. Business survivability, SC finance, firm performance, and CE practices of SMEs

A significant number of studies suggest that SCF can improve firm performance (Chakuu et al., 2019; Gelsomino et al., 2016; Huang et al., 2022; Jia et al., 2020; Xu et al., 2018). However, empirical evidence on the relationship between SCF and performance of SMEs is limited. Ali et al. (2018, 2020) are amongst a few studies showing that SCF significantly improves SMEs performance. Their focus is, however, more on the financial performance of SMEs, including measures of sales growth, pre-tax profit, and cash flow, neglecting the impacts of SCF on operational performance of the firms. The extant SCF literature suggests that SCF could enhance other financial performance such as working capital and operational performance such as order replenishment, inventory availability and turnover, and capacity optimisation.

Whilst SC finance could have a direct and positive relationship with CE practices of SMEs, when surviving SMEs are given access to SCF, their priority might be to use the financing to enhance their firm performance and therefore develop their business first, rather than adopting CE practices that might not immediately benefit them in the short-term (Crals & Vereeck, 2005; Jia et al., 2020). In other words, SC finance could mediate the relationship between business survivability and firm performance. Reflecting on Maslow's hierarchy of needs theory, safety needs in the form of firm performance might be more important as it could ensure a self-esteem to adopt CE as a self-actualisation need in the future. When good performance has been achieved, SMEs might start to think about adopting CE practices. As such, firm performance could now mediate the relationship between SC finance and CE practices of SMEs. Accordingly, we formulate the following hypotheses:

H8: SC finance is positively associated with firm performance of SMEs

H9: SC finance mediates the relationship between business survivability and firm performance of SMEs

H10: Firm performance mediates the relationship between SC finance and CE practices of SMEs

2.4. Supply chain finance, non-financial support, and circular economy practices of SMEs

For financially stronger and more sustainable companies within the supply chain, SCF might be seen as an investment in collaboration with other SC actors (Jia et al., 2020). As such, SCF might just be the beginning of the collaboration. SCF schemes could evolve over time because they need to fit with various supply chain actors' need. Whilst the implementation of SCF could be challenging, redefining and restructuring the supply chain actors' operations and financial capabilities are needed as non-financial supports to ensure the best fit of the SCF (Wuttke et al., 2013). We therefore predict that the more SCF facilities adopted by the SC actors, the more likely that the SC actors will involve in supporting receiving members to manage their business sustainably and manage their finance properly. Such a non-financial support is crucial particularly for SMEs which often lack skills in managing their business operations (Anwar & Li, 2021; Songling et al., 2018). Therefore, the more the SMEs receive SC non-financial support, the higher their chance to adopt CE practices as they are more prepared to transition towards more sustainable operations.

Without the SC non-financial support, SMEs might struggle to allocate their financial resources provided by SCF schemes and might not prioritise their environmentally friendly practices including CE. SCF might only be

seen as a way to secure short-term financing, which is more convenient to get, less complicated, and less risky compared to financing from banks. SC non-financial support could represent a social need in Maslow's hierarchy of needs theory, which could help SMEs enhance their confidence to adopt CE practices as a self-actualisation need. This leads to our next hypotheses:

H11: SC finance is positively associated with SC non-financial support to SMEs

H12: SC non-financial support is positively associated with CE practices of SMEs

H13: SC non-financial support mediates the relationship between SC finance and CE practices of SMEs

Whilst examining the relationships between the constructs, this research aims to provide a predictive model assessment of the phenomenon. Figure 1 shows the structural model depicting the hypothesised relationships.
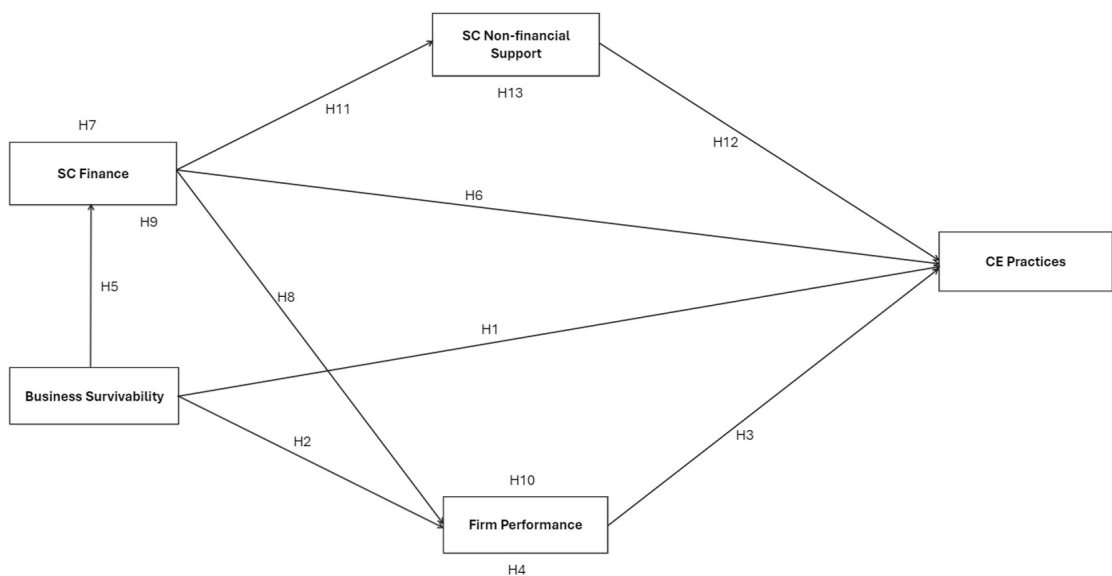

Figure 1. Proposed structural model and hypotheses.

3. Methods

3.1. Data collection

To test our hypotheses, we conducted a cross-sectional self-administered online survey to SMEs in Indonesia between September-October 2023. This type of survey was chosen due to practicality of collecting data from a vast archipelagic country where physical access to SMEs is challenging and inefficient. This design is also suitable given limited studies addressing the relationships between business survivability, SCF, and CE practices amongst SMEs, so that little is known about the pattern of the relationships (Spector, 2019). We used purposive sampling with the following criteria for our respondents: (1) we define SMEs in accordance with the Indonesian Government Regulation No. 7 (Indonesia, 2021) as businesses which have annual sales value of no more than Rp 50 billion or about $ 3.2 million; (2) SMEs that operate for at least one year; (3) SMEs that produce or sell tangible products; and (4) the questionnaire must be filled in by owners and/or directors/managers of SMEs because they typically have comprehensive understanding of the overall companies' operations and environment (Hisrich et al., 2008), so that their responses represent the companies.

Using a database of SMEs developed by the Central Bank of Indonesia, we distributed our questionnaire to 1,823 respondents with 29.7% response rate, resulting in 541 responses. We excluded incomplete data, SMEs that do not meet all the criteria, and SMEs that do not consent to participate. After the data cleaning, we acquired 515 valid responses to be analysed. The SMEs come from different provinces of Indonesia, with responses dominated by SMEs from provinces in Java, the most densely populated island in the country. The

SMEs also come from diverse industries, ranging from food and beverage (53.2%) to textile (4.27%). Some of these industries are in line with key sectors identified by UNDP (2021b) as having a great potential to adopt CE practices in Indonesia, in which food and beverage has been highlighted as a key sector contributing to the biggest wastes (57.5 million of tonnes) with 54% projected increase in wastes in 2030. Many of the SMEs had been operating for 1-5 years (48.93%), while a small portion of them had been in the industries for over 10 years (15.34%). Most of the SMEs have up to 10 employees (84.66%), whilst 6.02% of the respondents have over 20 employees. Detailed information about our respondents is presented in Table 1.

Table 1. Respondents' profile.

Characteristics	Classification	Number of respondents	Percentage of respondents
Industry	Food and beverage	274	53.2%
	Craft	88	17.09%
	Apparel	83	16.12%
	Agriculture	39	7.57%
	Textile	22	4.27%
	Others	9	1.75%
Business age (in year)	1 - 5	252	48.93%
	6 - 10	184	35.73%
	>10	79	15.34%
Number of employees	1 - 10	436	84.66%
	11 - 20	48	9.32%
	> 20	31	6.02%
Position of respondents in the SMEs	Owner	477	92.62%
	Director	14	2.72%
	Manager	24	4.66%

3.2. Measures

We developed our questionnaire based on previous studies in the area. Our measures of SCF were adapted from Huang et al. (2022), focussing on trade credits as one of the most common measures that look at SCF from the supply chain perspective, involving supplier as a primary actor to provide financing to support their supply chain operations (Chakuu et al., 2019). We do not use SCF measures that involve banks or other financial service providers because many SMEs do not have access to those kinds of finances (The World Bank, 2023). In fact, 51.2% of SMEs in Indonesia have difficulties in accessing financing from banks (Republika, 2023), some of the reasons include lack of collateral and limited access to banking information (Bank Indonesia, 2013). Examples of the SCF measures in this research include "The products I buy from suppliers can be paid in credit without additional costs nor interests within a certain period", "The payment for products I buy from suppliers can be postponed without additional costs nor interests within a certain period", and "The suppliers give discounts for the payment of products my company buy within a certain period".

Huang et al. (2022) suggest that SCF is closely linked to operational and financial management of firms. We therefore measure firm performance to cover operational and financial performance measures adapted from Huang et al. (2022), including for example "My company get the required materials or products from suppliers quickly", My company can increase sales, "My company can obtain the required working capital", and "My company can manage cash flow". Measures for SC non-financial support are in line with Huang et al. (2022), Wuttke et al. (2013), and Jia et al. (2020), covering assistance to manage business operations and to increase financial management skills: "My suppliers assist my company to manage business to be environmentally friendly" and "My suppliers assist my company to increase financial management skills".

Measures of business survivability were adapted from Morris et al. (2018), covering entrepreneurial orientation, technology investment, managerial skills, and organisational structure. These measures were assessed using a 1-4 scale, which characterise SMEs' modes of operations. For example, SMEs were asked to rate their entrepreneurial orientation, i.e. ability to capture opportunities, with the scores of 1 = very low, 2 = low, 3 = moderate, 4 = high. The higher the score, the higher the business survivability of the SMEs as they can transition from a survival mode to a more stable and developed business.

Our measures for CE practices are in line with key CE principles proposed by Suárez-Eiroa et al. (2019) and Moraga et al. (2019), covering input, process, output, and design of product and business model, which are

applicable for many industries, not only manufacturing of durable products. Examples of the measures include: "My company uses biodegradable materials", "My company uses efficient operational processes that produce environmentally friendly wastes" and "My company does downcycling, recycling, and upcycling". All items in this research, apart from those for business survivability, were measured using 7-point Likert scale, ranging from never (1) to always (7). Detailed items are listed in Appendix 1.

We use a different measurement scale (1-4) for business survivability because we follow four classifications of businesses proposed by Morris et al. (2018), in which businesses can transition from survival to better and more stable states, towards businesses with lifestyle, managed growth, or aggressive growth. This measurement is considered exploratory because similar approach to capture self-assessed business survivability is currently lacking from the extant literature. Prior studies have mainly measured business survivability using longitudinal studies and secondary database (e.g. Van Praag, 2003; Audretsch, 1994, 1995), which could take a long time to obtain insightful knowledge on the phenomenon, as well as qualitative case studies (Gaskins, 2019), which lacks statistical generalisation of the findings. Our measures are suitable for the survey methodology, which could be characterised as self-assessment and self-administration, allowing efficiency in collecting quantitative data to study the phenomenon in a cross-sectional setting.

3.3. Data analysis

We analysed our data using PLS-SEM. This approach allows us to get insights on a relatively new phenomenon, which balances between theoretical understanding and practical application (Cheah et al., 2023; Wang et al., 2023). Shmueli et al. (2016) suggest that PLS-SEM can provide both explanatory and predictive powers. This approach has recently started to gain traction within the logistics and supply chain management literature as it can fit with the more practical nature of the subject area where pure explanatory modeling is not sufficient to support reliable decision making (Cheah et al., 2023). PLS-SEM also allows us to estimate a complex model with many constructs and indicators. It also offers flexibility on data requirements and specification of the relationships between constructs and indicators (Hair et al., 2019). In this research, we used SmartPLS 4 as our analysis tool (Ringle et al., 2022) and followed steps recommended by Hair et al. (2019) and Shmueli et al. (2019) for assessing PLS-SEM results and the predictive model.

4. Results

4.1. Assessment of the measurement models

Our indicators (Figure 2) have significantly met the recommended ideal threshold of factor loading > 0.7 (Hair et al., 2019) and acceptable limit > 0.5 (Hair et al., 2014; Mishra et al., 2022), with all p-value < 0.01. In the supply chain management literature, Zhou & Benton Junior (2007) suggest that factor loadings should be > 0.3, whereas Lam (2012) suggests that factor loadings can go as low as 0.19 given their significance in representing the constructs. Cronbach's alpha and composite reliability (ρ_A, ρ_C) for all constructs are above 0.7, except for business survivability which have Cronbach's alpha and ρ_A of < 0.7, but are considered acceptable due to the exploratory nature of this construct (Hair et al., 2019; Lam, 2012; Zhou & Benton Junior, 2007; Fornell & Larcker, 1981). This indicates that our model has good internal consistency reliability and content validity. The scores are also below 0.95, showing no potential indicator redundancy (Hair et al., 2019). The respective scores of Cronbach's alpha, ρ_A, and ρ_C for all constructs are: SCF (0.837; 0.841; 0.879), SRV (0.642; 0.657; 0.787), FPF (0.905; 0.910; 0.921), SCNF (0.848; 0.879; 0.895) and CEP (0.835; 0.843; 0.876).

The average variance extracted (AVE) have all met the recommended threshold of > 0.5 (SCF = 0.549; FPF = 0.515; SCNF = 0.680; CEP = 0.506), except for business survivability with AVE of 0.482. According to Lam (2012) and Fornell & Larcker (1981), AVE of < 0.5 is acceptable so long as the composite reliability is above the acceptable level of 0.6. Whilst the AVE scores indicate the overall convergent validity of our measures, the heterotrait-monotrait ratio (HTMT) scores show discriminant validity of measures for all constructs as they are all < 0.85 (Hair et al., 2019). The respective HTMT scores for SCF with SRV, FPF, SCNF, and CEP are 0.290; 0.071; 0.295; and 0.115, while the respective HTMT scores for SRV with FPF, SCNF, and CEP are: 0.481; 0.328; and 0.361. Finally, the respective HTMT scores for FPF with SCNF and CEP are: 0.193 and 0.509, whereas the HTMT score for SCNF and CEP is 0.304.
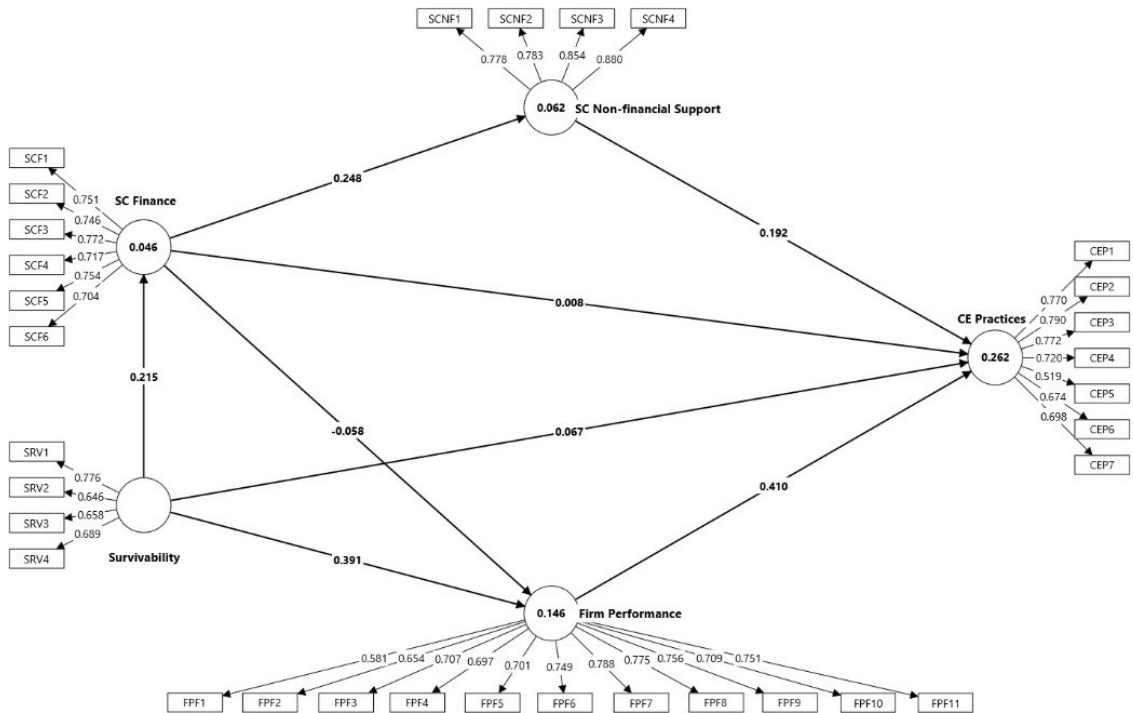
Figure 2. Tested structural model.

4.2. Assessment of the structural model

Our inner model is free from collinearity as all relationships have variance inflation factor (VIF) value of < 3 (Hair et al., 2019). We run 10,000 samples bootstrapping and find that the majority of the relationships are significant at 1% significance level; seven out of thirteen hypotheses are supported by the model (Table 2). This research finds that SC finance does not have a direct positive association with CE practices and SMEs firm performance. Therefore, H1 (β = 0.008, p > 0.1) and H2 (β = -0.058, p > 0.1) are not supported. Whilst firm performance is directly, positively, and significantly associated with CE practices and therefore supporting H3 (β = 0.410, p < 0.01), firm performance does not mediate the relationship between SC finance and CE practices. Hence, H4 (β = -0.024, p > 0.1) is not supported.

Table 2. Assessment of the structural model and hypothesis testing.

Path	β	p-value	VIF (inner model)	Hypothesis	Decision
SCF →CEP	0.008	0.861	1.101	H1	Not supported
SCF →FPF	-0.058	0.206	1.049	H2	Not supported
FPF →CEP	0.410	0.000	1.178	H3	Supported
SCF→FPF→CEP	-0.024	0.206		H4	Not supported
SCF→SCNF	0.248	0.000	1.000	H5	Supported
SCNF→CEP	0.192	0.000	1.123	H6	Supported
SCF→SCNF→CEP	0.048	0.000		H7	Supported
SRV→CEP	0.067	0.148	1.265	H8	Not supported
SRV→SCF	0.215	0.000	1.000	H9	Supported
SRV→SCF→CEP	0.002	0.867		H10	Not supported
SRV→FPF	0.391	0.000	1.049	H11	Supported
SRV→FPF→CEP	0.160	0.000		H12	Supported
SRV→SCF→FPF	-0.012	0.252		H13	Not supported

We find that SC finance is directly, positively, and significantly associated with SC non-financial support, which subsequently affects CE practices, supporting H5 (β = 0.248, $p < 0.01$) and H6 (β = 0.192, $p < 0.01$). The results also support H7 (β = 0.048, $p < 0.01$), suggesting that SC non-financial support fully mediates the relationship between SC finance and CE practices. Whilst business survivability does not have a direct and positive association with CE practices, hence H8 (β = 0.067, $p > 0.1$) is not supported, it has a direct, positive, and significant association with SC finance, supporting H9 (β = 0.215, $p < 0.01$). Despite these results, however, SC finance does not mediate the relationship between business survivability and CE practices, thus H10 (β = 0.002, $p > 0.1$) is not supported. Finally, we find that business survivability has a direct, positive, and significant association with firm performance and that firm performance fully mediates the relationship between business survivability and CE practices, supporting both H11 (β = 0.391, $p < 0.01$) and H12 (β = 0.160, $p < 0.01$). Nevertheless, the relationship between business survivability and firm performance is not mediated by SC finance, hence H13 (β = -0.012, $p > 0.1$) is not supported. Figure 2 shows the schematic representation of the results.

We further find that the R^2 values of the endogenous constructs are all above zero, while our main endogenous construct (CE practices) has R^2 and R^2 adjusted of 0.262 and 0.256 respectively, which are slightly higher than the lowest threshold recommended by Hair et al. (2019) of 0.25, and are acceptable considering lower R^2 found in previous supply chain management research (e.g. Zhou & Benton Junior, 2007). As such, the R^2 values show an acceptable in-sample model fit. We then run a PLSpredict algorithm with 10 folds (k = 10) and 10 repetitions (r = 10), resulting in satisfying $Q^2_{predict}$ values of more than zero, indicating a good out-of-sample predictive power for all endogenous constructs. In other words, our model outperforms the most naïve benchmark, i.e. the means of indicators from the training sample (Hair et al., 2019; Shmueli et al., 2019). The respective R^2, R^2 adjusted, and $Q^2_{predict}$ values for all endogenous constructs are: CEP (0.262; 0.256; 0.067), FPF (0.146; 0.143; 0.136), SCF (0.046; 0.044; 0.040), and SCNF (0.062; 0.060; 0.024).

In addition, Table 3 presents the PLSpredict assessment for all items of the endogenous constructs. Overall, as $Q^2_{predict}$ values for all items are above zero, our model provides relevant and meaningful predictive power. We also find that our PLS-SEM model produces lower prediction errors (root mean squared error – RMSE and mean absolute error – MAE) for the majority of endogenous constructs' items compared to those of naïve linear regression model (LM). This indicates that our model has medium predictive power (Hair et al., 2019; Shmueli et al., 2019).

Table 3. PLSpredict assessment of all endogenous constructs' items.

	Q²predict	PLS-SEM_RMSE (a)	LM_RMSE (b)	(a) – (b)	PLS-SEM_MAE (c)	LM_MAE (d)	(c) – (d)
CEP1	0.019	1.771	1.779	-0.008	1.399	1.401	-0.002
CEP2	0.021	1.588	1.595	-0.007	1.220	1.220	0.000
CEP3	0.039	1.514	1.519	-0.005	1.167	1.186	-0.019
CEP4	0.027	1.672	1.681	-0.009	1.321	1.327	-0.006
CEP5	0.024	2.023	2.031	-0.008	1.727	1.735	-0.008
CEP6	0.041	1.444	1.450	-0.006	1.173	1.167	0.006
CEP7	0.052	1.742	1.747	-0.005	1.376	1.383	-0.007
FPF1	0.041	1.410	1.418	-0.008	1.093	1.097	-0.004
FPF2	0.094	1.357	1.357	0.000	1.121	1.119	0.002
FPF3	0.092	1.280	1.283	-0.003	1.046	1.045	0.001
FPF4	0.032	1.363	1.369	-0.006	1.049	1.046	0.003
FPF5	0.032	1.316	1.322	-0.006	1.007	1.018	-0.011
FPF6	0.075	1.254	1.259	-0.005	0.965	0.969	-0.004
FPF7	0.072	1.202	1.205	-0.003	0.988	0.991	-0.003
FPF8	0.087	1.305	1.309	-0.004	1.039	1.038	0.001
FPF9	0.077	1.196	1.202	-0.006	0.989	0.994	-0.005
FPF10	0.068	1.135	1.134	0.001	0.909	0.905	0.004
FPF11	0.080	1.221	1.216	0.005	0.980	0.972	0.008
SCF1	0.019	1.894	1.903	-0.009	1.657	1.662	-0.005
SCF2	0.019	1.896	1.908	-0.012	1.646	1.657	-0.011
SCF3	0.027	1.731	1.740	-0.009	1.528	1.530	-0.002
SCF4	0.017	1.747	1.757	-0.010	1.485	1.495	-0.010
SCF5	0.020	1.516	1.524	-0.008	1.275	1.281	-0.006
SCF6	0.030	1.581	1.586	-0.005	1.391	1.387	0.004
SCNF1	0.007	1.724	1.686	0.038	1.452	1.399	0.053
SCNF2	0.004	1.632	1.624	0.008	1.326	1.311	0.015
SCNF3	0.023	1.923	1.858	0.065	1.670	1.584	0.086
SCNF4	0.025	1.800	1.729	0.071	1.560	1.465	0.095

4.3. Robustness checks

To ensure robustness, we test our model for nonlinear effects, endogeneity, and unobserved heterogeneity (Hair et al., 2019). To check for nonlinear effects, we run 10,000 samples bootstrapping with Quadratic Effects (QE) for all direct relationships within the model. The results suggest that none of the relationships shows significant QE ($p > 0.1$), indicating no nonlinear effects in the model. With the same bootstrapping, we tested all direct relationships for endogeneity with Gaussian Copula (GC). The results also suggest that none of the relationships shows significant GC ($p > 0.1$), indicating that our model is free from endogeneity.

Finally, we followed procedures recommended by Matthews et al. (2016) to test our model for unobserved heterogeneity using Finite Mixture (FIMIX) segmentations with five segments, 5,000 maximum iterations, 10^{-9} stop criterion, and 10 repetitions. The results suggest that the lowest Akaike's information criterion (AIC) value is presented in Segment 5, indicating that the correct number of segments should be less than 5. On the other hand, Consistent AIC (CAIC) and minimum description length with factor 5 (MDL5) show their lowest values are in Segment 1, indicating that two or more segments should be considered. In addition, the lowest values of modified AIC with factor 3 (AIC3), modified AIC with factor 4 (AIC4), and Bayesian information criterion (BIC) are all in different segments, suggesting that one, two, or three segments should be considered. The data, however, suggests that two and three segments are not feasible as the normed entropy statistic (EN) values are all < 0.5, so that one segment offers the best option. As such, the overall FIMIX assessment suggests that there is no substantial level of heterogeneity in our data and that the aggregate data set can be used to support the model. To summarise, given no evidence of nonlinear effects, endogeneity, and unobserved heterogeneity, our model is considered robust.

5. Discussion

Our research finds that business survivability could be treated as a starting point of SMEs' journey towards CE practices. When they survive, SMEs could have two different approaches – (1) developing their business until they perform well and are ready to embrace CE and/or (2) participating in SC finance (exploit trade credits) and involving SC actors to support with the transition to CE practices. Examining the path coefficients of our model, the first approach seems to be the better option for SMEs in Indonesia as it results in higher β and R2 values. These lines of arguments have not been considered within the extant literature.

The important role of firm performance in mediating the relationship between business survivability and CE practices suggests that the economic aspect should not be neglected in the CE transition process. When firms perform well, they could gain economic benefits from efficient operations and therefore better financial performance. They might then look at other ways to sustain their economic benefits and might start to adopt CE. In other words, firm performance and therefore the economic benefits can be an effective driver for CE adoption, which is in line with Gusmerotti et al. (2019, p. 318) who empirically prove that "organisations that are driven by economic benefits are more likely to adopt circular economy practices".

Our research suggests that non-environmental capabilities still become the priority of SMEs' operations in Indonesia. In Maslow's hierarchy of needs perspective, these non-environmental capabilities include not only survivability as a basic need, but also safety or stability of the business, social support, and self-confidence to further develop and innovate their business towards CE. In fact, SMEs in Indonesia are now facing difficulties in changing behaviour towards CE, lack of CE infrastructure, weak environmental regulations, weak end-market for environmentally friendly products, and a doubt that CE-driven business is not profitable (UNDP, 2021b), so that there might be no urgency to transition to CE. In other words, for many SMEs in Indonesia, CE practices might be seen as a "good to have" rather than a "must have" approach to do business.

Whilst exemplifying important capabilities as prerequisites to the adoption of CE practices amongst SMEs, this research answers the call for studies to understand managerial capabilities and the important interactions between stakeholders as drivers of CE implementation (Arranz et al., 2024). Our research challenges current arguments rooted in developed nations that CE practices could affect SME performance and business survival (e.g. Dey et al., 2022; Uribe-Toril et al., 2022), which is based on an assumption that CE has become a familiar practice as developed countries have reached a self-actualisation state and a suitable environment for sustainable development (Udo & Jansson, 2009). We provide evidence that the opposite relationships happen in the developing world, in which, following Maslow's hierarchy of needs, business survivability becomes a critical initial driving factor for the adoption of CE practices amongst SMEs. It is, however, important to note that our research uses a different approach from Dey et al. (2022) and Uribe-Toril et al. (2022), so that the challenge should be directed to the findings rather than the methodologies. Further research could confirm our findings using approaches

similar to Dey et al. (2022) and Uribe-Toril et al. (2022) in the contexts of developing countries, so that direct comparisons can be conducted.

Practically, this research highlights the importance of both financial and non-financial supports from SC partners (Maslow's safety and social needs) to enable CE practices amongst SMEs, which is in line with Rizos et al.'s (2016) findings suggesting that lack of support from supply and demand networks has become the biggest barrier for many SMEs to transition towards CE. Concurring with UNDP's (2021b) recommendation, we argue that the government needs to facilitate SMEs to strengthen their SC partnerships, so that they could benefit from increased bargaining power and access to SC supports. The government could technically facilitate networking events and provide incentives to encourage CE-inspired collaborations between SC actors. In addition, collaborations should be encouraged not only with internal but also external to the focal SC partners, which is in line with a sustainability-dominant logic that a wider SC configuration is needed to support CE practices (Batista et al., 2023; Chavez et al., 2023). All in all, our research strengthens the argument that the role of SMEs' social networks and stakeholders is pivotal to help the resource-constrained firms in Indonesia move forward in their environmental sustainability journey (Adomako et al., 2023; Akhtar et al., 2018).

UNDP (2021b) suggests that not all firms in Indonesia identify lack of capital as a barrier to adopt circularity actions. In line with this fact, based on our research, we argue that not all SMEs might need SC finance, and that the level of SC finance they need could depend on the level of their business survivability. SMEs with low business survivability might need SC finance just to keep their business running and earn just enough income to feed the owners' family and employees, while those with high business survivability might need strong SC finance to innovate and further develop their business. Our research implies that SC actors might want to help barely surviving SMEs, but provide more SC finance for SMEs which have higher business survivability as they are less prone to failure, thus minimising the SC actors' financial risks (e.g. default and demand risks which can be transmitted across upstream and downstream in the supply chain – Huang et al. (2022)) and increasing the chance for SMEs and the whole SC to adopt sustainable practices including CE. This argument also builds on Seifert et al. (2013) who suggest that default risk could determine whether SC actors will grant trade credits.

Whilst government policies are required to help SMEs tackle barriers to adopt CE practices, UNDP (2021b) advises that such policies need to consider variation in the SMEs' barriers and needs. Our research suggests that variation in SMEs' business survivability, which has not been mentioned in the current UNDP's (2021b, 2022) recommendations, should be considered in the policies. Whilst strict regulations might not fully help accelerate CE transition (see Gusmerotti et al., 2019), we suggest that the government and other external stakeholders could respectively apply staged policies and initiatives. For example, they could focus on giving necessary supports (e.g. trainings on entrepreneurship and basic managerial skills) for SMEs struggling to maintain their daily operations to increase their business survivability. This approach is in line with Akhtar et al. (2018) who highlight the essential of such micro-foundations for SMEs' business operations in developing countries to achieve environmental sustainability.

On the other hand, while promoting CE as a potential business avenue in the existing market, certain incentives such as subsidies for sourcing and producing environmentally friendly products could be offered to SMEs with higher stages of business survivability. Such incentives could make them more price-competitive to attract customers, increasing their performance and therefore confidence to innovate their business operations. The government and other external stakeholders could also help establish risk-free CE pilot projects, allowing SMEs to manage them to showcase CE as a profitable business model. This staged approach is in line with attention-based theory suggesting that external stimuli should be applied in accordance with what subjectively attracts or induces firms to do certain actions (Gusmerotti et al., 2019). In this case, rather than forcing SMEs to implement CE, the government and other external stakeholders could focus on understanding the SMEs' basic needs and use the satisfied basic needs as a stepping stone to embrace CE practices.

We argue that the notion of "need" and "priority" are pivotal as they represent a conceptual foundation of CE as part of a sustainable development (Ruggerio, 2021), which has been defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987; Ruggerio, 2021). The impactful Brundtland Report in 1987 on sustainable development suggests that the definition consists of two core concepts - "the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs". Accordingly, our research could be used to understand the needs and priorities of SMEs to transition to CE practices in Indonesia.

Finally, our research contributes by extending the applicability of Maslow's hierarchy of needs theory in the business context. Our findings are in line with Botana and Costa Neto (2014) who have applied the theory

to micro and small enterprises within the Brazil's graphic industry. We argue that our findings could be used to further inform practices in business management on the use of the theory to design management training and work structures by understanding motivating needs of employees, including financial incentives as well as psychological and professional growth (Lussier, 2019) within the context of SMEs. This also highlights the importance of non-financial supports, which, based on our research, are required to support CE practices amongst SMEs in Indonesia.

6. Conclusions

This research aims to understand whether and how business survivability and SC finance can drive CE practices amongst SMEs in an emerging economy. Employing PLS-SEM, our survey to 515 SMEs in Indonesia finds that business survivability and SC finance affect CE practices indirectly through firm performance and SC non-financial support respectively. This is the first empirical study of a kind in developing countries and it could be used as a basis for further theory development in this area. We address Kirchherr & Van Santen's (2019) call to unravel more empirical insights on the CE phenomenon in the less developed world and add to the extant CE literature which does not currently consider business survivability and SC finance as important factors affecting CE practices (e.g. Mishra et al., 2022). Practically, we argue that CE practices can be treated as a self-actualisation need, which should be adopted when basic and other necessary needs have been satisfied. Our robust model has a medium predictive power and could be used to predict cases of CE practices in similar settings.

Our research has several limitations which could be treated as opportunities for future research. First, our survey instrument only captures one type of SCF scheme, that is trade credit. Other types of SCF, such as reverse factoring, inventory financing, and purchase order financing (Huang et al., 2022) could be incorporated in future research. However, it is important to note that these other SCF instruments usually involve banks or financial service providers (FSPs). In fact, many SMEs in developing countries do not have access to or have difficulties in accessing financing from banks or FSPs (The World Bank, 2023; Republika, 2023), making the alternative SCF instruments not applicable. Our measures of SCNF are also limited to assistance to manage environmentally friendly business operations and to increase financial management skills, which are in line with our research focus on CE practices and SCF. Other types of SCNF, such as general management skills and operations management (e.g. Anwar & Li, 2021; Songling et al., 2018), could be incorporated in future research.

Second, our model does not consider other external factors such as regulations and market behaviours which might affect the effectiveness of CE practices amongst SMEs. Future research could examine the impacts of varying levels of law enforcement and market readiness on the CE practices. Third, we do not include awareness of CE in our model. SMEs which are more aware of CE practices might have better pro-environmental behaviour compared to those with no knowledge about the phenomenon. We leave this avenue for future research. Fourth, we measure SC finance and non-financial support from the perspective of one SC actor. Future research could try to incorporate different perspectives from different organisations across the SC to assess whether SC position and power could shape the relationships within the model. Finally, we measure CE to cover general practices that might be applicable in many industries. Future research could test our model in a specific industry with more specific measures to accommodate idiosyncrasies within the industry.

Data availability

Research data is only available upon request.

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Appendix 1. Constructs and measures.

Supply chain finance (SCF) – adapted from Huang et al. (2022)
7-point Likert scale: 1 = never, 2 = very rarely, 3 = rarely, 4 = sometimes, 5 = frequently, 6 = very frequently, 7 = always

(SCF1) The products I buy from suppliers can be paid in credit without additional costs or interests within a certain period

(SCF2) The products bought by buyers from my company can be paid in credit without additional costs or interests within a certain period

(SCF3) The payment for products I buy from suppliers can be postponed without additional costs or interests within a certain period

(SCF4) The payment for products bought by buyers from my company can be postponed without additional costs or interests within a certain period

(SCF5) The suppliers give discounts for the payment of products my company buy within a certain period

(SCF6) The payment for products bought by buyers from my company can be discounted within a certain period

Business survivability (SRV) – adapted from Morris et al. (2018)

(SRV1) Entrepreneurial orientation (ability to capture opportunities) *(1 = very low, 2 = low, 3 = moderate, 4 = high)*

(SRV2) Technology investment *(1 = none, 2 = limited, 3 = moderate, 4 = high)*

(SRV3) Managerial skills *(1 = making, selling, 2 = operational skills, basic management, 3 = planning, strategising, delegating, leveraging, 4 = planning, innovation, cash flow management, negotiation)*

(SRV4) Organisational structure *(1 = little to none, 2 = simple, 3 = functional, centralised, 4 = functional, product and market-based)*

Firm performance (FPF) – adapted from Huang et al. (2022)
7-point Likert scale: 1 = never, 2 = very rarely, 3 = rarely, 4 = sometimes, 5 = frequently, 6 = very frequently, 7 = always

(FPF1) My company can obtain the required working capital

(FPF2) My company can manage cash flow

(FPF3) My company can get and manage profit

(FPF4) My company can get the required materials or products from suppliers quickly

(FPF5) My company can get the required materials or products from suppliers according to the company's needs

(FPF6) My company can sell inventory quickly

(FPF7) My company can produce or sell products with the required capacity

(FPF8) My company can store the required materials or products according to the company's need

(FPF9) My company can increase sales

(FPF10) My company can get repeated orders or demand from buyers

(FPF11) My company can secure and ensure inventory in certain conditions to meet demand

Supply chain non-financial support (SCNF) – adapted from Huang et al. (2022), Wuttke et al. (2013), and Jia et al. (2020)
7-point Likert scale: 1 = never, 2 = very rarely, 3 = rarely, 4 = sometimes, 5 = frequently, 6 = very frequently, 7 = always

(SCNF1) My suppliers assist my company to manage business to be environmentally friendly

(SCNF2) My suppliers assist my company to increase financial management skills

(SCNF3) My company assists my buyers to manage business to be environmentally friendly

(SCNF4) My company assist my buyers to increase financial management skills

Circular economy practices (CEP) – adapted from Suárez-Eiroa et al. (2019) and Moraga et al. (2019)
7-point Likert scale: 1 = never, 2 = very rarely, 3 = rarely, 4 = sometimes, 5 = frequently, 6 = very frequently, 7 = always

(CEP1) My company uses biodegradable materials

(CEP2) My company saves the use of energy

(CEP3) My company saves the use of materials by increasing operational efficiency and productivity

(CEP4) My company uses efficient operational processes that produce environmentally friendly wastes

(CEP5) My company does downcycling, recycling, and upcycling

(CEP6) My company designs products based on their functionality and buyers' needs

(CEP7) My company designs new business model and strategy to sell environmentally friendly products or services