Performance of small firms in a circular economy: Configuring challenges and entrepreneurial orientation

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Abstract

Purpose:

Society's concerns about environmental degradation have tightened competitive pressure and brought new challenges to small firms. Against this backdrop, this study develops a decision model to determine a suitable configuration for entrepreneurial orientation to help small firms manage circular economy challenges and improve their performance.

Design/methodology/approach: This study used a multi-study and multi-method approach. Study 1, through qualitative in-depth interviews, identified a portfolio of circular economy challenges and entrepreneurial-orientation components. Study 2 applied the quality function deployment technique to determine the most important components of entrepreneurial

orientation. Study 3 adopted a fuzzy set qualitative comparative analysis to determine the best configuration for challenges and components.

Findings:

The findings reveal a set of challenges and identify the salient need to combine the negation of these challenges with the components of entrepreneurial orientation; this combination will improve the performance of small firms. The research extends the current knowledge of managing circular economy challenges and offers decision-makers insights into improving their resilience.

Originality: The use of the dynamic capability view, together with the multi-study and multi-method approach, may lead to an appropriate reconfiguration of entrepreneurial orientation, which, to date, has received limited empirical attention in the small-business-management discipline.

Keywords: circular economy, entrepreneurial orientation, small firm, dynamic capability, fuzzy set qualitative comparative analysis

Article Type: Research Paper

1. Introduction

Increased industrial activities and rising consumption due to higher living standards are the main causes of environmental degradation, such as solid waste generation, carbon emissions, and landfills (Lieder and Rashid, 2016). Moreover, high population growth, particularly in developing countries, is challenging the planet's limited resources (Bocken *et al*., 2016). The increase in environmental problems and resource scarcity has had a tremendous social impact (Fu *et al*., 2007). As a result, effective and efficient environmental and economic strategies are salient to minimize the environmental impact while upholding economic growth (Yuan *et al.*, 2006). Many small firms adopt a green solution, environmental regulations, and green skills and innovation in resource supply in addition to their daily business operations to ease the environmental challenges (Le *et al*., 2022; Rizos *et al.*, 2016). Therefore, there is growing interest among the practitioners and academics of entrepreneurial orientation (EO) to address ecological concerns and concepts such as the circular economy (CE) (Ameer and Khan, 2022; Cullen and De Angelis, 2021; Dwivedi *et al*., 2022a; Fang and Lee, 2022; Pee and Pan, 2022; Yadav et al., 2021). The CE has the potential to address environmental concerns and open new business and economic benefits (Sehnem *et al.*, 2019; Türkeli *et al.*, 2018; Zhu *et al*., 2019).

The concept of a CE can be captured in the phrase *reduce-reuse-recycle*, which seeks to harmonize environmental protection and economic growth, thereby overcoming the underlying weaknesses of a linear business model—that is, *take-make-use-dispose* (EC, 2015). Firms need to make strategic entrepreneurial decisions that embrace several practices, such as eliminating and converting waste, prioritizing renewable resources, designing long-lasting and re-assemblable products, and combining collaborative consumption in *product-service-systems* or, more generally, in *pay-per-use* schemes (Stahel, 2013). These practices will permit revenue streams and save costs. However, adopting CE practices is so challenging and complex (Ghisetti and Montresor, 2020) that minimizing the challenge is crucial for small firms to maintain their performance in the circular economy. A growing stream of studies shows that small-firm performance in the CE largely depends on an appropriate environmental orientation (Cullen and De Angelis, 2021). To adopt the CE model, small firms require essential higher-order strategic changes and entrepreneurial capabilities in the core areas (Tura *et al.,* 2019). The literature suggests that they need *dynamic* capabilities to change their existing business practices and strategies and help them adapt to the new business environmental context (Teece, 2007). Moon and Lee (2021) propose that the essence of developing dynamic capabilities is to adopt and adapt a CE-based business model. Therefore, the dynamic capability view (DCV) is suitable for explaining the strategic move of small firms toward CE practices. DCV studies posit that sensing and evaluating environmental challenges and designing an EO are vital to considering CE challenges and enhancing performance (Prieto-Sandoval *et al.,* 2019). While scholars have offered several other approaches, such as reactive, defensive, and accommodative (Clarkson, 2016), these approaches are generic and not necessarily effective in tackling the unprecedented challenges of the circular economy (Cullen and De Angelis, 2021). Adoption of CE through idiosyncratic entrepreneurial strategies based on a company's inherent dynamic capabilities is lacking (Moon and Lee, 2021). Further, dynamic capabilities that address the challenges of CE adoption are critical to understanding the phenomenon and formulating appropriate measures (Moric *et al*., 2020).

Despite a few attempts (Cantú *et al.,* 2021; Oncioiu *et al.,* 2018; Prieto-Sandoval *et al.,* 2019; Rizos *et al.,* 2016), the strategic move toward CE practices by small firms is still an under-researched topic that requires more empirical investigation (Crecente *et al.,* 2021; (Cullen and De Angelis, 2021). Prior studies have focused on investigating the *barriers and enablers* (e.g., challenges and strategies) on small-firm performance, failing to explain the phenomenon's complexity in the context of CE practices. An innovative approach is required to enhance small-firm performance (Zucchella and Urban, 2019). It is plausible that many

challenges in CE practices may simultaneously affect the success of CE-based small-business initiatives and how they are performed (Mas-Tur *et al.*, 2021). Meanwhile, the environmental orientation for adopting the right strategies will provide resilience against such challenges (Prieto-Sandoval *et al.*, 2019). More importantly, CE-related challenges and EO work conjointly, and dynamic capabilities are required to manage the right combination of challenges and EO to enhance performance. Therefore, the combined effect of challenges and EO on small-firm performance instead of the net independent effect needs investigation using an innovative research approach, given that assessing the net independent effect may lead to incorrect decision-making (Olya and Akhshik, 2019). Previous studies have ignored this.

This study aims to fill this gap by developing an innovative decision model that can help decision-makers determine the appropriate configurations of EO and minimize CE challenges to improve the performance of small firms. The study intends to answer the research question: which EO configurations and negations of CE challenges lead to improved small-firm performance?

The study applies a multi-method and multi-study approach to offer unique perspectives relating to the proposed research questions (Dwivedi et al., 2022b). *First*, we used semi-structured interviews to identify context-specific factors about CE challenges and EO. *Second*, we applied the *quality function deployment* (QFD) technique to determine the most significant environmental orientations corresponding to the prioritized challenges. *Finally*, we deployed a fuzzy set qualitative comparative case analysis (fsQCA) to identify the complex configurations of EO and challenges that could improve the performance of small firms.

The study contributes to managerial practices in two ways. *First*, it introduces an innovative approach for improving small-firm performance in the CE by employing a decision model using a multi-method research approach. Managers can identify CE-related challenges and the EO responsible for increasing or decreasing small-firm performance. *Second*, this study identifies and prioritizes the challenges and EO specific to small firms. Therefore, managers can plan and deploy different environmental orientations in their business while different CE-related challenges affect small-firm performance.

From the theoretical realm and grounded in DCV, this research responds to previous calls to identify new, comprehensive approaches for explaining small-firm performance in the context of the circular economy (Cantú *et al*., 2021; Cullen and De Angelis, 2021). Contrary to the symmetric approach, the results of the asymmetric models show that the condition for poor small-firm performance (i.e., the negation of small-firm performance) has sufficient configurations that are not a mirror opposite of causal models, leading to high small-firm

performance scores. This helps explain why knowledge about the role of EO has been inconclusive to date. The study results also extrapolate how a combination of minimizing CE-related challenges and implementing EO is a better option for explaining the performance of small firms.

The paper is organized as follows: section 2 presents the literature review and theoretical lens; section 3 outlines the methodology employed; section 4 presents the findings and analysis; section 5 is the discussion and conclusion; section 6 outlines the limitations and poses ideas for future directions.

2. Literature review

2.1 The circular economy challenges for small firms

The performance of small firms largely depends on their resources, processes, and people (Schneier, 1999). Small firms must balance and maintain these factors when undergoing organizational change; otherwise, the challenges linked with these factors can yield disappointing performance. The existing literature recognizes several CE-related challenges when dealing with environmental concerns (Cantú *et al.*, 2021; Rizos *et al.*, 2016). Small-firm managers are not always prepared for these challenges, leading to controversial decisions about who should be treated while small firms operate under a CE.

Currently, there are various identified impediments to transitioning smoothly from a linear to a circular economy. Several studies have focused on resource-related challenges to the circular economy; few have identified priority-based challenges. A lack of technological know-how may hinder small firms from transforming their linear business model into a circular one (Ormazabal *et al.*, 2018). Nevertheless, the demand for environmentally friendly technologies is often relatively low, and the technical capacities are inadequate (Geng and Doberstein, 2008). Insufficient investment in technologies focusing on circular product designs (eco-design) and operations, lack of advanced resource efficiency technologies (Rizos *et al.*, 2016), and a low pricing signal for raw materials (Van Buren *et al.*, 2016) are factors that are likely to impede a small firm's adoption of CE approaches. Moreover, the lack of information and a management information system (MIS) in regard to the benefits and legislation of information systems poses a challenge to implementing smooth business operations in a circular economy (Ormazabal *et al.*, 2018).

Challenges relating to people have a substantial impact on small-firm performance. Hierarchical systems inhibit flexibility and innovation, create silos between departments, and increase the risk aversion of managers (Tura *et al.*, 2019). Other challenges include

incompetence and incompatibility with existing operations (Rizos *et al.,* 2016). Bechtel *et al.* (2013) found that an inability to change the mindset of long-term thinking to solve problems in the current business culture, poor communication throughout the value chain, and lack of systems thinking are major barriers to promoting CE business. The other substantial challenges to CE-compliant supply chains are lack of network support and collaboration and uncertain consumer response (Mishra *et al.*, 2018; Rizos *et al.*, 2016; Tura *et al.*, 2019).

While ensuring effective small-firm operation, process-related challenges also obstruct the performance of small firms. Cantú *et al.* (2021) state that the lack of government support or effective legislation, such as effective taxation policy, laws, and regulations, are significant barriers to the uptake of environmental investments. Moreover, the administrative burden, such as monitoring and reporting environmental performance data, is complex and barely affordable for small firms. They are often required to engage external experts/consultants to process data for submission to various authorities in different formats (Christopher and Holweg, 2017; Truong Quang and Hara, 2018). Lack of support from the supply and demand networks is also a significant barrier to transitioning to a circular economy (Rizos *et al.,* 2016). Furthermore, a strong industrial focus on linear models, faulty design, and incongruence in the quality of products (Cantú *et al.*, 2021; Tura *et al.,* 2019) poses threats to business operations.

Table 1 summarizes CE-related challenges classified under the categories of resources, people, and processes according to Schneier's 1999 framework and based on Leavitt's 1964 diamond model.

Table 1: Small firm's CE challenges

C	Specific factors	References	Confirmed by participants
Resources	Insufficient investment in technologies (C1)	Rizos *et al.* (2016)	a,b,c,d,e,g,i,j
	Lack of advanced technologies and know-how (C2)	Ormazabal *et al.* (2018)	a,c,d,e,g,i,j
	Inadequate technology access (e.g., separate biological mixes) (C3)	Cantú *et al.* (2021)	a,d,e,g,i,j
	Complex data systems (C4)	Salmenperä *et al.* (2021)	b,d,e,g,h
	Lack of information and MIS (e.g., about benefits and legislation) (C5)	Cantú *et al.* (2021)	a,b,c,d,e,g,i
	Reluctance to adopt AI (artificial intelligence) (C6)	Interview	c
Processes	Lack of government support/effective legislation (C7)	Rizos *et al.* (2016)	a,b,d,e,f,i,j
	Administrative burden (e.g., monitoring and reporting) (C8)	Christopher & Holweg (2017)	a,c,f,i,j
	Lack of support from the supply chain network (e.g., engagement in sustainable activities) (C9)	Rizos *et al.* (2016)	a,c,d,e,g,i

	Strong industrial focus on linear models (C10)	Tura *et al.* (2019)	a,b,c,d,e,f,h,i
	Faulty design of products and incongruence in quality (C11)	Interview	b,d,e,f,g,h,i,j
	Lack of tools and methods to measure CE projects (C12)	Tura *et al.* (2019)	a,c,e,f,g,h,i
	Lack of managerial support and risk-averse attitudes (C13)	Tura *et al.* (2019)	a,c,d,e,f,g,i
People	Managers' limited knowledge of the CE concept (C14)	Cantú *et al.* (2021)	a,b,c,d,f,g,h,i
	Lack of social awareness and consumer responsiveness (C15)	Tura *et al.* (2019)	a,c,d,e,f,g,i
	Conflicts with existing business culture (C16)	Tura *et al.* (2019)	c,e,f,g,h,i
	Founder dependence (C17)	Interview	c,i

Note: a,d,i – manager; b,e,j – deputy manager; c,f,g,h – proprietor; challenges (C)

2.2 Entrepreneurial orientation

The EO concept explains how businesses can create value that leads to growth (Altinay *et al.*, 2016). EO refers to an entrepreneurial strategy that enables a firm to combat challenges arising from a dynamic, innovative, proactive, and risk-taking environment (e.g., Lumpkin and Dess, 1996). Therefore, to tackle CE-related challenges, an appropriate EO is crucial for a firm's success (e.g., Green *et al*., 2008). To understand the complexity of CE challenges, a priority-based, universally acceptable, and applicable EO is imperative for improving small-firm performance. Therefore, practitioners and academicians suggest several possible EO components instead of a single EO for enhancing small-firm performance (e.g., Green *et al.*, 2008).

As evident in the management literature, challenge-specific strategies may improve innovativeness and overcome crises. Similarly, environmental policy implementation, verification, and redesigning of materials for recycling, reuse, and upgradability improve the innovative capability to mitigate the challenges of small firms in a circular economy (de Oliveira *et al.*, 2019). Small firms are required to develop proactive responses to overcome performance challenges (Daddi *et al.*, 2019). For example, small firms adopt policy and legislation to integrate ecological costs to overcome the lack of government support or effective legislation in a circular economy (Cantú *et al.*, 2021). In addition, small firms may improve their proactive strategies to overcome challenges by establishing long-term relations with partners, building awareness and technical know-how for the reverse supply chain, adopting superior design materials and CE models, and promoting environmental culture through a proactive attitude (Hart *et al.*, 2019; Näyhä, 2020; Prieto-Sandoval *et al.*, 2019; Rizos *et al.*, 2016; Trigkas *et al.*, 2020).

Several risk-taking strategies are discussed in the literature to mitigate small firms' operation crises in the CE. For example, access to financial tools, financing solutions, and digital intelligence (such as IoT and Big Data) is essential for small-firm performance (Cantú *et al.*, 2021; Gong *et al.*, 2020). Further, creating a new and independent business unit could mitigate the operational challenges in a circular economy (Cantú *et al.*, 2021). Pilot programs to minimize risk will eventually improve the performance of small firms (Gong *et al.*, 2020). Table 2 presents various EO strategies for tackling these CE challenges.

Table 2: Small firms' EO components used to tackle CE challenges

E	Specific factors	References	Confirmed by participants
Innovativeness	Industrial symbiosis (E1)	Prieto-Sandoval *et al.* (2019)	b,d,e,f,h
	Formal environmental management (E2)	Prieto-Sandoval *et al.* (2019)	a,b,e,f,g,h,i,j
	Labelling standards (E3)	Prieto-Sandoval *et al.* (2019)	c,d,e,f,h,i
	Material redesigned for recycling, reuse, and upgradability (E4)	Rizos *et al.* (2016)	a,b,c,d,e,f,h,i
Proactiveness	Strategic alliances (E5)	Interview	h
	Environmental culture promoted through a proactive attitude (E6)	Rizos *et al.* (2016)	a,c,d,e,g,i
	Policy and legislation to integrate ecological costs (E7)	Cantú *et al.* (2021)	a,c,d,e,h,i
	Long-term relations with partners and awareness (E8)	Hart *et al.* (2019)	a,c,d,e,g,h,i
	Technical know-how for the reverse supply chain (E9)	Trigkas *et al.* (2020)	a,d,e,f,i,j
	Superior design materials and CE models (E10)	Näyhä (2020)	a,b,c,d,e,f,h,i
Risk-taking	Recognition and effective communication (E11)	Gong *et al.* (2020)	a,d,e,f,g
	Market segmentation focus (E12)	Interview	c,g
	Financial tools and financing solutions (E13)	Gong *et al.* (2020)	a,b,c,d,e,f,j
	Digital intelligence (e.g., IoT, Big Data) (E14)	Cantú *et al.* (2021)	a,d,e,g,h,i
	A new and independent business unit (E15)	Cantú *et al.* (2021)	a,b,c,d,e,f,h,i
	Respond and position in the emerging market (E16)	Gong *et al.* (2020)	a,b,d,e,f,g,i
	Pilot programs to minimize risk (E17)	Gong *et al.* (2020)	d,e,f,g,i

Note: a,d,i – manager; b,e,j – deputy manager; c,f,g,h – proprietor; EO components (E)

2.3 Theoretical lens and empirical model

According to Teece (2007), dynamic capabilities enable business enterprises to create, deploy, and protect intangible assets that support superior long-run business performance. They keep firms fit and allow them to be responsive to changing environments (Oliveira-Dias *et al.*, 2022). Firms must develop a high level of EO to shape (i.e., sense) the challenges and opportunities that will strengthen their competitive setting. A firm with the appropriate level of EO can avail

itself of the opportunities or tackle challenges in an uncertain environment to reduce the detrimental impacts of those challenges. Finally, firms must constantly transform their EO level into feasible strategic activities (reconfigure) to achieve the desired performance.

Under the DCV, researchers developed EO components (i.e., innovativeness, proactiveness, and risk-taking) to explain the capability of small firms to tackle challenges in both internal and external environments to enhance their performance (e.g., Khan *et al*., 2020). Similarly, challenges and uncertainties drive small firms to develop EO components and manage emerging situations to enhance performance. However, as a circular economy is an emerging situation, many small firms (in comparison to large firms) cannot adopt it concurrently with their other business for the following reasons (Rizos *et al.,* 2016). First, large firms can readily shift to CE through their R&D (research and development) activities, while small firms depend on the availability of market technology. *Second*, embracing CE requires substantial time and investment to restructure several areas (e.g., inventory, distribution, reverse logistics, production). Indirect costs (human resources and time), upfront costs, and the projected payback period are generally more sensitive for small firms than large firms. *Finally*, in terms of effective taxation policy, funding opportunities, laws and regulations, and training, large firms are more advantageously positioned than small firms. Consequently, small firms require a higher level of EO than large firms to adopt CE. Further, CE has become the priority in the public policy of many countries (i.e., members of the European Union)—although, due to the COVID-19 pandemic, many countries have cancelled, suspended, or postponed plans to adopt CE (Baran, 2021). As a result of the pandemic, the revenues of small firms have plummeted, meaning they now struggle to sustain their CE practices. Thus, small firms need a higher level of EO to sustain the circular economy. In this context, DCV is highly instrumental for investigating small firms' levels of EO to mitigate such challenges.

The components of EO—innovativeness, proactiveness, and risk-taking—are interlinked and central to EO; they do not work in isolation (Miller, 1983). By integrating innovativeness, proactiveness, and risk-taking, a firm can build the capability to tackle emerging challenges and improve its performance. Underpinned by the DCV, scholars have recognized EO as a vital property of firms, one that helps firms deal with the rapidly changing environment to improve their performance (Covin and Slevin, 1989). However, EO is insufficient to attain significant performance in a rapidly changing environment, such as an emerging circular economy (Teece 2007). Therefore, it could be applied to reconfigure new challenges that establish the essence of dynamic capabilities (Makkonen *et al*., 2014). A

combination of EO components and minimizing challenges is essential. Based on the above literature review and theoretical lens, Figure 1 presents the following empirical model.

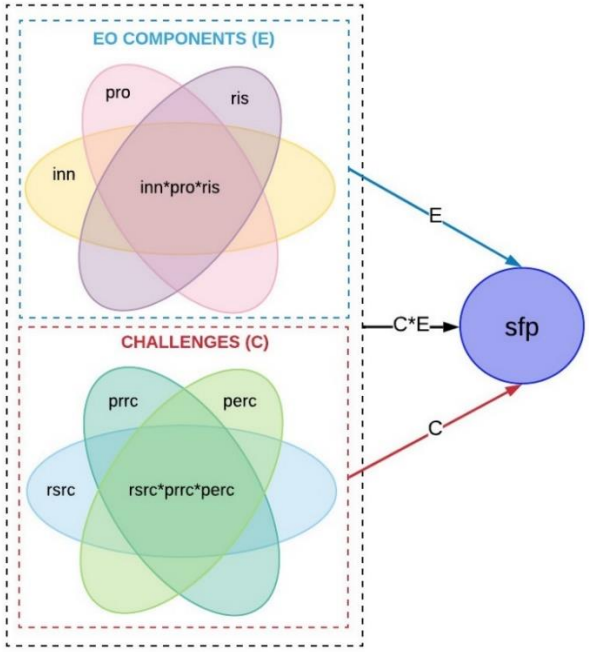

Figure 1: Research model

Note: rsrc = resource-related challenge; prrc = process-related challenge; perc = people-related challenge; inn = innovativeness-related EO; pro = proactiveness-related EO; ris = risk-taking-related EO; sfp = performance of small firms

The proposed model presents three configurational models. Arrow C (Model 1) represents the combination of challenges—resources, processes, and people—used to explore causal models predicting high and low small-firm performance. Arrow E (Model 2) represents the configuration of EO to indicate high and low small-firm performance based on innovativeness, proactiveness, and risk-taking approaches. Arrow C*E (Model 3) represents the combination of challenges and EO and suggests causal recipes for simulating high and low small-firm performance.

3. Methodology

The circular economy can be related to the sustainable development goals (SDGs) of the United Nations (UN). In context, Bangladesh is on track toward or is maintaining several SDGs such as SDG-1 (No Poverty), SDG-4 (Quality Education), SDG-12 (Reasonable Consumption & Production), and SDG-13 (Climate Action). Some of the areas are “improving” (SDG-2, 3, 6, 7, 8, 9, and 10); others are “stagnating” (SDG-5, 14, 16, and 17); and one is “decreasing” (SDG-15) (see Sachs *et al.*, 2022). The SDGs are ambitious and require the transformation of private and public sectors. This transformation is related to creating new business models, applying new technology/innovation, and doing business differently—i.e., more ethically and

sustainably. This Sustainable Business Model (SBM) or CE model opens new business opportunities for the private sector, particularly for small businesses. By 2030, the SBM could be worth $12 trillion and may have created 380 million jobs, with more than 50 per cent in developing nations, including Bangladesh (BSDC, 2017). The good-practice initiatives of the circular economy support small businesses and, in turn, contribute to the achievement of Bangladesh's SDGs.

Our multi-study, multi-method research approach (Abramova et al., 2022; Brewer and Hunter, 2006; Tomar et al., 2022) ensures the reliability and validity of our research findings (Dwivedi et al., 2022b). Table 3 provides a stepwise research design for this study.

Table 3: A stepwise research design

	Process
Literature review	– Identified the CE challenges of small firms based on the literature review
	– Identified the EO components of small firms based on the literature review
	– Categorized the CE challenges and EO components with literature support
	– Developed a conceptual definition of the CE challenges and EO components using theoretical justification
	– Developed configurational models using theoretical justification
Study 1: The interviews	– Conducted a qualitative study to contextualize the findings of literature factors and their items (i.e., semi-structured interviews)
	– Identified new and confirmed existing CE challenges of small firms in the literature review
	– Identified new and confirmed existing EO components to tackle CE challenges
	– Generated items for constructs using a literature qualitative study
Study 2: The quantitative case studies	– Determined relative importance ratings of CE challenges
	– Determined relationships between CE challenges and EO components
	– Prioritized the CE challenges of small firms
	– Determined the most important EO components to tackle CE challenges
Study 3: The fsQCA model	– In preparation to conduct a fsQCA:
	– confirmed content validity of items using Q-sort procedures and inter-rater reliability
	– purified and refined scale using EFA (exploratory factor analysis)
	– applied CFA to re-examine scale properties and confirm scale reliability, convergent validity, and discriminant validity
	– run a fsQCA
	– Determine the most suitable configuration of EO components to tackle CE challenges and improve the performance of small firms
Linking the new configurational models with theory and practice	– Theory: Extended DCV by developing configurational models
	– Practice: Developed a decision tool for conducting a configurational analysis for managers

Study 1 aimed to identify (a) small-firm challenges arising from CE and (b) EO components to manage those challenges. In doing so, a qualitative study was adopted comprising a literature

review and semi-structured interviews. In the interviews, key informants were selected from Bangladesh (see Table 4 for the demographic profile of the participants). According to (1995), consulting informants that are knowledgeable about the contextual factors yields better and more reliable data. We used a purposive and snowball sampling technique. Based on the findings from the literature review and interviews, a list of challenges and a list of EO components were developed (see Tables 1 and 2 above).

Table 4: Demographic profile of the interviewees

Participants	Position	Regional status	Firm size (No. of employees)
a	Manager	Dhaka	30–40
b	Deputy manager	Narayanganj	70–100
c	Proprietor	Munshiganj	10–15
d	Manager	Dhaka	20–30
e	Deputy manager	Munshiganj	75–100
f	Proprietor	Narayanganj	20–30
g	Proprietor	Narayanganj	5–10
h	Proprietor	Munshiganj	10–15
i	Manager	Munshiganj	25–40
j	Deputy manager	Munshiganj	115–120

Study 2 prioritized (a) challenges and (b) EO components to tackle the challenges. This phase deployed quantitative case studies using QFD. Two case studies in Bangladesh were considered—one small manufacturing firm (from Dhaka region, firm size 30–45) and one small services firm (from Munshiganj region, firm size 20–40). Using the purposive sampling method, two different sectors of these small firms were chosen to gather insights into the CE challenges and EO components. How our study selected the case study respondents ensured they were well-informed about the phenomenon of interest (e.g., circular economy). In this process, data were collected from managers through structured questionnaires.

The QFD technique was adopted for the case study data analysis because it is a popular tool for designing a portfolio of strategies (Chowdhury and Quaddus, 2015). The technique has been used to translate customer needs and wants into technical design requirements to increase customer satisfaction. QFD utilizes the house of quality (HOQ), which is a matrix that provides a conceptual map for the design process as a construct for understanding customer requirements. This study involves the CE challenges for small firms and establishing design requirement priorities to satisfy them. Small firms' EO components tackle the CE challenges. The QFD problem can be formulated into a mathematical programming problem subject to limited resources—e.g., an organization's budget (Park and Kim 1998). We used the best–worst method (Rezaei, 2016) to determine the weights of challenges and QFD to identify the relationship between the challenges and EO components, which were subsequently applied to

prioritizing EO components. QFD enables the exploration of not only the relationship between challenges and EO components but also, among the EO components, the recognition of the potential cost and time savings from the simultaneous implementation of EO components. The systematic processes in QFD are illustrated below:

Step 1: Challenges (WHATs=C_i) are identified from the literature review and interviews

Step 2: EO components (HOWs=E_j) are generated from the literature review and interviews

Step 3: Relative importance ratings of WHATs (= W_i) are determined

Step 4: Relationships between WHATs and HOWs (R_{ij}) are determined

Step 5: Based on the WHAT–HOW relationship score, the weights (AI and RI) of HOWs are determined to rank the EO components

Step 6: Relationships between HOWs are determined

Figure 2 illustrates the QFD model.

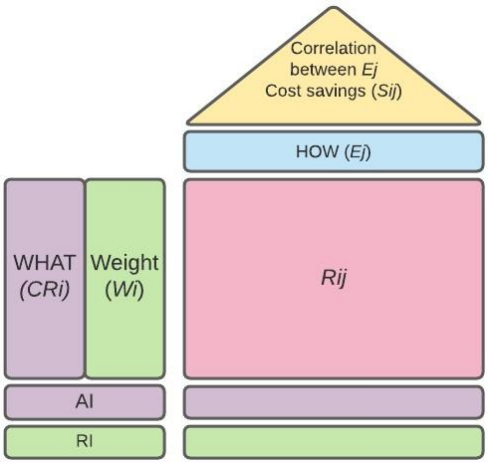

Figure 2: QFD model

Note: C_i = challenges; W_i = degree of importance of C_i's; *Ej* = EO components; R_{ij} = relationship matrix (i.e., the degree to which C_i is met by R_{ij}); AI = absolute importance of *Ej*'s; RI = relative importance of *Ej*'s.

Study 3 aimed to determine the most suitable combination of challenges and EO components that impact small-firm performance. We adopted a fsQCA (fuzzy set qualitative comparative analysis) for the configurational analysis. According to Fiss (2011), the fsQCA is a useful tool to investigate the best complex causal conditions leading to the outcome. In this research, they are EO components to manage CE challenges to determine small-firm performance. For fsQCA analysis, data were collected from a relatively small but adequate sample size of 109 (Greckhamer *et al.*, 2013) with structured questionnaires from small Bangladeshi firms (see Table 5). The study used the National Industrial Classification database, which only represents Bangladeshi firms. From that database, we classified small firms into

two different forms of operation: manufacturing and services. We used a systematic random sampling method to choose the firms. The unit of analysis was small-firm owners/managers from the chosen industries.

Table 5: Demographic profile of survey respondents

	Number of respondents	Percentage (%)
Service	59	54
Manufacturing	50	46
Number employees		
<50	42	39
50-100	32	29
100-150	25	23
150-200	07	06
200+	03	03
Number of years of service		
< = 5	30	27.52
6–10	25	23.00
11–15	27	24.77
16–20	18	16.51
21+	09	8.20

4. Findings and analysis from multi-study, multi-method approach

4.1 Study 1: The interviews

During the semi-structured interviews, the participants mentioned 17 CE challenges related to resources, processes, or people (Schneier, 1999). The participants also revealed 17 EO components to manage those CE challenges. See Tables 1 and 2. The EO components identified were underlined with innovativeness, proactiveness, and risk-taking approaches (Miller, 1983). Most of the identified challenges and EO components from the interviews were supported by the literature. However, few specific contexts or new challenges and EO components were identified (e.g., C6, C11, C17, E5, and E12). Table 1 shows that most participants focused on C1, C10, and C14, and Table 2 shows that most participants supported E4, E10, and E15 EO components.

4.2 Study 2: The quantitative case studies

As mentioned previously, two case studies were undertaken using the QFD technique to determine the most important challenges and corresponding EO to tackle them. Table 6 presents the results. In *case study 1*, it is evident that the most important challenges are C7, C1, C9, C10, and C2. Corresponding to the challenges, E5, E4, E8, E15, and E1 are the five most important EO components with relative importance scores of 0.131, 0.126, 0.120, 0.118, and 0.099, respectively. In *case study 2*, the most important challenges are C1, C2, C8, C7, and C5. Similarly, E13, E2, E15, E8, and E4 are the five most important EO components with relative

importance scores of 0.096, 0.082, 0.073, 0.068, and 0.064, respectively. From QFD-based analysis, it appears that there are overlaps in important challenges and EO components identified in both case studies. For example, C1 is a high-rated challenge in both cases. Similarly, E4 is a prioritized strategy in both cases. For deployment of the set-theoretic union approach, a combined list of important CE challenges (C1, C2, C3, C5, C7, C8, C9, C10, C11, C13, C14, C15, and C16) and EO components (E1, E2, E4, E5, E6, E7, E8, E9, E10, E13, E14, E15, and E17) was prepared from these two case studies.

Table 6: Summary of QFD results from the two case studies

					Case Study 1				
Challenges	C7	C1	C9	C10	C2	C13	C16	C11	C8
Weight	0.173	0.127	0.084	0.063	0.063	0.051	0.051	0.051	0.051
Weight rank	1	2	3	4	5	6	7	8	9
Challenges	C3	C15	C5	C14	C17	C6	C12	C4	-
Weight	0.051	0.042	0.042	0.037	0.036	0.036	0.032	0.012	-
Weight rank	10	11	12	13	14	15	16	17	-
EO components	E5	E4	E8	E15	E1	E13	E9	E14	E10
Relative importance	0.131	0.126	0.120	0.118	0.099	0.098	0.075	0.073	0.068
Relative importance rank	1	2	3	4	5	6	7	8	9
EO components	E6	E17	E7	E2	E11	E12	E16	E3	-
Relative importance	0.057	0.057	0.048	0.041	0.032	0.031	0.029	0.027	-
Relative importance rank	10	11	12	13	14	15	16	17	-
					Case Study 2				
Challenges	C1	C2	C8	C7	C5	C11	C13	C9	C14
Weight	0.155	0.114	0.114	0.076	0.076	0.057	0.057	0.046	0.046
Weight rank	1	2	3	4	5	6	7	8	9
Challenges	C16	C10	C15	C3	C4	C17	C12	C6	-
Weight	0.046	0.046	0.038	0.034	0.033	0.028	0.028	0.009	-
Weight rank	10	11	12	13	14	15	16	17	-
EO components	E13	E2	E15	E8	E4	E14	E1	E9	E10
Relative importance	0.096	0.082	0.073	0.068	0.064	0.064	0.062	0.061	0.059
Relative importance rank	1	2	3	4	5	6	7	8	9
EO components	E7	E5	E6	E17	E3	E11	E16	E12	-
Relative importance	0.058	0.053	0.048	0.047	0.045	0.042	0.040	0.038	-
Relative importance rank	10	11	12	13	14	15	16	17	-

4.3 Study 3: fsQCA model

In preparing to conduct a fsQCA, following the QFD results, *first*, we applied a *Q*-sort technique suggested by Todd and Benbasat (1991) to sort and categorize the challenges and EO components with the help of three-panel judges. *Second*, the inter-rater reliability of the categorization scheme was assessed based on the outcomes of the *Q*-sort technique. The findings suggested good reliability coefficients of 0.755 and 0.732, corresponding to the

categorization of CE-related challenges and EO components, respectively. Both categories' reliability coefficients (Kappa > 0.65) were satisfactory (Todd and Benbasat, 1991). To validate the identified factors (or categories) statistically and assess the psychometric properties of the measurement items of each, we conducted an exploratory factor analysis (EFA) using the varimax rotation procedure. We then evaluated the appropriateness of the EFA by using the Kaiser–Meyer–Olkin (KMO) and Bartlett test of sphericity. Three factors with eigenvalues ≥ 1.0 were extracted for both CE-related challenges and EO components. All the factor loadings (ranging from 0.447 to 0.834) were statistically significant (<0.40). All Cronbach's alpha values achieved the acceptable value of 0.70 (Carmines and Zeller, 1979).

Following the EFA, we conducted a confirmatory factor analysis to check the psychometric properties of the scale items. All the outer loadings were statistically significant (> 0.7). The composite reliability for each construct met the acceptable level (> 0.7) (Hair *et al*., 2011) (see Table 7). The AVE (average variance extracted) for each construct was also above the recommended cut-off values (> 0.5). Discriminant validity was examined using the heterotrait-monotrait ratio of correlations (HTMT) (Henseler *et al.*, 2015; Koohang et al., 2021; Lee et al., 2022; Yang et al., 2023). The HTMT ratios of each construct were less than 0.85 (see Table 8), which suggests that discriminant validity was established among the constructs in the model (Henseler *et al.*, 2015).

To address the fsQCA model (see Figure 1), in the *first* step, fuzzy set calibration was completed. Three qualitative anchors were used to calibrate crisp values for the scale items (each measured on a seven-point Likert scale) to fuzzy values: 90th percentile was considered full membership, 10th percentile full non-membership, and 50th the crossover point (Acquah *et al.*, 2021). In the *second* step, a necessary condition analysis was undertaken to examine which challenges and which EO components were individually necessary for diminishing and enhancing small-firm performance, respectively. It appeared that none of the factors emerged as a necessary condition (the highest consistency level was 0.751, thus failing to meet the threshold ≥ 0.9) for high or low small-firm performance. In the *third* step, to analyze the sufficient condition(s), a truth table was produced for different models; each row in the truth table is a possible configuration (Ragin, 2009). To simplify the truth table, the consistency (the extent of explanation of outcome by the cases sharing a given causal condition) cut-off was set as 80 percent and above, and frequency was set as 1 (Ragin 2009). Table 9 outlines the results of the fsQCA.

Table 7: Psychometric property of measurement items

	(Factors/items)	CFA item loading	CR/ AVE
Challenges	Resources		0.839/
	Insufficient investment in technologies (C1)	0.810	0.568
	Lack of advanced technologies and know-how (C2)	0.831	
	Inadequate technology access (e.g., separate biological mixes) (C3)	0.740	
	Lack of information and MIS (e.g., about benefits and legislation) (C5)	0.718	
	Process		
	Lack of government support/effective legislation-(C7)	0.759	0.809/
	Administrative burden (e.g., monitoring and reporting) (C8)	0.710	0.563
	Lack of support from the supply chain network (e.g., engagement in sustainable activities) (C9)	0.724	
	Strong industrial focus on linear models (C10)	0.802	
	Faulty design of products and incongruence in quality (C11)	0.779	
	People		
	Lack of managerial support and risk aversion attitudes (C13)	0.727	0.840/
	Managers limited knowledge of CE concept (C14)	0.781	0.569
	Lack of social awareness and consumer responsiveness (C15)	0.809	
	Conflicts with existing business culture-(C16)	0.701	
EO components	Innovativeness		
	Industrial symbiosis-(E1)	0.702	0.735/
	Formalization of the environmental management (E2)	0.817	0.517
	Redesign material for recycling, reuse, and upgradability (E4)	0.714	
	Strategic alliance (E5)	0.710	
	Proactiveness		
	Promote environment culture through a proactive attitude (E6)	0.705	0.855/
	Create policy and legislation to integrate ecological costs (E7)	0.773	0.544
	Establishment of long-term relations with partners and awareness (E8)	0.783	
	Technical know-how for the reverse supply chain (E9)	0.817	
	Adopting superior design materials and CE models (E10)	0.793	
	Risk-taking		
	Access to financial tools and financing solutions (E13)	0.710	0.866/
	Digital intelligence (e.g., using IoT, Big Data) (E14)	0.867	0.620
	Creation of a new and independent business unit (E15)	0.849	
	Conduct pilot programs to minimize risk (E17)	0.748	
Performance of small firms	Our CE performance is better in customer satisfaction than major competitors (P1)	0.748	0.871/ 0.592
	Our corporate identity in CE is better than competitors (P2)	0.702	
	Our overall service level in CE is far better than competitors (P3)	0.709	
	Our operational performance in CE is superior to major competitors (P4)	0.811	
	Our sales volume is higher compared to major competitors (P5)	0.708	
	Our market share is higher than major competitors (P6)	0.700	
	Our net profit before tax is higher compared to major competitors (P7)	0.704	

Note: CFA = confirmatory factor analysis; CR = composite reliability; AVE = average variance extracted

Table 8: HTMT ratio of construct correlations

Constructs	**rsrc**	**prrc**	**perc**	**inn**	**pro**	**ris**	**sfp**

Resource (rsrc)						
Process (prrc)	0.521					
People (perc)	0.516	0.552				
Innovativeness (inn)	0.193	0.249	0.199			
Proactiveness (pro)	0.104	0.287	0.274	0.698		
Risk-taking (ris)	0.182	0.427	0.261	0.657	0.726	
Performance (sfp)	0.339	0.500	0.342	0.535	0.630	0.787

Table 9: Configurations for improving and deterring small-firm performance

Models for high sfp	RC	UC	C	Models for low sfp	RC	UC	C
Model 1a: *sfp = f ~ (rsrc* prrc*perc)*				Model 1b: *~sfp = f (rsrc*prrc*perc)*			
prrc*~perc	0.382	0.0345	0.784	prrc*~perc	0.451	0.061	0.782
~prrc*perc	0.451	0.061	0.782	~prrc*perc	0.382	0.034	0.784
rsrc*~perc	0.425	0.005	0.816	~rsrc*prrc	0.439	0.012	0.805
rsrc*~prrc	0.440	0.012	0.805	~rsrc*perc	0.425	0.005	0.816
Solution coverage: 0.637				Solution coverage: 0.648			
Solution consistency: 0.830				Solution consistency: 0.835			
Model 2a: *sfp = f (inn*pro*ris*)				Model 2b: *~sfp = f~ (inn*pro*ris)*			
ris	0.827	0.329	0.811	*Pro*	0.76	0.0780	0.787
inn~pro*	0.400	0.032	0.817	*~ris*	0.807	0.125	0.824
*~inn*pro*	0.424	0.014	0.846				
Solution coverage: 0.766				Solution coverage: 0.761			
Solution consistency: 0.882				Solution consistency: 0.885			
Model 3a: *sfp = f (~rsrc*~prrc*~ perc*inn*pro*ris*)				Model 3b: *~sfp = f (rsrc*prrc*perc ~inn*~pro*~ris)*			
rsrc~prrc*inn*pro*	0.370	0.034	0.861	*~perc*inn*	0.563	0.006	0.829
~rsrc~prrc*~perc*pro*ris*	0.413	0.073	0.918	*~prrc*inn*	0.541	0.005	0.830
*~rsrc*perc*inn*pro*ris*	0.387	0.018	0.942	*~rsrc*inn*	0.496	0.003	0.796
				~rsrc~prrc*~perc*	0.477	0.011	0.786
Solution coverage: 0.785				Solution coverage: 0.712			
Solution consistency: 0.858				Solution consistency: 0.926			

Note: RC = Raw coverage; UC = Unique coverage; C = Consistency; rsrc = resource-related challenge; prrc = process-related challenge; perc = people-related challenge; inn = innovativeness-related EO component; pro = proactiveness-related EO component; ris = risk-taking-related EO component; sfp = performance of small firms

For Model 1a [*sfp = f ~ (rsrc* prrc*perc)*], two out of four configurations emerged to predict high small-firm performance. The configuration (*rsrc*~perc*) implies that low people-related challenges are sufficient to enhance small-firm performance, even though resource-related challenges are prevalent. The configuration (*rsrc*~prrc*) implies that low process-related challenges are sufficient to improve small-firm performance, even though resource-related challenges are prevalent. Alternatively, for Model 1b [*~sfp = f (rsrc*prrc*perc)*]—that is, the factors responsible for deterring small-firm performance—two configurations out of four were revealed, which do not mirror the configurations enabling small-firm performance. The configuration *(~rsrc*prrc*) suggests that the existence of process-related challenges substantially reduces small-firm performance, even though the system has a low level of resource-related challenges. Also, the configuration (*~rsrc*perc*) suggests that the presence of people-related challenges inhibits small-firm performance, even though the system has a low level of resource-related challenges.

For Model 2a [*sfp = f (inn*pro*ris*)], out of three configurations of EO, two solutions predicting high small-firm performance — (*ris*) and (*~inn*pro)* —have been produced. The configuration (*~inn*pro)* implies that a proactiveness-related EO enhances small-firm performance, even though the small firm may not have much innovativeness-related EO. Conversely, for low small-firm performance, that is Model 2b [*~sfp = f~ (inn*pro*ris)*], low risk-taking-related EO significantly deteriorates small-firm performance.

Two solutions for Model 3a [*sfp = f (~rsrc*~prrc*~ perc*inn*pro*ris*)] have been produced. The configuration (*~rsrc*perc*inn*pro*ris*) appears to be the best solution. It suggests that minimizing the process-related challenges with innovativeness-, proactiveness-, and risk-taking-related EO substantially enhances small-firm performance, even though the system had resource-related challenges. High small-firm performance can be obtained alternatively as well. The solution (*~rsrc*~prrc*~perc*pro*ris)* implies that if a system has a high level of proactiveness and risk-taking-related EO, despite having various challenges and without having innovativeness-related EO, it can still obtain small-firm performance. For Model 3b: [*~sfp = f (rsrc*prrc*perc ~inn*~pro*~ris)*], the fsQCA produced two sufficient and consistent solutions to examine low small-firm performance. The solution (*~perc*inn)* implies that having low challenges related to people, along with innovativeness-related EO, substantially inhibits small-firm performance. The result (*~prrc*inn)* implies those low challenges related to process, along with the innovativeness-related EO, significantly hinder small-firm performance.

5. Discussion and conclusion

5.1 Summary of the results

The research undertook three sequential studies (Study 1, Study 2, and Study 3) to (a) systematically identify the CE-led challenges of small-firm performance and relevant EO components to overcome those challenges; (b) prioritize the identified challenges and EO components; and finally, (c) determine the most suitable configurations of EO components and negation of challenges to reduce the impact of challenges and improve small-firm performance.

The results from Study 1 show that small-firm activities are influenced by numerous (17) CE challenges probably because it is challenging and complex to embrace several practices (i.e., *reduce-reuse-recycle*) in relation to CE (Ghisetti and Montresor, 2020). Decisions to adopt CE practices need substantial resources, process changes, and resolution of people-related issues. This finding is consistent with several previous studies (e.g., Cantú *et al.,* 2021; Rizos *et al.*, 2016; Tura *et al.*, 2019). Also, our result conforms with several new challenges—reluctance to adopt AI, founder dependence, faulty design of products, and incongruence in quality. The study also identifies (17) EO components to tackle the CE challenges. This finding confirms that a single EO component is ineffective in tackling various CE challenges; hence, a combination of EO components is required (Cullen and De Angelis, 2021). Our result identified new EO components—strategic alliance and focus on market segmentation.

The findings from Study 2 were used to evaluate and rank the CE challenges and potential EO components. They vary in each sector (i.e., manufacturing and services) of the small firm, as evident in the rankings of the two case studies. The results of the first case study (i.e., small manufacturing firm) show that insufficient investment in technologies, lack of advanced technologies and know-how, lack of government support or effective legislation, lack of support from the supply chain network (e.g., engagement in sustainable activities), and strong industrial focus on linear models are the five most critical CE challenges. On the other hand, the results of the second case study (i.e., small services firm) show that in the top five CE challenges, only three of the above five are common with two new ones—namely, lack of information or lack of MIS (e.g., about benefits and legislation) and administrative burden (e.g., monitoring and reporting). Similarly, EO components, such as redesigning material for recycling, reuse, upgradability, creation of a new and independent business unit, and establishment of long-term relations with partners and awareness, are found common in the top five EO components in both case studies. While industrial symbiosis and strategic alliance are found as the other EO components, in the top five for the small manufacturing firm, formalization of the environmental management and access to financial tools and financing

solutions are found for the small services firm. These results are consistent with the findings of several previous studies (e.g., Tang *et al*., 2020; Valdez-Juárez, *et al*., 2018), which found that the benefit of a EO component is not the same at the different echelons of small firms.

Study 3 finds that a standalone adoption of EO components or negation of challenges does not enhance performance in a circular economy. Therefore, a combination of negating challenges and adopting EO components is essential to managing challenges and enhancing performance. This explains the inconsistent findings of prior studies that reported the mixed performance of EO components. Considering the conflicting impact of EO components on performance outcomes, this study suggests that the performance outcome of EO components relies heavily on managers' ability to manoeuvre the EO components in the presence of certain challenges (Cullen and De Angelis, 2021). Hence, challenges and EO components have complex trade-offs on high and low small-firm performance, and only certain combinations of both attributes act as sufficient conditions.

5.2 Theoretical contributions

In response to the calls for more empirically tested decision models for small businesses navigating toward a circular economy (Mardani *et al.,* 2022), and by investigating which configurations of CE-related challenges and EO components can drive small-firm performance, this study offers several theoretical contributions. *First*, this is one of the few studies that empirically tests CE challenges and corresponding EO components in managing small-firm performance. Despite the CE concept being an emerging priority for many industries and businesses, the empirical works within this area of research are, so far, limited (Singhal *et al.,* 2019). Hence, this study endeavours to advance existing thought on this complex phenomenon of interest and allow future researchers to leverage our outcomes to explore additional factors related to CE challenges and EO components within the small-business-management domain.

Second, grounded in DCV, this study develops and tests configurations that operationalize various combinations of challenges and EO components for improving and deterring small-firm performance (see Table 9). Although CE-related challenges and EO components have been viewed as significant predictors that drive small-firm performance, little research utilizes an appropriate theoretical lens to examine configurations of challenges and EO components empirically. In the context of entrepreneurship research in general and small-business management in particular, this approach is new (Zhu *et al.,* 2019). The results of this study contribute to the CE literature on entrepreneurship by empirically showing that higher-

level small-firm performance can be achieved through combinations of certain challenges and EO components. The theoretical model and empirical results suggest that the DCV is a valuable theoretical lens through which to examine how to improve small-firm performance by configuring and reconfiguring various challenges and EO components.

Third, our study provides one unforeseen finding—it identifies some useful dynamic capabilities (i.e., EO components) for tackling the CE challenges in small firms. Dynamic capabilities such as sensing, seizing, and reconfiguring enable firms to be responsive and adaptable to dynamic environments (Teece, 2007). Those three dynamic capabilities may help small firms achieve and maintain a competitive advantage when facing the CE challenges mentioned in Table 1 (i.e., resources, processes, and people). Thus, the current study extends the DCV theory by investigating new CE challenges and identifying new dynamic capabilities (i.e., EO components).

Fourth, the empirical study offers an innovative methodology by applying fsQCA in conjunction with QFD for modelling complex social phenomena, such as CE-related challenges and EO components. Unlike the linear approach, the non-linear modeling of this study explores causal models for increasing and diminishing small-firm performance, which is different from the traditional research approaches (e.g., structural equation modeling and multiple regression analysis).

Finally, using the systematic approach, this study develops an innovative decision model based on DCV to expound on the small-firm performance in the CE nexus, which opens a new discourse in the small business management domain. Using the DCV and applying a multi-study and multi-method approach have led to reconfiguring an appropriate configuration of EOs that, to date, has received limited empirical attention in the small-business-management discipline.

5.3 Managerial implications

The outputs of the present study can guide small-business managers who attempt to tackle CE challenges. We suggest these managers take a holistic and systematic view to managing the various CE challenges and EO components that drive small-firm performance. The implementable implications for managing both high small-firm performance and low small-firm performance suggest six configurations (see Table 9).

Regarding the configuration related to reducing challenges, in line with causal Model 1a, small-business managers should manage the process- and people-related challenges to increase small-firm performance. Alternatively, causal Model 1b describes that the existence of process-

and people-related challenges lead to low small-firm performance scores. This result conveys a significant message for small-business managers: they should not solely rely on managing people-related challenges. In parallel, they must check the process-related challenges. Otherwise, the existence of people-related challenges will diminish small-firm performance, even though process-related challenges are addressed.

The configurations related to EO, as shown by causal Model 2a, suggest that small-business managers should apply proactiveness and risk-taking-related EO to engender high small-firm performance scores. On the other hand, in line with causal Model 2b, the study suggests that small-business managers should not compromise risk-taking-related EO because the absence of EO leads to low small-firm performance scores. As proactiveness and risk-taking-related EO are interrelated, the ability to calculate risk may improve proactiveness. Therefore, managers must develop an appropriate level of ability in calculating risk to build a strong foundation for the EO process.

Regarding the configurations related to both challenges and EO, causal Model 3a recommends two feasible configurations: proactiveness and risk taking. Among all the configurations, proactiveness and risk-taking-related EO have emerged as common EO components to improve the performance of small firms. This result portrays that small-business managers should implement required approaches to develop proactiveness and risk-taking-related EO against the potential challenges. The most feasible configuration for enhancing small-firm performance is the third configuration (see Table 9), which suggests that small-business managers must reduce resource-related challenges while applying innovativeness, proactiveness, and risk-taking-related EO to increase small-firm performance scores. This configuration provides an eye-opening guideline for small-business managers. It tells them they should focus on two interrelated approaches: implementing EO and negating challenges. Otherwise, the standalone application of each approach may result in sub-optimal results. The findings from causal Model 3b also suggest that small-business managers must overcome the process- and resource-related challenges and fix weaknesses of innovativeness related to EO; otherwise, performance will diminish significantly. Therefore, our findings advise small-business managers that a combination of negation of challenges and adoption of EO better predicts performance than application of either the challenge-minimizing approach or the EO approach on its own.

Overall, our study finding is beneficial and motivating for the managers of small firms in developing countries. They need to understand that EO components (i.e., innovativeness, proactiveness, and risk-taking) should capture CE challenges (i.e., resources, processes, and

people) within their firms' operations and that they must deliberate on green strategies in decision-making processes. The current study suggests five reasons for small firms to focus on CE: (1) to enhance the firm's image; (2) to improve service and product value; (3) to comply with environmental pressures; (4) to gain competitiveness; and (5) to seek new opportunities or markets.

The study outcomes are very much related to policymakers and their agencies in developing countries. They can reward and promote ecologically better products and services, as well as offer counselling about the available information on performance and quality concerning issues such as health and energy use. Most importantly, policymakers can concentrate on strategic (rather than regulatory and normative) benefits of CE policy in their efforts to inspire small firms to become sensitive to both the planet and the world's people. Furthermore, our study suggests that small firms with resource-, process-, and people-related issues will find obstacles to executing CE programs. Thus, policymakers may discover benefits in offering economic and technical aid and identifying quality in sustainable business practices to assist small firms adopt and execute CE programs.

6. Limitations and future directions

Though this study has many merits, it has some limitations. *Firstly,* the study is contextualized to small firms in Bangladesh, which implies that the findings apply to small firms in the context of developing countries and are not generalizable to other economic perspectives, such as developed country contexts. However, the systematic approach of the decision support model can apply in any context. Further research may include the CE challenges and EO for both developing and developed country contexts as a comparative study.

Secondly, our research model is grounded theoretically on the DCV. Additional theoretical perspectives from strategic management can be deployed to extend the body of knowledge in this research domain. *Thirdly,* this research identified the configurations of EO to tackle CE challenges. Future research can plan a road map for implementing the EO, determining the time and cost of implementation, and deciding responsible bodies for implementing the strategies. *Fourthly,* the CE challenges and EO we considered for our research model related to small-firm performance. However, small-firm-performance-related CE challenges can be investigated from a behavioural systems perspective. Future research may consider developing system dynamic modeling to capture dynamic data and explain CE challenges and EO from a behavioral systems perspective. Such a model may also enable decision-makers to simulate the impact of changes in policies and strategies on performance. Finally, configurations developed

for small-firm performance rely on the data collected from a cross-sectional survey. Given the high level of uncertainty and changes in CE situations, the challenges and EO components evolve. Therefore, future research may consider constructing a decision model using panel data.

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