An Analysis of Operational Behavioural Factors and Circular Economy Practices in SMEs: An Emerging Economy Perspective

Abstract: Circular Economy (CE) principles are relatively unexplored, especially in emerging economies. None of the studies have also explored operational behavioural factors and CE practices in the context of Small and Medium-sized Enterprises (SMEs). To address this gap, the present study explores operational behavioural factors that contribute to the adoption of CE practices in SMEs of emerging economies for the sustainable development of their societies. The study was conducted in three different phases. This involved an extensive literature review, a brainstorming session with experts, an empirical investigation based on 162 responses from SMEs, the development of a factors structure model employing Exploratory Factor Analysis (EFA) and building a Network Relationship Map (NRM). The study contributes to the theory of planned and operational behaviour by considering the influence of personal determinants in assessing the adoption of CE among SMEs to examine the behavioural factors that influence CE adoption in these organisations.

Keywords: Circular Economy (CE); Operational Behavioural factors; SMEs; Exploratory Factor Analysis; Quantitative analysis.

1. Introduction

Sustainability has become a key agenda in the academic literature, especially in the Supply Chain Management (SCM) area (Lee and Raschke, 2020; Luthra et al., 2020). However, the existing production and consumption models around the world are highly unsustainable (Dey et al., 2019). In this case, if the existing product sourcing, production, consumption, and regeneration processes do not change, there is no scepticism that natural resources will be depleted in the foreseeable future (Hazen et al., 2017; Patwa et al., 2021). An emergent philosophy and practice that may facilitate an essential change to address this challenge is the Circular Economy (CE) (Farooque et al., 2019; Mangla, et al., 2021). To address these and other sustainability issues, the CE philosophy has gained momentum in policymakers' decision-making (Geissdoerfer et al., 2017; Van Langen et al., 2021).

CE has been widely studied and implemented around the world. The rising popularity of CE has been captivating due to its focus on resource scarcity and the detrimental effects of economic actions on the environment (Gupta et al., 2019; Bertassini et al., 2021). The CE concept can be termed as - "an economic model aiming to use resource efficiently by minimizing waste, value retention for a long term, reducing primary resources, and developing closed-loop supply chains, product components and materials with environmental management and socio-economic benefits" (Morseletto, 2020; Priyadarshini and Abhilash, 2020). At a global level and in economic terms, once CE practices are completely executed; these would bring an economic gain of more than 1000 billion US dollars annually (Korhonen et al., 2018b). The concept of CE rethinks the current linear economic model into truly sustainable societies by addressing environmental problems, societal issues and economic challenges (Patwa et al., 2020).

The contribution of urban waste across the world is 1.3 billion tons in a year, which may increase to 2.2 billion tons by 2025. Every manufacturing organisation is facing this challenge and identifying ways to reduce waste generation and environmental issues. Therefore, there is an urgent need to transition towards more sustainable supply chains, which can be achieved through the concept of CE (Lahane et al., 2020). Manufacturing organisations that economise production and consumption would benefit from CE practices (Parida et al., 2019; Sharma et al., 2021).

According to the European Commission, 600 billion euros in economic gains can be created annually through an economic transition if CE practices are implemented in the manufacturing sector alone (Korhonen et al., 2018b). However, although such practices bring improvements in the social welfare and environmental up-gradation, only a few countries have initiated the processes for their implementation (de Oliveira et al., 2018).

The CE philosophy is significant for business and sustainable development across the countries. However, the adoption of the CE initiatives taken by the developed economies cannot be replicated or adopted fully by some of the emerging economies due to their distinct set of challenges (Patwa et al., 2020). Currently, emerging economies are seeking to transform into developed economies through improved production, the development of regulatory bodies, and progressively sophisticated markets. These economies are in the process of a transition from a less developed, low income, traditional economy to a modern and developed industrial

economy (Bao and Lu, 2020). India is a trillion-dollar fastest-growing country across the world contributing with a Gross Domestic Product (GDP) of $2.94 trillion. It has become the fifth-largest economy, surpassing the United Kingdom and France in 2018 (Investopedia, 2020). The 'Atmanirbhar Bharat Abhiyan' initiative from the Government of India (GoI) has the objective of revamping the economy and developing a self-reliant economy to support organizations in sustaining and tackling the future 'Black Swan' events (Outlook Money, 2020). This scheme has a major focus on transforming the SMEs sector of India. The Indian SMEs sector contributes to economic gains with 6.11% of the manufacturing GDP and 24.63% of the Service sector GDP. The SMEs sector in India is next only to the agricultural sector. SMEs consist of 42.5 million units and offer employment opportunities to over 106 million people i.e., 40% of India's workforce (EVOMA, 2020).

The estimated annual benefit of 40 lakhs crores or US$ 624 billion by 2025 can be achieved through adopting the CE path in India. It can also reduce greenhouse emissions by 44% along with a significant reduction in pollution (Sharma et al., 2021). This can contribute to healthier economic and environmental benefits to society (Ellen MacArthur Foundation, 2016). Due to financial and technical constraints, SMEs have less developed research and development areas, but because of their rigorous efforts' leashes to extremely specialized products that create demarcation of SMEs from their competitors (Mittal et al., 2018). SMEs represent a vast variety of businesses and thus, a significant way to successfully adopt CE in future. Although SMEs are progressively cognizant of resource efficiency improvement outcomes, they still fail to actively implement change (Bassi and Dias, 2019).

The CE concept is an extensively used approach in different countries, e.g. countries like Germany, France, UK, Japan and China have developed policies that back this philosophy to be adopted in their societies, but in India, it is still in a nascent stage due to the lack of facilitating policies. Manufacturing firms consider CE as a significant sustainable initiative for waste reduction, but limited research is available on the readiness of SMEs towards CE (Singh et al., 2018; Ormazabal et al., 2020; Sharma et al., 2021). Secondly, benefits outcomes from the CE implementation within companies are sometimes unclear to managers (Rosa et al., 2019). The issue in the context of what types of managerial practices companies must adopt for the implementation of CE practices still deserves specific attention. Indeed, CE infers substantial changes in the operational practices of companies; for example, in regards to new ways of using energy, materials, and resources efficiently to minimize their detrimental impact.

Companies should maintain the ownership of their products and components in addition to their production and distribution (Ünal et al., 2019a). It is also important to concede that the success of CE is highly dependent on users' behaviour. Moreover, the implementation of CE needs a change in the mindset of users as well as producers and how they communicate. However, the dilemma is the unawareness of the user towards the environmental stress caused by their consumption behaviour and non-acceptance of their responsibility when it comes to them. This uncertainty of user behaviour emphasizes the reassessment of the concept of CE operational behavioural factors (Anastasiades et al., 2020). Thus, in this context, an empirical investigation is required to understand the significance of operational behavioural factors in the CE and make a contribution to the theory of planned behaviour (TPB). TPB is a widely used psychological theory towards environmentally conscious behaviour (Parajuly et al., 2020). Thus, this research study serves as a beacon in exploring the operational behavioural factors of CE practices, in emerging economies' SMEs, which are needed to transition into more sustainable societies. More specifically, the current research study intends to discourse the following Research Questions (RQs):

RQ1: What are the operational behavioural factors that contribute to the adoption of CE practices in SMEs of emerging economies for the sustainable development of their societies?
RQ2: What role does the cause-effect relationship between these behavioural factors play in the adoption of CE practices in SMEs of emerging economies?

Therefore, to answer the above-mentioned questions, the study aims to investigate key operational behavioural factors and CE practices within the context of SMEs operating in an emerging economy. After an extensive literature review, we identified a gap in the literature related to operational behaviour factors for CE in the context of SMEs. To fill this gap in the literature, the following objectives were formulated:

- To empirically investigate the operational behavioural factors for adopting CE practices in SMEs;
- To understand the cause-effect relationship between the factors and build an influential network relationship map; and
- To provide recommendations for the effective adoption of CE practices in SMEs.

For achieving the above-mentioned objectives, in Phase I the current study conducted an extensive literature review to investigate the operational behavioural factors. Further, in Phase II, an empirical study was conducted through primary data, related to the operational behaviours for adopting CE practices collection, from SMEs. A total of 162 responses were collected in this phase. Further, a factor structure model using Exploratory Factors Analysis (EFA) was developed to confirm the factors. Data from eleven experts were collected to build an influential network relationship map among the factors to understand their cause-effect impact by DEMATEL. The cause-effect map will contribute by helping industry managers to obtain a clear understanding of the impact of each factor and their influence on other factors.

Following this introduction, the organisation of the paper is as follows: Section 2 presents the literature review, which helps in understanding the theoretical foundation of the research and tries to explore various operational behavioural factors of CE practices in emerging economies' SMEs. Further, research methods are described in Section 3. The real-world applicability and results are presented in Section 4. The discussion of findings with practical implications and the unique contribution of the present work are presented in Section 5. In the last section, concluding remarks are given with the limitations and directions for future research.

2. Literature Review

This section highlights the literature review on CE and its role in SMEs and elaborates on exploring various critical success factors (CSFs) for promoting CE principles in emerging economies' SMEs. In the last subsection, research gaps, which justify the present research, are identified.

2.1 Circular Economy and its Role in SMEs

The main challenges faced by humankind are addressed through the 17 Sustainable Development Goals (SDGs) of the United Nations to inspire world economies. Most of the SDGs focus on underlining the optimum utilization of resources to lead towards a CE (Kapoor et al., 2020). The definition of CE is still evolving, but there is growing consent that existing models, designs and processes have to be redesigned to replace 'linear' models ending in waste with circular models that promote durability, reusability, repair, refurbishment, and recycling processes (Chamberlin and Boks, 2018; Asgari and Asgari, 2021). The central theme of the CE paradigm is waste minimization through the 3Rs (reduction, reuse, and recycling) with

controlled leakage and environmental effect (Ellen MacArthur Foundation, 2016; Parida et al., 2019). CE practices bring benefits to businesses and society by improving supply chains and customer relationships, providing low price volatility of resources, and generating employment (Singh et al., 2018; Bertassini et al., 2021).

The size of the company plays a decisive role in developing CE strategies. SMEs may offer higher flexibility and improved customer services, while big companies are capable of achieving global solutions (Salvador et al., 2020). SMEs will be most influential in this process, as they constitute 95% of companies in OECD member countries (OECD, 2017; Ormazabal et al., 2018). CE has become significant and essential to change the flow from a linear to a circular model. However, its mechanism for assessment is not well defined yet, especially for SMEs (Garza-Reyes et al., 2019); and a huge number of companies- mostly SMEs- belong to the linear and unsustainable model (Sartal et al., 2020). A research gap exists between behavioural research and the concept of CE, primarily within the context of SMEs. This acts as the main obstacle in driving behavioural interventions to promote CE (Parajuly et al., 2020).

2.2 Operational Behavioural Factors of CE Practices in Emerging Economies' SMEs

The literature suggests the urgent requirement to understand and assess the progress of CE practices in emerging economies (Patwa et al., 2020; Sharma et al., 2021). For the effective implementation of CE practices, it is necessary to understand operational behavioural factors. Therefore, these operational behavioural factors should be identified and investigated for the most effective CE practices in Emerging Economies' SMEs. For an exploration of the operational behavioural factors, the selection of databases including "Scopus" and "Web of Science" (WoS) was made. The databases were searched with the keywords "*Circular Economy*" OR "*SMEs*", AND "*Operational Excellence*" OR"*Behavioural factors*". These terms had to exist in the titles, keywords and abstract. The search field was limited to "articles" and the period from "2015-2020". Initially, 40 operational behavioural factors were identified through an extensive literature review. Furthermore, experts were asked to validate each factor. The details of the experts are presented in subsection 3.2. The final representation of operational behavioural factors of CE Practices in SMEs is exhibited in Table 1.

[Insert Table 1 here]

2.3 Research Gaps

CE is a growing concept and a key solution to counter current challenges like waste generation and environmental degradation in emerging economies (Katz-Gerro and López Sintas, 2019). However, the circularity concept is not novel as such. CE implementation is a challenging task for the linear mindset structures currently well-established in industry and society (Lieder and Rashid, 2016). A recent report suggests that at a global level, only 9% of the world is circular, while the remaining wastes are incinerated, landfilled, or diffused in the environment (Circle Economy, 2019; Henry et al., 2020).

Community pressure has been a key player in developed countries and has become an important factor in defining the environmental behaviour of a firm (Liu and Bai, 2014), however evidence of such pressure are missing, especially in emerging economies (Jabbour et al., 2020). A firm's behaviour in operating CE is a tremendously complex process, influenced by several factors (Liu and Bai, 2014; Sehnem et al., 2019; Chang et al., 2021; Dokter et al., 2021). It is visible that planning and facilitating recycling is not sufficient to bring change in users' behaviour (Parajuly et al., 2020). It is, therefore, important to understand the operational behavioural factors in the adoption of CE practices (Tong et al., 2018).

The focus of CE is, so far, on operations management, technology, historical factors, methodology, resource management, innovation, CE indicators, limitations of the concept and economic aspects of the CE. HRM issues and the human side in the CE context is still unexplored (Jabbour et al., 2019b; Sawe et al., 2021). The techno-economic aspects of CE have been significantly learned in the past few years (Korhonen et al., 2018a, 2018b; Kumar et al., 2019; Kristoffersen et al., 2020; Rakshit et al., 2021). SMEs have to transform and adapt to new environmental settings that rely on their abilities to modify old practices and procedures.

However, like in the sustainability debate, the behavioural factors in the adoption of CE practices have not been equally examined, especially in emerging economies (Parajuly et al., 2020). Additionally, few studies so far have discovered how CE practices are incorporated in SMEs (Mura et al., 2020; Dokter et al., 2021; Gedam et al., 2021) but none of these studies has explored operational behavioural factors in SMEs. The TPB derived from the Theory of Reasoned Action (TRA) considers the influence of personal determinants in assessing CE adoption among SMEs (Ajzen, 1991). This theory is the most suitable psychological theory to examine the behavioural factors that influence CE adoption in SMEs. The study has identified the operational behavioural variables from the literature further developed into factors through

234 the EFA method. To the best of our knowledge, the influence of operational behavioural factors
235 on the adoption of CE has never been studied in conjunction with the TPB model, especially
236 within the context of SMEs. Thus, this study aims to determine the effect of operational
237 behavioural factors on CE adoption in SMEs. Also, it examines the inter-relationship among
238 the identified factors.
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240 ## 3. Research Methodology
241
242 To achieve the objective of the study, a three-phase study was conducted as illustrated in Figure
243 1.
244 [Insert Figure 1 here]
245
246 Figure 1 illustrates the methodology framework followed to conduct the proposed study. In the
247 first phase, an extensive literature review was conducted to identify the operational behavioural
248 factors for adopting CE practices in SMEs. Thereafter, a brainstorming session was conducted
249 to capture the perception of industry leaders and policymakers on the factors associated with
250 the adoption of CE practices in SMEs. The operational behavioural factors were then finalised.
251 In the second phase, an empirical study was conducted through primary data collection from
252 SMEs on the operational behaviours for adopting CE practices. A total of 162 responses were
253 collected in this phase. Then, a factor structure model using Exploratory Factors Analysis
254 (EFA) was developed.
255
256 After confirming the factors and understanding their cause-effect relationship, industry leaders
257 and policymakers working on the formulation of policies for SMEs were contacted for data
258 collection. Data from eleven experts were collected to build an influential network relationship
259 map among the factors to understand their cause-effect impact by DEMATEL. The cause-effect
260 map will help industry managers to not only understand the impact of each factor but also its
261 influence on other factors.
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263 ## 4. Data Analysis and Results
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265 ### 4.1 Empirical Analysis
266 An empirical analysis is an evidence-based approach to the study and interpretation of
267 information. An empirical investigation supports us to develop a substantial theoretical based

foundation of the study (Newman and Benz, 1998; Goodwin, 2005). To validate this empirical investigation and to provide the required strength to the foundation of the study, a mixture approach of quantitative and qualitative research methods was employed in this study. This research focused on presenting information by the means of the experiences of the respondents who were contacted to participate in the study. This study attempted to analyse and investigate the operational behavioural factors that are crucial for Indian SMEs to adopt CE practices. The factors that were analysed and investigated were largely behavioural factors to get a deeper understanding of the problem statement. Initially, the behavioural factors were identified through extensive literature and the experts' inputs as indicated in Table 1.

A questionnaire instrument was developed and the research team managed to record the relevant data from Indian SMEs. The establishment of the relations between the cause and effect of the identified factors and the sub-factors was also evident while investigating and validating these factors. The following sub-sections explain all the adopted steps in empirically study.

4.1.1 Questionnaire development and data collection

An empirical investigation was conducted to check and ensure that all the factors determined were statistically validated (Hair et al., 1998). To understand the opinions of the respondents and validate them with the support of the literature, a questionnaire was designed by using a 5-point Likert scale -strongly agree and 1-strongly disagree (Alzubaidi et al., 2021; Eller et al., 2021). In the pre-test stage, area experts from academia and industry were invited to provide their opinions on the designed questionnaire. After taking their inputs, some modifications were carried out in the questionnaire to make it clearer to the respondents and avoid bias. The study was related to understanding the role of behavioural factors in the adoption of CE practices in Indian SMEs. Thus, it was important for respondents to have an understanding of the research area. To achieve this and obtain relevant and valid data, convenience and snowball sampling techniques were used. Based on these techniques, the questionnaire was distributed to various SMEs. A total of 162 responses were collected and hence considered for analysis. This response rate was considered acceptable to conduct the EFA analysis (Hair et al., 1998).

4.1.2 Data collection, analysis and results

This study was conducted within the context of SMEs in India. The population of the present study is 162 responses from Indian SMEs. The sample size of 162 is sufficient for conducting

EFA. According to (Guadagnoli and Velicer, 1988) if the factor loading scores are around 0.80, then a size of (n >150) should be sufficient.

Various statistical tools and decision-making techniques were applied to evaluate the collected data; other details are provided below. The details of the participants' profiles are shown in Table 2.

[Insert Table 2 here]

4.1.3 Measurement of biasedness

To avoid biased opinions/data coming from the respondents, needful measures were taken. The entire process of data collection was carefully followed through the following steps:

a) All the responses given by the respondents were dealt with utmost privacy and no data was shared with anybody outside of the research team.
b) The respondents were educated about the objective of our study before their responses were recorded. All the participating respondents were encouraged to provide their relevant responses (Podsakoff et al., 2003).
c) Harman's one-factor common method bias test was conducted to check common bias issues. The analysis showed that percent of the total variance of one factor was less than fifty per cent of the total variance, which indicated that there were no common bias threats.

4.1.4 Reliability and validity checks

The reliability and validity checks test helps to assess the 'goodness' of a measure and how accurate the data collected from the respondents can be and organised (John and Reve,1982; Kimberlin and Winterstein, 2008). To measure the overall reliability of the data, Cronbach alpha (α) was calculated (0.944). The result of the Cronbach alpha test indicated that the collected data was reliable (Nunnally, 1978).

The concept of factor loading was used to check the validity of convergence. In this line, any value higher than 0.5 is considered acceptable (Hair et al., 1998; Field, 2009). In the case of the present research, each of the items had a factor loading value of more than 0.5, which was a positive reflection of the consistency of the validation of the convergence and the questionnaire that was used in the study. Once the structure of the factors identified for the CE for SMEs in the Indian context was established, a calculation of the Cronbach alpha for each

of the factors was carried out. The acceptable range for this was between 0.833 to 0.916, which indicated the validity of the identified variables (Hair et al., 1998; Field, 2009) as shown in Table 3.

4.1.5 Exploratory factor analysis (EFA)

The most commonly used technique, when it comes to the multivariate type models, to understand the structure of the factors is the EFA technique (Hair et al., 1998; Field, 2009). The EFA technique is particularly useful in reducing the set number of dimensions avoiding any information loss (Ruscio and Roche, 2012). The Kaiser-Meyer-Olkin (KMO) test resulted in a significant value of 0.944. This value can be considered acceptable as it is more than the minimum acceptable value of 0.60 (Kaiser,1974). The data for Bartlett's Test of Sphericity was also acceptable with $p < 0.01$ relevant for the behavioural factors. The value for sampling for all the factors was more than the acceptable value of 0.50.

The EFA was successfully tested to investigate the key factors in adopting the CE in the Indian SMEs context with the support of Varimax factor rotation. The quantified Eigenvalue was obtained as greater than 1 for the eventual factor structure. The value range for the factor loading was recorded in between 0.740 and 0.864 for all the behavioural variables in their specific category. The commonalities range was also considered as acceptable as it was in the range of 0.551 to 0.742 (Field, 2009). Composite Reliability (CR) and Average Variance Extracted (AVE) were calculated. CR values were in the range of 0.88 and 0.93, which were higher than the recommended value of 0.70 and AVE values were higher than 0.50 and less than CR values (Field 2017; Hair et al. 2013). All these values indicated the reliability and convergent validity of the collected data (Hair et al., 1998; Field, 2009) as shown in Table 3.

[Insert Table 3 here]

4.1.6 Determining causal relationships between behavioural factors

The DEMATEL method is the most suitable approach to examine the interdependency among the factors in a complex system. In this regard, the identified operational behavioural factors may be utilized for strategic planning and developing a future roadmap. DEMATEL is a widely used method by researchers of different domains (Kumar et al., 2018; Cui et al., 2019; Luthra et al., 2020; Yasmin et al., 2020). This method is highly capable of developing a map reflecting the relationships for solving decision-making problems (Govindan and Zhu, 2020). To

determine the causal relationship between the behavioural factors, the DEMATEL method was employed. DEMATEL is a widely used method by researchers of different domains (Kumar et al., 2018; Cui et al., 2019; Yasmin et al., 2020; Luthra et al., 2020). In the present research, specifically, a DEMATEL analysis was conducted not only to establish the cause-effect relationship between the behavioural factors but also to understand their influence.

The used mathematical steps carried out through this method were as follows:

Step 1: The respondents assessed the relationship between the barriers on a scale of 0 to 4. Where 0 denoted 'no influence' and 4 denoted 'very high influence'. Data from eleven experts were collected through a snowball sampling method. All the experts had a proper understanding of the research topic and worked in different departments, i.e. supply chain, innovation, operations, etc. in SMEs for at least 8 years.

Equation 1 was used to calculate the average matrix, see Table 4.

$$\boldsymbol{A} = a_{ij} = \frac{1}{H}\sum_{K=1}^{H} x_{ij}^{k} \text{ where } H \text{ is number of experts, } i, j = 1, \ldots n \quad (1)$$

[Insert Table 4 here]

Step 2: The matrix normalisation was obtained by applying Eqs. (2 and 3) as shown in Table 5.

$$U = k \times V, \quad (2)$$

$$k = \min\left(\frac{1}{\max_i\left(\sum_{i=1}^{n} a_{ij}\right)}, \frac{1}{\max_j\left(\sum_{j=1}^{n} a_{ij}\right)}\right), i, j = 1, 2, \ldots..n. \quad (3)$$

[Insert Table 5 here]

Step 3: Computing the total relation matrix (T) using Eq. (4):

$$T = U(I - U)^{-1} \quad (4)$$

Where r was defined as $n \times 1$ and c as $1 \times n$ vectors representing the summation of rows and columns of the total relation matrix, respectively. These were obtained from Eqs. (5 and 6) as indicated below.

$$r = [r_i]_{n\times 1} = \left[\sum_{j=1}^{n} t_{ij}\right]_{n\times 1} \quad (5)$$

$$c = [c_i]_{1\times n} = \left[\sum_{i=1}^{n} t_{ij}\right]_{1\times n} \quad (6)$$

Where t_{ij} represented the total relation matrix, for $i, j = 1, 2, \ldots, n$.

The relation matrix is presented in Table 6 while the impact results of adoption are shown in Table 7.

[Insert Table 6 here]

[Insert Table 7 here]

Step 4: To obtain the causal relationship digraph and to eliminate minor effects, the threshold value (α) was calculated using Eq. (10).

$$\alpha = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\left[t_{ij}\right]}{N} = 1.9192 \quad (7)$$

The total number of elements present in the total relation matrix (T) is represented by a digraph that was plotted for all the values that were greater than the threshold value (i.e. 1.9192). The values that were more than the threshold value of 1.9192 are included in the total relation matrix, see Table 6. A Network Relationship Map (NRM) was established, for instance, the value of t_{12} (2.0152) > α (1.9192); this presented the significance or strength of the relationship, which are shown in the digraph with an arrow. For instance, Circular Economy Financing (CEF) to Circularity and Consumer Engagement (CCE) referrers to the effect of CEF on CCE in the adoption of CE in Indian SMEs. By following the same steps, a causal relationship digraph of the main behaviour factors was established, see Figure 2.

[Insert Figure 2 here]

Through the DEMATEL analysis, all the main factors were divided into two groups, i.e. cause and effect, allowing a causal relationship map to be developed. Table 7 shows that the factors Circular Economy Financing (CEF), Changing Market Demands and Consumption (CMC),

Organisational Resilience and SDGs (ORS), Modern and Sustainable Society (MSS) are in the cause group, meaning that these factors influence the others. The effect group factors include Circularity and Consumer Engagement (CCE), Ecological Modernisation and Eco-Innovation (EMI), Green Market Reputation (GMR), meaning that these factors are influenced by other factors.

The impact results showing causal relationships between sub-factors are shown in Table 8.

[Insert Table 8 here]

Figure 3 illustrates the causal relationship between the sub-factors.

[Insert Figure 3 here]

5. Discussion of Findings

The current study assessed the role of operational behavioural factors and their inter-relationship in the adoption of CE practices within the context of SMEs. The study explored and identified behavioural factors from the literature, which were later validated through experts' inputs. The factors structure was finalised through the EFA method. The study also revealed the cause-effect relationship among the operational behavioural factors. This study provides insights into the current understanding of the adoption of CE practices in SMEs. Based on the results from the EFA, a structural model comprising of 7 factors- Circular Economy Financing (CEF) ($\alpha = 0.850$); Circularity and Consumer Engagement (CCE) ($\alpha = 0.833$); Changing Market Demands and Consumption (CMC) ($\alpha = 0.875$); Ecological Modernisation and Eco-Innovation (EMI) ($\alpha = 0.916$); Organisational Resilience and SDGs (ORS) ($\alpha = 0.906$); Green Market Reputation (GMR) ($\alpha = 0898$); and Modern and Sustainable Society (MSS) ($\alpha = 0.886$)- was developed. Based on the results derived from the DEMATEL analysis, Table 7 exhibits the causal and the effect factors categorisation. The factors CEF, CMC, ORS and MSS were determined to be in the causal group, whereas CCE, EMI and GMR were categorised in the effect group. The elaborated results for each subfactor explaining the cause-effect relationship are discussed in the following sub-sections.

5.1 Circular Economy Financing (CEF)

This factor belongs to the causal group factor. There are five sub-factors under this category, namely: Thinking CE initiatives and cost-saving behaviour (CEF1), Access to finance and risk

management tools (CEF2), Promoting CE initiatives by financial institutions (CEF3), the government regulation and infrastructure investment opportunity (CEF4), CE incentives and subsidised financing (CEF5). CEF1, CEF2, and CEF5 are part of the cause group sub-factors, whereas CEF3 and CEF4 are part of the effect group sub-factors. Based on the 'r – c' values, among all the sub-factors, Access to finance and risk management tools (CEF2) is the most crucial behavioural factor. This finding is in line with previous research conducted by Dewick et al. (2020) and Termeer and Metze (2019), which suggest that there is a need for financing by the private and public sectors to adopt CE practices. Initiatives taken by the government and the finance industry are showing a positive change in the thinking of financers and policymakers to endorse meaningful changes that will facilitate credible progress towards sustainable outcomes (Hussain and Malik, 2020; Gedam et al., 2021). Thus, the government and the finance industry need to develop new financial mechanisms or tools that facilitate firms with a robust CE transition. Therefore, SMEs must come forward to take advantage of these financial mechanisms and show their potential to utilize them, for instance, by preparing a monthly/yearly report about how they invested in the adoption of CE and its benefits so that trust of all involved stakeholders will increase and hence will come forward to support SMEs in the adoption of CE practices.

5.2 Circularity and Consumer Engagement (CCE)

This factor belongs to the effect group factor. Past studies have shown that the successful adoption of CE is dependent on changing consumers' behaviour (Elia et al., 2017; Maitre-Ekern and Dalhammar 2019; Parajuly et al., 2020). The mindset and attitude of consumers towards CE adoption are responsible for adopting the changes in practices such as recycling, product return and renting. With the adoption of CE practices, there is an increase in consumer engagement that can act as an effective tool for developing a sustainable society for future generations (Murray et al. 2017; Funk et al., 2021). This factor has five sub-factors, namely: Changing buying pattern of consumers (CCE1); Customer engagement and commitment for circularity initiatives (CCE2); Recycling behaviour and adoption (CCE3); Societal mind-sets (CCE4); Social group influence (CCE5). The sub-factors CCE1, CCE2 and CCE3 are in the cause group while CCE4 and CCE5 are the effect group. The factor CCE1 has the highest 'r – c' value among all the sub-factors. This indicates that changing buying pattern of consumers (CCE1) is the most influential factor that enhances consumer engagement towards CE adoption. This finding suggests that the operational behavioural factors are effective at both micro and macro levels therefore both understanding consumers' changing behaviour and its

impact on economies should be considered to accomplish the aim of developing sustainable societies (Kirchherr et al., 2019; Funk, et al., 2021). Therefore, this finding shows that SMEs must understand the changing buying pattern of consumers so that they can innovate accordingly at both micro and macro levels and try to show in their CE initiatives their consumer engagement programmes.

5.3 Changing Market Demands and Consumption (CMC)

This factor belongs to the causal group factors. The study conducted by Edmondson et al. (2018) showed that a transition to CE is dependent on the composition and innovation intensity of the economy and the evolution of new markets. Although the literature on CE awareness and practices is limited, there has been a constant growth in the adoption of CE practices by manufacturing firms (Liakos et al., 2019; Schröder et al., 2020). Despite this, past studies have shown that the CE awareness level in SMEs is low and thus it is the main cause for its limited adoption (Ormazabal et al, 2018). This factor includes 5 sub-factors, i.e. Environmentally consciousness and changing market consumption patterns (CMC1); Demand for sustainable products (CMC2); Changing lifestyle (CMC3); Willingness to minimise waste (CMC4); educating and increasing awareness (CMC5). The sub-factor- educating and increasing awareness (CMC5) resulted in the most crucial factor, with the highest 'r-c' value. The results from past studies have shown that CE adoption has gained momentum, but its awareness and adoption of its practices across the world are still below expectations (Masi et al. 2018).

5.4 Ecological Modernisation and Eco-Innovation (EMI)

This factor was positioned in the effect group. Solutions such as eco-industrial parks, energy-efficient practices, and cross-sector collaboration can contribute to enhancing the utilisation of material and energy, supporting policy formulation and developing evaluation frameworks (Zhao et al., 2018). This factor has 7 sub-factors: Commitment to eco-industrial chains (EMI1); Cross supply chain and cross-sector green collaboration (EMI2); National and international business opportunities (EMI3); Developing energy efficiency-driven practices (EMI4); Responsible manufacturing (EMI5); Fundamental reassessment of the use of resources (EMI6); Potential for new business development and synergy (EMI7). EMI1, EMI3, EMI5 and EMI6 are causal subfactors, whereas EM14 and EMI7 are effect group factors. Based on the 'r-c' value, among all the sub-factors, EMI1 had the highest value of 1.2438, indicating that Commitment to eco-industrial chains will be the most influential issue for SMEs to embark on the adoption of CE. Eco-industrial chains may be designed to achieve and incentivise CE

practices to achieve sustainable goals. These chains will also help economies to minimise waste, pollution, sharing resources, and achieving sustainable development goals (Yu et al., 2015; Zeng et al., 2017; Ebrahimi and Koh, 2021).

5.5 Organisational Resilience and SDGs (ORS)

Various studies have shown in the past that the engagement of an organisation's stakeholders through green practices such as green education, training, promotional campaigns, green incentives and rewards programs help to improve performance and achieve sustainable goals (Mendoza et al., 2019; Chang et al., 2021). This factor belongs to the causal group factors and includes 7 sub-factors, namely: Innovative thinking (ORS1); Thinking of adopting initiatives of sustainable resource management (ORS2); Organisational culture change and monitoring (ORS3); Responsible management (ORS4); Effective and efficient communication about CE initiatives (ORS5); Management commitment towards sustainability (ORS6); Training and development about CE insights within the organisational level (ORS7). Recent studies have proven that organisations need to redesign their SC networks around sustainable development (Bassi and Dias, 2020; Yadav et al., 2020; Dokter et al., 2021). There have been efforts by the government and organisations to raise consciousness through awareness programs and investing in training programs towards CE practices (Stahel, 2016). The sub-factor- Training and development about CE insights within the organisational level (ORS7) is the most influential causal factor, with 'r-c' value of 0.9550. This suggests that this factor is one of the main reasons for the low adoption rate of CE practices in SMEs.

5.6 Green Market Reputation (GMR)

The concerns of citizens, nations and organisations towards CE adoption is increasing day by day (Castro, 2020). Green reputation is built by organisations through waste reduction, reducing energy consumption and implementing CE practices. This is in line with the previous researches of Singh et al. (2018) and Knickmeyer (2020). Thus, this factor is positioned in the effect group. It includes 5 sub-factors, i.e. Ecological responsibility (GMR1); EC initiatives and competitive advantage (GMR2); Moral obligation to ensure safety at the workplace (GMR3); System and community trust (GMR4); Green attitude and positioning products (GMR5). Out of all the sub-factors, GMR1, GMR2 and GMR3 are causal sub-factors, whereas GMR4 and GMR5 are effect group sub-factors. Based on the 'r-c' value, GMR1 is the strongest causal sub-factor with a 0.5952 value. Ecological responsibility (GMR1) is not a new concept but the approach to interpret producer and consumer's behaviour towards nature and

earth has changed. This subfactor aims at integrating producer and consumer's responsibility throughout the complete life cycle of products (Campbell-Johnston et al., 2020; Diaz et al., 2021).

5.7 Modern and Sustainable Society (MSS)

This factor is the most important causal group factor with a 'r-c' value of 1.339. It has 6 sub-factors: Nature resource scarcity consciousness (MSS1); Thinking for sustainable behaviour (MSS2); Knowledge and skills enhancement of sustainability and future prospectus (MSS3); New government education policies towards sustainability (MSS4); Smart waste audit and reduction planning (MSS5); Government policies and regulations towards CE initiatives (MSS6). Out of the total sub-factors, MSS2, MSS5 and MSS6 are causal sub-factor, whereas MSS1 and MSS3 and MSS4 are effect group subfactors. MSS2 has the highest 'r-c' value of 0.6273, which indicates this subfactor is the main reason behind the adoption of CE in SMEs. This sub-factor focuses on individual behavioural change and incorporates psychological, sociological and economic perspectives (Sawe et al., 2021). For enhancing CE practices implementation, the thinking of users and producers have to be environmentally conscious. Also, the main requirement of the emerging economy is the awareness, policies, regulations to achieve sustainability through CE initiatives (Dokter et al., 2021). Currently, the consciousness among people is limited and thus this needs to be pushed by governments through launching new policies to support the adoption of CE practices in organisations in order to develop sustainable behaviour. This may help in forming a strong attitude, commitment and behavioural intention to be embedded in the organisation's culture to adopt CE practices.

6. Implications of the Research

CE has been widely deployed by governments and organisations of various countries to address the current environmental challenges faced by society. However, its adoption in India is still in a nascent stage. The current study has empirically investigated and validated the operational behavioural factors needed to adopt CE practices in SMEs. Furthermore, the study has also established the causal and effect relationship among these factors. The findings from this study make both theoretical and practical contributions by determining the significance of operational behavioural factors to adopt CE practices in SMEs and throwing light on the insights for managers and policymakers.

6.1 Theoretical Contributions

Two main key aspects exhibit the theoretical contribution of this study. Firstly, the current study has made efforts to identify the operational behavioural factors, in the context of SMEs, and build a factor structure model for visualising and determining the influence of behavioural intentions of organisations and people towards the adoption of CE. Based on the TPB, people intentions were established to be the driving force to adopt the changed behaviour in addition to attitude, subjective norms and self-efficacy. The study has shown that the intention of organisational people is moving in the direction of the adoption of CE practices and developing sustainable societies. The CE adoption will be enhanced through Circular Economy Financing, Circularity and Consumer Engagement, Changing Market Demands and Consumption, Ecological Modernisation and Eco-Innovation, Organisational Resilience and SDGs, Green Market Reputation, and Modern and Sustainable Society. Moreover, the mindset and attitude of consumers and producers towards the CE practices is responsible for bringing changes in circular activities such as recycling, product return and renting, among others, and thus the intention will be influencing the change in the behaviour towards CE adoption. A sustainable future is the aim of the United Nations. Modern and Sustainable Society (MSS) includes the key concept for the development of sustainable thinking among the individual, firm and society. Due to limited resources, there is a need to reduce the consumption of products. Firms need to develop the changed behaviour towards consumption. The role of government is also significant when implementing CE practices to enhance sustainable thinking in companies' operational behaviour.

Secondly, the contribution of this study is the establishment of a cause-effect inter-relationship among the operational behavioural factors and sub-factors respectively. This study is insightful for managers and policymakers to make decisions based on strong factors such as educating and awareness accessibility to finance, training to the employees, ecological responsibility and developing eco-industrial chains for enhancing the CE adoption in SMEs. The awareness and individuals' responsibility are a pre-requisite to adopt change in their operational behaviour to thoroughly adopt CE practices. The operational behavioural factors will act as drivers to influence the behavioural intention in the TBP model.

6.2 Practical Contributions

Emerging economies are witnessing a momentum moving from linear to circular business models and practices. However, due to various factors that play a significant role in the

adoption of CE, its implementation remains low in emerging economy nations. In this context, the implementation of CE, particularly in SMEs, can be enhanced if companies and policymakers are aware of the factors that contribute to its successful deployment and have an understanding of the existent relationship of such factors. Thus, this study is significant in determining the cause-effect factors for CE adoption and providing suggestions for its enhancement.

- A vision of sustainable thinking should create hope. Concepts, attitudes and rhetoric are not only helping in describing issues but also to open doors for opportunities. Sustainable thinking is the key towards developing operational behaviour for implementing CE practices in the firms.
- There is consciousness among people towards limited natural and the scarcity of resources for future generations. This consciousness needs to be pushed by governments through launching new policies to support the adoption of CE practices in organisations in order to develop sustainable behaviour. Moreover, institutions should create a normative culture among their staff. This may help in forming a strong attitude, commitment and behavioural intention to be embedded in the organisation's culture to adopt CE practices.
- Governments and the finance industry are thinking to bring change in CE practices to achieve sustainable outcomes. To achieve the same, there is a need to develop new mechanisms for enhancing the accessibility to financial resources to support the transition to CE. This is only possible through collaborative efforts between the government, private and public institutions and by providing support to SMEs so they can nurture behavioural practices such as recycling, product return, usage of renewable energy, building a green reputation, raising awareness, developing eco-industrial chains, minimise waste, pollution, sharing resources. This would enable them to achieve sustainable development goals and impart education and training related to CE.
- The rapid development of eco-industrial chains will help to enhance CE adoption in SMEs. Nations and companies can address issues such as minimising waste, pollution and foment the proper utilisation of natural scarce resources through the development of eco-industrial chains.
- Currently, the degree of adoption of CE among SMEs is low due to their short-term goals and lack of expertise in this economic business model. Thus, SMEs need to make long-term strategies focusing on CE practices and sustainability. Moreover, knowledge

enhancement can be achieved by integrating Industry 4.0 technologies into the operations of SMEs. Industry 4.0 technologies can contribute to the transition of companies into circular practices.

- Regulatory bodies such as the National Small Industries Corporation (NSIC) and Bureau of Energy Efficiency (BRE) must ensure that periodic audits are performed to detect non-compliance and anomalies that may hinder the proper execution of CE practices in SMEs.

6.3 Unique Contributions

The unique contribution of this study is the empirical definition and testing of the evidence of the theoretical linkage of operational behavioural factors and CE practices in SMEs of an emerging economy. As the majority of the research on CE adoption has been focused on developed countries (Kirchherr et al., 2019; Jabbour et al., 2020), this study centres on the institutional setting of India, an emerging economy. The study has assessed the influence of operational behavioural factors on CE adoption among SMEs in India, which is the first attempt in this area.

7. Conclusions

CE is a significant sustainable initiative that promotes various practices such as waste management, energy consumption, optimum resource utilisation, among others. However, behavioural factors affecting the adoption of its practices in SMEs are yet to be investigated. The study has shown that operational behavioural factors are crucial for SMEs to successfully transit into CE and thus it is necessary to evaluate the influence of these factors to provide empirical evidence that could facilitate the adoption of CE in SMEs. The results obtained from the EFA and DEMATEL methods suggests that operational behavioural factors that include Circular Economy Financing (CEF), Changing Market Demands and Consumption (CMC), Organisational Resilience and SDGs (ORS) and Modern and Sustainable Society (MSS) are the causal group factors and Circularity and Consumer Engagement (CCE), Ecological Modernisation and Eco-Innovation (EMI), Green Market Reputation (GMR) are key influential factors.

This study has developed an initial roadmap for identifying and examining the causes affecting the adoption of CE, along with the range and inter-relationship among the factors instigating

direct and indirect causing effects. Decision-makers and policymakers should consider the range of the factors' influence and should take appropriate actions on the identified significant causes and effect group factors for enhancing the adoption of CE in SMEs.

The results of the current study also indicate that Modern and Sustainable Society (MSS) is the most significant causal factor for the adoption of CE in SMEs. Therefore, there is an indication that SMEs need to formulate effective strategies for building sustainable societies. Consciousness and thinking towards sustainable behaviour are some of the main motivations for enhancing CE adoption in organisations. It is the prime responsibility of organisations and governments to support CE adoption. Thus, the formulation of the new policies is very much required to effectively adopt CE. The study suggests that commitment to eco-industrial chains is the major cause of CE adoption in SMEs. The study has provided insights for SMEs that could facilitate their transformation into circular organisations that will address prominent contemporary social and environmental challenges.

This research possesses some limitations that are required to be highlighted for future similar studies to consider. The study has investigated the operational behavioural factors affecting the CE adoption in SMEs, but the capacity to transition dependent on the internal capabilities has not been considered. Thus, future studies can assess internal organisational capabilities and their impact on the adoption of CE. Previous literature has shown that an organisation's size affects CE implementation and thus its moderating effect influences the results of the present study. Therefore, organisational internal capabilities can be considered in future studies. The present study focused on SMEs only, which does not represent the whole scenario of India. Therefore, future studies can also consider organisations of other sizes, i.e. large or micro. Finally, the theoretical model developed in the current study needs to be investigated further as CE adoption is necessary for developing sustainable societies in future. Analysing operational behavioural factors for CE adoption may provide a useful purpose to optimise the efforts of government, policy-makers and decision-makers.

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1055 **Table 1:** List of operational behavioural factors for the adoption of CE practices

Sr. No.	Operational behavioural factors	Brief description	References
1.	Access to finance and risk management tools	For transitioning into a CE, a major shift is required in private and public investment. Effective oversight is required to prevent CE to become compromised and ineffectual sustainability concept.	Dewick et al., 2020; Van Langen et al., 2021; Gedam et al., 2021
2.	CE incentives and subsidised financing	CE incentives and subsidised financing could be supplemental rewards that motivate circular actions. It enables waste minimisation, recycling and other waste handling methods that are necessary for enhancing resource efficiency.	Liu and Bai, 2014; Singh et al., 2018; Chang et al., 2021
3.	Changing buying pattern of consumers	Consumer's role is vital in CE. Customers should be motivated to change buying patterns such as sharing and leasing to buy and buying used products.	Maitre-Ekern and Dalhammar 2019; Parajuly et al., 2020; Mostaghel and Chirumalla, 2021
4.	Changing lifestyle	Changing lifestyles is one of the major contributors to growing environmental problems. By promoting sustainable lifestyles in the market can lead to CE activities.	Schröder et al., 2020; Van Langen et al., 2021
5.	Commitment to eco-industrial chains	Commitment to eco-industrial chains will help to solve problems like the emerging conflicts among economic growth, resource scarcity, and environmental degradation at the meso level.	Zhao et al., 2018; Garza-Reyes et al., 2019 ; Diaz et al., 2021
6.	Cross supply chain and cross-sector green collaboration	Cross supply chain and cross-sector green collaboration enable the achievement and promotion of a CE.	Batista et al., 2018; Lin, 2018; Brown et al., 2021
7.	Customer engagement and commitment for circularity initiatives	Engaging customers efficiently enhance their commitment, which is pertinent in circular business models. The circularity is dependent on product return by the consumers.	Kant Hvass and Pedersen 2019; Maitre-Ekern and Dalhammar (2019); Mostaghel and Chirumalla, 2021

8.	Demand for sustainable products	Although the demand for sustainable products is rising. Greater awareness about sustainability and environmental damage can lead to the demand for sustainable products.	Figge and Thorpe, 2019; Cainelli et al., 2020
9.	Developing energy efficiency-driven practices	Energy efficiency-driven practices must be developed to reduce emissions and environmental footprint through the encouragement of renewable sources of energy.	Kumar et al., 2019; Ünal et al., 2019a ; Stefanelli et al., 2021
10.	Environment Conscious (EC) initiatives and competitive advantage	EC initiatives positively influence prestige and profits. SMEs' strategy should be focused on developing a competitive advantage through value generation to serve customers with greener products and services.	Prieto-Sandoval et al., 2019; Van Langen et al., 2021
11.	Ecological responsibility	Ecological responsibility means integrating responsibility into the complete lifecycle of the product.	Campbell-Johnston et al., 2020; Brown et al., 2021
12.	Educating and increasing awareness towards CE practices	However, the awareness level towards CE is not high as per the expectations and practices are also far behind. Educating and increasing awareness about the benefits of sustainable products among society will strengthen CE initiatives in SMEs.	Liakos et al., 2019; Ünal et al., 2019 ; Sharma, et al., 2021
13.	Effective and efficient communication about CE initiatives	To enable the achievement and promotion of a CE, efficient communication about CE initiatives among all members of SC is necessary.	Lin, 2018; Ünal et al., 2019a; Knickmeyer, 2020
14.	Environmentally consciousness and changing market consumption patterns	Market segmentation can help identify the opportunities and challenges of spreading CE consumption patterns. It will also help to understand changing consumer values, motivations and behaviour.	Prieto-Sandoval et al., 2019; Funk et al., 2021
15.	Fundamental reassessment of the use of resources	Fundamental reassessment of resources' utilisation means more efficient utilisation and its reuses and reduces the level of resource inputs, energy, emissions, and waste leakage, etc.	Bassi and Dias, 2019; Ferasso et al., 2020 ; Asgari and Asgari, 2021
16.	Government policies and regulations towards CE initiatives	Government policies and regulations for developing CE are still imperfect, especially in emerging economies like India. These are also unsuccessful in achieving effective norms.	Singh et al., 2018; Bertassini et al., 2021
17.	Green attitude and positioning products	The attitude of the user towards environmental concerns has a significant impact on behaviour and willingness towards recycling.	Singh et al., 2018; Knickmeyer, 2020; Van Langen et al., 2021

18.	Innovative thinking	This factor refers to being environmentally innovative. The adoption of CE practices requires the innovative thinking of SMEs.	Masi et al., 2018; Batista et al., 2019; Hussain and Malik, 2020 ; Mostaghel and Chirumalla, 2021
19.	Knowledge and skills enhancement of sustainability and future prospectus	High awareness levels and skills enhancement is needed to minimise raw material consumption in SMEs.	Liu and Bai, 2014; Tura et al., 2019 ; Sawe et al., 2021
20.	Management commitment towards sustainability	Based on case studies, success stories of CE implementation exist in an industry that is overlooked. Implementation on a large scale requires a radical change in the operations and commitment level of the management.	Ellen Macarthur Foundation, 2014; Ünal et al., 2019
21.	Moral obligation to ensure safety at workplace	Managing health & safety conditions at the workplace may bring cost reductions such as medical care, sick leave and disability benefits.	Rodrigues et al., 2020
22.	National and international business opportunities	National and international business opportunities may help SMEs in doing structural changes in their production and consumption patterns to support CE.	Patwa et al., 2020; Van Langen et al., 2021
23.	Nature resource scarcity consciousness	Nature resource scarcity consciousness will help SMEs to adopt CE initiatives in their firms.	Bassi and Dias (2019) Liakos et al., 2019
24.	New government education policies towards sustainability	Education is key to achieve full human potential, emerging as an equitable society and promoting the development of the nation.	Kumar et al., 2020; Bertassini et al., 2021
25.	Organisational culture change and monitoring	The transformation of SMEs into sustainable businesses requires organisational culture change as well as continuous monitoring.	Garza-Reyes et al., 2019
26.	Potential for new business development and synergy	CE is possible only when new business should be based on circularity, and develops innovative efforts and industrial synergy between multiple stakeholders.	Jabbour et al., 2019a; Henry et al., 2020; Mangla et al., 2021
27.	Promoting CE initiatives by financial institutions	Financial institutions can play an important role in the positive framing of CE policies, particularly the promise of combining environmental quality with economic prosperity.	Termeer and Metze, 2019; Dewick et al., 2020; Mostaghel and Chirumalla, 2021
28.	Recycling behaviour and adoption	The user's collaborative behaviour to adopt recycling is a central tenet of the CE philosophy.	Muranko et al., 2018; Hussain and Malik, 2020; Brown et al., 2021

29.	Responsible management	Responsible management means thinking of a strategy or analysis on aligning the business to responsibility, i.e. Management of hazardous wastes with a major focus on resource conservation.	Parida et al., 2019; Kristoffersen et al., 2020
30.	Responsible manufacturing	Responsible manufacturing focuses on removing environmental waste in manufacturing and recovering used materials.	Kumar et al., 2019; Ünal et al., 2019b
31.	Smart waste audit and reduction planning	Smart waste audit and reduction planning are required to manage waste efficiently.	Bassi and Dias, 2019; Kerdlap et al., 2019
32.	Social group influence	Social group influence is one of the key parameters for changing consumer behaviour. Therefore, CE initiatives must align well with enhancing well-being for people and the planet and the UN's SDG	Singh and Singh, 2019
33.	Societal mind-sets	A change of mind-sets in society towards CE initiatives, especially in developing and less developed countries, is needed for CE to be successfully adopted. The participatory actors and companies should have the right mindset and inspiration to practice CE initiatives.	Brown et al., 2019; Hussain and Malik, 2020; Mostaghel and Chirumalla, 2021
34.	System and community trust	Trust is one of the key ingredients for CE initiatives. The operative effectiveness and efficiency of the system can be improved through system and community trust.	Knickmeyer, 2020; Brown et al., 2021
35.	Government regulation and infrastructure investment opportunity	The government is a key decision-making authority for making regulations as well as infrastructure development in any country. The realigning incentives and regulatory efforts must be focused on those who can afford to change in CE initiatives.	Velenturf et al., 2018; Bertassini et al., 2021
36.	Thinking CE initiatives and cost-saving behaviour	Thinking CE initiatives and cost-saving behaviour facilitate decision-making based on sustainable outcomes at higher and operational levels.	Mendoza et al., 2019; Hussain and Malik, 2020
37.	Thinking for sustainable behaviour	Design with sustainable intent is necessary for analysis and guiding the communication for CE implementation. It may suggest numerous strategies that may appeal to distinct aspects of people's behaviour.	Chamberlin and Boks, 2018; Van Langen et al., 2021
38.	Thinking of adopting initiatives of sustainable resource management	Thinking of adoption of initiatives of sustainable resource management means lifecycle thinking and a full closure of resource loops, which is currently missing, especially SMEs.	Campbell-Johnston et al., 2019; Ebrahimi, and Koh, 2021
39.	Training and development about CE insights within the organisational level	Training and development about CE insights within an organisational level will play a key role to develop a "green" culture and encourage it from SMEs internally.	Prieto-Sandoval et al., 2019; Hussain and

			Malik, 2020; Knickmeyer, 2020
40.	Willingness to minimise waste	This behavioural factor is related to the willingness of SMEs to minimise waste and showing their intention to adopt CE practices	Garza-Reyes et al., 2019; Parajuly et al., 2020 ;

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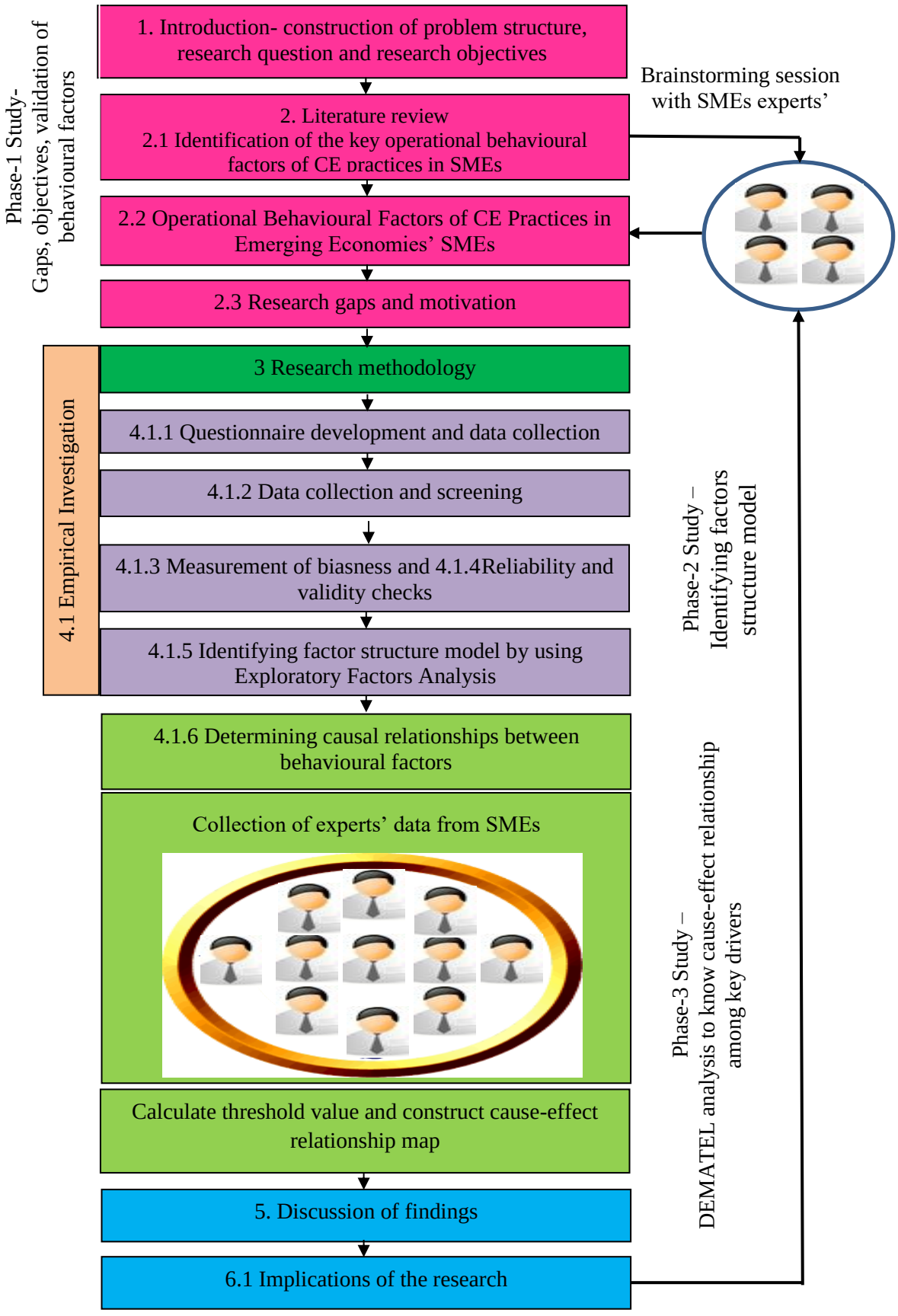

Figure 1: Methodology framework followed to conduct the study

1090 **Table 2:** Summary of respondents

Characteristics of respondents		Total	Percentage
Current position	CEO/COO/CIO	12	7.4%
	Managing Director/Executive Director	9	5.6%
	SVP/VP/AVP	13	8.0%
	Manager/Consultant	74	45.7%
	Specialist/Analyst/Engineer	36	22.2%
	Supervisor/Coordinator	13	8.0%
	Others	5	3.1%
Work experience (in years)	Less than 5	16	9.9%
	Between 5-10	36	22.2%
	Between 10 -15	43	26.5%
	Between 15 -20	24	14.8%
	More than 20	43	26.5%
Size of organisation (annual turnover)	Less than $100 million	14	8.6%
	Less than $ 500 million	25	15.4%
	Less than $ 2000 million	123	75.9%
SME type	Automotive	111	68.5%
	Pharmaceutical and Healthcare	4	2.5%
	Aerospace	1	0.6%
	IT and Consulting	9	5.6%
	Retail	4	2.5%
	Energy sector	8	4.9%
	Chemical	3	1.9%
	Food & Beverages	3	1.9%
	Electronics	2	1.2%
	Agribusiness	3	1.9%
	Others (please specify)	14	8.6%

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1092 **Table 3:** Mean, S.D., factor loading and communalities of the factors

Factors	Behaviour variables	Code	Mean	S.D.	Loading	Communalities	CR	AVE
Circular Economy Financing (CEF) (α = 0.850)	Thinking CE initiatives and cost-saving behaviour	CEF1	4.31	.821	0.767	0.589	0.89	0.63
	Access to finance and risk management tools	CEF2	4.24	.771	0.808	0.654		
	Promoting CE initiatives by financial institutions	CEF3	4.29	.787	0.740	0.548		
	Government regulation and infrastructure investment opportunity	CEF4	4.33	.825	0.798	0.637		
	CE incentives and subsidised financing	CEF5	4.36	.846	0.840	0.706		
Circularity and Consumer Engagement (CCE) (α = 0.833)	Changing buying pattern of consumers	CCE1	4.27	.796	0.748	0.560	0.88	0.60
	Customer engagement and commitment for circularity initiatives	CCE2	4.22	.793	0.751	0.564		
	Recycling behaviour and adoption	CCE3	4.28	.843	0.787	0.620		
	Societal mind-sets	CCE4	4.14	.943	0.770	0.593		
	Social group influence	CCE5	4.16	.938	0.816	0.666		
Changing Market Demands and Consumption (CMC) (α = 0.875)	Environmentally consciousness and changing market consumption patterns	CMC1	4.34	.791	0.819	0.671	0.91	0.67
	Demand of sustainable products	CMC2	4.27	.834	0.813	0.661		
	Changing lifestyle	CMC3	4.22	.870	0.803	0.645		
	Willingness to minimise waste	CMC4	4.19	.862	0.814	0.662		
	Educating and increasing awareness towards CE	CMC5	4.38	.706	0.844	0.713		
Ecological Modernisation and Eco-Innovation (EMI) (α = 0.916)	Commitment to eco-industrial chains	EMI1	4.21	.896	0.763	0.583	0.93	0.66
	Cross supply chain and cross-sector green collaboration	EMI2	4.18	.835	0.812	0.660		
	National and international business opportunities	EMI3	4.30	.765	0.861	0.742		
	Developing energy efficiency-driven practices	EMI4	4.38	.706	0.777	0.604		
	Responsible manufacturing	EMI5	4.26	.825	0.814	0.662		
	Fundamental reassessment of the use of resources	EMI6	4.28	.759	0.864	0.747		
	Potential for new business development and synergy	EMI7	4.29	.816	0.829	0.688		
	Innovative thinking	ORS1	4.43	.738	0.743	0.551		

Organisational Resilience and SDGs (ORS) (α =0.906)	Thinking of adopting initiatives of sustainable resource management	ORS2	4.31	.758	0.812	0.659	0.92	0.63
	Organisational culture change and monitoring	ORS3	4.33	.754	0.861	0.742		
	Responsible management	ORS4	4.41	.800	0.797	0.635		
	Effective and efficient communication about CE initiatives	ORS5	4.26	.838	0.751	0.563		
	Management commitment towards sustainability	ORS6	4.31	.830	0.793	0.629		
	Training and development about CE insights within the organisational level	ORS7	4.29	.839	0.796	0.633		
Green Market Reputation (GMR) (α =0898)	Ecological responsibility	GMR1	4.29	.728	0.841	0.707	0.92	0.71
	EC initiatives and competitive advantage	GMR2	4.18	.843	0.846	0.715		
	Moral obligation to ensure safety at workplace	GMR3	4.12	.976	0.861	0.742		
	System and community trust	GMR4	4.23	.896	0.848	0.719		
	Green attitude and positioning products	GMR5	4.34	.879	0.830	0.688		
Modern and Sustainable Society (MSS) (α =0.886)	Nature resource scarcity consciousness	MSS1	4.34	.723	0.818	0.669	0.92	0.66
	Thinking for sustainable behaviour	MSS2	4.29	.746	0.846	0.716		
	Knowledge and skills enhancement of sustainability and future prospectus	MSS3	4.23	.860	0.805	0.648		
	New government education policies towards sustainability	MSS4	4.17	.949	0.859	0.738		
	Smart waste audit and reduction planning	MSS5	4.31	.759	0.784	0.615		
	Government policies and regulations towards CE initiatives	MSS6	4.29	.890	0.792	0.627		

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Table 4: Average matrix for the key operational behavioural factors of CE practices

Factors	CEF	CCE	CMC	EMI	ORS	GMR	MSS
CEF	0.0000	2.6364	3.0000	2.8182	2.5455	2.9091	2.7273
CCE	2.8182	0.0000	3.0000	2.7273	3.0909	2.3636	2.5455
CMC	2.8182	3.2727	0.0000	3.0000	2.4545	2.8182	2.4545
EMI	3.0000	2.7273	2.0909	0.0000	2.3636	2.8182	2.6364
ORS	2.8182	2.6364	2.8182	2.9091	0.0000	3.0909	2.7273
GMR	2.2727	2.7273	2.3636	2.9091	2.6364	0.0000	2.8182
MSS	2.7273	3.4545	2.5455	3.2727	3.3636	2.4545	0.0000

Table 5: Normalised initial direct-relation matrix

Factors	CEF	CCE	CMC	EMI	ORS	GMR	MSS
CEF	0.000	2.636	3.000	2.818	2.545	2.909	2.727
CCE	2.818	0.000	3.000	2.727	3.091	2.364	2.545
CMC	2.818	3.273	0.000	3.000	2.455	2.818	2.455
EMI	3.000	2.727	2.091	0.000	2.364	2.818	2.636
ORS	2.818	2.636	2.818	2.909	0.000	3.091	2.727
GMR	2.273	2.727	2.364	2.909	2.636	0.000	2.818
MSS	2.727	3.455	2.545	3.273	3.364	2.455	0.000

Table 6: Total relation matrix (*T*) pertaining to the operational behavioural factors of CE practices

Factors	CEF	CCE	CMC	EMI	ORS	GMR	MSS
CEF	1.7970	*2.0152*	1.8781	*2.0410*	*1.9192*	*1.9353*	1.8765
CCE	*1.9282*	1.8796	1.8731	*2.0307*	*1.9362*	1.9067	1.8629
CMC	*1.9484*	*2.0566*	1.7483	*2.0636*	*1.9300*	*1.9456*	1.8791
EMI	1.8465	1.9189	1.7486	1.8039	1.8175	1.8367	1.7812
ORS	*1.9666*	*2.0496*	1.9023	*2.0799*	1.8272	*1.9762*	1.9089
GMR	1.8258	*1.9297*	1.7689	*1.9549*	1.8389	1.7097	1.7981
MSS	*2.0422*	*2.1657*	*1.9672*	*2.1778*	*2.0657*	*2.0275*	1.8520

Note: to avoid minor effects, all values above the threshold value ($\alpha = 1.9192$) are italicised and plotted on the digraph.

Table 7: Impact results of operational behavioural factors

Factors	***r***	***c***	***r + c***	***r - c***	**Impact**
CEF	13.462	13.355	26.817	0.107	Cause
CCE	13.417	14.015	27.433	-0.598	Effect
CMC	13.572	12.886	26.458	0.685	Cause
EMI	12.753	14.152	26.905	-1.398	Effect
ORS	13.711	13.335	27.045	0.376	Cause
GMR	12.826	13.338	26.164	-0.512	Effect
MSS	14.298	12.959	27.257	1.339	Cause

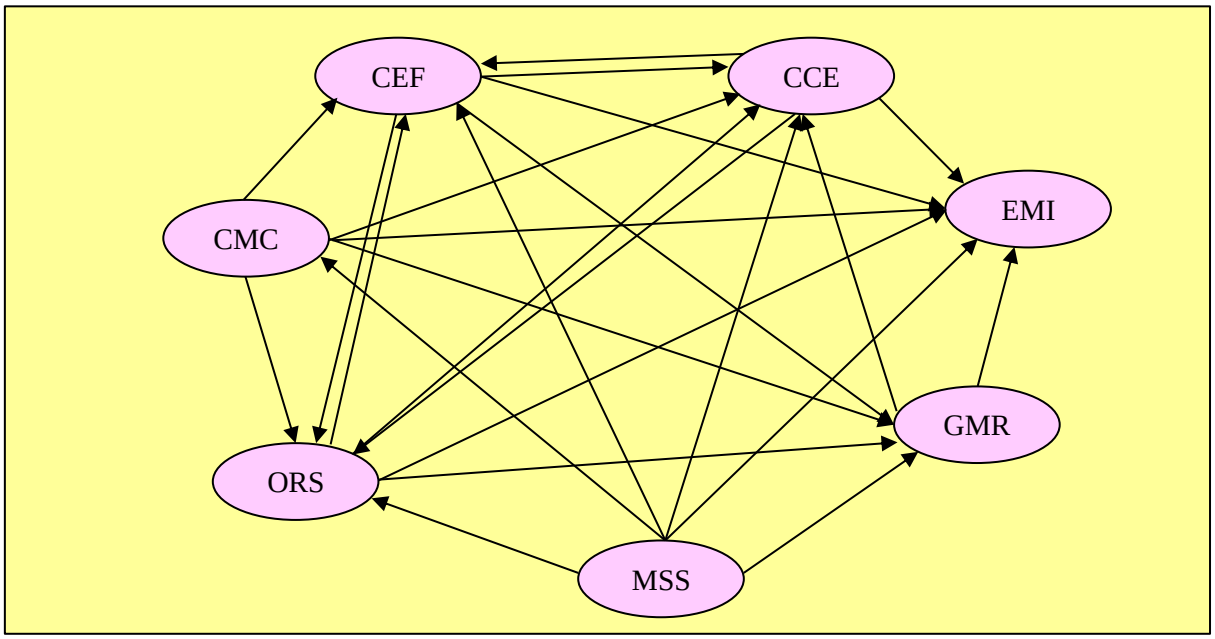

Figure 2: Causal relationship digraph of the main behaviour factors

Table 8: Impact results of behaviour sub-factors

Factors	Code	*r + c*	*r - c*	Impact
Circular Economy Financing (CEF)	CEF1	47.8778	0.1645	Cause
	CEF2	46.6720	1.1380	Cause
	CEF3	45.3616	-0.1671	Effect
	CEF4	45.6826	-1.4333	Effect
	CEF5	46.7369	0.2979	Cause
Circularity and Consumer Engagement (CCE)	CCE1	33.3024	0.9637	Cause
	CCE2	32.9478	0.4648	Cause
	CCE3	31.1325	0.3611	Cause
	CCE4	32.3347	-1.2851	Effect
	CCE5	33.5223	-0.5045	Effect
Changing Market Demands and Consumption (CMC)	CMC1	15.7337	0.0982	Cause
	CMC2	15.9268	0.0209	Cause
	CMC3	15.8249	-0.1671	Effect
	CMC4	16.2119	-0.7889	Effect
	CMC5	16.8699	0.8369	Cause
Ecological Modernisation and Eco-Innovation (EMI)	EMI1	43.9975	1.2438	Cause
	EMI2	43.0148	-1.5587	Effect
	EMI3	43.9868	0.6563	Cause
	EMI4	42.6193	-0.5375	Effect
	EMI5	43.4786	0.9251	Cause
	EMI6	45.2934	0.1289	Cause
	EMI7	43.5845	-0.8580	Effect
Organisational Resilience and SDGs (ORS)	ORS1	20.9306	-0.0254	Effect
	ORS2	19.9189	-0.6304	Effect
	ORS3	19.8423	0.5218	Cause

	ORS4	20.3352	0.4970	Cause
	ORS5	20.8967	-0.2963	Effect
	ORS6	21.2486	-1.0217	Effect
	ORS7	20.6004	0.9550	Cause
Green Market Reputation (GMR)	GMR1	18.9944	0.5952	Cause
	GMR2	17.9092	0.5005	Cause
	GMR3	17.8921	0.2199	Cause
	GMR4	18.5277	-1.1252	Effect
	GMR5	20.0817	-0.1905	Effect
Modern and Sustainable Society (MSS)	MSS1	18.6078	-1.1918	Effect
	MSS2	17.5784	0.6273	Cause
	MSS3	18.5590	-0.1084	Effect
	MSS4	18.4749	-0.1597	Effect
	MSS5	17.7026	0.2422	Cause
	MSS6	18.1659	0.5903	Cause

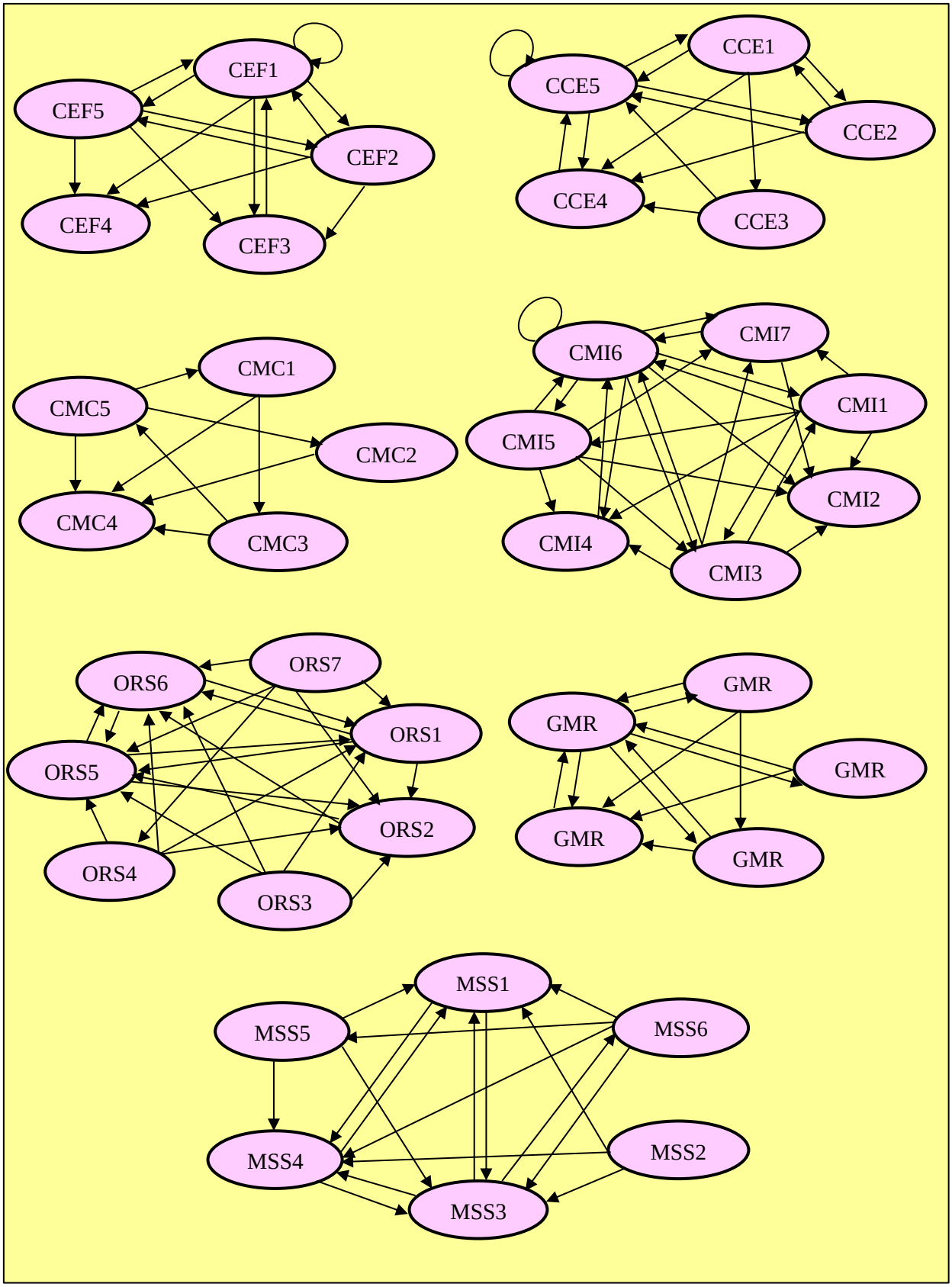

Figure 3: Network relationship digraphs of the sub-factors