

Assessing people-driven factors for circular economy practices in SME supply chains: business strategies and environmental perspectives

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Abstract: Globalisation and technological advancements have increased the pressure on small businesses to increase their productivity and to gain competitive advantages. That pressure has been placed on the resources available, resulting in increased environmental degradation as a result of the traditional linear model of make-use-dispose. Circular economy (CE) practices offer the opportunity for sustainable production based on the reuse-remanufacture and recycling of resources for small and medium-sized enterprises (SMEs) to increase their sustainability, resulting in enhanced performance levels in terms of business strategies and environmental perspectives. But in academic literature, the role of people-driven factors (PDFs) in the adoption of CE practices in the supply chains (SCs) of SMEs is limited. Therefore, to fill this literature gap, this research looks at analysing PDFs for the implementation of CE in the SMEs in developing countries in two phases. PDFs are identified from an extensive literature review; a DEMATEL technique is then employed to understand the significant influence of each factor in the adoption of CE practices in SCs by dividing them into cause-effect groups. The findings show that PDFs such as training and knowledge sharing, employee participation, leadership and management plus strategic alignment are considered to be the most important significant factors in the adoption. The findings of this study will help industrial managers to understand the significance of the role of PDFs for enhancing business strategies; these findings can reduce the negative environmental impact in the adoption of CE practices in the SCs of SMEs.

Keywords: Enhancing strategies; people-driven factors; circular economy practices; DEMATEL.

1. Introduction

Organisations over the last two decades have seen an increase in production and consumption; this has mainly been attributed to the growth and development of globalisation and technological advances as more options and choices become available for customers (Jaffry et al., 2004; Maurizio et al., 2020). In this environment, organisations are under constant pressure to quickly respond to the dynamic market conditions to gain high market share and maintain a greater competitive advantage in their respective SCs (Garza-Reyes, 2010). Globalisation has not only created pressure for both small and medium-sized

enterprises (SMEs) to enhance their business performance, but has also driven organisations to profoundly consider their environmental performance as well (Bai et al., 2015; Dey et al., 2020). A report by the World Economic Forum (2015) has shown that the total population worldwide has exponentially grown over the last few centuries; a recent increase is from 3.3 billion in 1965 to 7.2 billion by 2015 (Fraser, 2017). This presents businesses with both new opportunities and challenges as technological advances have transformed several products and market sectors and how their supply chains (SCs) operate (Geissdoerfer et al., 2017).

As previously mentioned, 21st-century organisations are continuously seeking to improve their financial performance to add value in their SCs (Kalyar et al., 2019). This situation suggests that if organisations can effectively leverage the benefits of sustainability, this can be a factor that will enhance the performance of the core SC functions i.e., planning, sourcing, procuring, distribution etc. Genovese et al. (2017) suggested that this is achieved through effective integration of environmental initiatives such as CE with the overall supply chain management (SCM) strategy, resulting in an overall improvement in organisational supply chain performance. Therefore, it can be argued that if organisations are to survive, their focus should move away from individual competition to making efforts to adopt leading technologies and practices, supplier evaluation, quality improvements and long term continuous improvement.

Much of the research that has been done mainly examines the hard dimensions of implementing CE and very few of the people driven factors. In support of this, Muduli et al. (2013) point out that human-related factors have mostly been left out of supply chain analysis, while major steps have been taken in technological impacts. This suggests that failure to address effective integration of critical human success factors can have a major negative impact that can hinder the successful implementation of CE practices in organisations.

Thus, this research is mainly focused on developing a framework for evaluating people-driven factors related to the implementation of CE. The following are the set objectives:

- To identify the key people driver factors towards enhancing CE practices in the supply chains (SCs) of SMEs.
- To identify the inter-relationships among the human resource-related factors towards enhancing CE practices in the SCs of SMEs.

- To provide suggestions and recommendations for adoption of CE practices in the SCs of SMEs.

An extensive review of relevant literature as well as expert opinions and inputs have been used as key PDFs for the adoption and implementation of circular supply chains (CSC). This study has deployed a DEMATEL technique in prioritising as well as evaluating the inter-relationships among CE practices (Sivakumar et al., 2018). The focus of this study is to develop a framework for analysing and assessing the CE implications based on the SMEs of developing countries. The adoption and implementation of CE practices in SMEs can be important in enhancing process improvement and hence boosting productivity and profitability.

This paper has six sections. Section 1 starts with the introduction of the study and its motivation. A literature review is presented in section 2. Section 3 starts with identification of people driven factors in the adoption of CE practices in supply chains. Section 4 includes analysis of factors. Discussion and implications are presented in section 5. Finally, conclusions and future research directions are presented in section 6.

2. Literature review

Over the years, several studies (Dubey et al., 2017; Sivakumar et al., 2018) have been conducted on CE and CSC as a business model that can make major contributions to enhancing organisational quality and performance improvements. For instance, in the current dynamic business environment, organisational performance levels are not only based on financial performance but rather on how effective they are in integrating and implementing sustainable practices to enhance environmental performance (Govindan et al., 2015). Therefore, it can be argued that the main goal for implementing CE is to ensure that organisations can both effectively and efficiently achieve high levels of financial performance while incorporating waste reduction strategies that would allow efficient flow of goods with minimal environmental pollution in their SCs (Ghisellin et al., 2016).

In an effort to reduce the environmental impacts brought on by the manufacturing sector, an interest in the implications of CE and CSC on SCM has caught the attention of both scholars and practitioners in identifying areas of improvement and reduction of waste in the SC process (Webster, 2015; Sivakumar et al., 2018) and its relevance in SC innovation in the move towards CE. Al-Ghwayeen and Abdallah (2018) point out that effective eco-friendly

strategies and policies should be employed by organisations that enable preventive actions on reducing environmental distraction along supply SCs such as lean and green practices which aim to reduce and remove waste in the SC network. By enforcing these practices, organisations will be able to transform those SCM activities that are essential for enhancing value creation by reusing, remanufacturing and recycling. Given the ongoing increase in awareness of environmental issues, organisational supply chains are becoming more compelled to reconsider and reinforce sustainable initiatives and transactions between themselves and customers (Al-Ghwayeen and Abdallah, 2018; Entezaminia et al., 2017). The result of this situation suggests that a large number of organisations have started to move from the traditional/linear/open-loop model of manufacturing to a modern circular framework to enhance SC sustainability in a move towards CE.

To appreciate the concept of CE and its impacts, it is vital to analyse the various definitions that have been used in the literature currently available. Merli et al. (2018) have highlighted how natural resources influence the economy, as they provide production and consumption as inputs as well as waste in terms of outputs. Moreover, during the '70s the definition of CE was further expanded with more features focused on factors such as industrial economics (Stahel and Reday, 1976). They conceptualised CE as a loop economy to redefine industry strategies for better waste prevention and resource efficiency (Geissdoerfer et al., 2017). The emphasis was on the idea of effective resource utilisation as a business model that can allow organisations to make a profit without the costs and risk associated with the waste (Stahel, 1982). However, one of the most renowned definitions of the concept has been framed by the Ellen MacArthur Foundation, who point out that CE is an 'industrial economy model that is restorative and regenerative by intention and design' (EMF, 2012). In support of this, Yuan et al. (2006) add that the CE model acts as a restorative factor that encourages organisations to keep their materials, products and components at their highest value at all stages in the manufacturing cycle.

In the last three decades, technology has been incremental in not only improving operational performance but has also been vital for increasing sustainability as a major driver for implementing CSCs (Tukker, 2015). In addition, new technology, according to Müller et al. (2018), has increased the traceability of products in SCs which in turn helps manufacturing organisations to optimise both the product and production. By doing so, this allows these organisations to be able to identify areas for improvement and to deliver more efficient and effective use of resources; this enables a CSC strategy (Erol, 2016). Despite this, it can be argued that although technology plays a major role in identifying performance improvements

in many areas, little attention has been paid to analysing the human factors and behaviours involved (Glock et al., 2017). This study asserts that humans are part of every manufacturing system and are involved in all stages such as assembly, transportation, installation, use and the overall lifecycle of the system. Erol (2016) maintains that organisational competitive advantage is based on how well managers can effectively manage and integrate human resource factors with advanced systems and practices in implementing and adopting CE. CE concepts and practices help manufacturing organisations in developing countries by reducing their operational costs, promoting better working conditions and flow of information, value creation and higher quality in delivery. To assist organisations in implementing CSC practices, Dubey et al. (2017) developed a framework of integrating both hard dimensions (technologies, strategies and policies) with soft dimensions (people driven factors). Factors such as employee engagement, training and management support are vital elements to consider rather than only focusing on the hard dimension elements in implementation of CE (Sweeny, 2013). Despite these general observations (Muduli et al., 2013; Glock et al., 2017), the consensus of opinion among researchers is that human factors have been largely neglected in manufacturing and engineering literature.

Based on these different perspectives, CE can be defined as a regenerative process in which input resources, waste and emissions are reduced in the production process by closing or narrowing the loops (Geissdoerfer et al., 2017). This is achieved by a continuous process of redesigning, remanufacturing, reusing and finally recycling (EMF, 2012). Zhan et al. (2018) agree that CE is not just about the protection of the environment, but is also a factor that promotes a shift of the value chain by reducing unnecessary waste through moving from a linear to a circular model. If used effectively, this can boost overall supply chain performance and value creation by reducing waste, operational costs, reducing lead time and therefore, enhancing productivity and profitability

2.1 Benefits of a Circular Economy as a Business Model

Business models are a series of strategic decisions and structures within an organisation that represent a set of values, activities and patterns of work with the sole purpose of enabling an organisation to achieve its aims and objectives (Zott et al., 2011). Several authors have highlighted the importance of viewing business models as commercial strategies and structures that support the overall goals and direction of an organisation for development (Mont, 2002; Manzini and Vezzoli, 2003). They agree that most organisations view these models as opportunities to exploit or launch new value-adding opportunities for more durable

and safer products as well as eliminating waste in the process. As such, CE can be argued as a business model that is responsible for enhancing value creation by enabling circularity in all SC activities of an organisation.

As previously mentioned, SCs are one of the key business elements that, when managed effectively, can be a major driver for change towards implementing a more sustainable business model (EMF, 2012). By effectively identifying and integrating CE as a strategic business model, this can be a major influencing factor for organisational development (Agrawal et al., 2020). For instance, a practitioner literature review conducted by EMF suggests that transition to a CE could reduce the consumption of primary materials in the food, construction and manufacturing sectors from 32% by 2030 to 53% by 2050 in the European Union (EU). They suggest that implementation of CE would involve a set of practical value creation mechanisms that have positive effects on enhancing productivity and therefore boosting competitiveness. This would result in reducing costs of imported raw materials and components that account for 40-60% of the total spend in the EU, hence generating cost savings of about €600m. With regard to both business and economic opportunities, researchers (Gregson et al., 2015; Murray et al., 2017) agree that CE can build overall prosperity without the depletion of natural resources. This viewpoint suggests that a CE model in macro-economic terms has the potential to provide organisations with a win-win situation (Jabbour et al., 2019).

2.2 Implications of Circular Supply Chains

SCs and SCM concepts gained huge attention during the late 70's and 80's. The rise of globalisation, the growth of technology and the invention of containerisation in the 60's (El Kalla, 2017) focused researchers on these concepts. As business and population grew so did the need to find strategic solutions on how to reduce the complexities of business to business, business to customer and customer to customer networks. The traditional SCM concept was largely associated with the operations management of an organisation, based on the performance control and flow of information among collaborating organisations (upstream/suppliers) to the ultimate satisfaction of the end-users (downstream/customers) (Hines et al., 2000; Defee and Stank, 2005 and Hult et al., 2007). However, the central theme of contemporary literature during that time points out that SCs and SCM aim to deliver effective and efficient management of both upstream and downstream activities to enable delivery of superior value-adding solutions at least cost. These remarks suggest that the main objectives of SCs were to be able to reduce cost and throughput time, therefore underpinning

the traditional view of SC (Korhonen et al., 2018). On the other hand, one of the most important developments in current literature on SC strategy has been the connection between sustainability and lean practices where organisations emphasise ‘doing more with less’ while also reducing the overuse of resources (Mollenkopf et al., 2010). Despite this, it can be argued that the association between SCM and sustainability owes its interest to the closed-loop model of remanufacturing and product recovery literature. Based on the above analysis, it can therefore be argued that the CE closed loop has vital implications towards the development of SCs and logistics. For example, with the implementation of reverse logistics (RL) in organisations, SC plays a major role in reinforcing CE principles; these are both essential and relevant in product return, recovery and recycling, resulting in enhancing value creation and minimising waste. According to research conducted by Ripanti et al. (2015) on CE and RL applications in product remanufacturing, these two concepts have close relationships and play a vital role in enhancing process improvement and performance in the manufacturing sector. As such, when organisational SCs shift from a linear system to a CE with RL, Frei et al. (2015) point out that this process creates an effective downstream value recovery process of planning, controlling and managing the flows of materials and components. Organisational activities of RL can be a factor that facilitates reduction of cost and value retrieval by enabling better quality improvements, damage control etc. which can result in boosting competitive advantage (Ripanti et al., 2015).

2.3 Implementation issues of Circular Economy

As previously mentioned, the strategic decision of employing the CSC model approach in organisations can have several positive implications that distinguish the traditional linear SC from a more CSC based system. These implications, as seen in the above analysis, do not only enhance organisational performance and competition but also prevent environmental damage; this can result in maximising competitive advantage (Stahel, 2013). Despite this, scholars such as Guide et al. (2003) and Korhonen et al. (2018) suggest that introducing CE or RL supply chain activities into a business can become a complex process. They state that recycling products is rarely seen as a value-adding system, pointing out that the process of product disassembly and remanufacturing can be difficult as conditions that are used on different products do not only vary but, as components are spread around the globe, they can be difficult to retrieve. As a result, despite the fact that closed-loop SC and RL can have major positive implications, on the other hand they can present challenges both at design and operational levels. Researchers have noted that although RL activities have been

implemented in sectors such as the auto industry since the 1920s, contemporary businesses still treat closed-loop systems as silos rather than an integrated process; this has resulted in slow adoption and implementation. Also, current literature has highlighted an over-dependence on technological activities at the neglect of human factors for enabling change from traditional approaches. This has also been a factor that has limited implementation (Muduli et al., 2013; Govindan and Hasanagic, 2018).

3. Proposed People Driven Factors

Previous studies have shown that there is a clear link between people factors and the implementation of environmental management systems (EMS) (Massoud et al., 2011). Furthermore, the human resource (HR) department of organisations and its relevance in the adoption and implementation of innovation, quality management and lean manufacturing has been a major focus in contemporary literature. Over the years both the PDF and CE business models have gained a lot of attention from scholars. However, the research exploring inter-relationships between the two concepts has remained scarce with limited sources. Moreover, Jabbour et al. (2019) point out that while the understanding and awareness of the principles of CE have been widely taken into consideration, there is still a relatively limited amount of attention given to the concept despite its potential in significantly enhancing organisational competitiveness. While research on the technical aspects (hard dimensions) of CE have been widely explored (Dubey et al., 2017), the people-driven factors (PDFs) still require further development. The disregard of the PDFs of CE has contributed to the fact that the implementation and adoption of CE practices in organisations remains a challenge.

Previous research studies have observed the roles that people play, in not only enabling and enhancing organisational goals and objectives, but also in implementing practices to boost performance (Jiang et al., 2012; Yusliza et al., 2019). Research work by Nejati et al. (2017) shows that the human contribution in implementing sustainable SCM goes far beyond organisational boundaries and should be managed effectively to ensure optimum successful implementation. Human resources (HR) and HRM practices have become a central theme in organisational development, with theories such as stakeholder management suggesting that the most relevant factor of interest is the organisation's employees (Murray et al., 2017). As such, it can be argued that HR can play a vital role in engaging and supporting the overall goals of organisations in introducing new ways of enhancing supply chain sustainability such as CE. Based on the above analysis, it can be seen that people factors play a vital role in enabling the implementation and achievement of performance enhancement practices

(Govidan et al., 2015). Therefore, a comprehensive literature review was conducted in this study to identify these people factors; they are described below.

3.1 *Strategic Management and Leadership Practices (PDF1)*

This is one of the most critical key factors in organisations that not only facilitates the decision-making process but also initiates the vision for implementation and adoption of essential strategic planning and operations of the firm. This can affect both its internal and external environment. Also, the lack of effective decision making from both top and middle-tier managers can result in a lack of drive and motivation to implement CE as a business model; a failure to raise awareness of the relevance of CE results in delay and hindrance to making a successful implementation. The managerial and leadership perception of sustainability is a critical factor that facilitates frameworks and policies in enhancing circular practices (Bansal and Roth, 2000; Jenkins, 2006; Giunipero et al., 2012).

3.2 *Inclusive Communication (PDF2)*

Effective communication involves inclusive top-down and bottom-up communication within an organisation. Good communication within an organisational setting aims to effectively integrate external and internal stakeholders such as employees, suppliers, customers and other SC agents to be able to achieve overall goals and objectives. One of the major implementation strategies for CE is the role played by effective communication in the adoption of CE practices. This includes the overall strategies, tools and support mechanisms that are put in place to enhance better knowledge, skills and information sharing among different business functions within an organisation (Ngai et al., 2008; Govidan and Hasanagic, 2018).

3.3 *Strategic Employee Participation and Recruitment (PDF3)*

Value creation and maintenance are some of the key core factors that drive the objectives and goals of an organisation to remain competitive. It should also be recognised that the ability of an organisation to recruit and retain quality employees can be a major factor that boosts and maintains value creation, resulting in the production of quality merchandise and services, hence boosting competitive advantage (Massoud et al., 2011; Muduli et al., 2013).

3.4 *Performance Appraisal (PDF4)*

Performance appraisal and effective reward systems are key factors to consider in the evaluation and implementation of sustainable practices in an organisation. Compensation management structures in an organisation play an important role in linking employee motives

to the overall organisational goals and objectives. It can therefore be argued that performance appraisals and reward systems should be an important part of the strategic approach of aligning HR and organisational policies.

3.5 *Organisational Culture (PDF5)*

Organisational culture can be defined as a set of rules, principles and traditions that have developed over a certain period within an organisation and has been transmitted across generations of employees (Ngai et al., 2008). Green organisational culture initiatives rely on the desire and motivation of the organisation to become involved in environmentally friendly practices. Similarly, organisational culture plays a critical role in attracting and retaining motivated and competent employees.

3.6 *Organizational Change Management (PDF6)*

Jabbour et al. (2019b) state that change is an ever-present and occurring factor in an organisational life cycle. Organisational readiness for change can be a major determinant towards successful change management and adoption of environmentally friendly practices that can have an impact on how work processes are achieved. Muduli et al. (2013) support the fact that for organisations to successfully implement CE practices, change readiness should be a core competence.

3.7 *Training and Knowledge Sharing (PDF7)*

Training can be referred to as a systematic process that equips employees with the necessary skill sets to accomplish the goals and objectives that have been laid down by an organisation (Muduli et al., 2013). CE, being a cultural transformative business model, requires adequate and relevant training to be provided to employees; insufficient training can result in employees being unable and unwilling to participate in the change process (Govidan and Hasanagic, 2018).

3.8 *Strategic Planning and alignment (PDF8)*

Strategic planning and alignment are imperative as they provide a framework that enables an organisation to provide a proactive decision-making process that evaluates the performance of the set goals and objectives towards implementing CE activities by assessing the risks and strategies to mitigate these risks (Muduli et al., 2013; Massoud et al., 2011). Selection of specific CE practices can assist in effective planning towards implementing sustainable environmental decisions that can enable an effective strategic alignment (Kahn et al., 2012).

3.9 *Mutual Trust (PDF9)*

As previously mentioned, organisations are under constant pressure due to the unpredictable and dynamic market environment which has resulted from globalisation and technological developments. This has generated the development of new ideas and systems that need mutual trust and understanding between different stakeholders within an organisation's SC to cope with internal and external business changes. Trust among employees within an organisation increases positive internal relationships and knowledge sharing, resulting in the creation of a common strategic vision (Muduli et al., 2013; Muduli et al., 2013).

3.10 *Strategic Partnership and Relationships (PDF10)*

Strategic partnerships and relationships relate to the collective effort of individuals or groups of people who share a common purpose and values, working together to achieve a common goal or objective within specific settings. Organisational mutual trust, respect and understanding can only be developed when both top management and employees work together to identify solutions to enhance environmentally friendly practices that are sustainable (Muduli et al., 2013; Chin et al., 2015).

3.11 *Intention and motivation towards green initiatives (PDF11)*

Green progression can be described as processes or activities that aim to improve organisational resource efficiency by minimising resources used in the production of unit outputs, as well as resource productivity in enabling the generation of added value from the resources used (Frone, 2017). These are the creative solutions that are generated from either individual or cross-functional groups of employees (Dubey et al., 2017); moreover, innovative ideas are generated when there is sufficient support and development initiatives within an organisation that enable learning through knowledge sharing and skill improvement. Adequate training programmes that focus on environmental issues can encourage employees to devise eco-innovative solutions that can benefit both the staff and increase organisational competitive advantage by improving ecological efficiency.

3.12 *Green Project Management (PDF12)*

Project management encompasses the planning, implementation, evaluation and management of projects in an organisation. If not managed effectively, organisational response to change can lead to negative outcomes and other associated risks as employees tend to resist change (Dubey et al., 2017). Project management is an essential tool that equips managers with the necessary skills to be able to manage change effectively; leaders have to devise risk

management solutions that enable organisations to reduce risks in the implementation of organisational development practices such as CE (Ngai, 2008).

3.13 *Customer Relationship Management (PDF13)*

Customer Relationship Management (CRM) is a fundamental critical success factor that can be used by manufacturing firms in managing their relationship with customers; good managers enhance and promote CSC practices from the purchasing stages to the eventual return, reuse and remanufacture of products (Stock et al., 2010). The growing concern over plastic wastage and environmental pollution has led globally to a growing number of customers not only changing their ways on waste disposal, but also increasing pressure on organisations to implement new practices in which recycling, reuse and remanufacturing of products can be enhanced (EMF, 2012).

3.14 *Welcoming green initiatives (PDF14)*

Motivating employees involves initiatives and activities that can be used in organising, planning and creating a better environment to promote circular activities. The ability of the leadership and management in guiding its employees in the step-by-step process in the adoption and implementation stages creates an environment where individuals feel included and involved, hence promoting effective participation and greater commitment (Muduli et al., 2013).

4. **Analysis of people driven factors of CE in SCs of SMEs**

To achieve the objectives of the study, the research methodology framework presented in Figure 1 was followed.

Figure 1. Methodology framework followed to conduct the study

4.1 *Analysis of factors using DEMATEL methodology*

The causal relationship of people driven factors of CE are analysed using Decision Making Trial and Evaluation Laboratory (DEMATEL) methodology. DEMATEL is a MCDM methodology which is widely used by many researchers in different fields of applications. [Yadegaridehkordi et al. \(2018\)](#) used DEMATEL to analyse the factors influencing adoption of big data technologies. [Nilashi et al. \(2019\)](#) used DEMATEL to analyse inter-relationships among factors influencing adoption of medical tourism in Malaysia. [Song et al. \(2020\)](#) used DEMATEL to analyse the inter-relationships among barriers of sustainable production. [Garg \(2021\)](#) uses a DEMATEL method to analyse cause and effect groups of e-waste mitigation strategies. To measure the cause-and-effect relationships among PDFs, DEMATEL is a widely used method to build a cause-effect model of selected factors. Experts were asked to rate the impact based on 0-4 scale (i.e. ‘0’ means no influence and ‘4’ means very high influence). The steps of DEMATEL are shown below:

Step 1: Development of initial direct relation matrix. In this step, we asked a panel of experts to provide a rating to each factor by comparing it with others. Data was collected in the form of 0-4 scale where 0 signifies no influence and 4 signifies very high influence. The average direct relation matrix (A) is formed using Eq. (1) as shown in Table 1.

$$A = a_{ij} = \text{where } p \text{ is number of experts,} \quad (1)$$

<Insert Table 1 here>

Table 1. Initial direct relation matrix of people driven factor for CE

	PDF1	PDF2	PDF3	PDF4	PDF5	PDF6	PDF7	PDF8	PDF9	PDF10	PDF11	PDF12	PDF13	PDF14
PDF1	0.000	3.667	3.556	3.111	3.222	3.222	3.111	3.333	2.889	3.333	3.222	3.556	2.889	3.556
PDF2	3.111	0.000	2.556	3.111	3.111	3.556	2.889	3.556	3.000	2.444	2.111	3.667	3.222	2.778
PDF3	3.000	2.444	0.000	2.889	2.444	2.667	3.333	3.444	3.111	3.556	3.222	3.222	3.111	3.556
PDF4	3.444	3.111	2.778	0.444	3.333	3.444	2.111	3.000	3.111	2.889	2.778	3.222	3.333	3.222
PDF5	2.778	3.111	2.556	3.444	0.000	3.556	2.667	3.444	3.111	3.000	3.111	3.222	3.111	3.333
PDF6	3.222	3.222	2.667	3.333	3.556	0.000	3.111	3.667	3.222	2.778	2.778	2.778	2.889	2.778
PDF7	3.444	3.000	3.222	3.222	3.000	3.111	0.000	3.222	3.556	3.333	3.222	3.444	3.111	3.333
PDF8	3.556	3.111	3.000	3.556	3.556	3.444	3.111	0.000	2.889	3.000	3.000	3.667	3.444	3.556
PDF9	2.889	3.556	2.889	3.333	3.222	3.444	3.222	2.889	0.000	3.444	2.889	3.000	3.000	3.000
PDF10	2.667	2.222	2.556	2.667	2.889	3.000	2.667	2.444	2.778	0.000	3.444	2.222	1.778	2.667
PDF11	2.778	2.222	2.667	2.444	2.667	2.222	2.667	2.889	3.111	3.444	0.000	2.333	2.000	2.667
PDF12	3.111	2.889	2.778	3.444	3.111	2.889	3.000	3.111	3.111	2.111	2.333	0.000	2.556	2.667
PDF13	3.111	2.556	2.556	2.667	2.667	2.444	2.444	3.111	2.444	2.111	2.222	2.889	0.000	2.333
PDF14	3.222	3.000	3.000	3.222	3.444	3.000	3.000	3.333	3.000	2.556	2.889	2.778	2.778	0.000

Step 2: Calculation for normalized relationship matrix. After development of initial direct relation matrix, the next step is to calculate normalized direct relation matrix. Equations 2 and 3 were used to calculate elements of the normalized relationship matrix. The normalized direct relationship matrix for people driven factors of CE is presented in Table 2.

(2)

(3)

Table 2. Normalized relation matrix of people driven factor for CE

	PDF1	PDF2	PDF3	PDF4	PDF5	PDF6	PDF7	PDF8	PDF9	PDF10	PDF11	PDF12	PDF13	PDF14
PDF1	0.0000	0.085	0.0829	0.0725	0.075	0.0751	0.07	0.0777	0.06	0.0777	0.075	0.0829	0.0674	0.0829

		5			1		25		74		1			
PDF2	0.0725	0.0000	0.0596	0.0725	0.0725	0.0829	0.0674	0.0829	0.0699	0.0570	0.0492	0.0855	0.0751	0.0648
PDF3	0.0699	0.0570	0.0000	0.0674	0.0570	0.0622	0.0777	0.0803	0.0725	0.0829	0.0751	0.0751	0.0725	0.0829
PDF4	0.0803	0.0725	0.0648	0.0000	0.0777	0.0803	0.0492	0.0699	0.0725	0.0674	0.0648	0.0751	0.0777	0.0751
PDF5	0.0648	0.0725	0.0596	0.0803	0.0000	0.0829	0.0622	0.0803	0.0725	0.0699	0.0725	0.0751	0.0725	0.0777
PDF6	0.0751	0.0751	0.0622	0.0777	0.0829	0.0000	0.0725	0.0855	0.0751	0.0648	0.0648	0.0648	0.0674	0.0648
PDF7	0.0803	0.0699	0.0751	0.0751	0.0699	0.0725	0.0000	0.0751	0.0829	0.0777	0.0751	0.0803	0.0725	0.0777
PDF8	0.0829	0.0725	0.0699	0.0829	0.0829	0.0803	0.0725	0.0000	0.0674	0.0699	0.0699	0.0855	0.0803	0.0829
PDF9	0.0674	0.0829	0.0674	0.0777	0.0751	0.0803	0.0751	0.0674	0.0000	0.0803	0.0674	0.0699	0.0699	0.0699
PDF10	0.0622	0.0518	0.0596	0.0622	0.0674	0.0699	0.0622	0.0570	0.0648	0.0000	0.0803	0.0518	0.0415	0.0622
PDF11	0.0648	0.0518	0.0622	0.0570	0.0622	0.0518	0.0622	0.0674	0.0725	0.0803	0.0000	0.0544	0.0466	0.0622
PDF12	0.0725	0.0674	0.0648	0.0803	0.0725	0.0674	0.0699	0.0725	0.0725	0.0492	0.0544	0.0000	0.0596	0.0622
PDF13	0.0725	0.0596	0.0596	0.0622	0.0622	0.0570	0.0570	0.0725	0.0570	0.0492	0.0518	0.0674	0.0000	0.0544
PDF14	0.0751	0.0699	0.0699	0.0751	0.0803	0.0699	0.0699	0.0777	0.0699	0.0596	0.0674	0.0648	0.0648	0.0000

Step 3: Computation for total relation matrix. In this step, total relationship matrix is computed as shown in Equation 4. Equation 5 is used to compute total relation matrix. The computed total relationship matrix for people driven factors of CE is presented in Table 3.

(4)

(5)

Table 3. Total relation matrix of people driven factor for CE

	PDF1	PDF2	PDF3	PDF4	PDF5	PDF6	PDF7	PDF8	PDF9	PDF10	PDF11	PDF12	PDF13	PDF14
PDF1	0.7517	0.7933	0.7659	0.8304	0.8210	0.8171	0.7663	0.8428	0.7967	0.7816	0.7664	0.8230	0.7611	0.8132
PDF2	0.7636	0.6619	0.6942	0.7741	0.7633	0.7686	0.7096	0.7901	0.7441	0.7101	0.6914	0.7702	0.7166	0.7425
PDF3	0.7719	0.7253	0.6481	0.7798	0.7600	0.7605	0.7288	0.7982	0.7570	0.7437	0.7249	0.7710	0.7233	0.7689
PDF4	0.7856	0.7441	0.7129	0.7310	0.7832	0.7816	0.7080	0.7946	0.7614	0.7341	0.7196	0.7761	0.7328	0.7666
PDF5	0.7758	0.7472	0.7116	0.7999	0.7146	0.7873	0.7226	0.8071	0.7650	0.7397	0.7297	0.7794	0.7315	0.7722
PDF6	0.7806	0.7458	0.7102	0.7936	0.7870	0.7069	0.7279	0.8074	0.7633	0.7317	0.7193	0.7668	0.7235	0.7574
PDF7	0.8187	0.7730	0.7526	0.8252	0.8093	0.8075	0.6918	0.8328	0.8030	0.7750	0.7598	0.8133	0.7588	0.8015
PDF8	0.8325	0.7862	0.7584	0.8437	0.8320	0.8256	0.7697	0.7748	0.8005	0.7783	0.7655	0.8293	0.7763	0.8171
PDF9	0.7834	0.7613	0.7234	0.8031	0.7897	0.7906	0.7391	0.8015	0.7029	0.7542	0.7305	0.7805	0.7343	0.7709
PDF10	0.6665	0.6275	0.6140	0.6756	0.6709	0.6699	0.6238	0.6774	0.6546	0.5749	0.6387	0.6529	0.6047	0.6546
PDF11	0.6706	0.6292	0.6181	0.6729	0.6681	0.6559	0.6256	0.6880	0.6629	0.6510	0.5660	0.6571	0.6109	0.6565
PDF12	0.7319	0.6949	0.6699	0.7487	0.7314	0.7236	0.6824	0.7485	0.7157	0.6741	0.6669	0.6599	0.6737	0.7096
PDF13	0.6704	0.6294	0.6090	0.6703	0.6609	0.6532	0.6140	0.6855	0.6419	0.6158	0.6077	0.6619	0.5601	0.6424
PDF14	0.7674	0.7286	0.7050	0.7778	0.7715	0.7589	0.7134	0.7872	0.7460	0.7148	0.7094	0.7536	0.7089	0.6837

Step 4: Row and column summation. In this step, the row elements of the total relation matrix are summed up to get row summation D. Similarly, the column elements of the total relation matrix are summed up to get column summation R. Similarly, a row and column summation operation is performed on the total relation matrix (. Equations 6 and 7 are used to calculate row and column summation respectively. The cause-and-effect group for people driven factors of CE is presented in Table 4.

(6)

(7)

Table 4. The Degree of prominence and the cause and effect net values

	Di	Ri	Di + Ri	Di – Ri	Cause/Effect
PDF1	11.131	10.571	21.701	0.560	Cause
PDF2	10.300	10.048	20.348	0.253	Cause
PDF3	10.461	09.693	20.155	0.768	Cause
PDF4	10.532	10.726	21.258	-0.195	Effect
PDF5	10.584	10.563	21.147	0.021	Cause
PDF6	10.521	10.507	21.029	0.014	Cause
PDF7	11.022	09.823	20.845	1.199	Cause
PDF8	11.190	10.836	22.026	0.354	Cause
PDF9	10.665	10.315	20.980	0.350	Cause
PDF10	09.006	09.979	18.985	-0.973	Effect
PDF11	09.033	09.796	18.828	-0.763	Effect
PDF12	09.831	10.495	20.326	-0.664	Effect
PDF13	08.923	09.816	18.739	-0.894	Effect
PDF14	10.326	10.357	20.684	-0.031	Effect

5. Discussion and Implications

Over the last two decades, organisations have been under constant pressure to ensure that they can promote productivity and profit growth while also preventing environmental pollution in their SCs (Luthra et al., 2017). As such, CE has attracted both scholars and practitioners as a method of enhancing organisational sustainability; the role played by people-based factors in enabling the adoption and implementation of CE has been a key factor to consider. Therefore, it is important that SME industries in developing economies like Tanzania and India are able to focus on employing these factors. Company targets are to achieve and support the development of not only business objectives, but also to tackle issues that may affect the environment (Dubey et al., 2017). Data was collected from industry experts and used to provide an analysis; this is detailed in the data analysis section. Hence, based on the analysis as seen in Table 4, factors have been arranged in order of importance based upon the D + R rating as follows: PDF8 – PDF1 – PDF4 – PDF5 – PDF6 – PDF9 – PDF7 – PDF14 – PDF2 – PDF12 – PDF3 – PDF10 – PDF11 – PDF13. Additionally, based on the D-R rating showing the overall data set of the experts, eight PDFs have been identified as the cause group of factors; they are PDF1, PDF2, PDF3, PDF5, PDF6, PDF7, PDF8 and PDF9. The remaining factors have been identified as the net effect group; these are PDF4,

PDF10, PDF11, PDF12, PDF13 and PDF14. More details can be seen in Table 4. The net cause factors as seen above are categorized as influencing factors; the net effect factors are considered as the influenced factors.

5.1 *Influenced and influencing factors*

Based on the above findings, the cause group, Training and Knowledge Sharing (PDF7) can be seen to have the highest (D-R) influence score as a causal factor. This relates to building and sharing of information and skills that equip employees with the ability to solve problems more efficiently (Ngai et al., 2008). This is in agreement with Sarkis et al (2010) who point out that the introduction of environmental training activities will equip employees with the right skill set in developing and understanding how eco-friendly CE can be implemented.

The second highest PDF based on the (D-R) score is Strategic Employee Participation and Recruitment (PDF3). This is the process through which employees can participate and be involved in the strategic decision-making process of an organisation. This suggests that when employees are treated as important stakeholders, this will increase positive results as high emphasis is being placed in the involvement of employees which in turn empowers them to perform better (Muduli et al., 2013). Therefore, involving employees is not only beneficial to the organisation but is also a major factor that can encourage the success of eco-friendly and environmental objectives (Ngai et al., 2008). This can lead to several benefits such as increased commitment, trust and respect plus greater job satisfaction. These benefits can make a positive impact on achieving a CE based business model for the organisation (Massoud et al., 2011).

Strategic Management and Leadership Practices (PDF1) is seen as the third-ranking casual factor. This indicates that effective leadership and management is an important aspect for the effective implementation of change within an organisation by providing policies and strategies that can guide employees. Due to current developments in technology and globalisation, there has been increasing growth in resource overutilization (Govidan and Hasangic, 2018). Muduli et al. (2013) state that industries need to be able to adopt CE practices and systems to be able to reduce waste and reduce resource overuse while promoting reuse, remanufacture and reuse strategies. That means that organisational leadership and management should be able to stimulate and promote environmentally friendly and efficient products. This factor plays a major role in enabling the adoption of CE practices in the SCs of SMEs of developing economies. Thus, organisations should be able to adjust their communication systems and offer support for employees; this will encourage staff

commitment to take actions and opportunities in enhancing environmentally sustainable practices.

Strategic Planning and Alignment (PDF8) is the next factor in the cause group influence criteria. It is vital to ensure that the fit between implementation, adoption and the overall goals and objectives of organisations are carefully aligned to ensure commitment among employees and managers within the organisation. The alignment approach should make sure that both the organisation and its employees are ready for change. Support should be provided in terms of resources, training etc to ensure that change-resistance is minimised as well as showing that all stakeholders can benefit both before and after the implementation stages. The selection of best practices as well as setting out realistic performance measurement strategies is essential when changing processes to adopt CE as a business model. Therefore, effective management of organisational strategy can be an effective tool in ensuring best practice for the improvement of current processes and the development of new business systems (Kahn et al., 2012).

Mutual Trust (PDF9) is another critical factor that has been identified as a cause criterion. This is another important factor as it plays a major role in determining how willing employees are in implementing changes within an organisational setting (Ngai et al., 2008). Trust and respect are essential among employees, management and the leadership team as this not only increases the levels of response but also improves communication. This creates an environment to successfully introduce a collective strategic direction, for instance, the implementation of CE as a business model. A lack of mutual trust and respect between managers and employees can occur when either of the two does not appreciate the contribution of the other. This can cause a decrease in morale and commitment which in turn hinders the development of new business developments and solutions (Muduli et al., 2013). However, by involving and empowering staff through the development of better communication systems and providing training and participatory activities in major decision making, trust and respect between the two groups can be boosted. With reduced tensions, innovation and development of eco-friendly activities within the organisation can be encouraged.

Inclusive Communication (PDF2) is the next factor in the cause group influence criteria. Communication is another important aspect that is vital in enabling the transformation of processes within an organisation (Dubey et al., 2017). Communication within an organisation includes collective strategies, policies, procedures and objectives that are aimed at enhancing knowledge sharing and skill improvement among team members. As such, effective

communication that is both top-down and bottom-up is essential in building trust among top management and staff. From an employee's context, effective communication is important as it provides employees with the opportunity to share their ideas and thoughts, which in turn can help in the development and implementation of CE within the organisation. Involving employees in initial communication is useful in the development of a collaborative workplace; this is necessary to enhance performance levels within different sections in the business (Ngai et al., 2008). Hence, communication in terms of knowledge sharing can be a major driver in the promotion of environmentally friendly and CE based manufacturing decisions resulting in increased competitive advantage.

Organisational Culture (PDF5) is another major influencing factor in the R-C criteria. Research conducted by Liu and Bai (2014) among 157 SMEs in China towards the implementation of a circular business model, concluded that cultural and behavioural factors within an organisation play a vital role in either promoting CE practices or act as a barrier in the implementation process. The implementation and adoption of CE practices can force organisations to re-engineer and reconfigure their processes outside traditional boundaries (Yee and Oh, 2012). As such, this requires organisations to carefully plan and manage a transformative strategy that is based on a structured methodology that will allow smooth implementation (Nanayakkara et al., 2016).

Organisational Change Management (PDF6) is the final influential factor in the R-C criteria. Change management is considered as a continuous factor that is ever-present in the organisational lifecycle (Ngai et al., 2008). Changes can be a challenge when for instance, employees in the organisation do not understand or feel included in the change process, hence resulting in high resistance (Moduli et al., 2013). Organisational readiness for change is a major determinant for successful implementation of new developments like CE. Developments such as these can affect the business-as-usual processes; hence new skills will be required (Sarkis et al., 2010). Therefore, managers must consider change management as a critical competence required for successful implementation of CE.

Factors in the effect group also play a significant role in the adoption and implementation process. Among these factors, Strategic Partnership and Relationships (PDF10) received the highest score. Strategic Partnership and Relationships relate to the collective effort of individuals or groups of people who share a common purpose and values, working together to achieve a common goal or objective within specific settings. Organisational mutual trust, respect and understanding can only be developed when both top management and employees

work together to provide a solution to enhancing environmentally friendly practices that are sustainable (Muduli et al., 2013; Chin et al., 2015).

The other influenced factor that follows from the D-R criteria includes Customer Relationship Management (PDF13). CE offers new ways of looking at enhancing relationships among organisations, their markets, customers and the use of resources. Customer inclusion can help in increasing pressure on organisations to improve their processes and transform the current extract-make-dispose model to a reuse-remanufacture-recycle economic model.

Intention and motivation towards green initiatives (PDF11) is another influenced factor in the D-R criteria. This factor is essential for organisations since employees have a direct impact on the successful implementation of new business developments. Hence based on this, managers should be able to look for different ways in which they can encourage and motivate their employees towards successful implementation of CE practices. These methods can be both intrinsic and extrinsic such as higher remuneration, job security or improved working conditions. By implementing these factors, employee morale can be increased.

Next is Green Project Management (PDF12) in the D-R influenced factor. Project management is an essential tool that equips managers with the necessary skills to be able to manage change effectively and risk management solutions that enable organisations to reduce risks in the implementation of organisational development practices like CE (Ngai, 2008).

Another influenced factor based on D-R criteria is Performance Appraisal (PDF4). Performance appraisals can be used as a strategic approach that bridges both the employee's goals and the overall goals and objectives of an organisation. As such, through aligning organisational goals of enhancing circularity and establishing strategies where employees can also benefit from new developments, the success of CE practices becomes more achievable.

Welcoming green initiatives (PDF14) is another influenced factor in the D-R criteria. CE considers the introduction and development of new ways and procedures of increasing value while providing opportunities within which organisations can reduce waste and basic costs of resources. As such, green innovation aims at enhancing an organisation's ability to cultivate new ideas, new options and skill improvement that will result in the development of eco-friendly activities.

5.2 Unique recommendations

Based on the above findings, for organisations to develop and to maintain an effective strategic advantage it is essential to consider future opportunities and options to gain a higher

market share. The analysis below provides some practical considerations that can be used by organisations; they may wish to consider these recommendations.

Enhancing Innovation: Technological advancements over the past two decades have been a factor that has spearheaded the development of new ways to support sustainable business practices (Heyes et al., 2018). SMEs can enhance their processes by investing and incorporating ICT systems into their business production; this will assist them in the development of CE solutions in their existing practice (Govidan et al., 2015). For instance, a report by Bakker et al. (2014) shows that incorporating sustainable technologies such as renewable energies can enhance resource efficiency and boost environmental performance. Hence, by applying and investing in different technologies, organisations can develop sustainable solutions that will enhance performance, resulting in greater efficiency and effectiveness of business processes.

Organisational Culture: The success and development of any business strategy are dependent on how people resources in the organisation are managed; employees are the primary source of organisational growth and profitability (Muduli et al., 2013). The leadership and management in an organisation are responsible for setting goals and objectives that in turn become part of the culture of the organisation, determining how individuals interact and behave (Luthra et al., 2017). CE is fast becoming one of the most vital initiatives in sustainable environmental development for SMEs. Incorporating a culture where employees are encouraged to develop new ways of working that promote circularity, as opposed to the traditional linear model, is a factor that can determine the survival of a business (Heyes et al., 2018). Understanding the importance of cultural change towards enhancing CE can have major benefits in solidifying and gaining greater market advantage, thus improving overall performance (Luthra et al., 2017).

6. Conclusions and future research directions

Based on the above analysis and findings, all of the cause group PDFs presented can be helpful for SMEs in the successful adoption and implementation of CE within their SCs. Furthermore, based on the cause-and-effect factors, managers will be able to determine the most significant factors and therefore promote a wider understanding of the application of CE in its business processes. Factors such as training and knowledge sharing, employee participation, leadership and management plus strategic alignment are areas that managers should closely examine to enhance the success levels of CE in the SCs of SMEs. This study has focused on understanding the CE concept and its contribution to SMEs. It has also looked

at the background and the development of the concept based on the traditional linear business model of take-use-dispose to a circular model of reuse-remanufacture-recycle. A comprehensive literature review was developed to analyse this background and its importance in enhancing circularity within an organisation. This paper has aimed at understanding how CE can be of benefit if adopted and implemented effectively and how it can contribute to the growth and development of SMEs in developing economies. Based on the literature review, a gap in current research was identified - the factors that contribute to the implementation of CE in organisations. Two main issues were identified; hard dimension factors (strategy, technology, policies) and soft dimension factors (human resource). The conclusion to this analysis will be further explained below. This research has attempted to explore these areas and understand their impacts and contributions on the implementation and adoption of CE in SMEs.

Based on the work recorded in past and contemporary literature, fourteen key PDFs were identified to uncover the importance of soft-dimension factors (people-driven factors) in the adoption and implementation of CE. These listed factors can be used in enhancing SC performance in terms of developing an eco-friendly business solution model. As previously mentioned, CE over the last two decades has become one of the most significant initiatives in the development of eco-friendly strategies for performance improvements in SCs of SMEs and indeed larger corporations. In this context, this research proposes a structural model that is able to identify and analyse relevant factors, as well as evaluating their influence, related to both organisations and consumers.

As stated in section 2, a structural model/technique was used in analysing the influence and importance of the PDF. The DEMATEL technique was used in analysing the factors to distinguish the cause-and-effect inter-relationships of the factors. The model helps in not only understanding the causal inter-relationships of the factors, but also the strength of the relationship between each factor. This was done by identifying how these factors had an influence on each other from the point of view of an organisational expert. The findings of the survey showed that factors PDF7, PDF3, PDF1, PDF8, PDF9, PDF2, PDF5 and PDF6 are the cause group factors that need to be focused on. These are crucial to achieving the overall desired goals of sustainability. Moreover, the remaining factors - PDF10, PDF13, PDF11, PDF12, PDF4 and PDF14 - have been identified as the effect group; these factors require improvements in the CE initiatives in organisational SCs. Furthermore, it can be concluded that the cause group factors have highest priority and importance due to their direct influence and impact. Managers should focus on these factors for the implementation and adoption of

CE as the cause group has a major influence on the effect group. It is important to understand the impacts and benefits of CE; factors such as management and leadership, organisational culture and strategic alignment have an increasingly effective influence in any successful implementation. From a managerial perspective, by focusing on the cause group factors, this can improve the decision-making process of CE implementation.

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