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Circular Economy Practices and Environmental Performance for Manufacturing Firm's : A Systematic Literature Review

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Abstract
This study presents a systematic literature review of environmental issues in the manufacturing industry, provides an overview of circular supply chain management (CSCM) and outlines a brief background of the circular economy practices (CE). The literature review was done using multiple different sources of data collection, such as Science Direct, Scopus, Emerald, Wiley Online Library, Sage and Elsevier. The discussion continues with the conceptualisation of Circular economy practices (CE) and organisational environmental performance (EP). The current study aims to establish the relationship between Circular economy practices (CE) and organisational Environmental Performance (EP), and identify the subsequent impacts of the association. Multitudinous benefits witnessed from (CE) adoption have been identified in the mainstream literature, including reduced resource consumption, reduced environmental emissions, generation of a privileged competitive position for various businesses, and the minimisation of risks. Moreover, the (CE) also intertwines with the internal operations of individual businesses and environmental sustainability initiatives of a company, such as increased energy efficiency, waste recovery, use of renewable energy sources, and input of recycled or sustainable materials in the raw material supply chain. In this regard, businesses are required to adapt their business strategies to implement the (CE) principles to achieve environmental and sustainable goals. A thorough review of past studies and research approaches underlying the existing research frameworks and hypotheses contributed to the conceptual framework development of the current study. This analysis could be a significant reference for other researchers or organisations which conduct quantitative research in terms of selecting a valid and reliable scale as well as fulfilling the requirements of the research context.
Keywords: Circular Supply Chain Management, Circular Economy, Organisational Environmental Performance

Introduction

Environmental management is witnessing increasing levels of popularity across the globe as a higher number of organisations starting to perceive the grave consequences

resulting from the actions of environmental contamination. Accordingly, numerous businesses have shifted their attention to improving environmental conditions by developing and implementing innovative solutions to mitigate the negative effects of production and emissions across different industries (Nor-Aishah et al., 2020; Abdul-Hamid et al., 2020; Hishammuddin et al., 2018; Cousins et al., 2019; Geng et al., 2017). Similarly, Lahti et al. (2018) asserted that enterprises should continue defending the current environmental and ecological ideals of the society in the future. Simultaneously, Geissdoerfer et al. (2018) also proposed that circular economy (CE) practices could be a potential approach to promoting sustainable development in the manufacturing sector.

González et al (2008) discovered the worldwide trend of rising demand on all manufacturing firms to focus on environmental preservation, resource conservation, and knowledge enhancement on the importance of environmental and resource management. In this regard, environmental-oriented supply chain collaboration (ESCC), as proposed by Georgiadis and Besiou (2008), emphasises the cooperation between consumers and suppliers as a viable management method to achieve environmental sustainability while increasing productivity. Meanwhile, supply chain management (SCM) could be considered the most preferable approach by various organisations to gain cost and service advantages in the contemporary globalised business environment (Lai & Cheng, 2009). The SCM can be defined as the management of the flow of goods and services from one location to another. By incorporating the ESCC principles into the SCM, companies could increase the efficiency level of the supply chain process while concurrently accomplishing sustainable development outcomes without compromising productivity.

Circular Supply Chain Management

Ubiquitously, businesses benefit from a CE with the integration of the entire supply chain and engagement with end-users by recovering and redefining the values of obsolete items in their life cycles (Gregson et al., 2015). Past studies indicated that circular supply chains could provide a superior opportunity to recover the potential values of outmoded goods before being redefined for different purposes, while simultaneously reducing or eliminating the accumulation of trash (Hankammer et al., 2019; Hofmann, 2019; Hofmann & Jaeger-Erben, 2020; Vlajic et al., 2018).

Circular SCM (CSCM) encourages an organisation across different units or departments to closely operate, function, and coordinate material flows to reduce or narrow the amount of energy expended during production or manufacturing (Kazancoglu and Sagnak et al., 2018; Hofmann and Jaeger-Erben, 2020); Hankammer et al., 2019). Respectively, the CE encompasses the main concept of the CSCM and the existing management principles in the current SCM (Vlajic et al., 2018; Hofmann et al., 2019). Geissdoerfer et al (2018) demonstrated that the enhanced competitiveness and improved operational effectiveness from the minimisation of resource input in a CE could assist prevent waste generation and excessive emissions to the environment. As such, manufacturing industries are recommended to align respective strategies by considering environmental, economic, and social impacts, implementing the CSCM principles in the entire manufacturing process, and engaging multiple stakeholders to actively support and participate in the manufacturing process to achieve specific production goals (Geissdoerfer et al., 2018).

Geissdoerfer et al (2018) propounded that a company could proactively engage with the stakeholders to encourage the active adoption of reused or recycled materials for the manufacturing input. The engagement could allow a sustainable business model and the

growth of green materials in the existing market. To attain long-term sustainability objectives, the entire organisation should concentrate on developing a responsible enterprise, which adheres to the environmental regulations and principles and employs materials that could be recovered, reused, and recycled. Simultaneously, the adoption of circular processes might necessitate a reshuffling of the entire supply chain structure with prohibitive costs in an organisation when compared to traditional approaches (Vegter et al., 2020). Resultantly, specific ideology and approach have been developed for the CE to smoothly integrate the principles into the SCM with lower thresholds.

Definitions of the CE

The CE has been defined by past studies either as "an economy that is regenerative by design", "an economic system in which products and services are traded in closed loops or cycles", or "a method for overcoming the current production and consumption model, which is focused on continuous expansion and increased resource throughput" (Ellen MacArthur Foundation, 2013; Ghisellini et al., 2016; Kraaijenhagen et al., 2016). Essentially, conventional definitions of the CE focus on the preservation or enhancement of economic values while simultaneously reducing or sustaining the use of raw materials and restricting the exploitation of the natural environment. Correspondingly, the ultimate goal of the CE is to improve the quality of life for all stakeholders and eliminate waste and leakage from traditional economic supply chains by reducing, reusing, and recycling at every stage to allow the entire process to be situated in a closed loop of value preservation.

On the other hand, Korhonen et al (2018) suggested a broad definition for the CE, wherein a CE was defined as a system built on social systems of production and consumption to maximise services produced by linear materials and energy throughputs circulating between nature and civilisation. The system could be accomplished through the use of renewable energy sources, cyclical material flow, and primary energy circulation. To ensure an effective process, a CE must contribute to all three pillars of sustainable development, namely environmental, economic, and social. Accordingly, ecological cycles would be applied in an economy established from a circular design that limits throughputs to a tolerable rate for nature in each economic cycle. Summarily, the definition of CE is not only restricted to the reduction of material flow but also incorporates the three components of sustainable development. Furthermore, the anticipation of social impacts associated with circular economic activities is imperative when developing a CE. Existing CE definitions from different researchers are listed in Table 1.

Table 1
An Overview of Existing Definitions of the CE

Reference	***Definition***
Ellen Macarthur Foundation (2013)	An industrial system that is regenerative by design and intention where renewable energy is used and hazardous chemicals are avoided, striving to eliminate waste through improved design of products, materials, business models, and systems.
Giurco et al (2014)	The cyclical movement of resources serves as the foundation for a new paradigm of production, consumption, and utilisation.
Murray et al (2017)	A CE could demonstrate a new vision of the economy, including a new concept of value, a new understanding of the system, and a new understanding of economics, production, and consumption. In turn, the CE contributes to long-term economic development as well as environmental sustainability and social development.
Zhijun & N*ailing (2007)*	The development of a model of economic growth based on the ecological circulation of natural resources.
Sarkis & *Zhu (2008)*	Developed in China as a technique of reducing the demand for natural resources in the country's economy while also minimising environmental damage, the CE has become widely accepted.
Gregson et al (2015)	This field of study, which is founded in the related but distinct fields of ecology and environmental economics, is characterised by its eclectic collection of ideas that have been brought together to make a cohesive whole.
Geng & *Doberstein (2008)*	A CE technique encourages organisations to blend economic activities that mirror natural ecosystems with feedback mechanisms that mimic the natural ecosystem, to create a more sustainable and resilient system. "Resources Product(s) Transformation By-products Used as Resources for Other Industries". Essentially, the CE approach is the same as the more well-known terms 'industrial ecology' and 'Earth-friendly development', which are both synonymous with environmental protection.
Ying & L*i-jun (2012)*	Environmentally conscious economic activity necessitated by the CE, which is primarily an ecological economy, includes human economic activities that comply with the 3R principle (reduce, reuse, and recycle).

Literature Review

The Conceptualisation of CE Practices

According to Brown et al (2020), collaborative innovation is critical for the successful implementation of CE practices in a variety of settings. Furthermore, environmental rules and regulations play a vital role in derived innovation to encourage recycling, reusing, and minimising resources, which are beneficial to society (Cainelli et al., 2020). Peiro et al (2020) posited that eco-design policies could stimulate the legal adoption of CE practices, including the accessibility of critical inputs and data, the availability of firmware, and the design of products. Pertinently, the interaction matrix analysis is a paradigm that could foster the execution of CE practices and creates opportunities for the adoption of a circular supply chain system (Coenen et al., 2020).

Business models, closed-loop design, system-related drivers, and reverse logistics are also the most important factors in the adoption of CE practices (Hopkinson et al., 2020). Separate research conducted by Chen and colleagues (2020a) discovered that green chemistry principles possessed an important influence in the promotion of CE practices. The actions of reducing, redesigning, recycling, recovering, and reusing were demonstrated to be potent aspects of green chemistry and beneficial to the transformation of waste into wealth. Manufacturing companies, on the other hand, should also interact with cross-functional teams, build a chemical management system, produce environmentally friendly goods that are long-lasting, and train employees in the principles of green chemistry to monitor the implementation process of CE practices.

Eco-design, management systems, and investment recovery are three primary elements of CE practices that had been employed in the study model of the current paper. Eco-design is a potentially useful strategy for increasing eco-efficiency while simultaneously reducing environmental damage (Aoe, 2007). The Chinese government, according to Zhu et al (2008) and Kainuma and Tawara (2006), has commenced accepting the augmentation of environmental management by including the behaviours of reuse, recycling, and reduction in the life cycle of a product or service to "complete the loop" in supply chains.

Melnyk et al (2002) postulated that a management system would be essential to improving the environmental performance (EP) of an enterprise and was considered an important CE practice. Management methods, similar to the approaches employed for evaluating CE practices at the industrial zone level, are essential to developing sustainable production amongst manufacturing organisations (Geng et al., 2009). Investment recovery, which encompasses management measures including reuse and recycling, is also regarded as a facet of environmental conservation strategies (Zhu et al. 2008). Therefore, the three aforementioned characteristics of CE practices described above are critical to the effectiveness of environmental management methods in the manufacturing sector. CE execution procedures for the current study are organised based on the following dimensions in Table 2 parallel to existing literature and reviews:

Table 2
Types of CE Practices

Researchers	***Types of CE Practices***		
	Eco-design	**Management systems**	**Investment Recovery**
Kamble & Gunasekaran (*2021)*	1	1	1
Zhu et al (*2011)*	1	1	1
Zhu et al (*2010)*	1	1	1
Silva et al (*2019)*	1	1	1
Botezat et al (*2018)*	1	1	1
Garcia-Muiña et al (*2019)*	1		
Liu et al (*2018)*	1	1	1
Masi et al (*2018)*	1	1	1
Scarpellini et al (*2020)*	1		
Total	**9**	**7**	**7**

Eco-design

Designing for the environment, or eco-design, an essential facet of CE practices, is a potential strategy for boosting eco-efficiency in addition to environmental design. Multitudinous businesses have discovered that eco-design is a successful technique to increase the overall degree of organisational eco-efficiency and a useful instrument for waste reduction and recycling (Aoe, 2007). Correspondingly, the cost of recycling, refurbishing, remanufacturing, and disassembling are frequently influenced by the complexity level of the product design (Bhattacharjee & Cruz, 2015). The influence could be observed in a majority of goods constructed from a wide variety of individual pieces and raw materials, resulting in the cost and consumption of a product being positively associated with the cost of disassembling. Furthermore, the process would generate a significant amount of waste (Almeida et al., 2017) and hence, designing products with environmental considerations should be a green practice for product designers by incorporating recycled components to fulfil environmental and economic objectives (Fitch & Cooper, 2005). Firms consisting of a disassembling and recycling ecosystem could generate significant environmental benefits compared to respective counterparts lacking the mentioned ecosystem (Go et al., 2015).

Management Systems

Globally, management systems, or meta-standards, are increasingly prominent amongst enterprises and organisations. Management systems include a wide variety of management concepts and institutional frameworks. Past periodicals and publications have been devoted to the standardisation of management system principles (To et al., 2012b; Prajogo et al., 2012; Gavronski et al., 2008). The standardisation of management systems in terms of meta-standards and the final result is a complex phenomenon that could produce a wide range of ramifications for organisations. In this regard, numerous studies have been frequently conducted from different perspectives while maintaining a common focus on

related fields, such as operations management, organisational behaviour, sociology, and international economics.

Development of different management systems in the workplace, such as environmental management systems (EMS; ISO 14001), quality management systems (ISO 9001), corporate social responsibility (SA 8000), prevention of occupational hazards, and the implementation of health and safety regulations in the workplace, are all important considerations (OHSAS 18000). Successful ISO 9001 and ISO 14001 standards could be established by utilising the processes similar to the procedures of creating, structuring, and implementing, as well as third-party monitoring, of these standards. In environmental management, management systems play a critical role in boosting CE practices within an organisation by focusing on the EP to reduce environmental impacts, hazards, pollutants, and other negative effects. Numerous academics and publications have organised the connection between EMSs and quality management systems, which fall under the purview of organisation management systems in the CE context (To and Lee, 2014; Stahel, 2016; Tukker, 2015).

Investment Recovery

Investment recovery (IR) refers to the strategies of 'reclaiming', 'remanufacturing', and 'recycling' previously used products from consumers, comparable to the fundamental notions of contemporary environmental initiatives (Zhu et al., 2010; Zhu et al., 2011; Zhu et al., 2011; Zhu et al., 2010). Despite the shift in the economic model, a vast majority of businesses continue to operate within linear economy models (Geissdoerfer et al., 2017). In other words, the IR refers to the strategic utilisation of optimised business assets for recovery, redeployment, and resale to maximise the value of existing products and materials (Zhu et al., 2008). Previous studies discovered that actions, such as "taking back things from customers after they finished using them" and "remanufacturing products", were some of the most crucial activities in the scope of the IR initiatives (Lienig et al., 2017).

To achieve the objectives of the IR in closed-loop supply chains, adherence to the 3R principles, namely reducing, recycling, and reusing resources, at all stages of manufacturing, consumption, and distribution processes is exigent. Recycling systems, product take-back programmes, selling off excess materials, and reverse logistics are one of the several essential operations in the process of the IR (Bing et al., 2015; Lai et al., 2013; Zhu et al., 2008b). Correspondingly, Atkinson (2002) delineated that the IR primarily aimed to increase the revenue of a company through the sale of idle assets, reduction of storage space or rental, and the relocation of superfluous assets to other locations in preventing a company from purchasing excessive materials and equipment. In terms of reselling activities, the IR could be a beneficial strategy as indicated by various industries, which generated at least 70% of the total revenue from reselling activities of multitudinous merchandise, including healthcare products, consumer products, power generators, chemicals, forestry products, computer products, and other electronic devices (Avery, 1997; Cottrill, 1997; Franke et al., 2006; Sarkis, 2003).

The Conceptualisation of the EP

When considering and implementing CE practices, the EP was constructed as an outcome variable in the current research. The EP metrics are listed in this section while a full evaluation of recent related research is included in the discussion section. Increased external environmental demands, such as stricter regulation, increased customer needs, and internal

environmental demands, necessitate companies to expand their capacities in measuring, managing, and regulating the EP of their activities. According to Veleva et al (2003), an increasing number of businesses began to develop and apply environmental sustainability indicators as part of their daily business operations. Supply chain managers would be responsible for determining the impacts of their operations on the natural environment (Zhu et al., 2008; Zsidisin & Sifert, 2001). When assessing the performance drivers of a company, the EP could be critical in providing significant information to be subsequently employed for improving the company on acquiring a competitive edge.

Piotrowicz and Cuthbertson (2008) also discovered that environmental criteria were rapidly emerging as important factors in the development of sustainable business practices, particularly in the manufacturing sector. The investigation of supply chain metrics by pertinent academics and practitioners is also required to accommodate financial and environmental considerations. By developing a case study methodology, Vasileiou and Morris (2006) discovered that environmental factors were obtaining higher levels of interest and attention owing to the influences on decision-making and as performance indicators of a company. Since the early 1990s, Noci (1995) revealed that managers in Denmark, Sweden, and Norway witnessed the improvements in the EP as one of the most significant competitive initiatives of enterprises until the contemporary era.

The EP has been constantly measured at the supply chain level by academics through an extensive variety of approaches to address different environmental concerns before being eventually applied to supply chains of varying lengths. The existing literature, on the other hand, did not provide a consistent technique across different topics in a similar research field. In reviewing past studies on environmental sustainability, solutions acceptable to supply chains frequently accounted for only a single environmental element although multiple sustainability dimensions had been addressed (Beske-Janssen et al., 2015; Seuring, 2013; Taticchi et al., 2013, 2014). As such, Liu et al (2011) posited that data collection and decision support could provide higher degrees of accessibility when numerous organisations limited the assessment areas of performance indicators compared to the broadening of research scopes to include multiple environmental effects that might render applicable resolutions with higher levels of difficulty to execute.

In light of the growing amount of information available on the EP of various firms, the establishment of formal corporate accountability procedures is deemed necessary. While companies are demonstrating a high degree of willingness to develop and allow EP information publicly available, a significant number of firms are excluded from the EP programmes when formal procedures are not instituted (Masi et al., 2014). Furthermore, standardised reporting measures remain a source of uncertainty. Owing to varying approaches utilised in reporting the EP of an enterprise, meaningful comparisons between goods and facilities, as well as between organisations in different industries and countries, are currently with high degrees of ambiguity (Masi and Cagno, 2015).

The improvement in the EP of companies could produce beneficial upshots for their abilities to compete. For instance, a new process for the implementation of environmental policies, such as the use of environmentally friendly products and processes, could have a higher extent of feasibility when the implementation is expeditiously becoming a prerequisite for existing and future manufacturing organisations. As indicated by Singhal and colleagues (2005), integrating environmental perspectives was fundamentally different from implementing other business strategies in an organisation. The difference was due to an organisation being required to measure the environmental impacts on its financial

performance before executing an environmental management strategy. Moreover, challenges also existed in determining the appropriate trade-offs between financial outcomes and EPs, including diverse attitudes of stakeholders toward the trade-offs with queries and ambiguities engendered on the objectives (Thoresen, 1999). Hence, environmental sustainability is continually connected with a lengthy period and a high level of uncertainty in subsequent executions, thus resulting in the evaluation of environmental management systems as an arduous undertaking (Epstein & Roy, 2001).

A plethora of studies have been conducted on the subject of the optimal EP metrics for CE practices with relevant findings successfully published in numerous journals. Hence, a comprehensive range of positive EP indicators, including the decrease of solid or liquid waste, the conservation of resources, and the reduction of emissions, are available from past studies. Examples include the reduced consumption of hazardous, damaging, and poisonous products and a decrease in the frequency of environmental mishaps (Eltayeb et al., 2011; Geyer & Jackson, 2004; Zhu & Sarkis, 2004). Besides, several additional measures could also be implemented to improve the EP, namely improved employee and community health, reduced environmental impacts during the manufacturing stage, promotion of recycling and reuse, avoidance of fines, reduced environmental cost, increased efficiency in resource utilisation, improved product 'green image', and improved relationships amongst suppliers, customers, and members of the general public (Chiou et al., 2011; Choudhary & Seth, 2011; Eltayeb et al., 2011; Geyer & Jackson, 2004; Zhu et al., 2007b; Zhu & Sarkis, 2004).

Figure 1 highlights the strategies employed by prior studies to evaluate the EP of different organisations. Conservation of resources (use of total materials per unit) and recycling (total recycling materials per unit or waste recycling amount per unit) are amongst the preservation practices that generate positive impacts on the EP. On the other hand, pollution prevention strategies, such as total reduced waste amount per unit or minimal use of harmful substances could also provide positive effects on the EP.

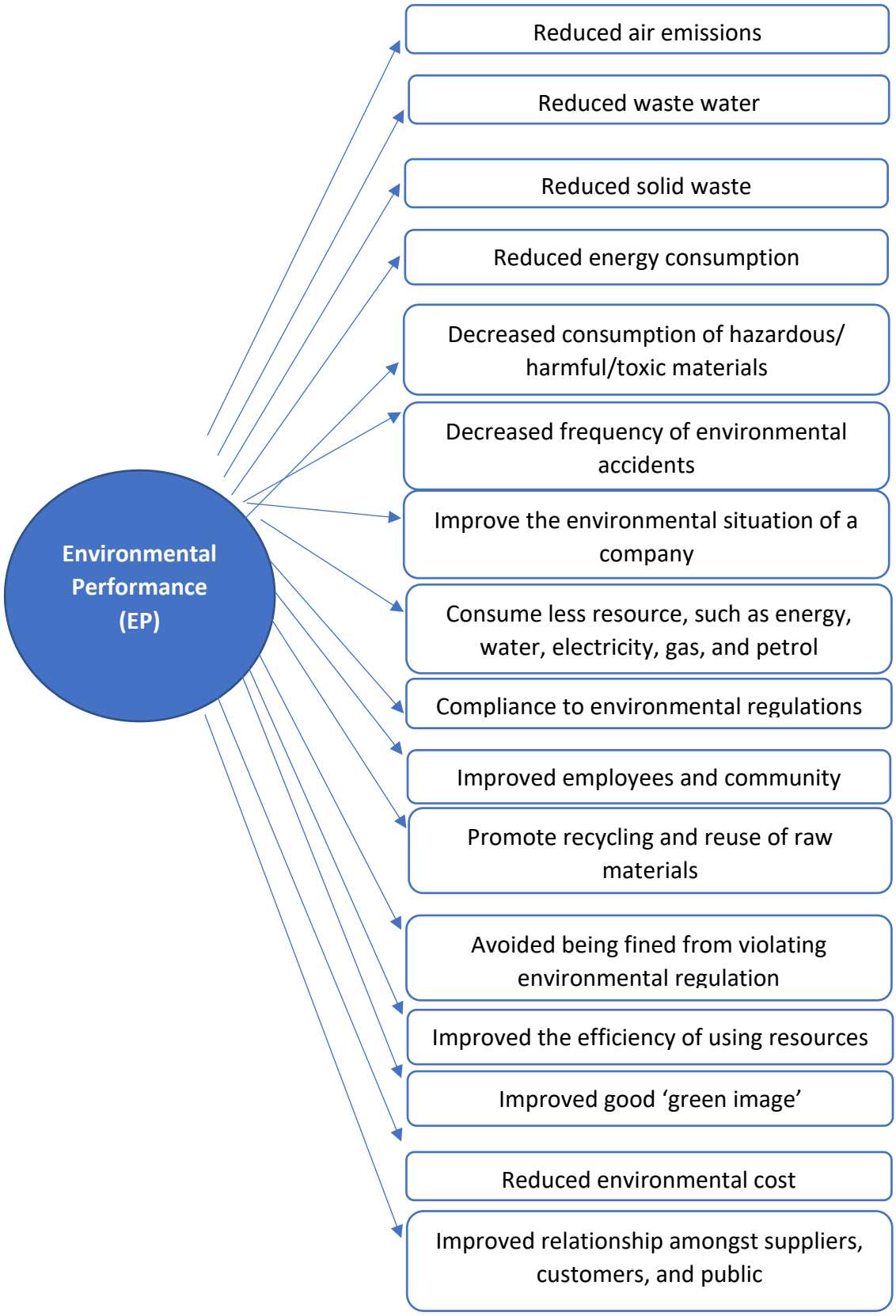

Figure 1: The Measures of the EP

Table 3
Key Characteristics of a CE towards the EP (European Environment Agency, 2016)

CE Category	***Key Characteristics of* the EP**
Less input and use of natural resources	• Reduced overall energy and water consumption • Reduced reliance on natural resources imports • Utilisation, minimisation, and optimisation of raw materials to generate more values from fewer materials • Optimal utilisation of natural resources
Increased share of renewable and recyclable resources and energy	• An increase in the proportion of recyclable and recycled materials that can be used to replace the use of virgin resources is desired. Closure of material recirculation loops • Non-renewable resources are being phased out in favour of renewable resources at sustainable levels of supply • Raw resources that have been sourced responsibly
Reduced emissions	• Using clean material cycles to reduce pollution • Reduced emissions throughout the material cycle as a result of less raw material usage and more environmentally-friendly sourcing
Fewer material losses/residuals	• Incineration and landfilling should be kept to a bare minimum • The wastage build-up was greatly reduced
Keeping the value of products, components, and materials in the economy	• Component re-use is encouraged • Product lifespans are extended to maintain the value of items while they are in use

Discussion

Does a positive and direct significant relationship between CE practice adoption and organisational EP exist?

The CE is an economic system that strives to fulfil the dual demands of economic performance and environmental well-being by integrating the latest approaches to environmental protection into economic decisions. The CE attempts to leverage the total sustainable production and consumption by implementing closed-loop regenerative and restorative physical and economic cycles, as well as the combination of repairing, remanufacturing, reusing, maintenance, refurbishment, and recycling processes (Ellen MacArthur Foundation, 2012, 2014; Pearce et al., 1990). In presuming that resources were limitless, the traditional linear economic model of "take-make-consume-disposal" or "extract-produce-use-dump material and energy flow" is unsustainable as witnessed by the depletion of resources and pollution of the environment, consequently engendering economic, environmental, and social concerns (Masi and Cagno, 2015). The concerns include increased price value and volatility from the scarcity of resources presently, which produce a detrimental impact on the development and capture of economic values. Furthermore, according to the Ellen MacArthur Foundation (2012, 2014); Pearce et al (1990), consumer preferences have been shifting in favour of items with a higher degree of ecological

friendliness, and new sharing models are emerging as alternatives to traditional ownership patterns.

The method of developing and establishing a CE is founded on the concept of enhanced resource management through the use of waste and by-products from processes and consumers as direct or indirect inputs to the operations, hence reducing resource scarcity and over-exploitation (Ellen MacArthur Foundation, 2012, 2014; Pearce et al., 1990). According to Ghisellini et al (2016), a CE could increase the competitiveness of a firm by mitigating the existing risks without endangering the environment or causing resource scarcity. A CE could also contribute to long-term economic growth while providing tangible and intangible benefits to a company and its stakeholders, such as sustainable and enduring economic growth. An extensive range of scientific fields, including process engineering, environmental science, management, ecology, biology, sociology, and economics, as well as territorial and urban planning and legislation, are the facets of CE formulation (Ghisellini et al 2016; Lieder, 2016; Murray et al., 2017; Sauve, 2016). In this regard, the application of a CE covers diverse activity sectors (Bruce et al., 2004) and the European Environment Agency proposes the aforementioned characteristics of the CE for enhancing the EP.

Multitudinous benefits witnessed from CE adoption have been identified in the mainstream literature, including reduced resource consumption, reduced environmental emissions, generation of a privileged competitive position for various businesses, and the minimisation of risks (EEA, 2016; Masi et al., 2017). According to Rizos et al (2017), a considerable number of experts, legislators, corporate practitioners, and international organisations have urged for a shift to a CE with growing support from the European Commission. Correspondingly, an integrated approach that focuses on a long-term system transformation or transition is required to replace the linear “source, use, and waste” economy with the CE model (Fonseca et al., 2017). Moreover, several elements have been highlighted as enablers (or impediments) to the successful adoption of the CE, including an examination of the environmental culture of a firm and its managers and staff, who will be responsible to encourage the conservation of the environment and the successful adoption of CE practices (Liu et al., 2014).

The cost and benefit analysis of the CE necessitates a long-term view that takes into account the risks and opportunities associated with the business and processes. Furthermore, a firm is necessary to overcome existing and potential oppositions to the metamorphosis from an existing business model to an innovative framework (Kok et al., 2013). As a constituent of the CE, government regulations, consumer behaviours, corporate practices, infrastructure, SCM, and different subsystems, including logistics, energy, and financial, are imperative to undergo coordinated and significant alterations to take advantage of the latest value and supply chains. The process would pose positive impacts on multiple business processes, such as design and supply, delivery, production, disposal, collection, usage, sharing, upgrading, repairing, and remanufacturing. Besides, relevant parties are also required to ensure that the CE systems outperform the current linear economic systems in terms of the EP. For instance, the actions include addressing the possibility of excessive use of transportation and energy or the creation of unfavourable working conditions in certain areas, such as product recovery (Masi et al., 2017). To evaluate the entire EP of new or proposed solutions, life cycle analysis could serve as a highly valuable tool.

Corporate environmental management systems are the process of generating strategic, operational, and tactical decisions in a company to reduce the negative consequences of the related business activities on the environment by integrating

environmental management principles into the business plans (Boffelli et al., 2019; Cramer, 1998; Resta et al., 2015). Accordingly, material flow is reduced at every stage of the value chain with an emphasis on resource and energy efficiency, which is a key component of the CE (Llena-Macarulla et al., 2020). Furthermore, the systems also seek to prevent the waste of natural resources and, on a broader scale, safeguard the environment by mitigating the ramifications of severe climate change while conversing current biodiversity (Stewart & Niero, 2018). Subsequently, a lower level of resource consumption is achieved in a CE from the reduction in the available resources or through the use of recycled raw materials while sustaining a constant volume of production (Givry et al., 2018), concurrent to the emphasised ideas of reducing, reusing, recycling, and remanufacturing (Santos et al., 2019).

The successful CE implementation demands a gradual transformation of the economic and political systems. Moreover, the CE also intertwines with the internal operations of individual businesses and environmental sustainability initiatives of a company, such as increased energy efficiency, waste recovery, use of renewable energy sources, and input of recycled or sustainable materials in the raw material supply chain (Lieder & Rashid, 2016; Moreno et al., 2016). In this regard, businesses are required to adapt their business strategies to implement the CE principles to achieve environmental and sustainable goals (McAloonen et al., 2019). In the circular business model, the goals of an enterprise include not only the creation of economic values but also addressing social and environmental challenges to ensure long-term sustainability.

Korhonen et al. (2018) discovered that the present corporate environmental management policies of multiple organisations were primarily focused on decreasing the environmental effects of a company in the short term (Korhonen et al., 2018; Lozano, 2020; Nuur et al., 2020; Robert et al., 2002). To ensure sustainability, striking a balance between competitiveness, environment, and social impacts over the long term is imperative for businesses aside from maximising profits (Jaca et al., 2018). As such, incorporating the CE principles into the existing corporate environmental management generates various opportunities to apply sustainable practices by repurposing trash as resources and facilitating collaborative manufacturing to further boost the EP (Baumgartner, 2018).

In the effort to expand the existing corporate environmental management systems, the CE encourages enterprises to derive significant economic values from the material life cycles (Bakker et al., 2016; Stahel, 2016). Resultantly, designing products and services compliant with the social and environmental ideals of the CE is a prerequisite to success for a business. During the production process, the CE could expedite organisations to manage their resources sustainably on internal and external levels (Korhonen et al., 2018). On the internal level, environmental rules and public incentives would impact the sustainable CE practices of an organisation, which would in turn shape the overall business strategy and the EP (Aranda-Uson et al., 2020; Ghisellini et al., 2016). Meanwhile, when observing on the external level, the legislative regulations that governments have enacted to facilitate the CE implementation not only address recycling and waste management issues, but would also be supportive of sustainable design, recyclable product monitoring and collection, and effective waste sorting mechanisms at every stage of the supply chain to achieve satisfactory levels of the EP (Lazarevic & Valve, 2017; Jia et al., 2020). Thus, the following hypothesis was formulated:

There is a positive and direct significant relationship between CE practice adoption and organisational EP.

Table 4
Major Research Papers on CE Practices and Environmental Outcomes

Researcher	**Title *of* the *Study***	***Type of* CE Practices**	***Samples Data***	***Key Outcome***
Zhu et al., *2010*	Circular Economy Practices amongst Chinese Manufacturers Varying In Environmental-oriented Supply Chain Cooperation and the Performance Implications	1) Eco-design 2) Management systems 3) IR	Quantitative	Due to differences in environmental-oriented supply chain cooperation amongst the four types of Chinese manufacturers identified, cluster analytic results using multivariate analysis of variance (MANOVA) showed that it was critical to intensify cooperation with upstream and downstream supply chain partners for a CE initiative to be successful and the EP.
Zhu et al., *2011*	Environmental Supply Chain Cooperation and Its Effect on the Circular Economy Practice-Performance Relationship amongst Chinese Manufacturers	1) Eco-design 2) Management systems 3) IR	Quantitative	The data analysis indicated that ESCC techniques were effective in moderation and, in certain situations, crucial in mediation for Chinese enterprises attempting to achieve the performance targets intended in CE practices. The findings underscored the need for Chinese enterprises to strengthen supply chain coordination as part of their efforts to establish a CE in their country. On the policy front, the research findings implied that ESCC practices were helpful and, in some cases, indispensable to the CE growth in China and improved the EP.
Botezat et al., 2018	An Exploration of Circular Economy Practices and Performance Amongst Romanian Producers	1) Eco-design 2) Management systems 3) IR	Quantitative	According to the findings, cluster participation possessed a modest impact on CE practices despite producing a significant impact on CE-targeted EP overall.
Silva et al., 2019	Circular Economy: Analysis of the Implementation of Practices in the Brazilian Network	Drivers and barriers to a CE	Qualitative	The practices that are most widely used are related to product design. Although the implementation was punctual in the majority of cases and did not include a series of continuous and commensurate measures, the findings revealed the embryonic contours of the European Commission in the network under investigation. The activities from the management category were less frequently observed, indicating that the

				environmental variable was not taken into consideration while developing strategic business plans.
Demirel & Danisman, 2019	Eco-innovation and Firm Growth in the Circular Economy: Evidence from European Small- and Medium-sized Enterprises	1) Circular eco-innovations 2) External funding available for a CE	Quantitative	The research demonstrated that eco-design was the only circular eco-innovation that generated considerable growth returns for SMEs and achieved EP. Researchers also discovered the levels of investment in circular eco-innovation.
Hysa et al., 2020	Circular Economy Innovation and Environmental Sustainability Impact on Economic Growth: An Integrated Model for Sustainable Development	CE innovation and environmental sustainability impact	Systematic literature review	A robust and positive link was revealed between CE and growth in both environmental and economic performance, thus demonstrating the critical role that sustainability, innovation, and investment in zero-waste programmes played in promoting prosperity.
Horbach et al., 2012	Employment and Performance Effects of Circular Economy Innovations	CE innovations	Quantitative	If the financial standing of a company and turnover growth were taken into consideration, the EP consequences of CE innovations were often good. In the case of employment effects, the findings of quintile regressions demonstrated that the same applied.
Vence & Pereira, 2019	Eco-innovation and Circular Business Models as Drivers for a Circular Economy	1) Eco-innovation 2) Circular business models	Systematic literature review	The study includes efforts to transform dominant business models (from new product and service design to reconfigured value chains, and new or short supply chains), transform the way citizens interact with products and services (owning and leasing, sharing, repairing, reducing, remanufacturing), and develop improved systems for delivering values (green mobility, smart energy systems, short supply chains) to achieve EP.
Schwarz et al., 2021	Plastic Recycling in a Circular Economy: Determining Environmental Performance through an LCA	CE	Life cycle assessment (LCA) matrix model	A thorough understanding of the environmental implications of recycling and the most effective ways to recycle certain plastic polymers was required to establish a CE for plastics. To achieve the objective, researchers used the chemical attributes of the top 25

	Matrix Model Approach			polymers produced in Europe to assess the EP of 10 selected recycling systems with varied TRL levels. The results were then compared.
Fonseca et al., 2018	Assessment of Circular Economy within Portuguese Organisations Luis	CE	Quantitative	Environmental Management System (EMS) certification status and the willingness to improve the EP and establish a sustainable business model were discovered to have a beneficial impact on the level of CE adoption.
Kazancoglu et al., 2021	This study is to address the above gaps and needs by proposing a framework highlighting policy-related barriers for the supply chain towards a CE and determining the relevance of the identified barriers for higher corporate environmental management.	CE	Fuzzy DEMATEL method	A set of recommendations was developed for improving the corporate EP of businesses through incentives and unique rewards, improving communication amongst stakeholders, the government's perception of the CE and the current linear economy, cooperation with non-governmental organisations (NGOs) and civil actions, the government's vision towards circular principles, the circular public procurement process, and the circular public procurement process.
Kazancoglu et al., 2021	Building Design and Construction Strategies for a Circular Economy	CE	Qualitative	To achieve a more comprehensive and uniform adoption of the CE in the building industry, researchers suggested that a new design typology be developed to facilitate CE-oriented decision-making in a building context and that the strategies be according to their potential in terms of reducing building-related environmental impacts.

Research Conceptual Model

Figure 2 represents the theoretical framework of the current research. The model is separated into two components with CE practices (eco-design, management systems, the IR) as the independent variable (IV) and the EP as the dependent variable (DV).

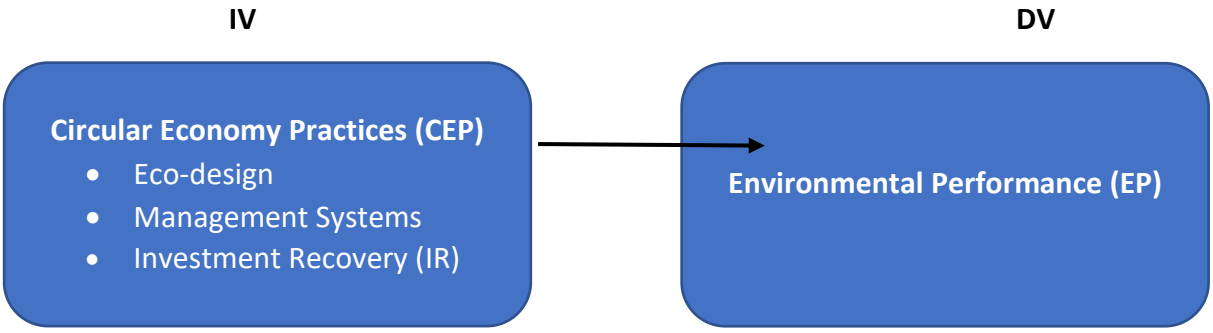

Figure 2: Research Conceptual Framework

Conclusion

The current study reviewed past literature to analyse the proposed circular environmental practices and organisational environmental indicators. The purpose of the analysis is to determine the elements and components of existing CE practices based on the three aforementioned dimensions, namely eco-design, management systems, and IR, and understand the latest trend from scholars in integrating the EP. This study concluded that scholars were discovered to frequently propose specific sets of indicators for specific research sectors although a plethora of the CE practices incorporated the three dimensions in enhancing the EP. As such, the revealed trend from the current study could assist decision-makers to facilitate the implementation of CE practices.

As the current paper reviewed and analysed the subsequent effects of the CE practices on the EP, the findings contributed to the existing body of knowledge by providing a delineation of the themes required to adhere to when complying with all environmental criteria. The themes employed as a measurement for the analysis fulfilled the primary environmental development concept encompassing various environmental, social, and financial issues. The analysis could provide pertinent guidelines to the government, managers, and decision-makers to understand the selection methods of appropriate tools in measuring and implementing CE practices with the following outcomes for the manufacturing industries.

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