Integrating knowledge management and orientation dynamics for organization transition from Eco-innovation to Circular Economy

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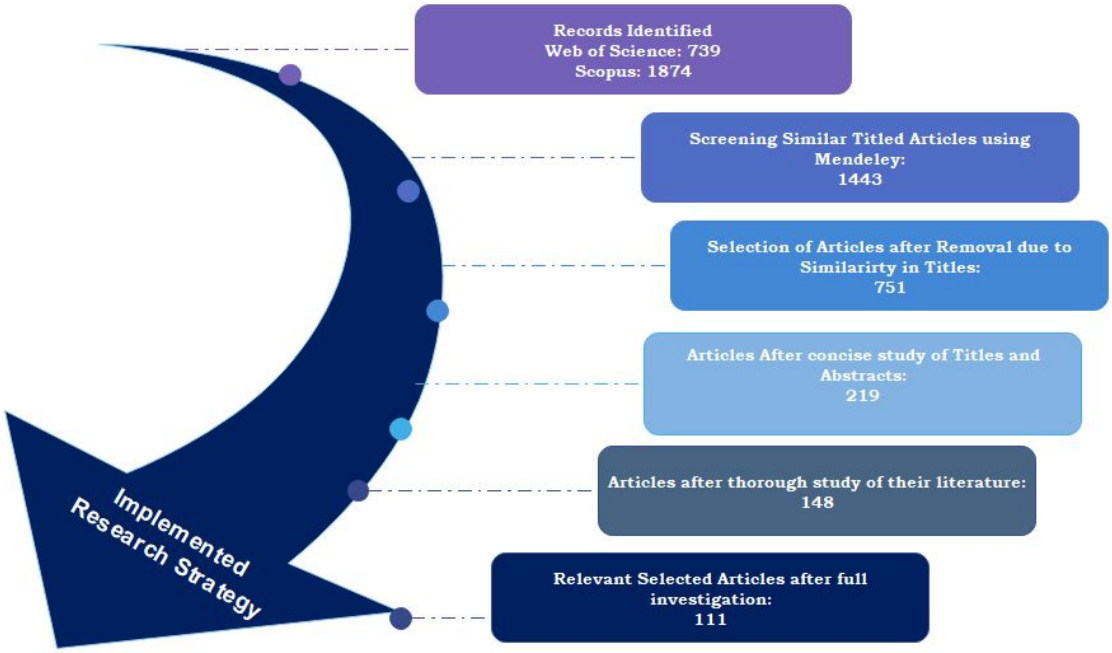
Fig. 1. Implemented research strategy adapted from Moher *et al*. (2009)



- Use of advanced technology to engage in reducing emissions.
- Looks for new technology from customers.
- Aggressively look for recycling technology.
- Increase speed of product development with less resources.

- Firms seek knowledge about waste management.
- Firms knowledgeable about environmental protection practices.
- Firms utilise recycled products for new products.
- Firms revisiting and shifting vision to promote cleaner production technologies.

- Firms committed to achieve zero emission goal.
- Firms provide training on new technology.
- Firms' management emphasise the importance of sharing new technology knowledge.
- Firms' interest in products with reused material.

- Firm is known for developing innovative products, aggressively promoting creativity and innovative goals for product development.
- Firm seeks external resources to anticipate change in new technology.
- Firm interested in development of new products whenever possible.

Supplementary file:

Table: Conceptualization of Eco-innovation (EI)

Europeia (2007)	Eco-innovation is 'any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving more efficient and responsible use of natural resources, including energy.'
Kemp and Pearson (2007, p. 7)	'The production, assimilation or exploitation of a product, production process, service or management or business methods that are novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives.'
Economic Co-operation (2009, p. 13)	'Eco-innovation is any innovation which would result in reduced environmental impact, even if such an outcome was not intended initially; such a definition, although workable, depicts eco-innovation as more of a side-effect and fails to emphasize its credibility as an alternative to business-as-usual.'
The Eco-Innovation Observatory (2012, p. 8)	The Eco-Innovation Observatory (2012, p. 8) defines eco-innovation as the 'introduction of any new or significantly improved product (good or service), process, organizational change or marketing solution that reduces the use of natural resources (including materials, energy, water, and land) and decreases the release of harmful substances across the whole life cycle.'
Horbach *et al*. (2012, p. 119)	'Eco-innovations are product, process, marketing, and organizational innovations, leading to a noticeable reduction in environmental burdens. Positive environmental effects can be explicit goals or side effects of innovations. They can occur within the respective companies or through customer use of products or services.'
Pham *et al*. (2019, p. 1093)	'EI as organizational support for eco-initiatives moreover, collective actions that co-ordinate the knowledge and expertise of employees, including the creation, development, and optimization of resources for the differentiation or the continuous improvement of green products (technological or management related).'

Table 1: Summary of previous literature review on Eco-innovation (EI)

Title	Authors	Summary
"The use of collaboration networks in search of eco-innovation: a systematic literature review"	(Sineiro and Sineiro, 2021)	The primary contribution of this study is to bring together the most relevant collaborative studies on eco-innovation in one place in order to chart future research directions in this critical area of the global economy.
"What is the role of eco-labels for a circular economy? A rapid review of the literature"	(Meis-harris *et al*., 2021)	In general, the findings indicate that eco-labels as a standalone information-based communication tool are unlikely to significantly change consumer behavior or production.
"Empirical generalizations in eco-innovation: A meta-analytic approach"	(Bitencourt, et al., 2020)	Identifying and analyzing factors affecting eco-innovation are critical for advancing and consolidating knowledge in this field.
"Key strategies, resources and capabilities for implementing the circular economy in industrial small and medium enterprises"	Prieto-Sandoval *et al*. (2019)	The review focuses on determining key resources, strategies and capabilities for implementing circular economy.
"A systematic review on environmental innovativeness: a knowledge-based resource view"	Pham *et al*. (2019)	Reviews literature on environmental innovativeness aspects such as eco-innovation orientation, environmental management, green absorptive capacity, and green adaptive capacity.
"Drivers of eco-innovation in the manufacturing sector of Nigeria"	Sanni (2018)	Reviews existing literature on eco-innovation from a different capability perspective.
"Contemporary corporate eco-innovation research: a systematic review."	He *et al*. (2018a)	The review mainly focuses on stakeholders' influence, drivers of eco-innovation, new product developments, product-service systems, and environmental management systems.
"The drivers for the adoption of eco-innovation"	Bossle *et al*. (2016)	Findings highlight the need for more education for sustainability in the business
"A literature survey on environmental innovation based on main path analysis."	Barbieri *et al*. (2016)	Literature revolves around the following topics: 1) determinants of EI, 2) economic and environmental effects of EI, and 3) policy inducement of EI.
"Eco-innovation: insights from a literature review"	(Díaz-García *et al*. (2015)	Reviewed eco-innovation

Table 2: Circular economy (CE) definitions contrasting different perspectives.

Standing *et al*. (2008, p.5)	"CE was developed in China as a strategy for reducing its economy's demand for natural resources as well as ecological damage".
Geng and Doberstein (2008, p. 232)	"A circular economy approach encourages the organization of economic activities with feedback processes which mimic natural ecosystems through a process of natural resources transformation into manufactures products by-products of manufacturing used as resources for other industries".
Ying and Li-jun (2012, p. 1683)	"Circular economy is essentially an ecological economy which requires human economic activities in line with the 3R principle, namely reduce, reuse, and recycle".
MacArthur (2013, p. 7)	"an industrial system (…) restorative by intention and design that relies on renewable energy and eliminates the use of toxic chemicals' aiming for the elimination of waste through the superior design of materials, products, systems, and (…) business models".
Su *et al*. (2013, p. 1)	"a traditional open-ended economy model developed with no built-in tendency to recycle which is reflected by treating the environment as a waste reservoir".
Giurco *et al*. (2014, p. 432)	"The concept of the circular economy proposes new patterns of production, consumption, and use based on circular flows of a resource".
de Jesus *et al*. (2016, p. 10)	"Circular economy is a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. It can be achieved through durable design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling".
Murray *et al*. (2017, p. 377)	"Circular economy is an economic model wherein planning, resourcing, procurement, production and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being".
Blomsma and Brennan (2017, p. 1)	"as an emergent framing around waste and resource management that aims to offer an alternative to prevalent linear take-make-dispose practices by promoting the notion of waste and resource cycling".

Table 3: Research Strategy

Publication selection criteria	**Web of Science, Scopus**
Searched items	Journal articles review papers
Search applied on:	Full text, to avoid exclusion of papers not including searched keywords in abstracts or titles, or those using a a different variant of the terms but which were relevant for the review.
Year of publications	2006–2020
Research method	Classification of methods used (mathematical modelling, the survey, case studies, literature review)
Inclusion criteria	Peer-reviewed research papers using quantitative, qualitative, blended-methods in any country that must address the circular economy.
Exclusion criteria	Not related to management area, book chapters, conference proceedings, not original research (editorial or commentary)
Scopus inclusion criteria	Inclusion Criteria Language: English The search field(s): Title, abstract, and keywords. Scientific areas(s): Social Sciences, Business, Management, and Accounting, Environmental Science Journal(s): All journal and review articles
Web of science inclusion criteria	Inclusion Criteria Language: English Scientific areas(s): Management, Business, Environmental studies Journal(s): All The search field(s): Topic science citation index expanded (SCI-EXPANDED) -1975-present. social sciences citation index (SSCI) -1975-present. arts and humanities citation index (AandHCI) -1975-present. emerging sources citation index (ESCI) -2015-present. Date of publication: 2006-2020

Table 4: Conclusive remarks of the relevant research articles distinguishing design and methods and key findings.

Author (Year)	Design and methods	Key findings
Ghassim and Bogers (2019)	Quantitative	According to the findings of this study, involving stakeholders in the development of renewable energy technologies and the production of goods with a greater degree of recyclability is significantly linked to the implementation of ongoing knowledge.
Adams *et al*. (2019)	Quantitative	Organizational capabilities align firm knowledge resources and improve innovation performance.
Kiefer *et al*. (2019)	Empirical	Strong co-operation links with key stakeholders can help the organization to develop end-of-pipe solutions.
Tseng *et al*. (2019)	Empirical Analysis	- Inter-functional co-ordination has a positive impact on strategic orientation. - Strategic orientation improves environmental innovation capability.
Nogueira *et al*. (2019)	Literature review	A transition towards CE requires understanding different actors and their interests.
de Jesus *et al*. (2019)	Qualitative	Co-operation and multi-actor networking are needed to encourage a take-make-dispose economy in the direction of the innovation system.
Parida *et al*. (2019)	Case study	There are two types of ecosystem orchestrators to achieve the system transition towards CE: 1) ecosystem readiness assessment and 2) ecosystem transformation.
Aranda-Usón *et al*. (2019)	Quantitative	Essential requirements for the implementation of CE practices: resource saving and efficiency.
Guzzo *et al*. (2019)	Literature review	Key success factors for circular model innovation; reduced consumption and sharing products.
Ünal and Shao (2019)	Empirical Analysis	Companies' competitive capability to reconfigure their operations and business models is positively associated with operational and innovation performance.
Jean *et al*. (2018)	Empirical Analysis	key findings are: - Strategic orientation links with the innovation generation. - Improve joint learning capability.
Li *et al*. (2018)	Empirical analysis	Different stakeholders likely to affect organizational innovativeness outcomes.
Jonas *et al*. (2018)	Empirical analysis	Stakeholders' engagement is useful for institutional arrangements, resource dependency and inter-organizational innovation.
Kiefer *et al*. (2018)	Empirical analysis	Co-operation, technological path dependency, corporate culture, technology-push and market-pull are key factors for EI.
Watson *et al*. (2018)	Literature review	External collaboration is critically crucial for environmental innovation.
Reike *et al*. (2018)	Review	Firms need to put more focus on remanufacturing, refurbishing and repurposing.
Pigosso *et al*. (2018)	Empirical analysis	Organizations' internal activities and process are essential to act as a strategic bridge between the external environment and readiness for eco-innovation.
Masi *et al*. (2018)	Empirical Analysis	A firm with better environmental awareness can positively contribute towards the transition to CE.
Korhonen *et al*.(2018)	Review	Collaboration is an essentially contested concept for circular economy outcomes.
Ghisellini *et al*. (2018)	Literature review	Adoption of CE practices positively associated with environmental benefits.

Stewart and Niero(2018)	Literature review	Circular economy and sustainability are interlinked with each other.
Kalmykova *et al*. (2018)	Literature review	Companies require research and development, market readiness and knowledge transfer strategies within all value chain parts.
Murray *et al*. (2017)	Literature review	Redesigning processes and reusing materials is a major focus.
Urbinati *et al*. (2017)	Literature review	implementing CE requires the value of networks and customer value proposition.
De los Rios and Charnley (2017)	Case Study	Capabilities, skills and change in the design process are essential to support the CE approach.
Mu *et al*. (2017)	Empirical Analysis	- External and internal variables affect the relationship between strategic orientation. - Strategic orientation affects new product development performance.
Geissdoerfer *et al*. (2017)	Literature review	The circular economy is regarded as a necessary requirement for long-term viability.
Spring and Araujo (2017)	Review	The circular economy can improve the reconfiguration of networks.
Velenturf (2016)	Case study	Strategic insights and operational efficiencies likely to promote waste to resource management for innovation.
Van Weelden *et al*. (2016)	Qualitative	The findings highlight the importance of information provision and decision making in product design and acceptance of refurbished products.
Flammer and Kacperczyk (2016)	Empirical Analysis	This study finds that customer-focused firms are likely to improve innovative productivity.
Franklin-Johnson *et al*. (2016)	Modelling	It is imperative to manage design decisions as a business to enable continued material and production retention.
Lieder and Rashid (2016)	Literature review	Informal joint support affects the successful implementation of the CE concept.
Ghisellini *et al*. (2016)	Literature review	In order to implement the CE concept, exchange partners' collaboration is fundamental.
Sauvé *et al*. (2016)	Conceptual	Findings indicate the need for an interdisciplinary approach to help to solve environmental challenges.
Supino *et al*. (2016)	Literature review	The conclusion highlights the need for a collaborative approach between stakeholders such as the business community and institutions as a business strategy to implement circular economy practices.
Maletič *et al*. (2016)	Empirical Analysis	Sustainability-orientated innovation is positively associated with innovation performance.
Tukker (2015)	Literature review	The result shows that the product-service system supports the CE approach. Managers required to possess relationship management skills and knowledge of the product and its reusability.
Haas *et al*. (2015)	Socio-metabolic approach	Eco-design adoption practices facilitate the economic transition from linear to circular.
Weng *et al*. (2015)	Empirical Analysis	The organization can benefit from stakeholder's perspectives on green innovation.
Klewitz and Hansen (2014)	Systematic literature review	External actor co-operation is an enabling mechanism for SMEs. Sustainability orientation is likely to lead to an improved innovation path.
Su *et al*. (2013)	Literature review	The collaborative relationship is essential.
Oxborrow and Brindley (2013)	Empirical Analysis	Supplier co-operation is critical and a catalyst for sustainability innovations.

De Marchi (2012)	Empirical Analysis	Co-operation with the supplier is more relevant for innovation.
Van Bommel (2011)	Literature review	External orientation and transparency, co-operation between departments, learning and adapting can enhance the innovation perspective.
Zhu *et al*. (2010)	Empirical Study	Companies with better environmental-orientated supply chain co-operation are more likely to implement circular economy approaches.
Verghese and Lewis (2007)	Literature review	Results showed that environmental innovation requires a co-operative approach to reduce environmental impacts and costs.
Yuan *et al*. (2006)	Conceptual Study	The adoption of a CE strategy is more likely to result in increases in resource productivity and environmental efficiency.
Sizhen *et al*. (2005)	Quantitative Analysis	It is imperative to manage cleaner production technologies.

Table 5: Review of the findings related to the benefits of environmental innovation to a circular economy (CE).

Author (Year)	Design and methods	Key findings
Suchek, *et al.* (2021)	Literature review	Companies must be aware of and engage in more sustainable practices to transition to a circular economy. The literature also shows that research on innovation in the circular economy needs to be expanded to include all sectors, because many studies only look at the fashion and manufacturing industries, while those that deal with the biological cycle and the environment aren't given as much attention as they should be.
Kiefer, *et al.* (2021)	Mathematical Modelling	Some argue that the two concepts are compatible and interdependent and that EI is critical to achieving the CE. The findings contribute to one's understanding of how EIs facilitate the transition to the CE.
de Jesus *et al.* (2019)	Qualitative Analysis	The successful transition towards EI requires the identification and exploration of opportunities within the organization. Circular economy initiatives have the potential to contribute positively to sustainability.
Salim *et al.* (2019)	Literature review	Integration capability as co-ordination activities introduce new or changed products.
Colombo *et al.* (2019)	Review	Research should explore the relationship between the circular economy and eco-innovation. Eco-centric approaches to sustainability may provide an opportunity to unlock the real potential of circular economy initiatives.
Potter and Graham (2019)	Empirical Analysis	Findings show that working collaboratively with their suppliers to generate inter-organizational eco-innovations.
Fernando *et al.* (2019)	Empirical Analysis	Key elements pursuing EI: - supplier involvement. - cross-functional co-ordination. - market focus.
Aboelmaged (2018)	Empirical Analysis	Supplier collaboration and environmental orientation are positively associated with eco-innovation.
He *et al.* (2018b)	Literature review	The critical process for eco-innovation: - collaborative management among customers and suppliers. - Institutional role.
Sanni (2018)	Empirical Analysis	Key drivers for eco-innovation: - Organizational innovation. - Marketing innovation. - Informal sources of knowledge.
Sáez-Martínez *et al.* (2016)	Empirical Analysis	Technological collaboration and green consumerism are a crucial driver for eco-innovation.
de Jesus, *et al.* (2016)	Literature review	As a new paradigm, the CE has been steadily gaining traction. There is a considerable number of literature on EI, as well as a rising body of study on the CE but as yet there is no full understanding of the relationships that exist between these two notions.
Del Río *et al.* (2016)	Literature review	Eco-Innovations depends on: - Sectoral and regional features. - In-house knowledge. - Customer relationships and reputation.
Peng and Liu (2016)	Empirical Analysis	The findings indicate that managerial environmental awareness, eco-innovation management and external resource acquisition may increase the eco-process and eco-product innovation
Hojnik and Ruzzier (2016)	Literature review	Market pull factors and conceptualization of the EI process.
Bossle *et al.* (2016)	Literature review	Major drivers for eco-innovations are: - Environmental capability.

		- Environmental managerial concerns.
Díaz-García *et al*. (2015)	Literature review	Key Elements for the introduction of EI: - Firm internal competencies and capabilities. - Visionary management. - Green organizational identity and absorptive capacity.
Mylan *et al*. (2015)	Qualitative Analysis	- Positive co-operation and co-ordination. - A shift in the existing model of governance mechanism. - Focus on information exchange modes and framing of sustainability issues. - Mechanisms to stimulate eco-innovation. - The clarity in the orientation of eco-innovation.
Klewitz and Hansen (2014)	Literature review	The higher level of sustainability behavior, the better the innovation practices.
Bönte and Dienes (2013)	Empirical Analysis	This study finds three different process innovation strategies: - A firm may follow in house strategy. - A firm may opt for the external resources. - A firm may opt for a co-operation strategy.
Kesidou and Demirel (2012)	Empirical Analysis	- Environmental regulations. - High level of investment. - Organizational capabilities. - Cost saving.
Cheng and Shiu, (2012)	Empirical Analysis	The key findings are: - Developing new products with the use of cleaner production technologies. - Use natural materials in designing new products. - Reduce waste in operations.
Horbach *et al*. (2012)	Empirical Analysis	Determinants of eco-innovations: - Market pull factors (customer and market conditions). - Market push factors (regulations). - Investment intensity and improvement of a company's innovative capacities (energy efficiency or renewable energy). - Market orientation of the different environmental areas.
Kammerer (2009)	Empirical Analysis	- Green capabilities. - Resources and knowledge. - Government regulations. - Internal factors (customer orientation, environmental strategy).

Highlights

- Critique of sustainable eco-innovation (EI) and the implementation of circular economy (CE) with regards to integrating knowledge management.
- Better understanding of how, and under what conditions, businesses may successfully transition from EI to CE.
- Stakeholder orientation and organizational learning orientation are necessary to acquire for Knowledge management and transmitting information for achieving efficient and responsible use of natural resources.
- Sustainability orientation and entrepreneurial orientation enable firms to make a gradual understanding of shared global challenges and risks such as resource scarcity, climate change, capture new growth opportunities, and build a green company image.

Integrating knowledge management and orientation dynamics for organization transition from Eco-innovation to Circular Economy

Abstract

Purpose – This study focuses on establishing relations with some important but underestimated elements of knowledge dynamics and firm orientations to characterize organizational circular economy activities through eco-innovation (EI). The advent of the circular economy (CE) in this post-pandemic era has brought unpredictable sustainable challenges for the manufacturing industries. This research aims to bring more clarity to the extant literature on the relationship between EI and CE.

Design/methodology/approach – In this study, a systematic literature review methodology was used to research the determinants of eco-innovation in the knowledge environment that drives the implementation of a circular economy.

Findings – This paper proposes a framework that articulates organizational learning and orientation dynamics and offers a new set of internal knowledge resources for a corporate circular economy. It is found that change towards CE requires connection with EI. However, successful CE growth largely depends on leveraging knowledge resources and orientation dynamics (stakeholder orientation, sustainability orientation, organization learning orientation, and entrepreneurial orientation). CE techniques are still in their early phases of adoption and their implementation is still in its development. Circular Knowledge Economy (CKE) has the potential to be a useful alternative to achieving thriving CE to achieve sustainability in local and global businesses operations.

Originality/value – This paper abridges the knowledge gap in identifying key drivers and presents the current eminence, challenges, and prognostications of sustainable EI parameters in the changing climate of CE. This study builds a framework that combines insights from different viewpoints and disciplines and extends one's understanding of the relationship between EI and CE. From a theoretical perspective, this study explains the knowledge management complexity links between EI and CE. It builds a theoretical bridge between EI and CE to illustrate how firms transition towards CE following the recommendations. Thus, researchers should continue to support their research with appropriate theories that have the potential to explain EI and CE relationship phenomena, with a particular emphasis on some promising but underutilized theories such as organizational learning, dynamic capabilities, and stakeholder theories.

Practical implications – This study helps companies to understand the organizational learning and different orientation dynamics for achieving CE principles. The research findings imply that eco-innovation is critical in establishing a sustainable transition toward CE through organizational learning and orientation dynamics and has garnered significant attention from academics, public policymakers, and practitioners. The proposed framework can guide managers to develop sustainable policies related to the circular economy. Our research recognizes that firm-level circular knowledge economy is important in shaping how knowledge resources relate to CE within transition management literature.

Keywords: knowledge management dynamics, eco-innovation; circular economy; organizational learning; sustainable transition; circular knowledge economy

1. Introduction

Knowledge management with a focus on managing sustainability is necessary for the development of the ecological health of the planet (Chopra *et al*., 2021). Research by (Martinez-Martinez et al., 2022) suggest that firms are realizing sustainability increase because of Environmental knowledge management (EKM). Given the importance of EKM, firms need to realize the importance of sustainability knowledge management to (Cegarra-Navarro et al., 2010; Martínez-Martínez et al., 2015a) . Sustainability knowledge management aims to provide firms with the ability to meet natural resource needs without sacrificing future generations' needs (Birou *et al*., 2019). The urgency to reduce CO_2 emissions in order to avoid preventable climate change is echoed by the IPCC sixth assessment report in 2021 (IPCC, 2021), which states the earth's warm up of 1.1°C from 1850-1900 was caused by human activities, specifically in the post-industrial era. Primarily, the industrial revolution focused entirely on systems, products, and services. Eco-innovation (EI) research focuses on a set of different firm knowledge resources that deal with an objective such as reducing material consumption, improving energy savings, and innovating the recycling-reduce- processes (Ghisetti *et al*., 2015). Today's EI has emerged as an important issue affecting input resources to create growth conditions and accelerate environmental efficiency (Cainelli *et al*., 2020; Canh *et al*., 2020; Nasir *et al*., 2021), and improve manufacturing processes' performance (Lee and Schmidt, 2017). There has been a growing interest in scholars on EI to tackle global climate challenges of sustainable modes of consumption and production (de Jesus *et al*., 2016). According to Pham *et al*. (2019, p. 1093) EI can be defined as a process of "creation, development, and optimization of resources for the differentiation or the continuous improvement of green products". EI has been called a catalyst for the new sustainability paradigm and remains a relatively poorly understood concept (Gonzalo *et al*., 2020). Much of the EI and circular economy (CE) research

has investigated the EI and CE antecedents and drivers (de Jesus *et al*., 2016). CE at meso-level provides an opportunity to improve environmental performance (Ghisellini *et al*., 2016). However, despite its importance of reducing the impact of the production-consumption system, product-service system and addressing ecology challenge and biodiversity (del Río *et al*., 2010), a few empirical studies on the relationship between EI and CE were reported (Gonzalo *et al*., 2020). The paucity of research applies specifically to exploring the knowledge base and key factors influencing the relationship between EI and CE (de Jesus *et al*., 2016).

The role of sustainability knowledge management is critical for understanding the relationship between EI and CE. (Birou *et al*., 2019). Accord to (Cegarra-Navarro et al., 2010; Martínez-Martínez et al., 2015a) , environmental knowledge (EK) remains an important topic in light of the continued development of sustainability challenges. However, recent research has revealed that businesses driven by EI are making a substantial shift to a CE (de Jesus *et al*., 2016). In a broader sense, the EI's increased relevance implies that CE, as a result of sustainable consumption and production activities, has eminence to modern manufacturers. Kirchherr *et al*. (2017, p. 224) use the term CE "as an economic system that is based on the reuse, reduction, recycling, and extraction of materials from end-of-life products to accomplish the long-term benefit of current and future generations". The eco-innovation literature has expanded in size, but its influence on the EC has yet to be fully developed (Cainelli *et al*., 2020). Many firms still face challenges managing the change from a linear to a CE (Cainelli et al., 2020; Dogan et al., 2020). Atiku, (2020)point to the need to develop a knowledge base ecosystem for resource recovery to advance eco-innovation for environmental preservation. The knowledge base perspective may serve as a foundation for understanding as a basis for assessing relevant aspects of CE (Zhongming *et al*., 2016).

The most recent systematic literature review reveals that CE initiatives significantly drives EI *(*de Jesus *et al*., 2016). As an example, Bitencourt *et al*. (2020) found that

incorporating reused and recycled material could partially support sustainable consumption and production. The association between EI and CE within the internal organizational mechanism from an absorptive capacity has not been thoroughly investigated (Marrucci *et al*., 2021). Further, de Jesus and Mendonça (2018) observe that the relationships between EI and EC remained overlooked in the academic literature. Global problems of resource scarcity and environmental challenges have promoted interest in different stakeholder groups to enforce manufacturing firms to implement and use various circularity practices (Lieder & Rashid, 2016) and knowledge base perspective (López-Torres *et al*., 2019a). According to Salim et al. (2019), EI research has just begun to investigate the role of firms' internal capabilities in enhancing firm performance without elaborating the role of knowledge dynamics. Organizational knowledge dynamics represent knowledge creation and sharing activity(Nonaka, 1994).The term "knowledge dynamics" represents how knowledge undergoes change development and integrates many of a firm's new experiences and new ways of thinking(Bratianu & Bejinaru, 2020). EK and knowledge management (KM) provide much guidance on how to use in green operations(Huang, 2009; Martínez-Martínez et al., 2015a). Knowledge can be used to maintain traditions, gain experience, produce fresh ideas, and disseminate gained information(Cheng & Wu, 2015). EKM system enabling presents an opportunity for an individual in an organization to gain an understanding of the environmental knowledge circulation process to make an environmentally responsible business decision(Huang, 2009).Little is known about how EKM promote sustainability (Martinez-Martinez *et al*., 2022), therefore, exploring specific skills of businesses can help organization shift from EI to CE (Marrucci et al., 2021). Zwiers *et al*. (2020) believes a knowledge management (KM) approach is critical, becoming fundamental to firm transitions from eco-innovation to CE. This transition is key to a CE. For this reason, therefore, in recent years, there has been increasing interest in creating better KM strategies and firms to enhance their primary focus to take action to operate more sustainably(Atiku, 2020). Given the

importance of research on KM in the CE and the high interest and expectations in KM and sustainability, it is important to understand how KM can prove to be a useful tool in the quest to drive eco-innovation(Ghinoi *et al*., 2020). First, empirical evidence indicates that firms fail to undertake a set of knowledge practices that add value to their existing internal routines to transition towards eco-innovation and sustainability (Marchi *et al*., 2013). Second, empirical evidence suggests that different orientation perspectives may enhance EI (Tseng *et al*., 2019). Third, Manninen *et al*. (2018) recently highlighted the importance of stakeholders' roles in capturing intended environmental value through CE practices. In his recent study, (López-Torres *et al*., 2019b; Zhongming *et al*., 2016) calls for more scholarly research into KM and CE.However, relatively few research studies other than Watson *et al*. (2018) explicitly examine operating capabilities' impact on innovation. Therefore, a lack of understanding on how knowledge base perspective is likely to have a positive impact on a manufacturer's ability to address CE challenges.

The CE has grown increasingly important in recent years in order to achieve organizational targets to progressively reduce its greenhouse gas emissions and achieve resource recovery efficiency (Awan & Sroufe, 2022). Given the heterogeneity of EI and CE in the literature, understanding the broader picture of businesses' internal capabilities in the field of EI and CE is still missing (Marrucci *et al*., 2021). Ghinoi *et al*. (2020) suggested that firms' orientation about local and regional administrative agencies could support firm strategy in the transition to CE for improving sustainability management. Previous literature recognizes that EI can be influential in the transition process by linking stakeholders' activities and resources. Despite the increasing interest in bridging EI and CE (Cainelli *et al*., 2020), the current understanding of EI drivers and the consequences of CE is limited. However, the impact of knowledge base perspective on CE is not clariid by the recent studies (Zwiers *et al*., 2020). EI is all forms of innovation that foster sustainable consumption and production and addresses

ecology challenges and encourages a closed-loop approach, leading to increased economic and environmental benefits whilst CE is a dual-loop regenerative system (Alhawari *et al*., 2021).

For instance, a vast body of evidence in the academic literature has been devoted to researching how various knowledge management approaches can contribute to a firm's CE(Ghinoi *et al*., 2020). (Zwiers *et al*., 2020) finds that there has been researched on CE and sustainability; however, research on how the knowledge base perspective affects the CE is rarely considered in the organizational setting. Therefore, it is critical to review the existing literature to examine the links between EI and CE and call for future research to account for dynamic factors that facilitate successful firm transitions (de Jesus *et al*., 2016). The purpose of this research is to bring more clarity to the extant literature on the relationship between EI and CE. This paper argues that the main relevant transition mechanisms can be grouped into different internal and external knowledge resources and firm capabilities perspectives. It argues that previous research has focused on how firms can search for potential internal inbound knowledge to improve EI (De Marchi and Grandinetti, 2013). Following Cainelli *et al*. (2020), the literature on EI and CE was systematically reviewed and critical issues for future research were highlighted. This study answers the following question: What internal and external factors influence the transition between EI and CE in a sustainable manner in this changing climate? This literature review focuses on critical organizational capabilities that affect the EI and CE's perceived initiatives.

This research makes three significant contributions. First, the existing literature on eco-innovation and CE is consolidated and a framework that combines insights from different disciplines are investigated. Second, it responds to recent calls in the literature to identify critical factors that influence CE's transition As there is a limited understanding of how different capabilities may facilitate CE transition (de Jesus *et al*., 2016). Previous research emphasizes the significance of knowledge management system and organizational structures as antecedents

to promote sustainability (Chaurasia *et al*., 2020). Third, from a knowledge base theoretical perspective, this study explains the complex links between EI and CE. It builds a theoretical bridge between EI and CE to illustrate how firms transit towards CE following the recommendations of Cainelli *et al*. (2020). The authors describe how diverse orientations such as stakeholder orientation, sustainability orientation, learning orientation, and entrepreneurial orientation impact the link between EI and CE. Finally, this review highlights the importance of different orientation capabilities and how these are critical in shaping firm circular initiatives from the managerial perspective. Thus, it also provides insights into the effectiveness of such orientation capabilities.

2. Research Gaps on Sustainable Eco-Innovation to the CE Level

2.1 Environmental innovation

Consequently, the natural resources of the globe, particularly the complicated ecosystems that support biodiversity, are in jeopardy of becoming exhausted or even disappearing altogether (López-Torres et al., 2019b).In this regard, eco-innovation plays a critical role in actual sustainable development (Rodríguez-Rebés *et al*., 2021). An essential element of environmental innovation is higher resource efficiency. In the literature, Environmental innovation (EI), ecology innovation(EI), and green innovation (GI) phrases are frequently used interchangeably. Environmental innovation is broadly defined as "the development of products (goods and services), processes, marketing approaches, organizational structure, and new or improved institutional arrangements which, intentionally or not, contribute to a reduction of environmental impact in comparison with alternative practices" (OECD, 2009, p. 2). CE remains a highly debatable topic and Alhawari *et al*. (2021, p. 1) defined CE as a "dual-loop regenerative system that focuses on the effective and efficient utilisation of resources in the ecosystem, which is beneficial to environmental and economic

performance optimisation". Adopting CE principles is encouraged by European Union policies (Korhonen *et al*., 2018). Management, marketing, and institutional structures at the manufacturing level could establish a framework for achieving resource efficiency and sustainability goals (Awan, 2020). The most common theme of the CE definition is the maximization of resource utilization until its recycling stage (Awan et al., 2022). A strength of this concept is that they emphasize the reusage of resources, while ensuring that both during manufacturing and after the product's lifespan, there is minimum waste and closing loops (Awan, 2020). One particular line of inquiry on development of resource efficient products, Pham *et al*. (2019) have carried out a literature review of 40 studies on EI (Watson *et al*., 2018). The other studies aimed at advancing an overview of the literature on EI and a capability-based framework from 1970 to 2014. In this paper, the authors suggest that operating capabilities are key to drive eco-innovation, for which 88 scientific articles are analyzed, focusing on environmental capabilities, learning capabilities, and marketing capabilities from an organizational perspective. Although their conceptualizations are aligned with the existing literature review on EI, they focused only on the capability perspective rather than examining the determinants of CE initiatives that impact ecological innovation at micro-level. There are also literature review studies that focus on the capability perspective.

In contrast, Klewitz and Hansen (2014) carried out a systematic literature review on sustainability orientation in small- and medium-sized enterprises (SMEs) between 1987 and 2010. For instance, Bhupendra and Sangle (2015) focus on the essential characteristics of capability (market, product and behavioral) to successfully implement cleaner production technologies to reduce pollution emissions whilst, Adams *et al*. (2016) reviewed literature related to environmental management and sustainability between 1995 and 2012; these were all connected to a sustainability mindset with the explicit goal of generating environmental and social value. Amui *et al*. (2017) studied the drivers of organizational capability development to

enhance environmental conservation for the sustainability of which innovation is the core issue at micro-level. The earliest work on CE appeared in literature in the early 1980s. The closed-loop economy was first introduced by Stahel and Reday-Mulvey, (1981). Their work focused on evaluating the inter-organizational relationships and concern about the extraction of waste disposal back into the system (Ayres and Kneese, 1969). Discussion on how to incorporate and maintain a balance between organizational resources and governmental demands came into discussion in the 1970s after the remarkable work of Stern (1973).

2.2 Circular Economy

CE aims at the implementation of the 3R (reduce, reuse and recycle) initiative which is essential to achieve a broader sustainable development goal towards landfill prevention, reduction of greenhouse gas emission, procurement of resources, and management of hazardous waste (Ghisellini *et al*., 2016). It has various limitations and problems, much like other sustainability methods, that must be acknowledged. CE's main idea is that one can identify significant dimensions of 5Rs (reuse, recycle, remanufacture, repair, recovery) and attribute them to shape the future. The term recycling has been highlighted in the literature *(Murray et al*., 2017). The concept of recycling about any recovery procedures that include waste materials being reprocessed into goods or materials that can be used for their original or other purposes. (European Commission, 2008). Reusage refers to using the product again to maximize life (Stahel, 2014). Reuse is the process of reusing non-waste materials or components for the original purpose for which they were intended (Yuan *et al.*, 2006; European Commission, 2008). The concept of CE has been emphasized as a system to use a substitute or reuse the materials to improve the firm ability to meet the needs of future generation (Awan and Sroufe, 2022). CE has recently received attention due to its ability to provide the basis for the end-of-life products for re-processing, re-managing, re-utilization, and promotion of zero waste. The

zero wase means to keep waste for upcycling (redesigning the same part or components to improve the quality of the product) or downcycling (use parts or components to develop a new product). The aim of zero waste is not to dispose of unwanted waste in the landfill *(Murray et al*., 2017).

The Ellen MacArthur model demonstrates a component recycling and recovery program is useful in reducing waste (Ellen MacArthur Foundation, 2013). This model is predicated on the circulation of technical and biological nutrient-based goods and materials through the economic system, as described above. (Ellen MacArthur Foundation, 2013). Hence, some reusage of components and recycling components are just as relevant when the objectives for minimizing greenhouse gas emissions influence the environment. When the firm owns specific resources to reuse the components it can attract internal and external stakeholders *(Rodríguez-Rebés et al*., 2021). Firms will be able to gather ecological knowledge, enhance waste management, and engage in green innovation due to the knowledge generated through KM activities *(Chopra et al*., 2021). Consequently, the use of organizational knowledge management is one of the key elements that improves environmental sustainability throughout the entire life cycle of a product (Shahzad *et al*., 2020).

The KM strategies that are used to achieve environmental advantages are impacted by the identification of both the internal and external drivers of organizational eco-innovation (Marrucci *et al*., 2021). Managers use knowledge produced by the external stakeholders that generate the conditions necessary to reduce the amount of scattered knowledge (Gomes *et al.*, 2021). In this case, knowledge is learned sequentially and informally(Huang, 2009). Following literature insights by (Martínez-Martínez *et al*., 2015), One critical observation of the extant literature on CE is that few studies have focused on the circular knowledge economy. The concept of CE has provided a useful basis for understanding circular knowledge management(Zwiers et al., 2020). CE dual loop organizational planning process leads toward

more environmentally responsible production and consumption system(Awan *et al*., 2022). It keeps material in use for a longer period (to eliminate trash and promote the effective and efficient utilization of the ecosystem) to achieve sustainability goals (Alhawari *et al*., 2021). The KM literature has evolved to consider knowledge economy necessitate to focus on advancing EK (Martinez-Martinez *et al*., 2022). EK is critical for sustainability initiatives(Martinez-Martinez et al., 2019; Martínez-Martínez et al., 2019), and is viewed as a knowledge resource with which organizations align their initiatives to tackle existing and upcoming environmental challenges(Cegarra-Navarro *et al*., 2010). For this reason, the nature of environmental challenges necessitates a firm level focus in examining circular knowledge economy (CKE). The knowledge economy aims to provide a unified system of production of products and services that contribute to the development of technology and scientific innovation(Cheng & Wu, 2015). Following (Huang, 2009) and (Martínez-Martínez *et al*., 2015), the CKE consists of the mechanism and process that enable an organization to re-accumulation, re-internalize, re-utilization, a re-sharing knowledge-intensive activity that focuses on resource-productivity and eco-efficiency for creating and delivering products, components, and materials at their highest utility for customers and society that contribute to renewal and material management innovation. However, the more profound understanding of the CE practices is still scary and in its infancy in developing countries. Table 1 provides a summary of the previous literature review on eco-innovation while Table 2 provides an overview of CE definitions.

<<Tables 1 and 2 go about here>>

The aforementioned literature shows that several research studies investigated the influence of orientation perspectives on eco-innovation. Environmental innovation is concerned with new product development, reducing energy costs, increasing customer satisfaction, and high sales volume. Thus, sustainable manufacturing necessitates the demands of new processes

and equipment to create new businesses. The pursuit of long-term viability is prompting businesses to rethink their approaches to technologies, products, and business processes (Nidumolu *et al*., 2009). Realising sustainability benefits requires the implementation of CE practices. Many firms are aware of civic sustainability's potential benefits (Awan *et al*., 2014). For instance, Kesidou and Demirel (2012) focus on different vital determinants of the eco-innovation process, market conditions and demand factors. Sustainability is usually associated with developing and implementing activities that support existing resources to meet future generations' needs.

Innovation plays a critical role in actual sustainable development (Chopra *et al*., 2021; Zhang, Rohlfer, &Varma, 2021). An essential element of environmental innovation is higher resource efficiency. Moreover, sustainable development can be achieved by reducing the use of resources, production and consumption process (Bossle *et al*., 2016). At manufacturing level, management, marketing and institutional arrangements constitute a mechanism for attaining resource efficiency goals and sustainability. The link between, EI, and orientation viewpoint is one of the study motivations for many of the studies covered in this literature review. Thus, literature acknowledges that eco-innovation may be undertaken for several rationales and motivations such as reduced environmental impact, exploitation of process and product management, improved quality of products, reduced usage of natural resources, reduction in environmental burdens and creation and optimization of resources.

3. Capabilities of EI and CE

Knowledge creation can be based on internal resources and capabilities focused on environmental management (Bresciani *et al*., 2022). Companies with open participation processes, strategies, and tailored activities might have the best knowledge resources to effectively oversee a more efficient way to manage and implement waste-to-resource

innovations (Velenturf, 2016). To that extent, the collaboration mechanism impact on organizational capability development could be regarded as dynamic regenerative capabilities (Ambrosini and Bowman, 2009). Much like prior literature, this study suggests a focus on top-down knowledge inflow and sharing, enabling the recipient's ability to improve innovation (Quan *et al*., 2021; Shahzad *et al*., 2020). The field of CE is viewed as a means of value creation and design process for innovation (Awan and Sroufe, 2022). Yet despite the relevance of value creation and innovation for EI and CE, very little is known about the impact of different capabilities on the relationship between EI and CE (Kiefer *et al*., 2021). There is limited understanding of how different capabilities may facilitate the transition to CE (de Jesus *et al*., 2016). de Jesus *et al*. (2019) discussed the sustainability transition of EI in the context of CE. According to Masi *et al*. (2018), the prior research is concerned with understanding the preferences of CE related practices at firm level. Previous research has given little attention to the extent to which factors trigger the adoption of CE practices at the firm level. With a view on exploring the barriers and drivers of CE, recent literature reviews by (Govindan and Hasanagic, 2018) have made attempts to explore CE's implementation by identifying barriers and drivers. CE implementation in manufacturing has received more attention (Kalmykova *et al*., 2017). Some research studies have been published in recent years, offering a conceptualization of CE (Kirchherr *et al*., 2017), expected transition to the ecosystem (Ghisellini *et al*., 2016), CE for product design (Mestre and Cooper, 2017), and challenges of the CE . Research on implementation of CE practices, which considers the role of collaboration, and level of implementation occurring at a particular capability setting are important to the advancement of implementation.

4. Solution Method

A systematic review approach was followed to answer the specific question to collect and analyze CE and EI (Denyer and Tranfield, 2009). Contributions, analysis of existing research, and evidence reporting are all part of this sort of review. The literature was then evaluated in terms of the model's dimensions and the results were discussed. Winans *et al*. (2017) examined the CE concept's history and current applications by reviewing 150 articles from Scopus, ScienceDirect, and google scholar. They used keywords such as eco-industrial parts, material flow analysis and industrial symbiosis. There is an essential publication in this direction by Ghisellini *et al*. (2016) that reviewed 155 articles (ranging from 2004 to 2014, using the Web of Science and Science direct) with different keywords such as clean production, CE and eco-industrial parts. More recently, Govindan and Hasanagic (2018) conducted a review of the systematic literature on the determinants of drivers and barriers in relationship to stakeholders' perspectives, analyzing 173 articles from Scopus2 and Web of Science. They used keywords such as drivers, barriers, practices, closed loop, remanufacturing, reduce, reuse and recycling. In this study, article selection was carried out through Scopus and the Web of Science. The general keywords, circular economy, remanufacturing, recycling, drivers and institutional are employed as research criteria in both databases with title, keywords, and abstract. The data range set to 2006 following the assessment of Govindan and Hasanagic (2018) 2006 marked the beginning of academic interest in the CE.

The four-step procedure was adopted as the foundation for this review of literature as outlined by Kunisch *et al*. (2018). First, a search query for the selected database was initiated. Second, studies were selected and evaluated. Third, studies were analyzed and broken down, and finally, the results were analyzed and presented. The research strategy is shown in Table 3. The research cover article was restricted using the key terms stakeholder AND innovation, stakeholder AND eco-innovation, orientation AND circular economy, green innovation OR

environmental innovation, circular economy AND Orientation AND Innovation, strategic orientations AND innovation, circular economy AND eco-innovation. The search was narrowed to published articles between 2006 (as the concept of CE emerged then) to 2020. The research on both databases was conducted on 30 August 2020. The authors select the articles to be analyzed based on which title, keywords and abstracts contained the terms circular economy (CE), remanufacturing, recycling and innovation.

First, Mendeley was used to eliminate duplicate articles from both databases. These articles were removed from the overall number of articles, bringing the total number of articles down to 1443. The abstracts of publications were reviewed, tallied, and categorized according to the study problem features and facet of the CE. 111 publications were selected as not being related to the study goal after carefully analyzing the title, abstract, and keywords. The goal was to keep up with the most recent developments in CE and innovation research. To further concentrate on relevant articles, only articles from business economics were included in the review since the aim is in the mechanisms that affect CE practices implementation from an environmental innovation viewpoint. Articles were included if they specifically aligned to aCE , management practices, innovation and collaborations. Fig. 1 provides an overview of data collection and illustrates the study flow diagram searches on a web of science and Scopus databases. The identification of relevant articles was based on the four steps, 1) identification of the papers, 2) analysis of data and screening, 3) define for the eligibility, and 4) inclusion (Moher *et al*., 2009). The literature identification strategy resulted in 111 articles.

<< Table 3 and Figure 1 go about here>>

5. Findings and Discussion

5.1 Sustainable Eco-Innovation Research

<<Table 4 goes about here>>

Tables 4 and 5 review the findings related to the benefits of environmental innovation to CE. Many studies found that transition towards eco-innovation requires identification of opportunities (de Jesus *et al*., 2019), development, integration of internal competencies (Salim *et al*., 2019), working collaboratively (Potter and Graham, 2019), supplier involvement and cross-functional collaboration (Fernando *et al*., 2019) for the CE. While others have looked at the relationship between organization innovation, marketing innovation (Sanni, 2018), market pull factors (Hojnik and Ruzzier, 2016), environmental capability, and managerial concerns (Bossle *et al*., 2016), few studies have pragmatically tested eco-innovation determinants (Del Río *et al*., 2016; Horbach *et al*., 2012; Kammerer, 2009). The literature analysis shows that few research studies are investigating the influence of orientation perspectives on EI. EI is concerned with new product development, reducing energy costs, increasing customer satisfaction and high sales volume. Thus, sustainable manufacturing necessitates the demands of new processes and equipment to create new businesses. Realising sustainability benefits require the implementation of CE practices. Many firms are becoming aware of civic sustainability's potential benefits (Awan *et al*., 2014). For instance, Kesidou and Demirel (2012) focus on different critical determinants of the eco-innovation process, market conditions and demand factors.

<<Table 5 goes about here>>

6. Prognostications

6.1 Approaches to understanding the role of multiple strategic orientations

This literature review highlights the importance of various organizational capabilities and orientations for aiding firms in their CE to EI transition. For example, Adams *et al*. (2019) point to the prominence of developing strategic orientation (SO) that is necessary for innovation performance. SO reflects the firm's ideology of managing the business and participating in a

market to achieve superior performance (Gatignon & Xuereb, 1997). Strategic orientation fosters adaptations to its environment through the generation and dissemination of knowledge to obtain required resources (Miles & Snow, 1978). Strategic orientations are "principles that direct and influence a firm's activities and generate the behaviors intended to ensure its viability and performance" (Hakala, 2011, p. 199). According to the literature study, entrepreneurial attitude emphasizes creativity, risk-taking, and proactiveness.

Knowledge management (KM) systems have become increasingly popular in literature in order to facilitate the learning, transmission, and reuse of information (Edwards *et al*., 2005), organization learning effectiveness depends on knowledge transformation (Jiang *et al*., 2019), and learning orientation capability assumes a strong propensity to create physical resources and create knowledge (Sinkula *et al*., 1997). Learning orientation, according to the study, is a flexible method to build new technologies, products, and processes (Calantone *et al*., 2002) or changing organizational structure to meet the specific requirements of customers. Technology orientation is closely related to product orientation and innovation (Grinstein, 2008). The high level of SO is thus based on the degree to which sustainability activities are embedded in the organizational culture as a central element under consideration of the natural environment's long-term protection (Adams *et al*., 2016). SO within a company is supposed to increase the integration of changes in products and processes, focusing on sustainability orientation innovation (Linnenluecke and Griffiths, 2010). The review provided evidence that technology orientation is related to the organization-wide development of new solutions through new technology. There is little evidence in the literature that supports technology orientation to introduce or use new products, innovations and technologies. It suggests that orientation capabilities trigger managerial activities to meet ecological challenges. This review of the literature led the authors of this paper to offer several research streams by the degree to which different orientations contribute to the firm path towards CE.

6.2 Research stream 1: stakeholder orientation in eco-innovation as means to a circular economy

As this literature analysis shows that CE concerns are becoming more prevalent, managers are faced with the task of incorporating CE principles into their operations. Stakeholder participation, for example, has been found to be a key driver of EI in a variety of studies (Munodawafa and Johl, 2019). However, Meixell and Luoma (2015) suggest that different stakeholders have a different influence on various supply chain areas. Some stakeholders dominate in one area more than others. According to Freeman *et al*. (2010), "stakeholders are those active groups whose action can significantly impact the firm operational objective". Stakeholders' interests and expectations may vary from being an implementation to supportive. Previous research has explored different stakeholders' influence empirically on environmental strategy, green and social responsibility practices, and green innovation (Park-Poaps and Rees, 2010; Sarkis *et al*., 2010; Betts *et al*., 2015; Graham, 2017; Kawai *et al*., 2018; Nguyen *et al*., 2021). Li *et al*. (2018) suggest that one or more stakeholders are likely to affect innovation outcomes. This study considers firm stakeholder orientation as a means of involvement, collaboration and exchange of knowledge and resources at various functional levels. These findings support the idea that firms that seek to enhance operational efficiency should share environmental knowledge with employees and other stakeholders(Martínez-Martínez et al., 2015)

However, little remains in the literature about how the organization views the interest of stakeholders in the implementation of CE (Ghinoi *et al*., 2020). As an example, in Netherland, a customer of the mobile phone showed resistance in adopting the remanufactured mobile phones due to the lack of awareness limiting the move towards circular consumption (Van Weelden *et al*., 2016). Customer collaboration should be aimed at catalyzing CE initiatives at

the operational level to the extent that collaboration mechanism impacts organisational capability development, could be stakeholders interactive abilities (Ambrosini and Bowman, 2009; Nasir *et al*., 2021). Much the same as prior literature, this paper suggests a focus on top-down knowledge inflow and sharing, enabling the recipient's ability to improve performance. The literature on CE identifies varied types of stakeholders' interest in implementing law and policies regarding CE and influences firms to adopt circular thinking (Li and Yu, 2011; Maitre-Ekern and Dalhammar, 2016; Sauvé *et al*., 2016). Previous studies focus their analysis on tax incentive to develop new clean production technologies and tax incentives on renewable energy use (Andersen, 2007; Ghisellini *et al*., 2016; Hazen *et al*., 2017; Lieder and Rashid, 2016; Shahbaz *et al*, 2020). Stakeholders' involvement in environmental innovation help firms to reduce waste and improve the recyclability of waste (Weng *et al*., 2015). Based on the previous discussion, stakeholder orientation may be more relevant in an EI context. A small number of research studies have investigated how stakeholder orientation affects EI. The effect of stakeholder orientation on CE has been investigated (Salvioni and Almici, 2020).

Another insight gained from the review of the literature is that there is no previous study that explicitly examines how stakeholder orientation may affect the relationship between EI and CE. This study's review of the literature led to the following research question: To what extent does stakeholder orientation affect the relationship between EI and CE? It would be interesting to test this relationship in information technology-related firms in terms of future research direction. Another potential future direction is applying strategic flexibility theories (Martinez-Sánchez *et al*., 2009; Bock *et al*., 2012). These studies suggest that decision-makers (internal stakeholders) experience different cognitive flexibility challenges as they are enthusiastic about bringing substantial change related to tackling ecological challenges. This review uncovered stakeholder orientation such as increased use of technology to improve products using natural resources, increased understanding of customer requirements, increased collaborative planning

for resource integration and increased attention of the community and institutional pressure. This review has revealed that little research has examined stakeholder orientation with eco-innovation that may increase the CE performance. This study proposes that the more excellent stakeholder orientation related to sustainability, the higher the long-term CE performance.

6.3 Research stream 2: learning orientation in eco-innovation as a means to a circular economy

Another relevant theme invoked in the literature review is the role of learning orientation; that is, how much of CE implementation is affected by organizational learning and engagement. While Mu *et al*. (2017) examined the relationship between strategic orientation and product development, many empirical research studies are positioned in describing that knowledge resources (Adams *et al*., 2019), inter-firm co-ordination (Tseng *et al*., 2019) technology push, and market pull factors (Kiefer *et al*., 2018) are reasonable to support environmental innovations. Korhonen *et al*. (2018) suggest that collaboration enhances the CE orientation by generating better information at creating skills and capabilities. Companies with open participation processes, strategies and activities tailored might have the best knowledge resources to manage effectively, more efficiently manage, and implement waste-to-resource innovations (Velenturf, 2016). Thus, organizational learning orientation (OLO) leads to incremental and radical innovation in high-tech firms (Sheng & Chien, 2016) and improve awareness on environmental knowledge (Martínez-Martínez et al., 2015). The concept of EK is comprised of environmental information resources with a focus on organizations and individuals can better manage environmental risk (Martínez-Martínez *et al*., 2015). EK helps enhance individuals' responsible behaviors with greater environmental awareness, are more likely to show concern for the environment and take initiatives(Cheng & Wu, 2015). EK has become priority of many firms in order to improve environmental learning orientation (Huang, 2009)

In this context, there is a necessity to foster environmental learning processes both within and between organizations in order to collect information from a variety of sources in order to support the adoption of CE policies such as zero waste practices (Agyabeng-Mensah *et al*., 2021). As evident from the literature, the relationship between CE practices and KM orientation is less clear (Zhongming *et al*., 2016). Urbinati *et al*. (2017) propose the value of networks and customer value proposition understanding requires for a successful transition towards a CE. Previous research has established a hierarchical structure of different learning orientations and innovation, and firm performance (Calantone *et al*., 2002). Thus, the innovation perspective is less clearly understood as to how and under what condition the recognition of learning orientation may affect EI. Recently, Wang *et al*. (2020) have examined learning orientation and green innovation. However, multiple researchers in various countries have thoroughly examined the barriers and drivers in implementing CE (Scipioni *et al*., 2021a). Thus, it can be expected that organization learning orientation as a shared understanding of generating learning from external resources, acquiring strategic information and combining with their existing pieces of information and disseminating among the organization would enable the organization to recognize the needed resources to overcome barriers of EI and may shift towards CE. However, little remains known about how OL orientation is influencing the implementations of CE.

As the literature review explicitly acknowledges that learning orientation may initiate the change process, most studies do not identify a specific type of market orientation and organizational learning capabilities. Therefore it can be summarised that these organizational factors are more fitting for implementing an EI and CE. This review has revealed that little research has examined learning orientation with eco-innovation that may increase the CE performance. This review uncovered learning orientation, such as management commitment to training, to achieve resource conservation objectives. Management encourages people to think

out of the box for resource conservation and one understands the importance of sharing vision and resource conservation ideas across all units. From the above literature discussion, the following research question is proposed: how would OL orientation interact with the EI and influence CE. This paper suggest that organizational learning orientation may act as a moderator between EI and CE. If the firm has chosen this form of OL orientation, it is argued that the greater the firm OL orientation the greater the firm's tendency towards CE. This study proposes that the greater learning orientation related to sustainability, the higher the eco-innovation impact on long-term CE performance.

6.4 Research stream 3: Entrepreneurial orientation in the Eco-Innovation as means to a circular economy

Filion (2008) defines an entrepreneur as "an actor who innovates by recognizing opportunities (who) makes moderately risky decisions that lead into actions requiring the efficient use of resources and contributing an added value" (p. 7). EO is essential for strategy development (Smith and Jambulingam, 2018). EO's concept is just emerging in the CE literature (Veleva and Bodkin, 2018; Cullen and De Angelis, 2020). The field of CE is viewed as a means of value creation and design process for innovation. However, despite the relevance of value creation and innovation for EI and CE, the research of EO within the CE literature is limited. Despite the overall progress made in EI and CE, this literature review reveals that minimal advancement has been made in studying the orientation capabilities.

Nevertheless, very little is known about the relationship between specific aspects of circularity entrepreneurial and business model innovation (Cullen & De Angelis, 2020). This provides evidence that there is a dearth of study in the entrepreneurial process that addresses environmental problems while both identifying and exploiting new business prospects. (Ranta

et al., 2018). It is evident from literature there is an increased interest in cross-level studies in which entrepreneurship at one level affects the CE. Previous literature has discussed entrepreneurship from business model innovation (Henry *et al*., 2020). It inflates the interest of research to examine further how entrepreneurial orientations does affect CE initiatives. First, it requires an investment in developing research and development capacities to exploit competitive advantages (Haro-Domínguez *et al*., 2010).

This review of literature provides limited evidence on how and under what conditions EI significantly influences CE initiatives. Pro-active circularity EO means establishing policies and procedures to provide a foundation for successfully implementing practices. Pro-activeness towards green initiatives, risk-taking in introducing green productions, and implementing innovative ideas, means managers may strive for accomplishment and growth to pursue the circularity ecosystem goal. This review uncovered learning orientation such as one has the autonomy to implementing creative ideas to contribute towards sustainability objective and has the autonomy to seek opportunities that contribute towards sustainability objectives. There is a culture of promoting creativity across all units for sustainable initiatives. The study of CE within the entrepreneurial is only gaining recent attention in the literature to address firm environmental challenges. Regardless of the changing nature of the business environment, it was concluded that there had been little or no research on how EO affects CE. In other words, this paper argues that EO may act as a moderator between EI and CE.

6.5 Research stream 4: Sustainability-orientated innovation (SOI) in the Eco-Innovation as means to a circular economy

Sustainability-oriented innovation (SOI) "involves making intentional changes to an organization's philosophy and values, as well as to its products, processes or practices, to serve the specific purpose of creating and realizing social and environmental value in addition to

economic returns" (Adams *et al*., 2016, p.181). Today, firms operate within complex environmental innovation challenges requiring them to explore innovative processes for adapting to environmental changes. Many researchers suggest that sustainability orientation innovation could be achieved by increasing customer collaboration and flexibility (Klewitz and Hansen, 2014). External stakeholders offer organizations insights to improve a firm's sustainable innovation orientation (Ayuso *et al*., 2011; Malik et al., 2021). A collaborative approach with customers is increasingly recognized as a possibility of innovation (Goodman *et al*., 2017). The sustainability orientation practices include safeguarding the ecosystem, improving the end of product life cycling issues and promoting health and safety (Karakayali *et al*., 2007). The evidence from the literature suggests that sustainability orientation innovation facilitates customer expectations around new solutions to the problems and can co-create solutions for sustainable development.

Firms with sustainability objectives are often depicted as environmental, economic, and sustainability orientations. This study proposes that the key determinant of collaboration success relies on the presence of sustainability learning and planning. Sustainability orientation refers to the level of the individual firm about environmental, social, and economic responsibilities. A company's sustainability orientation depends on how social and ecological challenges are met conceptually, institutionally and instrumentally (Arnold, 2015). In the stakeholder collaboration, the SOI may help achieve the operation and exchange of information on sustainability-related challenges. On the other hand, SOI will encourage the firm to integrate sustainability initiatives to benefit operational efficiencies such as product customization ability, new product introduction ability and new product quality and reliability (Hong *et al*., 2019). The broad picture that emerges from the literature review is that organizations need to continuously make intentional changes in their operational routine with a vision to set a greater

purpose for environmental innovation and improve the related organizational system to progress towards a better future for the common good.

This review uncovered learning orientations such as intelligent knowledge generation about environmental management, increased knowledge about environmental protection practices, and increased use of customer green knowledge resources to develop new environmental protection practices. The study of CE within the sustainability orientation is only gaining recent attention in the literature to address firm ecological challenges. Regardless of the changing nature of the business environment, this paper concluded that there has little or no research on how sustainability orientation affects CE. Thus it proposes that sustainability orientation plays a role in moderating the relationship between EI and CE performance.

<<Figure 2 goes about here>>

7. Implications for theory and Practice

The paper's previous review of the available empirical literature on links between EI and CE relationships established unequivocally that this sustainable business strategy research field has matured over time into a substantial body of scholarly knowledge with sound theoretical and managerial implications. The review's comprehensive and integrated approach has aided in the emergence of some novel and useful insights into the EI and CE relationship phenomenon. First, from a theoretical perspective, it was discovered that research on EI and CE relationships has a robust theoretical foundation, as evidenced by the wide array of explicit (make use of the RBV, institutional theory, stakeholder theory, or so forth, in an individualistic) theories (Hazarika and Zhang, 2019). From a theoretical perspective, this study explains the complex links between EI and CE. It builds a theoretical bridge between EI and CE to illustrate how firms' transit toward CE following the recommendations (Cainelli *et al*., 2020). The proposed framework contributes to the literature by showing that organizational learning is also important for determining a firm's ability to maintain a sustainable improvement in CE. As a result of the

link between KM and sustainability, organizations are rethinking their position and managing their knowledge practices and processes to fulfill their sustainability objectives (Chopra *et al*., 2021; Song, Zhao, & Varma, 2022).

Following previous literature (Chopra *et al*., 2021), the authors of this paper suggest that stakeholder orientation and organizational learning orientation are necessary processes through which firms may acquire and transmit information for achieving efficient and responsible use of natural resources. In this framework, knowledge management has emerged as a new paradigm that may help firms attain sustainability goals and targets efficiently and seamlessly (Shahzad *et al*., 2020). KM may be key to achieving sustainability (Chopra *et al*., 2021). Another relevant theme invoked in the literature review is the role of learning orientation; that is, how much of CE implementation is affected by organizational learning and engagement (Awan and Sroufe, 2022). Most of the previous literature has viewed EI and CE from the organizational learning perspective. Most of the studies' focal point is on organizational learning orientation and transition towards CE (Scipioni *et al*., 2021b). Organizations' focus on different orientation perspectives enables navigating differences in environmental management practices and their stakeholders' collaboration. Thus, researchers should continue to support their research with appropriate theories that have the potential to explain EI and CE relationship phenomena, with a special emphasis on some promising but underutilized theories, such as organizational learning, dynamic capabilities, and stakeholder theories. Second, Previous studies review the literature on EI in the transition to CE (de Jesus *et al*., 2016). As argued by Suchek *et al*. (2021), the literature demonstrates the importance of broadening the scope of research on CE innovation to include all sectors. However, little has been known about the micro level contribution of various EI characteristics to CE (Kiefer *et al*., 2019; Carrillo-Hermosilla, 2021). This study builds up a framework that combines insights from different orientations and disciplines and extends our understanding of the relationship between EI and

CE. Third, these findings have practical implications for the decision-makers. There is limited understanding of how different capabilities may facilitate CE (de Jesus *et al*., 2016). In practice, literature advocates that CE policies and regulations guide and create awareness to pursue responsible production and consumption patterns. In literature, many approaches are likely to proceed successful implementation of CE practices, but little consensus about how to incorporate and proceed (Lieder and Rashid, 2016). Identifying stakeholders is one of the most significant hurdles in implementing CE principles (Tyl *et al*., 2015).The implementation of CE practices requires collaboration across the value chain. (Kalmykova *et al*., 2017). The findings of this research suggest that firms must embrace a deeper understanding of stakeholder orientation and organizational learning orientation to achieve efficient and responsible use of natural resources. On the other hand, sustainability orientation and entrepreneurial orientation enable firms to gradually understand shared global challenges and risks such as resource scarcity and climate change, capture new growth opportunities, and build a green company image.

8. Conclusions

This study aimed to investigate the link between eco-innovation (EI) and circular economy (CE) to better understand how, and under what conditions, businesses may successfully transition from EI to CE in this changing environment. After synthesizing the findings of 111 encompassed studies on EI and CE this analysis reveals several internal organizational learning dynamics and orientation strategies that can support a firm transition from EI to CE. Understanding these factors on EI and CE links is of paramount importance for policymakers in both designing and implementing climate change-related reforms and the firms that need to take competitive advantage of the new opportunities. The research contributes by drawing attention to the significance of contextual knowledge dynamics and orientation strategies from

an organizational perspective in explaining that EI is an essential determinant in achieving a sustainable transition towards CE. However, the existing studies exhibit that a complicated relationship exists between EI and CE. Circular Knowledge Economy (CKE) has the potential to be a useful alternative to achieving thriving CE to achieve sustainability in local and global businesses operations. The circular knowledge economy allows a business to re-accumulate, re-internalize, re-use, and re-share knowledge-intensive activities that emphasize resource-productivity and eco-efficiency for creating and delivering products, components, and materials with the highest utility for customers and society, thereby contributing to renewal and material management innovation. In view of the expanding body of research on CKE in the CE and the high expectations surrounding the convergence of KM and sustainability, it is essential to get an understanding of the various ways in which KM can aid progress toward the objective of driving eco-innovation. The role of knowledge management dynamics and orientation strategies in implementing EC is emphasized for an accelerated transition toward CE to achieve United Nations Sustainable Development Goals.

9. Limitations, Future Research, and Implications

Circular economy (CE) research has gained momentum over the last decade due to scholars giving accrued importance to industrial symbiosis development aimed at zero waste for the industrial process. Many diverse CE practices exist in different countries such as the upgrading technology and product development in China, increasing consumer responsibility for material return and reusage in Japan and Korea particularly, and emphasis on recycling, reusage, and reduction in Europe which have the potential to contribute to standardized CE practices in manufacturing industries. Never before has stakeholder' collaboration research been necessary among researchers. The more remarkable advances in recycling and waste management have resulted from inter-firm joint activities (for example, eco-industrial symbiosis). North America,

Europe, Australia, and China have made significant progress towards industrial symbiosis through policies and legislation in recent years. However, affirmative action programs and regulations are required in benefitting from the recycling-manufacturing and reuse of materials; this study provides insights for managerial decision-makers. It implies that a sustainable future for human growth and improvement will demand the implementation of CE practices without compromising the firm's economic self-interest-seeking behavior. The results guide the managers in compliance with the stakeholder's expectations. A vital issue in the CE and sustainability literature is to increase the understanding of various stakeholders' roles in creating awareness about sustainable production and consumption attitudes by managing resource more efficiently. Although there is a wealth of literature on CE and sustainability, the knowledge base viewpoint's impact on CE in the organization is rarely studied. When a company moves from EI to CE, a CKE approach is essential. The findings of our study have critical implications for managers. Our findings suggest that successful renewal and transition toward CE depend on knowledge and orientation dynamics. Given the diversity of the knowledge and orientation dynamics, this study should help firms manage the identified KM factors and encourage further development of circular knowledge for the transition to CE. Our findings encourage firm's to focus on cultivating a CKE environment within firms to take global climate challenges to shift focus toward using the restorative design of material products and systems within a business to help improve sustainability performance. Indeed, the development of CKE is critical to top management efforts to encourage managers to be proactive in creating knowledge assets in their CE activities. Our research recognizes that firm level CKE are important in shaping how knowledge resources relate to CE within transition management literature. This change in CKE is important for a CE and sustainability. The literature on CKE has been silent on how to promote and mitigate sustainability challenges. Circular firms must position themselves as CKE pioneers in a resource constraint environment to improve their ecological footprint. We suggest

that managers should consider firm-level CKE more suitable because the long-term viability of the CE system depends on the firm's ability to use knowledge about encouraging material resilience (resource productivity ad eco-efficiency) and respecting product life cycle eco-system that maximize waste to achieve long-term sustainability.

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