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From Sensemaking to Circular Economy Practices: Role of Institutional Pressure and Environmental Sensemaking in SMEs of Developing Countries

Dr. Missal Khan[1], Prof. Dr. Abdul Majid*[2], Shahid Farooq[3], Muhammad Adil Khan[4], Muhammad Tahir[5], Muhammad Sajid Asim[6]

1 Institute of Management Sciences, The University of Haripur. Email: missalkhan08@gmail.com

2 Institute of Management Sciences, The University of Haripur.
*Corresponding Author Email: abdulmajid@uoh.edu.pk

3 PhD Scholar Public Policy and Governance, Institute of Management Sciences, The University of Haripur. Email: chshahidFarooq@yahoo.com

4 Chief Financial Officer, The National Radio Telecommunication Corporation (Pvt) Ltd. Email: adil.qau@gmail.com

5 PhD Scholar Public Policy and Governance, Institute of Management Sciences, The University of Haripur. Email: mtahir@uoh.edu.pk

6 PhD Scholar Public Policy and Governance, Institute of Management Sciences, The University of Haripur. Emai: muhammadsajidasim05@gmail.com

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Abstract

Purpose – Transition towards circular economy practices (CEP) is increasingly recognized as a critical approach to improving environmental performance. However, the transition towards the circular model, specifically concerning institutional pressures (IP) and environmental sensemaking (ES), has not been adequately explored. Therefore, this study is specifically designed to examine the impact of IP and ES on CEP among SMEs in Pakistan. Moreover, the mediating role of top management support to sustainability (TMSS) is also discussed to develop a comprehensive model of CEP in the context of developing countries.

Design/methodology/approach – A two-stage (T1 and T2) survey approach was employed to collect the data from the same respondents over a period of three months. Data were collected from 379 manufacturing SMEs (912 respondents, including procurement managers, HR Managers, production managers, and Finance Managers) through a questionnaire. The framework of the study was empirically tested using structural equation modeling.

Findings – The findings of the study clearly demonstrate a positive relationship between environmental sensemaking (ES), institutional pressure (IP), top management support for sustainability (TMSS), and circular economy practices (CEP). Additionally, the result of the study confirmed that TMSS mediates the relationship between ES-CEP and ES–CEP.

Practical implications – This study provides valuable insights to top management and decision makers to implement CEP and achieve sustainable development goals.

Originality/value – This study bridges the gap in environmental management by conducting a systematic review of the framework of CEP. The theoretical underpinning of this research is based on institutional theory and sensemaking theory, which helps us develop a comprehensive mediation model. This study suggests significant guidelines to SMEs to turn institutional pressures and environmental sensemaking into CEP.

Keywords – Institutional pressures, environmental sensemaking, top-management support for sustainability, circular economy practices, SMEs.

1.0. Introduction

In the contemporary sustainability debate, SMEs hold a central place because of their significant social and economic contributions and cumulative environmental impacts (Clemente-Almendros et al., 2025). In developing countries, SMEs account for almost 90% of all firms and play an important role in overall industrial operations, resource extraction, and energy use. Despite their smaller size, the environmental footprint of SMEs often surpasses that of large enterprises (Franco & Rodrigues, 2021). As part of the United Nations' (UN) Sustainable Development Goals (SDGs) program, all member countries are required to give serious consideration to the achievement of 17 SDGs by 2030. Regardless of reasonable progress towards SDGs, the developing countries have fallen far short of expectations; therefore, their commitment and level of responsibility are seriously questioned (Allen et al., 2018). To achieve the targets of SDGs, manufacturing sectors in developing economies are making serious efforts to shift towards resource-efficient pathways (Pansare et al., 2023). Therefore, engagement of SMEs in sustainable practices is not only desirable but imperative. In the existing literature, various strategic sustainability methodologies and approaches are available in which CEP has emerged as a central pillar of the environmental management framework (Rathee et al., 2025; Singh et al., 2023). CEP encompasses three important dimensions: resource and material efficiency, circular design, and business model innovation (Kumar et al., 2019). According to Schulz et al. (2019), CEP has the primary purpose of disassociating value creation from linear systems and environmental degradation through promoting a circular model, enhancing product endurance, reducing waste, and systematically redesigning production-consumption systems.

CEP offers numerous benefits to SMEs; however, translating these principles into solid organizational actions remains a challenging task in developing countries (Urbinati et al., 2017). Various constraints, like financial, technological, and limited environmental knowledge, etc., hinder the ability of SMEs to respond strategically to environmental complexities and adopt the CEP framework (Mishra, 2022). Therefore, the perception, interpretation, and response to environmental signals have become an integral part of sustainable transformation. In this regard, ES enables SMEs to make sense of uncertain and complex situations and helps them to make informed decisions and take appropriate actions (Knight et al., 2025). Moreover, ES empowers organizations to understand environmental challenges and facilitates them to give meaning to environmental opportunities and threats (Wibeck & Linnér, 2021).

Sensemaking is a critical capability, but alone, it seldom ensures organizational actions. The transition from environmental awareness to action-oriented behavior is a complex phenomenon and is often obstructed by various structural and resource barriers. Even when environmental issues are identified and considered as strategically important, the decision to make sustainability investments and adopt circular models requires strong managerial commitment and support (Horak et al., 2018). At this point, TMSS becomes increasingly important. TMSS refers to the commitment and involvement of top management and senior leadership towards embedding sustainability into organizational strategies, policies, and actions (Ramus, 2001). Empirical studies in contemporary literature regularly advocate that TMSS acts as a critical driver of green innovation, sustainability-driven efforts, and circular transition decisions (Ilyas et al., 2020). Therefore, in this study, we considered TMSS as a mediator in the relationship between ES and CEP.

In the modern world, manufacturing firms operate in broader institutional systems. Therefore, operating in isolation and improving the internal cognitive processes is practically impossible. According to institutional theory by DiMaggio and Powell (1983), the broader institutional system comprises stakeholders' demands and expectations, regulations, competitive pressures, and social norms that shape organizational strategic response (Voinov & Bousquet, 2010). IP, including coercive, mimetic, and normative pressures, compels organizations to behave in an environmentally friendly manner (Majid et al., 2020). IP in the form of coercive, mimetic, and normative pressures compels organizations to adopt resource-efficiency measures and reduce their environmental footprints

(Lüdeke-Freund, 2019). These pressures motivate organizations to reduce waste, minimize costs, and adopt circular practices in production and consumption (Hom et al., 2025). Although IP is a critical external stimulus to adopt CEP, to decide on the adoption of CEP, support from top management becomes vital (Lima et al., 2025). Therefore, in this study, we have focused on the argument that IP alone is insufficient to ensure a meaningful circular adoption. TMSS serves as a bridging mechanism that translates institutional expectations into actionable circular strategies (Hart & Dowell, 2011).

The main argument of this study is that the adoption of CEP in SMEs is dependent on the interplay of three forces. Firstly, ES provides a strong knowledge of environmental signals to identify the opportunities and threats concerning CEP and make strategically sustainable decisions. Secondly, IP acts as an external stimulus that compels organizations to adopt sustainability initiatives like CEP and reduce their environmental footprint. In response, the institutional framework provides organizations with maximum resources, legitimacy, and survival advantage. Thirdly, TMSS acts as a mediator and internal facilitator that legitimizes and operationalizes the circular strategies.

The interplay between external and internal forces creates a synergetic effect within which SMEs can easily transform from a linear model to a circular model. This study attempts to present an integrated framework to explore the cognitive and institutional perspectives jointly. The majority of previous studies deal with these variables separately without investigating how they jointly shape CEP in SMEs (Calzolari et al., 2023; Gross et al., 2025). Moreover, the majority of studies, while studying CEP, have ignored the role of TMSS as an enabling mechanism and considered this critical variable as a moderating element (Singh et al., 2023). Despite the availability of a huge literature on sustainability, contemporary literature is still lacking in exploring the synergistic effect of ES and IP on the adoption of CEP. Moreover, the important mediating role of TMSS is also rarely discussed in the context of these two important independent variables. This study attempts to address these research gaps by developing a comprehensive framework that links IP, ES, and TMSS with three dimensions of CEP.

Based on the above-mentioned research gaps, we have selected Pakistani SMEs for four reasons. Firstly, there is a growing need for SMEs in Pakistan to improve their environmental performance and reduce their economic footprint (Shahbaz et al., 2025). Secondly, the majority of SMEs in Pakistan are facing difficulties in adopting CEP, mostly due to financial and technical limitations, limited managerial expertise, and a lack of ecologically friendly technologies (Hassan et al., 2023). Thirdly, the top management of SMEs in Pakistan is still not fully convinced about the strategically positive role of CEP (Ilyas et al., 2020). Lastly, due to the critical role of SMEs in Pakistan's economy, such as employment generation, GDP growth, etc., this sector is selected for investigation. While investigating these important concepts in the context of SMEs, this study offers practical implications to top management and motivates them to invest in sustainability initiatives and adopt circularity principles.

To achieve the objectives of this research, the study is divided into multiple sections. In the following section, significant literature is reviewed, focusing on the formation of various conceptions and hypotheses. Section three discusses the research methodology, whereas the subsequent sections address the data analysis, findings, theoretical and managerial contributions, and research limitations.

2.0. Literature Review and Hypotheses Development

2.1 Theoretical Background

Sensemaking theory and Institutional theory present the theoretical grounded framework for comprehending and integrating CEP at the organizational level. Sensemaking theory presents a critical lens for understanding how organizations analyze environmental issues and sustainability themes and reshape them into strategic actions (Knight et al., 2025). Sensemaking theory states that operationally effective organizations continually examine, interpret, and shape their managerial cognition, environment, and subsequent actions. (Weick, 2005). From the perspective of manufacturing enterprises, environmental sensemaking is crucial because they have limited resources, which highlights the significance of managerial interpretation as a response to sustainability challenges (Pain

et al., 2024). Therefore, the sensemaking process develops environmental awareness, opportunities, and risks that could catalyze the adoption of circular practices such as circular design, resource and material efficiency, and recycling (Singh et al., 2021).

On the other hand, institutional theory reinforces the perspective of the circular economy in these enterprises by explaining the external influences and shaping organizational behavior accordingly (Liu, 2025). According to existing literature, manufacturing SMEs continuously confront various types of IP, including coercive pressures from regulations (Sun et al., 2025), mimetic pressure from sustainability initiatives by their competitors (Pasamar et al., 2025), and normative pressure from industry standards (Hom et al., 2025). These institutional forces motivate organizations to ensure regulatory compliance and direct them to align operations with circularity principles (Schulz et al., 2019).

2.2. Hypotheses Development

Sensemaking refers to the process of making sense of uncertain and complex situations so that individuals and organizations can make informed decisions and take suitable actions (Helmes. et.al. 2010). According to Wibeck and Linner (2021), the process of sensemaking also helps in understanding and interpreting the complex situation. In contrast to concentrating on outcomes, Weick (1995) presented sensemaking as a framework that provides insights into how individuals and organizations give meaning to environmental events. Since its inception, the notion of sensemaking has passed through various stages of development and has now become a comprehensive method of analysis (Weick, 2005). When organizations integrate sensemaking into their strategic management, they empower themselves to give meaning to environmental challenges (Knight et al., 2025). Therefore, it not only helps organizations and managers to understand their environment but also helps them to understand environmental opportunities and threats (Kiwi et al., 2025). In a nutshell, ES refers to a framework that helps organizations understand environmental complexities, issues, and trends, facilitate their interpretation, and design accurate responses to them.

In the available literature, the notion of ES is operationalized in various ways. Most researchers have interpreted this concept by employing theoretical methodologies (see, e.g., Helms et al., 2011; Weick, 1995; Wibeck & Linnér, 2021). However, some scholars have attempted to analyze its various dimensions by using empirical and quantitative data (see e.g. Aldehayyat, 2015; Pain et al, 2024). Pain et al. (2024) extended the model presented by Weick (1995) and presented three dimensions of ES. In their extended model, they presented three dimensions of ES. These three dimensions encompass environmental scanning, environmental interpretation, and environmental response.

Environmental scanning is a methodical process of monitoring, collecting, and analyzing data from an organization's internal and external environment (Zhang et al., 2025). The rationale behind environmental scanning is to collect the most relevant data that can affect an organization’s strategies and decisions. Environmental interpretation is a systematic managerial process of analyzing environmental data and making sense of it (Xu et al., 2013). In simple words, environmental interpretation is a process of converting the data into relevant and required information. The process of interpretation involves analyzing the collected data, evaluating the data, and assigning meaning and usage to the relevant data (Milliken, 1990). Environmental response is an action phase of ES that refers to actions, decisions, and practices that organizations adopt after interpreting environmental information (Murillo-Luna et al., 2008). It is the most critical step of ES that involves how an organization responds to environmental opportunities and threats and takes actions to deal with sustainability challenges (Delmas & Toffel, 2008).

According to Egan (2019), making sense of environmental issues facilitates organizations to make major decisions regarding environmental management. One of the major decisions is the transition from a linear model to a circular model (Schulz et al., 2019). Adoption of CEP is a strategic decision in which ES provides a helping hand by enabling managers to interpret environmental signals and

translate them into circular actions. CEPs refer to sustainability initiatives and strategic actions undertaken to reduce resource consumption and minimize waste generation (Singh et al., 2023). CEPs emphasize establishing an integrated system of resource preservation and its intelligence use that significantly reduces environmental effects and preserves natural resources (Heshmati, 2017). Some of the major CEPs include reusing, refurbishing, recycling, and redesigning products and processes to develop a closed-loop system (Lüdeke-Freund, 2019; Urbinati et al., 2017). Simultaneously, it also serves the community through resource preservation, employment generation, developing green goodwill, and protecting the natural environment (Bocken et al., 2016). Besides, CEPs provide a range of environmental, social, and economic benefits that are not only essential but also desirable in the contemporary management era (Kumar et al., 2019).

The notion of CEPs is operationalized in the available literature in a variety of ways. The process of operationalization of CEPs is principally determined by the context under study. There is no significant difference in most cases; however, some dissimilarities still exist in their dimensions when studied in different contexts, e.g., manufacturing industry (Kumar, 2019), agriculture (Humberto, 2025), and society (Schulz et al., 2019), etc. In the majority of studies, CEPs have been modeled in three dimensions. There has been a great deal of debate and empirical analysis of the three-dimensional model of CEPs, which includes resource & material efficiency (RME), circularity design (CD), and business model innovation (BMI).

RME refers to how efficiently a production system uses production resources to create goods and services with the purpose of reducing waste, minimizing cost, and lowering the environmental footprint (Schulz et al., 2019). RME aims to create a closed-loop system that promotes approaches to recycling, reuse, and remanufacturing to improve resource efficiency (Urbinati et al., 2017). CD refers to developing a system that facilitates the manufacturing process in a way that keeps material in use or required resources as long as possible (Kumar et al., 2019). BMI refers to transforming the way products and services are designed, delivered, and monetized to create new or modified business models that create superior value for customers and the organization (Lüdeke-Freund, 2019). Three dimensions of CEPs work together to develop an integrated framework and manufacturing system to strengthen resilient economic models (Schroeder et al., 2019).

CEP requires a comprehensive knowledge of resource flows and production rationalities. In order to adopt CEP, organizations must have knowledge of value addition and creation, consumption, waste generation, and management (Hussain & Malik, 2020). ES enables organizations to adopt CEP by equipping organizations with the ability to scan the organizational environment, make interpretations, and respond accordingly (Hong et al., 2024).

Resource and material efficiency involves optimizing resource usage, minimizing waste, and improving recycling procedures. ES plays an important role in organizational alertness to resource deficiency and fluctuations in input cost (Egan, 2019). This awareness encourages organizations to reduce waste, minimize costs, and lower their environmental footprint. Moreover, ES also helps to identify the invisible inefficiencies in the production system that would otherwise remain unnoticed (Fisher, 2024). Circular design involves redesigning the system for recyclability, repeatability, and durability. According to Seidel et al. (2018), ES provides a fundamental underpinning by helping organizations to re-understand and re-interpret the organizational environment and encourages them to transform from linear design to circular design. Environmental signals, such as stakeholders' demands and expectations, motivate organizations to adopt circular design and to improve environmental performance (Nogueira et al., 2019). According to Egan (2019), making sense of environmental issues compels organizations to pay respect to the stakeholders' demands and adopt innovative and environmentally friendly product design, with a recyclable and durable characteristic. ES will reduce the risks associated with circularity investment and contingencies associated with the transition from the linear model to the circular model; therefore, help organizations to implement an innovative approach in the fundamental business model (Kuhlmann et al., 2023). Based on these

arguments, we have developed the following hypothesis.

H1: *Environmental Sensemaking has a positive effect on Circular Economy practices*

IP refers to the pressure exerted by external institutional forces that influences how organizations make decisions and implement a variety of strategies (Kauppi, 2013). External institutional forces include economic, social, cultural, legal, and environmental factors (Lee, 2011). Neo-institutional theory by DiMaggio and Powell (1983) has emerged as a strong framework that provides substantial insights into the effects of external forces on decision-making and potential actions. According to this theory, organizations tend to follow IP and expectations to gain maximum resources, legitimacy, and survival advantage. The notion of organizational field is discussed initially by DiMaggio and Powell (1983) in terms of institutional theory. According to them, an organizational field is a collection of organizations that establish an area of work and life within the organization. The organizational field consists of all stakeholders, including customers, regulators, competitors, suppliers, investors, and the community, etc. (Voinov & Bousquet, 2010). In contemporary literature, three main dimensions of organizational fields are discussed in detail. These three dimensions are coercive, mimetic, and normative.

Coercive pressure refers to pressure, whether formal or informal, exerted by powerful actors on whom the organization depends. These powerful actors include regulatory bodies, suppliers, customers, donor agencies, society, and government as well (Liu, 2025). On the other hand, mimetic pressure occurs when organizations imitate other successful organizations whose strategies, policies, success, and legitimacy are admired (Pasamar et al., 2025). Mimetic pressures normally occur at times of high uncertainty. In a professional or industry environment, normative IP arises from shared norms, values, ethics, and expectations (Hom et al., 2025). Normative pressures compel organizations to incorporate certain practices as they are seen as the right thing to do. These practices are considered socially acceptable and professionally desirable (Liu, 2025). Normative pressure comes from professional associations, various certifications, and industry standards.

Circular practices within an organization depend not only on organizational capabilities and technology but also on the environment in which it operates. The available literature indicates a strong link between IP and resource-efficiency measures. Coercive pressure in the form of environmental regulations, laws, and statutes compels organizations to focus on resource efficiency and smart use of inputs (Khan et al., 2022; Lüdeke-Freund, 2019). These pressures motivate organizations to reduce waste, minimize costs, and lower their environmental footprint. Whereas MP, on the other hand, motivates organizations to follow the market leader, which has adopted good practices of sustainable manufacturing and environmental performance (Kumar et al., 2019). NP pushes organizations to follow the industry standards and focuses on good manufacturing and sustainability (Voinov & Bousquet, 2010). Therefore, it is evident from the literature that IP has a strong positive effect on resource and material efficiency. According to Singh et al. (2023), circular practices, in the form of product durability, repairability indices, and some other requirements, directly pressurize manufacturing organizations to meet the minimum criteria of product design, which is technically rational and socially desirable. MP, on the other hand, compels organizations to imitate the market leader and adopt a circular approach, and develop products that are repairable and recyclable (Urbinati et al., 2017). NP motivates organizations to follow the industry norms and transform the linear methodology into a circular methodology (Schulz et al., 2019). Based on these arguments, we have developed the following hypotheses.

H2: *Institutional Pressure* has *a positive effect on Circular Economy Practices*

ES is a critical framework for developing a deep understanding of the environment. The process of sensemaking involves collecting environmental data, processing it, and giving meaning to environmental signals (Knight et al., 2025). Therefore, ES plays a significant role in shaping top management's commitment to sustainability. TMSS refers to the commitment and involvement of top management and senior leadership towards embedding sustainability into organizational strategies, policies, and actions (Ramus, 2001). Top management support is a critical driver of organizational

strategic initiatives as they are responsible for shaping organizational priorities, allocating resources, and developing a framework for implementation. The natural resource-based view (NRBV) also focused on the same argument and highlighted the critical role of top leadership (Hart, 1995). According to NRBV, management that considers sustainability as a strategic capability rather than a compliance requirement leads to superior environmental performance (Hart & Dowell, 2011).

Environmental Scanning empowers top management to identify environmental issues, thereby enabling them to gain a deeper understanding of sustainability-related opportunities and threats (Pryor et al., 2019). The interpretive dimension of ES helps top management to interpret the environmental data and shape the data into opportunities and threats. Wang and Dass (2017) argued that top leadership with environmental sensitivity constructs innovative and opportunity-focused understandings, hence developing a greater strategic-level commitment to sustainability initiatives. The environmental responding dimension of sensemaking reduces the complexity and ambiguity of environmental data and facilitates top management in making innovative decisions (Singh et al., 2021). As sustainability is difficult to predict and also challenging to give quantitative meaning to sustainability, therefore, top management faces difficulties in portraying a clear picture of sustainability investment and sustainability return (Rego et al., 2017). Sensemaking in this regard plays a critical role in creating a clear picture of the environmental dimension and risk implications. This clarity lowers the top management's psychological fear and motivates them towards sustainability initiatives (Kutaula et al., 2025). Based on these arguments, we hypothesized that

H3: *Environmental Sensemaking has a positive effect on Top Management Support to Sustainability.*

The nexus of IP and TMSS has become an important avenue of investigation in organizational behavior and sustainability research (Colwell & Joshi, 2013; Zhou et al., 2024). In the contemporary environment, particularly following the establishment of the UN 2030 Agenda for Sustainability, organizations face increasing pressures from various stakeholders. These pressures shape managerial priorities, strategic urgencies, and organizational commitments (Sun et al., 2025).

Coercive pressures arising from laws, regulatory agencies, and other national and international agreements intensified this pressure, compelling top management to support sustainability initiatives and align organizational policies with stakeholders' demands and expectations to avoid adverse actions (Rashid et al., 2025). Coercive pressures also come from other sources, such as customers, existing employees, investors, and the general community, which strongly influences top management's commitment, behavior, and support for sustainability (Voinov & Bousquet, 2010). `

Likewise, mimetic pressures also have a strong effect on TMSS, e.g., institutional and managerial benchmarking practices significantly shape TMSS. According to Khurshid et al. (2025), if a successful market player achieves market advantage through sustainability initiatives, top leadership will be more inclined to follow the initiatives taken by the successful player (Yang & Kang, 2020). By means of mimetic pressures, it would be easy for top management to follow best practices and adopt successful innovative initiatives (Mehrabi et al., 2021).

Normative pressures reflect the impact of professional norms, industry standards, associations, and educational institutions. These NP from national and international professional bodies and global sustainability initiatives (e.g., ISO 14001) shape managers' beliefs about sustainable and responsible organizational behavior. When managers accept sustainability and responsible environmental behavior as a professional norm, they perceive sustainability targets as acceptable and desirable (Pasamar et al., 2025). Subsequently, TMSS rises as top leadership becomes convinced that sustainability initiatives are not only desirable but also strategically beneficial for the organization. Based on these arguments, we have developed the following argument (Durand et al., 2019).

H4: *Institutional Pressure has a positive effect on Top Management Support Sustainability*.

The shaping and adoption of CEP is heavily dependent on top management support. CEP, including resource and material efficiency, circularity design, and business model innovation, not only requires

an operational shift but top management strategic commitment and visionary zeal. Therefore, TMSS plays a decisive role in transforming a linear model into a circular design. Horak et al., (2018) argued that when top management is committed towards sustainability, they are more inclined towards cleaner and sustainable production, waste-minimizing procedures, and resource-saving methodologies. Available studies also focus on top management commitment to adopt circularity design and bring business model innovation, and state that a design shift is only possible when top management is committed and motivated towards sustainability (Hart & Dowell, 2011). Based on these arguments, we have developed the following hypotheses.

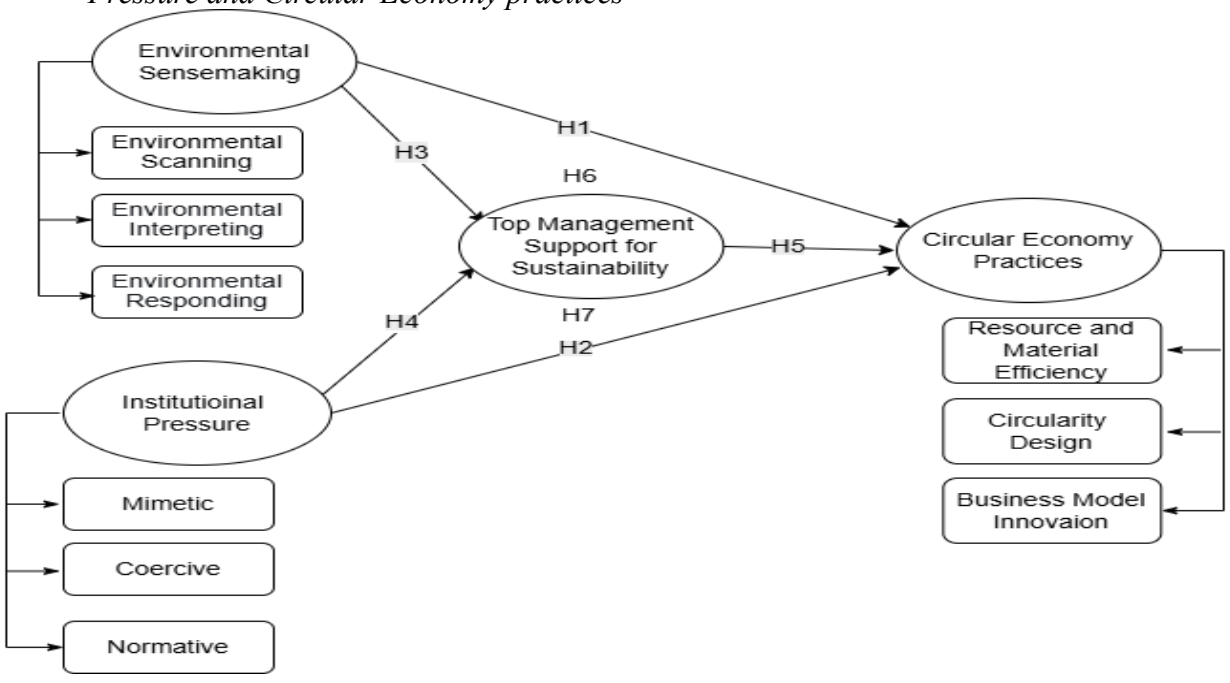
H5: *Top Management Support for Sustainability has a positive effect on Circular Economy practices*

ES plays a significant role in shaping TMSS. The process of data collection, processing, and interpretation related to the organizational environment gives immense insight to top management to make rational decisions (Merendino et al., 2018); therefore, it empowers top management to identify contemporary environmental issues and gain a deeper understanding of sustainability-related opportunities and threats (Aguilera et al., 2021). When top management is empowered with environmental data, they are in a better position to transform from a linear model to a circular model (Järlström et al., 2018). In this way, TMSS bridges the relationship between ES and CEP. Based on these arguments, we have developed the following mediating hypotheses.

H6: *Top Management Support for Sustainability mediates the relationship between Environmental Sensemaking and Circular Economy practices*

IP is one of the major driving forces in shaping circular economic practices. However, IP alone is insufficient to ensure a meaningful circular transformation Ranta et al., (2018). The available literature increasingly focuses on the top management support as a mediating mechanism that translates stakeholders' expectations into actionable circular strategies Jakhar et al., (2019). Based on these arguments, we have developed the following mediating hypotheses.

H7: *Top Management Support for Sustainability mediates the relationship between Institutional Pressure and Circular Economy practices*



3.0. Methodology

A quantitative approach is used to collect data in this study. We have used a survey-based methodology to collect empirical data. We have applied statistical analysis and structural equation modeling (SEM)

to analyze the proposed hypotheses and framework of the study. The objective of these statistical techniques was to assess the direct and mediated relationships among the constructs included in this framework. The SEM approach is commonly used by previous researchers in the discipline of business and management because it provides substantial support in hypothesis testing and development of the framework of the study (Bajjou & Chafi, 2025; Legate et al., 2024).

3.1 Sampling Procedure

In this study, we collected data from SMEs registered with the Small and Medium Enterprises Development Authority (SMEDA) in Pakistan. These SMEs were engaged in the production of auto body parts, plastic products, wooden furniture, electrical appliances, and PVC pipes. We have selected these manufacturing SMEs because the Environmental Protection Agency (EPA) Pakistan warned them three years ago to incorporate CEP into their routine business operations. These enterprises were selected because of their substantial strides in ensuring environmental regulatory compliance, resource recovery initiatives, adopting circular policies, and promoting product circularity to address environmental challenges (Ali et al., 2024). According to a study by Massuga et al. (2024), the environmental performance index of Pakistan is ranked 179 out of 180 nations, revealing a critical need for considerable measures to address environmental challenges. Due to the fact that SME sectors usually procure raw materials extracted from natural resources or refine them through industrial processes, the selection of SMEs for this study is quite relevant.

In order to select the firms for data collection, several parameters were set to make the selection process more appropriate. These parameters included: (i) the firm must be registered with SMEDA Pakistan; (ii) the firm must have been functioning in the last 10 years; (iii) the firm must be involved in production only; (iv) the firm must have maintained a workforce of up to 250 employees. In order to reduce social desirability bias and common method bias (CMB), we ensured confidentiality of the data and encouraged voluntary participation of the respondents in this study. According to the selection criteria of the study, a total of 470 SMEs were selected for data collection; however, only 379 SMEs provided their consent for participation in this research.

On the recommendation of Sheehan et al., (2025), we have collected data from four different types of respondents from each enterprise (including procurement managers, HR managers, production managers, and finance managers), as they were directly involved in decision-making and were the most appropriate respondents to provide relevant, accurate, and required information on the study constructs. For data collection purposes, we have hired five research assistants and conducted three workshops to train them to ensure protocol and procedures, ethical guidelines, and data quality standards of the study. Each research assistant was assigned a separate district for data collection. We have collected data at two different times (T1 and T2) from the same participants, with a time lag of 3 months. In T1, we have collected data for the constructs of ES and IP. In T1, we have distributed 1516 (379 x 4) questionnaires; however, we have received 833 filled questionnaires. We have sent various reminders to all remaining respondents to submit their responses. In response to the reminders, we have collected 295 additional filled questionnaires in T1. Thus, we have collected a total of 1128 questionnaires in T1. After a lapse of three months (T2), we contacted the same 1128 respondents to provide the data on the remaining constructs of the study, such as TMSS and CEP. In T2, we received only 721 valid questionnaires. We have decided to send a reminder to the remaining respondents. We are thankful to them; they cooperated with us and returned 191 additional filled questionnaires. Finally, we have collected 912 filled questionnaires (60.15% response rate), which were sufficient to meet the required sample size of the study. For conducting this study, written consent was obtained from the Research and Ethics Committee (REC) of the Institute of Management Sciences, University of Haripur, through letter no. UOH/IMS/R&D/REC/2025/02.

3.2 Instrument Development

The items of all the constructs were adopted from the previous literature using a 5-point Likert scale, indicating 1 for strongly disagree and 5 for strongly agree. ES was analyzed using 14-items scale with three dimensions, i.e., environmental scanning, environmental interpreting, and environmental responding. Environmental scanning, having a 4-item scale, was adopted from the study of García-Carbonell et al. (2021). Environmental interpreting was assessed using a 5-item scale from the study of Thomas et al. (1993). Environmental responding was measured using a 5-item scale from the study of Choo (2003). The second independent construct IP was measured using a 16-item scale having three dimensions: coercive, mimetic, and normative, adopted from the study of Phan and Baird (2015). The mediating variable, TMSS, having 7-items scale was adopted from the study of Chatterjee et al. (2023). CEP has a 9-item scale with three dimensions, i.e., resource and material efficiency, circular design, and business model innovation, adopted from the study of Khan et al. (2021).

The survey data were analyzed through the technique of structural equation modeling (SEM). As recommended by Zhang et al. (2021). We have used two widely recognized approaches for data analysis, including partial least squares structural equation modeling (PLS-SEM) and covariance-based structural equation modeling (CB-SEM). The principal distinction between these approaches pertains to their applications. PLS-SEM is highly appropriate for optimizing the variance explained by the dependent variable. However, CB-SEM is designed for testing and validation of theories. According to Lauro et al. (2018), PLS-SEM has emerged as a de facto standard analytical tool in measuring predictive relationships of CEP. PLS-SEM is useful to measure multifaceted constructs and diverse interaction effects to test the hypotheses outlined. This analytical technique is reliable and minimizes the likelihood of false positive outcomes, which allows measuring normally distributed data, direct and mediating connections among the variables (Zhang, Dawson & Kline, 2021). Hence, this is optimally suited to the modeling of CEP and the objectives of the study.

3.3 Common Method Bias (CMB)

In order to address CBM, three measures have been adopted. Initially, the participants were assured that their responses would be treated confidentially and anonymously, and the data would be used solely for research purposes. Secondly, respondents were briefed that no response was deemed correct and were directed to respond based on their knowledge instead of the institution. In addition, we have calculated the variance inflation factor (VIF) to test the multicollinearity due to CMB. The VIF value was 2.3 (less than VIF threshold value of 3.3), highlighting that CMB was not expected to influence the outcomes of this study (Howard et al., 2024). These measures serve to reduce possible CBM and strengthen the validity of the outcomes of the study. It is worth mentioning that we have employed PLS-SEM as an analytical technique to assess the structural paths and mediating effect of top management support for sustainability on circular economy practices. On the other hand, CBM was used as an additional validation test to support the validity of the framework of the study.

4.0. Results

4.1 Demographic Profile

Table 1 presents the demographic profile of the SMEs that highlights frequencies and percentages of all the control variables. Most enterprises (36%) are over 10-15 years old, with a workforce of up to 250 employees. We have collected data from procurement managers (30%), HR managers (27%), Production managers (24%), and Finance managers (19%).

Table 1
Descriptive Profile of Respondents (n = 912)

Demographics Profile	Frequency	%
Enterprise Age (Years)		
10-15	328	36
16-20	283	31
21-25	182	20
26-30	64	7
More than 30	55	6
Enterprise size (Number of Employee)		
50-100	456	50
101-150	219	24
151-200	146	16
More than 200	91	10
Manager's Education		
Matriculation	173	19
Intermediate	246	27
Bachelor	301	33
Master and higher degrees	192	21
Manager's Experience (Years)		
1-5	173	19
6-10	255	28
11-15	356	39
16-20	82	9
More than 20	46	5
Manufacturing Sector		
Auto Parts	219	24
Plastic Products	182	20
Wooden Furniture	173	19
Electrical Appliances	173	19
PVC Pipes	164	18
Respondents		
Procurement Mangers	274	30
HR Managers	246	27
Production Managers	219	24
Finance Managers	173	19

4.2 Descriptive Statistics

The findings of descriptive statistics are displayed in Table 2, which points out the noteworthy tendencies. As per this study, CEP has the highest average score of 4.8, while ES, IP, and TMSS have an average score of 4.3, 4.5, and 4.6, respectively. Statistical results in Table 2 confirmed the relationship among latent variables such as ES and TMSS ($r = 0.33$); ES and CEP ($r = 0.37$), IP and TMSS ($r = 0.21$), IP and CEP ($r = 0.42$), TMSS and CEP ($r = 0.29$). The result also showed that all the relationships are positively correlated in this study.

Table 2
Descriptive Statistics

Construct	M	SD	CR	1	2	3	4	5	6	7	8
SMEs Age	2.8	.81	-	-							
SMEs Size	3.7	.79	-	-	-						
Managers' Education	3.4	.72	-	-	-	-	-				
Managers' Experience	3.3	.80	-	-	-	-	-				
ES	4.3	.81	.87	.07	.05	.06	0.8	**.86**			
IP	4.5	.82	.90	.08	.07	.07	.06	.07	**.78**		
TMSS	4.6	.91	.83	.06	.05	.08	.47**	.33**	.21**	**.83**	
CEP	4.8	.88	.89	.04	.04	.06	.29**	.37**	.42**	.29**	**.78**

4.3 Measurement Model

Table 3 depicts the outcomes of measurement model analysis that shows the validity and reliability parameters. Construct validity and reliability were analyzed through discriminant and convergent validity criteria. We have used three methods to examine the construct reliability. First, confirmatory factor analysis (CFA) is measured through factor loading, the value ranges from 0.809 to 0.828, surpassing the recommended threshold of 0.70. Second, composite reliability (CR) values varied from 0.913 to 0.932, which fulfills the criteria of internal consistency by surpassing the threshold of 0.70. Third, the values of average variance extracted (AVE) ranges from 0.75 to 0.78, exceeding the recommended threshold of 0.50 of convergent validity. According to the recommendation of Hair et al. (2019), all validity and reliability measures meet the threshold criteria, thereby confirming our measurement model.

Table 3
Constructs Measurement

Variables	Items	FL	AVE	CR	CA
Environmental Sensemaking	ES1	0.812	0.78	0.913	0.812
	ES2	0.718			
	ES3	0.821			
	ES4	0.773			
	ES5	0.789			
	ES6	0.812			
	ES7	0.791			
	ES8	0.803			
	ES9	0.765			
	ES10	0.783			
	ES11	0.801			
	ES12	0.767			
	ES13	0.827			
	ES14	0.811			
Institutional Pressure	IP1	0.703	0.75	0.932	0.809
	IP2	0.723			
	IP3	0.764			
	IP4	0.725			
	IP5	0.722			
	IP6	0.737			
	IP7	0.746			
	IP8	0.771			
	IP9	0.709			
	IP10	0.726			
	IP11	0.746			
	IP12	0.736			
	IP13	0.780			
	IP14	0.767			
	IP15	0.755			
	IP16	0.771			
Top Management Support for Sustainability	TMSS1	0.851	0.77	0.919	0.819
	TMSS2	0.819			
	TMSS3	0.755			
	TMSS4	0.767			
	TMSS5	0.785			
	TMSS6	0.799			
	TMSS 7	0.817			
Circular Economy Practices	CEP1	0.701	0.76	0.923	0.828

CEP2	0.736
CEP3	0.727
CEP4	0.733
CEP5	0.746
CEP6	0.754
CEP7	0.744
CEP8	0.769
CEP9	0.721

4.4 Inner Measurement Model

We have bootstrapped subsamples of 5000 to analyze the path coefficients and significance of indicators. The assessment criteria for the inner model were calculated and confirmed to be within acceptable limits, providing evidence of an acceptable model fit (GoF = 0.689). This value of acceptable model fit reveals that the model of CEP is classified as "Large", highlighting goodness of fit with the data. Moreover, this value reflects the fitness of the model that exhibits an excellent fit. According to the recommendation of Hair et al. (2019), these indicators consistently reflect an excellent fit while complying with the set criteria. In addition, the value of the normed fit index (NFI) is calculated as 0.947, which highlights that the environmental sustainability model satisfy the standard threshold ≥0.90 (or 0.95) to develop a resilient model, revealing potential for model fit. However, the value 0.063 of standard residual root mean square (SRMR) indicates a good fit, since it falls below the threshold (0.08). These results validate the potential of the model to reduce waste, conserve natural resources, and extend product lifecycle (Harakati, Ghazouani & Hlioui, 2024).

In terms of variance explained, the constructs of the model show a variance of 23.7% in CBM through ES and IP. Moreover, CEP are explained by 17.2% of the variance of these constructs. We have applied the Q^2 criterion of Stone Geisser to determine predictive relevance. As suggested by Hair et al. (2019), all endogenous constructs demonstrated a Q^2 value exceeding zero, ranging from 0.039 to 0.138, evidencing positive metrics and moderate predictive validity of the PLS model for predicting the internal constructs of CEP's framework.

4.5 Hypotheses Testing

As recommended by Falk et al. (2024), we have used the Bias-corrected and accelerated (BCa) bootstrap procedure at CI = 95% with a subsample of 5000 to test hypotheses of the study. The potential predictive effects of both exogenous and endogenous constructs are assessed through the PLS-SEM bootstrapping approach (Sharma et al. 2022). Hypotheses are deemed significant with the t-value equal to or greater than 1.96, and the p-value is less than 0.05. Table 4 displays the comprehensive analysis of the relationships among ES, IP, and TMSS to validate the study hypotheses. The beta and p-value calculated in Table 4 clearly affirm our initial assumption that ES positively influences CEP ($\beta = 0.198$, $p < 0.004$), thus supporting H1. Similarly, IP positively affects CEP ($\beta = 0.277$, $p < 0.000$), validating H2. Similarly, ES positively affects the TMSS ($\beta = 0.256$, $p < 0.001$), supporting H3 of the study. IP positively affects the TMSS ($\beta = 0.324$, $p < 0.000$), thus supporting H4 of the study. H5 also confirms the positive effect of TMSS on CEP ($\beta = 0.237$, $p < 0.000$).

Table 4
Direct Relationships

Hypotheses	β	Sample mean	Standard deviation	*t*-Value	p-value	Remarks
H1 ES ➔CEP	0.198	0.201	0.042	3.457	0.004	Significant
H2 IP ➔CEP	0.277	0.251	0.033	12.087	0.000	Significant
H3 ES ➔TMSS	0.256	0.263	0.036	6.265	0.001	Significant
H4 IP ➔TMSS	0.324	0.371	0.031	4.265	0.000	Significant
H5 TMSS ➔CEP	0.237	0.229	0.029	7.568	0.000	Significant

Table 5 presents the indirect effects analysis of TMSS, which supported hypotheses H6 and H7. Particularly, the TMSS mediates the relationship between ES and CEP; a considerable effect was examined for CEP (H6: $\beta = 0.052$, $p < 0.001$). Correspondingly, H7 of the study shows the mediating role of TMSS in the relationship of IP and CEP, as confirmed by significant coefficients for CEP (H7: $\beta = 0.048$, $p < 0.000$).

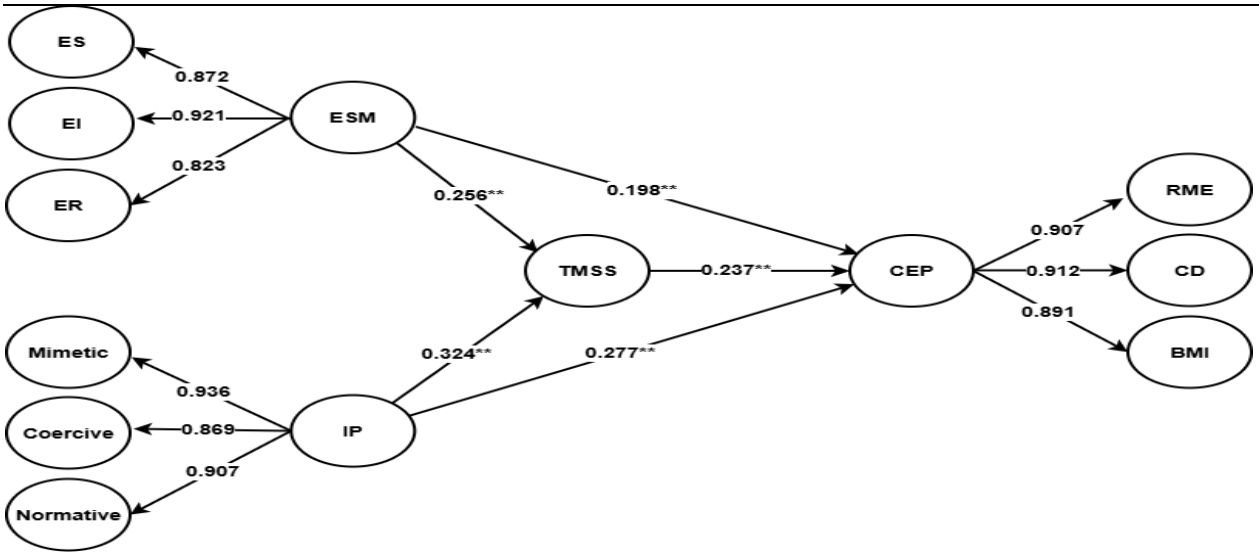
Table 5
Indirect Relationships

Hypotheses	β	Sample mean	Standard deviation	*t*-Value	p-value
H6 ES➔TMSS➔CEP	0.052	0.027	0.015	3.265	0.001
H7 IP➔TMSS➔CEP	0.048	0.051	0.019	5.254	0.000

Table 6 exhibits the analysis of total effects, highlighting the most influential drivers on CEP. ES significantly influences CEP ($\beta = 0.250$, $p < 0.000$). On the other hand, IP has a significant total effect on CEP ($\beta = 0.325$, $p < 0.001$).

Table 6
Total Effects

Hypotheses	β	Sample mean	Standard deviation	*t*-Value	p-value
ES➔ CEP	0.250	0.224	0.046	6.218	0.000
IP➔ CEP	0.325	0.324	0.043	6.251	0.001



5.0. Discussion

This study highlights the instrumental role of ES in fostering CEP among manufacturing SMEs (H1). Consistent with existing literature, ES shapes the cognitive frames of top management, leading to stronger commitment to adapting CEP (Knight et al. 2025). This study delineates itself by conducting an in-depth analysis of the cognitive role of sensemaking in the actual adaptation of circularity initiatives in SMEs of developing countries like Pakistan. The positive effect in ES and CEP suggests that effective ES aligns organizational strategic initiatives with waste reduction principles and resource conservation decisions (Singh et al., 2021). The findings also suggest that IP is positively associated with CEP (H2). This relationship reinforces the importance of IP by prioritizing both regulatory compliance and adoption of circular economy initiatives (Mehrabi et al., 2021). However, IP alone is insufficient to promote circularity initiatives; the role of TMSS is required to make circular practices possible at the enterprise level (Rashid et al., 2025).

Consistent with existing studies (Pain et al, 2024; Zhang et al., 2025), the findings of the study establish a positive connection between ES and TMSS (H3). This relationship suggests that the role of top management in manufacturing enterprises is crucial in interpreting and responding to complex environmental issues, thereby promoting organizational support for environmentally sustainable efforts (Wibeck & Linnér, 2021). The findings of the study also demonstrated the positive connection between IP and TMSS (H4). These finding highlights that IP, i.e. coercive, normative, and mimetic forces, shape priorities and perceptions of top management to align their strategic actions with environmentally sustainable practices in SMEs (Kutaula et al., 2025).

sThis study confirms the positive relationship between TMSS and CEP (H5). According to Horak et al. (2018), TMSS shapes strategic priorities (resource efficiency, resource conservation), provides resources, and drives motivation necessary for effective adaptation of circular economy initiatives (Ilyas et al., 2020). TMSS emphasizes the crucial role of senior management in promoting sustainability initiatives and achieving sustainable organizational goals in SMEs of developing countries (Zhang et al., 2025).

The results of the study confirm the mediating role of TMSS in the relationship between ES and CEP (H6). The process of ES, interpretation, and strategic response enhances the capacity of top management for interpretation of environmental complexities (Aguilera et al., 2021). These understandings enable top management of SMEs to provide fundamental strategic direction and allocate resources that can foster sustainable initiatives at the firm level (Merendino et al., 2018). The results also confirm the mediating role of TMSS in the relationship between IP and CEP (H7). This relationship highlights that IP sets external expectations of policymakers, government, competitors, and community for a sustainable environment (Jakhar et al., 2019). However, the critical role of top management is essential to translate these expectations into tangible actions for circularity (Horak et al., 2018).

5.1 Theoretical Implications

This study makes various significant contributions to existing literature by explaining how ES and IP enable managers of SMEs of developing countries respond to environmental and institutional cues through strategic sustainability initiatives. Firstly, this study enhances the basic understanding of ES by revisiting its basic conceptualization as an intellectual process and presents its role as a strong driver to initiate the process of CEP in manufacturing SMEs (Hong et al., 2024). By developing a strong link between ES and the adoption of CEP, this study attempts to revisit the traditional understanding of the transition process towards circularity in manufacturing SMEs of developing countries (Hong et al., 2024; Knight et al., 2025). Therefore, this research demonstrates that ES is not only about recognizing environmental issues, but also about actively developing shared meanings that guide strategic and operational processes towards circularity.

Secondly, the study contributes to institutional theory by interpreting the internal processes through which IP influences the adoption process of CEP (DiMaggio and Powell, 1983). Rather than considering that the three elements of IP: coercive, normative, and mimetic pressures, only have direct and inevitable effects, this study suggests that these three types of pressures require internal translation and endorsement through top-management support in SMEs of developing countries (Horak et al., 2018). This advances institutional theory by highlighting TMSS as a critical factor that enables SMEs to move from symbolic compliance to applicable circular economy engagement.

Thirdly, this study attempts to extend the existing understanding of CEP by redesigning CEP as an outcome of managerial understanding, external IP, and leadership engagement rather than considering it as an efficiency measure or technologically based circularity process (Kumar, 2019). Available literature on CEP has primarily focused on various elements like technical capabilities (Knight et al., 2025), material flows (Aguilera et al., 2021), supply chain (Akash et al., 2025), and policy instruments (Humberto, 2025). In contrast, this study explains the implementation of CEP as a cognitively rooted and managerially embedded process, especially in the context of SMEs, where structured routines towards sustainability are weak. By integrating cognitive and behavioral dimensions, this study enhances the existing understanding of CEP.

Fourthly, by considering TMSS as a central mediating element, the study contributes to existing research by providing empirical evidence that top management commitment and support are critical in converting ES and institutional demands into CEP (Horak et al., 2018). This contribution is specifically relevant in the context of SME where ownership and top management are often intertwined. The study thus strengthens the argument that top management support is not a secondary element but a central theoretical point that supports the transition process towards strategic growth (Hart & Dowell, 2011).

Finally, this research presents a consolidated theoretical framework that interlinks ES, IP, and CEP through TMSS. By combining insights from institutional theory and dynamic capability theory, this study moves beyond the fragmented explanations of CE adoption and attempts to provide a comprehensive framework of how intellectual processes and external institutional forces interact to facilitate the transition process. This integrative methodology contributes to the existing body of knowledge by revealing the synergistic nature of intellectual, institutional, and managerial dynamics in adopting CEP.

5.2 Managerial Implications

Managerial implications of CEP vary across industrial contexts and economies. The managerial implications of CEP and its performance outcomes may differ between developed and emerging economies and also differ in the context of large industries and manufacturing SMEs. This study presents insightful implications for managers aiming to transform their business in a progressive direction toward a circular system, specifically for manufacturing SMEs in developing countries. Firstly, managers of these SMEs are suggested to ensure TMSS in strategic roadmap development to comprehend complex environmental situations and meet institutional demands. Top management support could foster CEP at the corporate level by incorporating ES into their strategic priority and swiftly responding to IP.

Secondly, ES emerges as a strategic driver for ensuring resource and material efficiency, promoting circular design and business model innovation. Therefore, managers are encouraged to build their competencies of environmental scanning, interpreting, and responding to conform to their efforts to achieve environmental sustainability and circular goals. According to Hong et al. (2024), ES is an organizational capability that enables organizations to adopt CEP through systematic scanning, interpreting the environmental changes, and responding accordingly. Therefore, managers of manufacturing SMEs should embed environmental scanning into their routine business operations and decision-making practices in order to ensure proactive recognition of environmental opportunities, risks, and trends for strategic adaptability.

Thirdly, an effective CEP demands a resilient system with top management support for fostering environmental sustainability in business operations by establishing individuals' knowledge and skills. ES helps to develop environmental awareness and approaches to meet challenges of how stakeholders and organizations understand, interpret, and act on environmental information and direct how CEPs are adapted and sustained (Pain et al, 2024). Moreover, the role of IP is crucial in fostering CEP by ensuring regulatory compliance, reducing uncertainty, and motivating individuals to adopt sustainable practices. Therefore, managers of SMEs must support the factors of ES and IP when devising long-term strategies for environmental sustainability.

5.3 Conclusion

This study has identified four noteworthy insights. Firstly, ES is fundamental to enhancing managerial support and promoting a production system of circularity. ES enhances organizational capability to proactively leverage environmental opportunities and adopt broad-based circular strategies. Secondly, ES has an indirect effect on TMSS, while directly influencing RME, CD, and BMI. Therefore, ES encourages these enterprises to respond to environmental challenges proactively and positively to adapt to rapid environmental transformation. Thirdly, the mediating role of TMSS in the relationships of ES and IP is crucial in promoting CEP at the organizational level. The role of TMSS as a mediator is significant in supporting sustainability initiatives by allocating resources and fostering a culture of environmental responsibility towards achieving long-term environmental goals. Finally, this research integrates institutional theory and dynamic capability theory by developing a refined and integrated model to analyze the implementation of CEP in the setting of SMEs.

5.4. Research limitations and future research agenda

Despite various theoretical and managerial implications, this research also has some limitations that could be opportunities for future research. This study employs purely quantitative methods to investigate the effects of ES and IP on CEP. The notions of ES and IP are relatively complex terms, and it would be better to use a mixed-method approach to understand the process of sensemaking and institutional demands and their role in designing and adopting CEP in SMEs. Secondly, the unit of analysis for this study was SMEs. Therefore, there might be some generalizability issues. Thirdly, in this study, we have considered TMSS as a mediating factor without considering the heterogeneity in managerial values and cognition. Various managerial-level factors, like previous environmental knowledge and experience, environmental values, and top management structure, can shape and strengthen the top management support. Therefore, it is suggested to consider all these factors in designing future research studies. Finally, some insignificant relationships identified in section four of this study require further in-depth investigation.

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