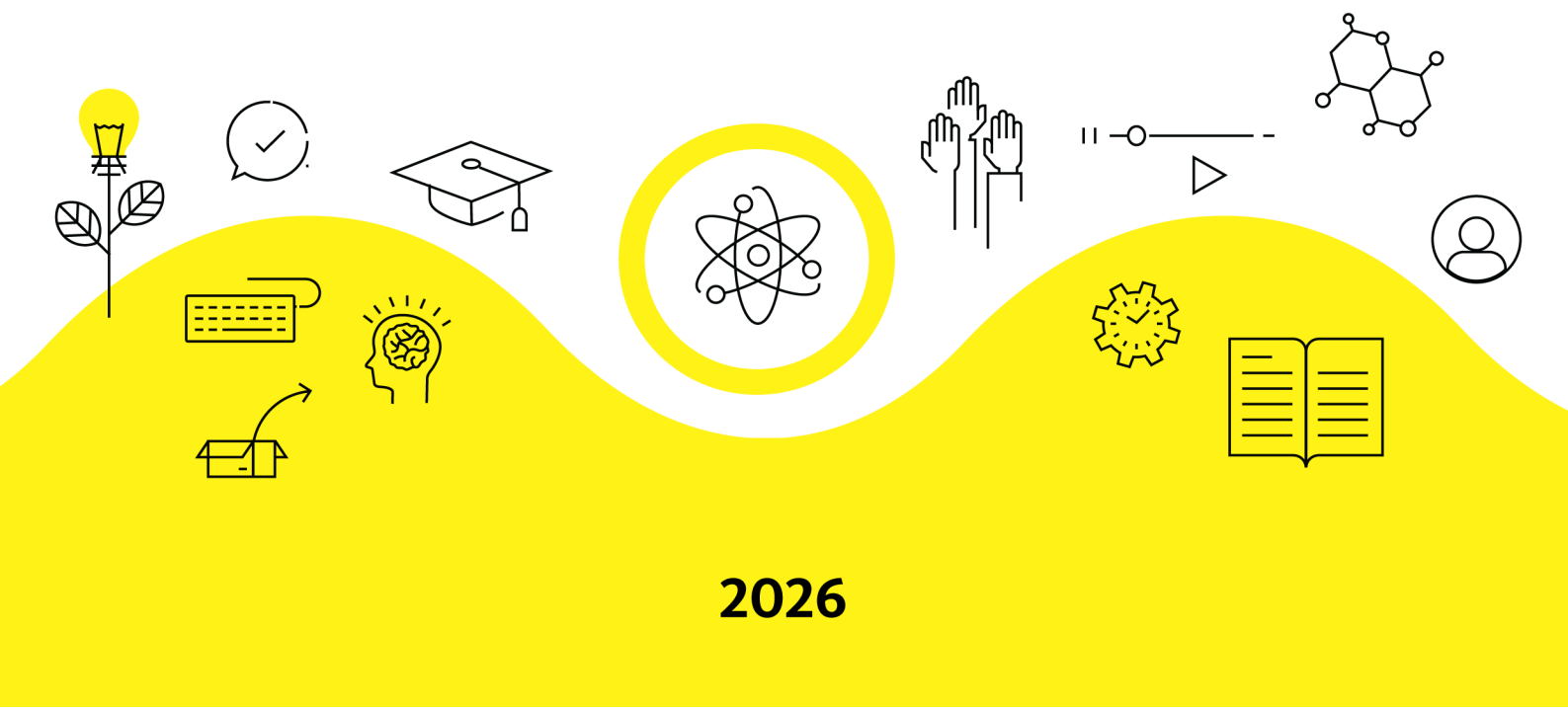


CLOCKS CAN BE STOPPED, TIPPING POINTS CANNOT - WHEN POLITICS PAUSES BUT PHYSICS DOESN'T: SUSTAINABILITY IN AN AGE OF 'STOP THE CLOCK'

IX. BUEB International Sustainability Student Conference

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Reciprocal nepotism and sustainable succession in family businesses

BÉKESINÉ KOVÁCS Noémi¹

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Abstract

This study explores the relationship between reciprocal nepotism and socioemotional wealth in family businesses with particular attention to leadership succession as a catalyst for organisational transformation within a broader sustainability context. Reciprocal nepotism – defined as competence- and trust-based appointments of family members – is analysed through the FIBER framework (Family control, Identification, Binding social ties, Emotional attachment, and Renewal of family bonds), and it is also considered how social thresholds, such as perceived fairness, legitimacy and inclusion, shape stakeholder responses during succession. Adopting a qualitative, interpretivist approach, the research investigates three Hungarian family businesses undergoing intergenerational CEO transitions. Data were collected through semi-structured interviews with predecessors, successors and non-family employees. The findings reveal that succession is not merely a transfer of authority but a complex, socially embedded process of change that requires balancing among tradition, adaptation and emerging sustainability trends. Management and employee reactions highlight varying levels of commitment, learning and resilience, while also exposing tensions related to equity, role legitimacy and organisational continuity. The study demonstrates that when reciprocal nepotism is embedded in transparent, inclusive and competence-based decision-making, it can support socially sustainable transformation by reinforcing trust, strengthening organisational identity, and maintaining critical social thresholds. Furthermore, the research identifies resilient practices and solutions – such as inclusive communication, stakeholder engagement and structured change management – that enhance both socioemotional wealth and long-term adaptability. These practices help emerging sustainability trends with emphasising social responsibility, intergenerational continuity, and ethical governance in family firms. Overall, the findings contribute to the discourse on sustainable entrepreneurship and ethical succession in FBs by illustrating how family influence can be balanced with professional governance to foster resilience, inclusivity and enduring organisational value.

Keywords: Reciprocal nepotism, socioemotional wealth, family businesses, sustainability, succession, FIBER framework, qualitative research

JEL Classification: L26, M10, M12, M14, Q56

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Introduction

Family businesses constitute one of the most prevalent organisational forms globally, and account for a substantial share of employment, value creation and economic stability (Sharma & Sharma, 2011; Huszák et al., 2021). Beyond their economic importance, family firms play a crucial role in maintaining social cohesion and supporting local communities through their long-term orientation and embeddedness in regional contexts. However, despite their strengths family businesses face significant challenges, among which leadership succession is one of the most critical ones (Heidrich et al., 2018, 2019; Mosolygó et al., 2022; Mosolygó et al., 2023; Berrone et al., 2012).

Succession is widely recognised as a defining moment in the life cycle of a family firm (Heidrich et al., 2018, 2019; Mosolygó et al., 2022; Mosolygó et al., 2023; Berrone et al., 2012). It involves not only the transfer of ownership and managerial authority but also the bestowing of values, identity, and social relationships across generations. Failure to manage succession effectively can jeopardise organisational continuity, while successful transitions can strengthen resilience and long-term sustainability.

Within this context, nepotism emerges as a central yet controversial and rather problematic phenomenon (Firfiray et al., 2017; Bellow, 2003; Padgett & Morris, 2005). Traditionally, nepotism is defined as preferential treatment based on kinship ties and is often associated with inefficiency, lack of meritocracy and reduced organisational performance. Consequently, it has been widely criticised in both academic and practitioner discourse. However, recent research suggests that this view may be overly simplistic (Jaskiewicz et al., 2013; Firfiray et al., 2017). Not all forms of nepotism are inherently detrimental; rather, their impact depends on how they are enacted and perceived within the organisation.

In particular, the concept of **reciprocal nepotism** (Jaskiewicz et al., 2013) has gained attention as a more nuanced form of family-based governance. Unlike entitlement nepotism (Jaskiewicz et al., 2013), which relies solely on familial connections, reciprocal nepotism is grounded in mutual expectations, competence and trust. In this context, family members are appointed not only because of their kinship but also due to their qualifications and commitment to the firm. This form of nepotism may foster loyalty, accountability and long-term engagement thereby contributing to organisational sustainability.

At the same time, the concept of **socioemotional wealth (SEW)** (Gómez-Mejía et al., 2007) provides a valuable theoretical lens for understanding family firm behaviour. SEW refers to the non-financial value that family members derive from their involvement in the business, including identity, emotional attachment, and the desire to preserve family legacy. These factors often influence strategic decisions, leading family firms to prioritise long-term continuity over short-term financial gains.

Despite growing interest in both nepotism and SEW, limited research has examined how these concepts intersect in the context of sustainability and succession. In particular, the role of reciprocal nepotism in shaping sustainable organisational transformation remains underexplored. This study addresses this gap by investigating how reciprocal nepotism influences succession processes and sustainability outcomes in family businesses.

The research is guided by the following question: **Can reciprocal nepotism contribute positively to sustainable succession in family businesses, and if so, how?**

Literature Review

Family businesses and sustainability

Family businesses are often characterised by long-term orientation, strong local embeddedness and deep stakeholder relationships. These features position them as important actors in

promoting sustainability, particularly social sustainability and community development. Unlike non-family firms, which may prioritise short-term financial performance, family businesses frequently prioritise non-financial goals such as legacy preservation and reputation, and also often emphasise continuity and intergenerational responsibility (Gómez-Mejía et al., 2007).

Sustainability in a family firm context extends beyond environmental concerns and includes social responsibility, ethical governance and intergenerational continuity. These firms frequently engage in community development, support local employment, and maintain long-standing relationships with stakeholders. As such, family firms play a critical role in fostering social sustainability and regional resilience.

The alignment between family values and sustainability objectives has been widely discussed in the literature, which suggests that family firms may naturally support sustainable practices. For example, Cruz et al. (2014) argue that family firms are more likely to engage in corporate social responsibility (CSR) activities due to their concern for reputation and social legitimacy. Similarly, Berrone et al. (2010) suggest that family firms may prioritise environmental and social performance as part of their long-term strategic orientation.

Nepotism in family firms

Nepotism has traditionally been viewed as a negative organisational practice associated with favouritism and inefficiency undermining fairness and efficiency. However, recent studies have highlighted the need to differentiate between different types of nepotism. Jaskiewicz et al. (2013) distinguish between entitlement nepotism and reciprocal nepotism. While entitlement nepotism is based solely on family ties, reciprocal nepotism involves mutual expectations, competence and trust.

Entitlement nepotism refers to the preferential treatment of family members regardless of their competence, which often leads to negative organisational outcomes. In contrast, **reciprocal nepotism** involves mutual obligations, trust and competence-based selection. In this case, family members are expected to contribute meaningfully to the organisation, and their appointment is justified by their capabilities. Reciprocal nepotism may strengthen organisational cohesion and commitment, particularly when successors feel obligated to reciprocate opportunities through performance and loyalty. This distinction is critical for understanding the role of nepotism in family firms. While entitlement nepotism may undermine organisational performance, reciprocal nepotism can enhance trust, commitment and long-term engagement.

Socioemotional Wealth (SEW)

The concept of SEW provides a comprehensive framework for understanding family firm behaviour. According to Gómez-Mejía et al. (2007), SEW refers to the non-financial value that family members derive from their involvement in the business. SEW encompasses the firm's non-financial aspects that meet the family's emotional needs, including identity, emotional attachment, control and legacy.

The FIBER framework (Berrone et al., 2012) conceptualises SEW across five dimensions:

- Family control and influence
- Identification with the firm
- Binding social ties
- Emotional attachment
- Renewal of family bonds through succession

SEW plays a central role in shaping strategic decisions, which often causes family firms to prioritise long-term stability and social responsibility over short-term financial gains.

Succession and organisational transformation as a sustainability process

Succession is not merely a managerial transition but a complex social process involving identity, legitimacy and stakeholder perceptions. It represents a critical moment where tradition meets innovation. Successful succession requires balancing continuity with adaptation, particularly in response to sustainability challenges. Furthermore, **succession in family businesses** is a complex, multi-dimensional process involving both technical and emotional components. It involves matching continuity with change as new leaders must adapt the organisation to evolving market conditions while preserving its core values. From a **sustainability perspective**, succession represents an opportunity for organisational transformation. New leaders may introduce innovative practices, adopt sustainable strategies and respond to emerging societal expectations. However, these changes must be managed carefully to maintain stakeholder trust and organisational stability.

Methodology

This study adopts a qualitative, interpretivist approach to explore the relationship between reciprocal nepotism, SEW and sustainability.

Research design

A multiple case study design was employed to capture the complexity of succession processes in family firms.

Sample selection

Three Hungarian family businesses were selected based on:

- Family ownership and control in order to meet the criteria of family business defined by Kása et al. (2019)
- Size over the size of a micro enterprise.
- Multi-generational involvement
- Active succession process
- Engagement in community or sustainability-related activities

Data collection

Data were collected through:

- Semi-structured interviews with predecessors, successors and non-family employees of each firm
- Secondary sources including company documents

Data analysis

The data were analysed using **thematic analysis**, which allows for the identification of patterns related to SEW, nepotism and sustainability.

Case companies

The empirical setting of this study consists of three Hungarian small and medium-sized family enterprises (SMEs), all established following the post-socialist economic transition after the Hungarian regime change in 1990. Each firm operates in a multi-generational industry context and exceeds the size of a micro-enterprise, and is currently undergoing intra-family leadership succession. Despite sectoral differences, the cases share common structural characteristics including family ownership, generational involvement and active transition processes. The **first**

case company operates in the building materials industry, where the successor is the second son, who joined the firm at an early stage of his professional career and gradually climbed the career ladder in the family business. The **second case** involves a firm engaged in technology machinery distribution, in which the second daughter has assumed the successor role, who has previously relinquished her own independent business to join the family enterprise. The **third case** is a coatings wholesaler, where the first son has taken over succession responsibilities after leaving his prior professional career. Collectively, these cases provide a diverse yet comparable empirical basis for examining intra-family succession dynamics and the role of reciprocal nepotism across different industry contexts.

The relatively small sample size is methodologically appropriate for narrative and thematic analysis, as the purpose of qualitative research is to develop an in-depth understanding of complex phenomena rather than to produce statistically generalizable results. In family business research, processes such as succession, reciprocal nepotism and the preservation of socioemotional wealth (SEW) are highly context-dependent and require detailed exploration of participants' experiences and interpretations. A limited number of purposefully selected cases enables the collection of rich, nuanced data and the examination of the meanings that different stakeholders attribute to these processes (Yin, 2018; Riessman, 2008). The sample size is limited to the three chosen companies, which represent, on the one hand, typical Hungarian family businesses as for the current life cycle of the successor and of the firm; and on the other hand, family members involved in the firm and the decision-making (Wieszt & Drótos, 2018). The selected companies represent different successor paths on how they can earn their role within the company. The companies also differ in terms of their establishment and this is so as the study wishes to provide a broader picture of the current situation of Hungarian FBs. In the case of the first two companies, their professional roots date back to three generations, and were already in place even before they were founded, and these roots led to the establishment of the current companies following the regime change in Hungary. In the third case, however, the founder established the company well after the political transition drawing on his previous industry experience. In addition, the three cases are selected from different industries even if all the three companies are SMEs regarding their size. This multi-perspective design provides sufficient data for within-case and cross-case comparison, and allows for the triangulation of findings. Accordingly, the adequacy of the sample is determined not by its size, but by the relevance, richness and analytical value of the information obtained (Patton, 2015; Tracy, 2020). Moreover, this study paves the way for further exploration of these findings in a future larger-scale study.

Findings

The findings indicate that succession is a **socially embedded transformation process** rather than a simple transfer of authority. Several key themes emerged:

Succession as a socially embedded process – Role of reciprocal nepotism and trust

Succession is not merely a transfer of authority but a complex social process involving identity, legitimacy and relationships. The process is characterised by tensions between tradition and change.

Reciprocal nepotism enhances trust and legitimacy when succession decisions are perceived as competence-based. Transparency and fairness are critical in maintaining legitimacy.

SEW and organisational identity – Continuity

Succession reinforces organisational identity and strengthens family legacy. SEW plays a central role in maintaining continuity.

SEW reinforces long-term orientation and supports continuity during transition.

Stakeholder reactions

Employees demonstrate varying levels of acceptance depending on perceived fairness and competence. Tensions arise around role legitimacy and equity.

Sustainability outcomes – Sustainable practices

Inclusive communication, stakeholder engagement, and structured change management contribute to resilience and long-term adaptability.

Sustainable practices emerge through stakeholder engagement, communication and ethical governance.

Discussion

The findings suggest that reciprocal nepotism can serve as a **mechanism for socially sustainable transformation** when embedded in professional governance practices. This challenges the traditionally negative perception of nepotism (Bellow, 2003; Padgett & Morris, 2005) by demonstrating that reciprocal nepotism can support sustainable organisational outcomes and highlights the importance of context. By integrating nepotism theory with SEW, the study provides a more nuanced understanding of family firm governance. SEW (Gómez-Mejía et al., 2007) emerges as a key driver of sustainability, and influences decision-making towards long-term value creation and social responsibility. The integration of family values and professional management appears crucial in achieving sustainable outcomes.

Theoretical contribution and practical implications

The findings contribute to the literature by linking nepotism, SEW and sustainability, and offer new insights into family business governance. On the one hand, the main academic contribution of the research paper is that it explores reciprocal nepotism within the SEW framework from a sustainability perspective. On the other hand, the practical implication of the research is to provide actionable insights into ethical and effective succession planning in FBs.

Limitations

This study is subject to several limitations that should be acknowledged when interpreting the findings. First, the reliance on the FIBER model presents certain constraints: while it provides a structured and widely accepted approach to capturing dimensions of socioemotional wealth, it may not fully encompass the nuanced aspects of family firm dynamics, particularly those related to informal relationships, power asymmetries, or evolving intergenerational expectations. Second, the research is part of a broader, ongoing initiative to develop a more comprehensive understanding of nepotism in family businesses. As such, the present study represents an exploratory phase with a relatively limited empirical scope. Future stages of the research will expand the dataset and will incorporate additional cases and perspectives to enable more robust generalisation and deeper theoretical development regarding the role of nepotism in family firm governance and sustainability.

Future directions

Though limited in scope, this study is part of a longer-term research initiative. Its purpose is to establish key theoretical and empirical insights that will support a more extensive exploration

of the effects that different types of nepotisms have on the FIBER scale dimensions of SEW in FBs in subsequent phases.

Despite the huge amount of useful information, due to limitations on the scope of this study, the research paper has highlighted only the key findings. Future research in family business management should focus on deepening our understanding of nepotism by comparing the impacts of entitlement-based and reciprocal nepotism. To enhance generalizability, future studies must utilise larger, more diverse samples of family firms, and need to move beyond small case studies. Furthermore, it is critical to investigate the long-term succession outcomes of these practices, and analyse how different types of nepotism influence firm survival, leadership stability, and professionalisation over multiple generations.

Conclusion

Family businesses represent a dominant organisational form worldwide (Sharma & Sharma, 2011; Huszák et al., 2021) and play a critical role in economic development, employment and community stability. Their unique governance structure – characterised by the overlap of family and business systems (Tagiuri & Davis, 1996) – creates both advantages and challenges, particularly in the context of leadership succession. **Succession** is widely recognised as one of the most critical and risky phases in the life cycle of family firms, and often determines long-term survival (Heidrich et al., 2018, 2019; Mosolygó et al., 2022; Mosolygó et al., 2023; Berrone et al., 2012).

Nepotism, defined as preferential treatment based on kinship ties, is a common yet controversial feature of family businesses. Traditionally, nepotism has been associated with inefficiency and non-meritocratic practices (Bellow, 2003; Padgett & Morris, 2005). However, recent research (Jaskiewicz et al., 2013; Firfiray et al., 2017) suggests that not all forms of nepotism are inherently detrimental. In particular, reciprocal nepotism (Jaskiewicz et al., 2013), which is grounded in competence, trust, and mutual obligations, may contribute positively to organisational outcomes.

This study investigated how reciprocal nepotism influences sustainable succession processes through the lens of socioemotional wealth (SEW) (Gómez-Mejía et al., 2007). It aimed to contribute to the growing discourse on sustainability in family firms by examining how family-based governance mechanisms interact with long-term value creation, social responsibility and organisational resilience.

By adopting a qualitative, interpretivist multiple case study design, this research investigated three Hungarian family firms undergoing intergenerational CEO succession. Data were collected through semi-structured interviews with predecessors, successors and non-family employees, and were complemented by secondary sources. Findings reveal that succession is a socially embedded change process that requires a balance between tradition and adaptation. When reciprocal nepotism is embedded in transparent and competence-based decision-making, it can enhance trust, organisational identity, and long-term sustainability, and can also support socially sustainable outcomes. The study highlights the importance of balancing family influence with professional management to achieve sustainable outcomes, and it contributes to the literature by integrating nepotism theory with SEW and sustainability, thereby offering new insights into how family-based governance can foster long-term resilience and ethical succession practices.

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Not all circular fashion models are the same: A comparative study of consumer acceptance of different circular fashion models

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Abstract

Circular economy has emerged as a key response to sustainability challenges facing the fashion industry. However, the literature often treats circular fashion consumption as a homogeneous phenomenon. The aim of this study is to examine whether different circular fashion models—purchasing sustainable products, second-hand consumption, and clothing rental—are accepted to varying degrees among consumers. The study is quantitative, based on a questionnaire survey of a sample of university students ($N = 137$), and we used repeated-measures analysis of variance to analyse the data. The results show significant differences between the examined models ($p < 0.001$) and indicate a large effect size, which suggests that circular fashion cannot be considered a uniform consumption category. Purchasing sustainable products was the most accepted, followed by second-hand consumption, while clothing rental showed significantly lower acceptance. The results suggest that circular models align with consumer decision-making logic to varying degrees, which influences the actual adoption of such models. This study contributes to the literature on sustainable consumption and the circular economy by empirically confirming the heterogeneity of circular fashion and highlighting that the success of sustainable transition depends heavily on consumer acceptance.

Keywords: circular fashion, consumer acceptance, second-hand consumption, clothing rental, sustainable purchasing, consumption models, perceived risk (D12)

Introduction

In recent decades, the fashion industry has become one of the most critical areas of global sustainability discourse, and is characterized by rapidly changing collections, business models based on low prices, and overproduction (Clark, 2008; Goworek et al., 2012). These systems, based on a linear “take–make–dispose” business logic, result in significant environmental impacts, particularly given the dominance of fast and ultra-fast fashion models (Niinimäki et al., 2020). In contrast, the circular economy offers a systemic alternative that focuses on keeping resources in circulation and extending product life cycle (Ellen MacArthur Foundation, 2017; Todeschini et al., 2017). The literature on the circular economy emphasises that the transition to sustainability is not merely a matter of technological or business model innovation, but also requires a structural transformation of consumer behaviour, without which systemic change cannot be achieved. The circular economy is particularly relevant to the fashion industry in terms of waste minimisation and resource efficiency (Shirvanimoghaddam et al., 2020).

Circular fashion can be understood as a consumer-level manifestation of the principles of the circular economy. It does not represent a single category of behaviour, but rather a combination of various forms of consumption. These models—including the purchase of sustainable products, second-hand consumption, and access-based solutions such as clothing rental—differ to varying degrees from the traditional, ownership-based logic of consumption, which influences the consumer acceptance of such models (Hvass, 2015; Jung & Jin, 2016). This means that the implementation of the circular economy at the consumer level should not

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be interpreted as a uniform transition but rather as the adaptation of different models at varying speeds and depths.

At the same time, a growing body of research indicates that sustainable consumption is not being realised despite the positive commitment observed at the level of declared attitudes. The so-called “green gap” phenomenon—the discrepancy between attitudes and actual behaviour—is particularly pronounced in the context of fashion consumption (ElHaffar et al., 2020; Busalim et al., 2022). This phenomenon is particularly problematic from the perspective of the circular economy, as it indicates that positive attitudes alone are insufficient to change actual consumer behaviour, which underscores the need to examine the varying acceptance of individual models. However, the vast majority of research interprets this phenomenon as a uniform consumer reaction and pays little attention to the fact that different circular models may align with consumers’ decision-making logic to varying degrees.

In studies of circular fashion consumption, a significant portion of the research focuses on sustainability attitudes and general willingness to purchase often implicitly assuming that different circular business models are interpreted similarly by consumers. In recent years, an increasing number of studies have drawn attention to the fact that sustainable consumption is not a uniform behavioural category but rather a set of diverse practices linked to differing perceptions, risks, social meanings, etc. (Camacho-Otero et al., 2019; Hvass, 2015). Nevertheless, comparative studies of different circular economy models remain limited. The circular economy emerges as a key element of sustainable development, aiming not only to increase resource efficiency but also to transform production and consumption systems. In this process, consumer behaviour plays a pivotal role, as the social acceptance of sustainable solutions determines their actual adoption. This research addresses this gap by interpreting circular fashion consumption not as a uniform phenomenon, but as a set of practices organised along different consumer logics. The aim of this research is to examine the extent to which various circular fashion models—particularly the purchase of sustainable products, second-hand consumption, and clothing rental—are considered acceptable among university students, and whether significant differences exist among them.

Literature review

The heterogeneity of circular fashion consumption

The aim of this study is to examine the extent to which various circular fashion models—particularly the purchase of sustainable products, second-hand consumption, and clothing rental—are considered acceptable by consumers, and to identify the underlying mechanisms that explain differences among buyers. The research was based on the assumption that circular fashion is not a uniform consumer category, but rather a set of practices organized according to different logics.

Circular fashion and its significance

Sustainability challenges facing the fashion industry have become increasingly prominent in recent decades particularly due to the overproduction and excessive resource consumption associated with fast and ultra-fashion (Clark, 2008; Goworek et al., 2012). In response, the concept of the circular economy offers alternative models aimed at extending the life cycle of materials and products, and keeping resources in circulation (Todeschini et al., 2017).

Circular fashion represents the implementation of these principles at the consumer level, and encompasses a variety of business models, including the purchase of durable products, second-hand consumption, recycling, and alternative access models such as clothing rental (Hvass, 2015; Jung & Jin, 2016). Although these models share the common goal of promoting sustainability, their operation and consumer perception can vary significantly. The literature,

however, points out that the environmental and economic impacts of these models as well as their consumer acceptance can vary significantly (Shirvanimoghaddam et al., 2020). This suggests that circular models differ significantly not only in their environmental impacts but also in consumer perceptions and acceptance, which justifies a comparative analysis. This is particularly important from the perspective of sustainable development, as the gap between positive attitudes and actual behaviour may limit the real environmental impact of circular models.

Circular consumption as a heterogeneous practice

Much of the literature treats circular fashion as a uniform phenomenon and focuses primarily on examining sustainability attitudes and general willingness to purchase (Camacho-Otero et al., 2019). However, this approach often overlooks the fact that different circular models align with consumers' everyday practices and norms to varying degrees.

In their systematic literature review, Camacho-Otero et al. (2019) point out that different forms of circular consumption are organised around distinct motivations and barriers, yet these differences are rarely analysed in an integrated manner. The study's strength lies in its extensive database and structured analysis; however, its limitation is that it remains primarily at the conceptual level and does not offer an empirical comparison between the different models. Nevertheless, most of the existing research examines individual models in isolation, or approaches sustainable consumption in aggregate terms, thus obscuring the structural differences among the models and their implications for consumers.

Hvass (2015) reaches a similar conclusion: in examining circular fashion business models, he emphasises that each model offers a distinct value proposition to consumers. Although the study makes an important theoretical contribution, it is limited from a methodological perspective, as it does not support the differences in consumer acceptance with empirical data.

Second-hand consumption: a practice becoming mainstream

Second-hand fashion is one of the most widely studied circular models, which has gradually become mainstream among consumers in recent years. According to research by Jung and Jin (2016), the acceptance of second-hand products is primarily motivated by economic benefits and sustainability values. The study employs a quantitative method, which allows for the statistical analysis of factors but is limited in that it does not compare the second-hand model with other circular alternatives.

Clothing rental: Low acceptance and high uncertainty

Clothing rental, as an access-based model, differs significantly from the traditional consumption logic of ownership, which may help explain the lower acceptance of this model. According to Lang and Armstrong (2018), the acceptance of clothing rental is significantly influenced by perceived risk, particularly by concerns about hygiene and quality. The study's strength lies in its use of an experimental method, which allows for the examination of causal relationships. However, its limited sample size reduces the generalizability of the results. Furthermore, the research does not contextualise clothing rental within other circular models, thus failing to address how widely accepted this model is in relative terms.

In line with this, Becker-Leifhold and Iran (2018) point out that the acceptance of access-based models depends heavily on consumers' attitudes towards ownership. The study is strong from a theoretical perspective, but its empirical validation is limited.

The role of perceived risk and consumption norms

Perceived risk is a key mechanism underlying the differences among circular fashion models. Kim et al. (2021) demonstrated that concerns about quality and hygiene significantly reduce willingness to consume, particularly for second-hand items and clothing rental. Price sensitivity is also a key factor (Blas Riesgo et al., 2022), particularly when consumers do not perceive clear added value in sustainable alternatives. Gazzola et al. (2020) further highlight the role of accessibility, which poses a barrier particularly in less developed markets. Taken together, these studies suggest that the acceptance of circular models is not solely a matter of attitude, but rather a process determined by the specific consumption context. At the same time, these factors are typically examined in isolation, which limits the ability to compare models.

The spread of circular models is influenced not only by individual perceptions but also by structural and market barriers, which affect individual business models to varying degrees. These barriers—including accessibility issues, lack of trust, and infrastructure limitations—can further reinforce differences in acceptance across models.

Research gaps and contribution

Based on a critical analysis of the literature, it is clear that while the factors associated with various models of circular fashion are well documented, their comparative analysis remains incomplete. Most studies examine a single model or approach to sustainable consumption at a general level without accounting for the structural differences across consumption forms.

This fragmented approach makes it difficult to understand why consumers accept different circular models to varying degrees. Consequently, the aim of this study is to address this gap through a comparative empirical analysis.

Summary

Overall, it can be concluded that the literature on circular fashion consumption provides an important foundation for understanding the various models, yet it exhibits significant gaps in terms of their comparative examination. The strength of existing research lies in identifying key mechanisms—such as perceived risk, price sensitivity, and social norms—but an integrated analysis of these is lacking.

This study contributes to this gap by empirically examining the acceptance of various circular models and highlighting that circular fashion is not a uniform phenomenon but rather a system of practices operating along different consumer logics.

Methodology

The study employs a quantitative cross-sectional methodology, using questionnaire-based data collection to examine consumer acceptance of various circular fashion models. This research approach is particularly suitable for achieving the objectives of this study, as it allows comparisons of different consumption patterns within the same sample and the identification of statistical differences in consumer preferences. The choice of quantitative methodology is justified by the fact that the research does not aim to gain a deep understanding of a single phenomenon, but rather to measure and compare differences between various circular models, which requires the use of standardised measurement tools and inferential statistical methods. Data collection was conducted using convenience sampling rather than probability sampling. The questionnaire was distributed among university students, primarily through online channels including university mailing lists and student groups. This sampling strategy allowed for quick and efficient access to the target group, but it also has limitations regarding the representativeness of the sample (Bryman, 2016).

The selected target group—university students—is appropriate for this research, as this consumer segment is particularly relevant to the study of circular fashion models. Young adults are, on the one hand, more open to innovative and sustainable forms of consumption. On the other hand, their decisions are highly sensitive to price, perceived risk, and social norms, which play a key role in the acceptance of various circular models (Jung & Jin, 2016). Inclusion in the sample was voluntary, participation was anonymous, and there was no financial incentive. A total of 146 responses were collected, of which 137 were found to be complete and suitable for analysis following the data cleaning process. During data cleaning, incomplete or inconsistent responses were removed, thereby the reliability of the analysis was ensured. The sample size meets the requirements for conducting basic statistical analyses, particularly for repeated-measures procedures (Field, 2018). Although convenience sampling limits the generalizability of the results, the aim of this study is not to draw conclusions representative of the entire population, but rather to explore the relative differences between various circular fashion models. In this sense, the selected sample provides an appropriate framework for examining the research questions, particularly since the comparison is based on the evaluations the same respondents.

The questionnaire consisted of several sections, of which the items concerning purchase intention and the acceptance of various circular models are of particular importance for the present analysis. Respondents rated their agreement with each statement on a five-point Likert scale, where a score of 1 indicated complete disagreement and a score of 5 indicated complete agreement. The three circular models examined were the purchase of sustainable products, second-hand consumption, and clothing rental. These models were operationalized through separate measurement items that reflect the level of consumer acceptance.

The analytical strategy of the study was based on comparing the acceptance of different circular models. Since the same respondents evaluated all three models, we used repeated measures ANOVA in the analysis. This method allows us to examine whether there are significant differences in the average acceptance of different consumption forms while controlling for individual respondent variance (Field, 2018). The use of repeated measures ANOVA is particularly justified in this case, as the goal is not merely to describe the absolute levels of each model, but to compare them relative to one another within the same decision-making context.

In the first step of the analysis, descriptive statistics were calculated to provide an overview of the acceptance levels for each model. We then used a repeated-measures ANOVA to test the main effect—that is, whether the model type significantly affects acceptance level. After demonstrating a significant main effect, we performed pairwise comparisons using the Bonferroni correction to determine which models exhibit statistically significant differences. This procedure reduces the risk of Type I errors arising from multiple comparisons, and ensures more reliable results (Armstrong, 2014).

During the statistical analyses, we paid particular attention to testing the assumptions. One of the key assumptions of repeated-measures ANOVA is sphericity, which we tested using the Mauchly test. If the sphericity assumption was violated, we applied the Greenhouse–Geisser correction to adjust the F-statistic, thereby ensuring the validity of the results (Field, 2018). In addition, we checked the data distribution for outliers, which could skew the results. The statistical methods used in the analysis made it possible to answer the central question of the study, namely, whether different circular fashion models are perceived as acceptable by consumers to varying degrees. The chosen methodological approach ensures that the results are not merely descriptive but also suitable for drawing statistically supported conclusions.

Overall, the quantitative, repeated-measure research methodology and the applied analysis of variance provide an appropriate framework for examining the heterogeneity of circular fashion consumption. The methodological approach aligns with the research objectives

by enabling the systematic exploration of differences among consumption models and contributing to a nuanced understanding of circular consumption. The study was conducted in accordance with ethical guidelines for research involving human subjects. Participation was voluntary and anonymous, and informed consent was obtained from all respondents. The study was conducted in accordance with applicable ethical guidelines for research involving human subjects. Data supporting the study's findings are available from the author upon request. For privacy reasons, the data are not publicly available.

During the preparation of this manuscript, we used AI-powered tools to improve the linguistic quality of the text. The authors have reviewed and edited the entire content and assume full responsibility for the final version.

Results

Descriptive statistics

Based on descriptive statistics, there is a clear difference in the acceptance of the circular fashion models examined (Table 1). Purchasing sustainable products showed the highest mean value ($M = 4.01$, $SD = 0.96$), followed by second-hand consumption ($M = 3.80$, $SD = 1.36$), while clothing rental showed a lower average value for acceptance ($M = 3.20$, $SD = 1.39$). The results preliminarily indicate a hierarchy of acceptance among the different models.

Table 1: *Descriptive statistics of circular fashion models*
Source: *Compiled by the author based on JASP program*

Model	Mean (M)	Standard Deviation (SD)
Sustainable purchase	4.01	0.96
Second-hand	3.80	1.36
Rental	3.20	1.39

This trend is consistent with previous studies, which indicate that ownership-based sustainable consumption models are more widely accepted than access-based alternatives (Jung & Jin, 2016; Lang & Armstrong, 2018).

Table 2: *Repeated measures ANOVA results*
Source: *Compiled by the author based on JASP program*

Effect	F	df	p	Partial η^2
Model type	26.90	(1.85, 253.3)	< .001	0.164

We used repeated-measures analysis of variance to statistically test for differences (Table 2). The sphericity assumption was violated (Munchley $W = 0.919$, $p = 0.003$), so we applied the Greenhouse–Geisser correction ($\epsilon = 0.925$). The ANOVA results showed a significant main effect of model type, $F(1.85, 253.3) = 26.92$, $p < 0.001$, partial $\eta^2 = 0.164$. This indicates a large effect size, which suggests that the acceptability of the different models differs statistically significantly. The repeated-measures ANOVA showed a significant main effect of model type, $F(1.85, 253.3) = 26.92$, $p < .001$, which clearly indicates that the acceptance of different circular fashion models differs statistically significantly. These findings confirm that consumers evaluate circular fashion models in different ways, which is consistent with previous research highlighting the heterogeneity of circular consumption practices (Camacho-Otero et al., 2019; Hvass, 2015).

Model-specific results

Based on the descriptive statistics, clear differences are evident in the level of acceptance concerning each model. The purchase of sustainable products showed the highest mean value ($M = 4.01$, $SD = 0.96$), followed by second-hand consumption ($M = 3.80$, $SD = 1.36$), while a significantly lower mean value was observed for clothing rental ($M = 3.20$, $SD = 1.39$). This result empirically supports the notion that different circular models cannot be considered a homogeneous consumption category. This finding is consistent with previous findings that have highlighted that sustainable fashion is more readily accepted when it aligns with existing purchasing habits (Blas Riesgo et al., 2022; Jung & Jin, 2016). The consumption of second-hand goods showed moderate acceptance. This finding is consistent with studies indicating the increasing normalisation of second-hand markets, although acceptance among consumers remains varied (Cairns et al., 2022).

Of the models examined, clothing rental showed the lowest level of acceptance. This finding is consistent with previous research, which identified risk perception, lack of knowledge, and trust-related concerns as barriers to the adoption of rental services (Lang & Armstrong, 2018; Kim et al., 2021).

Interpretation of results

The results suggest that circular fashion models cannot be considered a homogeneous consumer category. These differences indicate that consumers have varying attitudes towards each model, which influences their acceptance and potential adoption. The higher acceptance of purchasing sustainable products suggests that models closer to traditional consumption logic can be more easily integrated into existing consumer practices. The results reveal a clear hierarchy of acceptance among the models examined. Ownership-based forms of consumption—particularly the purchase of sustainable products—enjoy greater acceptance while access-based models, such as clothing rental, are significantly less popular among consumers.

The research findings indicate that circular fashion is not perceived as a uniform consumer category by consumers. This finding suggests that the differences between circular fashion models are not merely marginal but reflect structural differences in consumer decision-making.

These findings suggest that the effectiveness of circular fashion models in contributing to sustainability goals is strongly influenced by their level of consumer acceptance.

Discussion

The aim of this study was to examine whether consumers perceive different circular fashion models similarly and whether significant differences exist among them.

Confirmation of ownership-based dominance

The results show that purchasing sustainable products enjoyed the highest level of acceptance. This finding confirms previous studies that indicate that consumers are more likely to adopt sustainable fashion practices when these practices align with their existing ownership-based consumption habits (Jung & Jin, 2016; Blas Riesgo et al., 2022). This supports the broader argument found in the literature that behavioural compatibility plays a central role in the spread of sustainable consumption. Consumers are more likely to commit to sustainability if it does not require a fundamental change in their consumption logic. At the same time, this study complements previous research by demonstrating that a preference for sustainable purchasing is not observable only in isolation but remains dominant even when directly

compared with other circular models. This comparative evidence reinforces existing claims regarding the relative attainability of ownership-based sustainability.

Partial confirmation and clarification of the normalization of second-hand goods

The results suggest that the consumption of second-hand goods occupies an intermediate position in terms of acceptance. This finding is consistent with previous research indicating that second-hand fashion has become increasingly normalised and socially accepted (Cairns et al., 2022).

However, the results also reveal substantial variation in responses, which suggests that acceptance is not uniform among consumers. This nuance complements the existing literature, which often emphasises the growth of second-hand markets but pays less attention to the persistence of ambivalence or resistance among certain consumer segments. Thus, while the study confirms the trend towards normalisation identified in previous research, it also demonstrates that the consumption of second-hand goods remains a transitional model situated between traditional ownership and more revolutionary circular practices.

Clear confirmation of access barriers related to clothing rental

The significantly lower acceptance of clothing rental clearly confirms previous findings that access-based fashion models face greater barriers to adoption (Lang & Armstrong, 2018; Kim et al., 2021). These barriers include perceived risk, unfamiliarity, and trust-related concerns.

However, this study supplements the existing literature with direct comparative evidence. While previous studies have identified barriers to borrowing, they have often examined these barriers in isolation. In contrast, the current findings show that renting is not only less accepted in absolute terms but is also significantly less accepted within the same consumer context than sustainable purchasing or second-hand consumption.

This suggests that renting is not merely a less mature circular alternative, but represents a fundamentally different logic of consumption. It appears that the shift from ownership to access-based consumption requires a bigger behavioural and cultural change than has been emphasised so far.

The heterogeneity of circular fashion: Extending previous frameworks

The most important finding of this research is the empirical confirmation that circular fashion models differ significantly in consumer acceptance. This finding reinforces previous research that has emphasised the diversity of circular consumption practices (Camacho-Otero et al., 2019; Hvass, 2015). At the same time, this study complements the existing literature by demonstrating that these differences are not merely conceptual but are statistically significant, and also relevant from a behavioural perspective. While previous research has often treated circular fashion as a unified category, the present findings challenge this assumption.

This suggests that future research and practice should move beyond general approaches to circular fashion and should, instead, consider the adoption dynamics specific to particular models.

Clarifying the “green gap”: differences between models

The results also contribute to the relevant literature on the “green gap,” which highlights the discrepancy between eco-friendly attitudes and actual behaviour (ElHaffar et al., 2020; Busalim et al., 2022). The results do not contradict this literature but clarify it by demonstrating that the green gap is not uniform across circular fashion models. Purchasing sustainable products

appears to reduce the gap as it aligns with consumers' existing habits. In contrast, clothing rental may widen the gap due to higher behavioural and psychological barriers.

This interpretation is consistent with Ajzen's (1991) theory of planned behaviour, which emphasises that attitudes alone are insufficient for predicting behaviour. Perceived control, familiarity and social norms also play a decisive role in the development of acceptance.

Where the results differ from previous assumptions

Although most of the results are consistent with the existing literature, the study also highlights important differences.

First, the extent of the difference between ownership-based and access-based models suggests that previous research may have underestimated the structural nature of this divide. Circular fashion is often discussed as a linear transition, but the results indicate that different models may follow fundamentally different implementation pathways.

Second, although second-hand clothing is often described as fully normalised, the observed discrepancies suggest that normalisation is not yet complete. This indicates that social acceptance is still evolving and may vary depending on context or consumer group.

Third, the results challenge the implicit assumption that promoting sustainability as a general concept would be equally beneficial for all circular models. The findings suggest instead that acceptance depends on how well a model aligns with existing consumption habits.

From a practical perspective, the results have important implications for companies and decision-makers. The introduction and scaling of circular business models cannot be addressed with a one-size-fits-all strategy, as individual models vary in acceptance. When it comes to purchasing sustainable products, the focus may be on communication and branding while, in the case of the second-hand market, ensuring trust and quality is key. In the case of clothing rental, however, deeper structural and cultural barriers must be overcome such as reducing perceived risk and increasing social acceptance. From a practical perspective, the results suggest that circular business models cannot be addressed with a one-size-fits-all strategy. While communication and branding play a key role in the purchase of sustainable products, trust, risk reduction, and increased social acceptance become critical factors for second-hand goods and, in particular, clothing rental.

According to the systemic approach to the circular economy, a sustainable transition can only be successful if business models, the regulatory environment, and consumer practices change in a coordinated manner (Ellen MacArthur Foundation, 2017). However, the present findings suggest that certain models—particularly access-based solutions—do not currently align well with dominant consumption norms, which limits the widespread adoption of such models.

At the same time, this research has limitations. Convenience sampling and a sample limited to university students reduce the generalizability of the results. Furthermore, the study relies on self-reported data, which may distort the relationship between actual behaviour and attitudes. Further research is needed involving different demographic groups, as well as longitudinal and experimental methods.

According to the systemic approach to the circular economy, a sustainable transition can succeed only if business models, the regulatory environment, and consumer practices change in a coordinated manner (Ellen MacArthur Foundation, 2017).

Overall, this research highlights that the successful adoption of circular fashion depends not only on strengthening sustainability attitudes but also on how well individual business models align with consumers' existing practices and norms. This insight opens new avenues for research and practical implementation in the circular economy. The results suggest that the acceptance of circular models depends not only on sustainability attitudes but also on how well

a given model aligns with dominant consumption norms and the cultural meanings associated with ownership.

This systemic interpretation of the results is reinforced by the fact that policy frameworks for the circular economy also emphasise the key role of consumer behaviour in the success of the transition (European Commission, 2022). This research indicates that transition does not occur uniformly. Rather, different business models can embed themselves in consumer practices to varying degrees. This is consistent with the systemic approach to the circular economy, which holds that a sustainable transition can succeed only if business models, the regulatory environment, and consumer practices change in a coordinated manner (Ellen MacArthur Foundation, 2017).

The findings of this study highlight that sustainability transitions in the fashion industry are not solely dependent on technological or business model innovation, but also on consumer adoption patterns. This underscores the importance of aligning circular models with existing social norms and consumption practices.

Conclusion

The aim of this study was to examine whether different circular fashion models are perceived as acceptable to varying degrees among consumers. The results clearly confirm that circular fashion is not a uniform consumer category, but rather a collection of models organised according to different logics.

According to the identified hierarchy of acceptance, purchasing sustainable products is the most accepted, followed by second-hand consumption, while clothing rental shows the lowest level of acceptance. This pattern suggests that consumers are more likely to accept circular solutions that align with the traditional, ownership-based logic of consumption.

The main contribution of this study lies in empirically confirming the heterogeneity of circular fashion and highlighting that different models operate through distinct consumer mechanisms. This finding has important theoretical and practical implications, as it indicates that the successful implementation of the circular economy cannot be addressed with a one-size-fits-all approach.

Our findings are consistent with the systemic approach to the circular economy, which holds that the transition to sustainability is not a uniform process, but rather unfolds at different speeds and through different mechanisms across various business models.

Overall, the successful implementation of circular fashion models requires not only structural and regulatory changes but also a deeper understanding of consumer behaviour, which is key to achieving long-term sustainability goals.

Limitations

When interpreting the results of this study, several limiting factors must be taken into account. First, the sampling was not probability-based, and the study was limited to university students. While this sample is relevant in terms of circular fashion, it limits the generalizability of the results to other demographic groups.

Second, the research is based on self-reported data, which is subject to the bias of socially desirable responses. Regarding sustainability-related questions, respondents may present a more positive picture of their own behaviour than is actually observed.

Third, the study is cross-sectional in nature, thus it does not allow for the clear identification of causal relationships or the tracking of changes in consumer attitudes and preferences over time. Furthermore, the study examined three specific circular models, which, while allowing for comparison, do not cover all possible forms of circular fashion.

Finally, the variables under examination were measured with a single indicator, which may limit the ability to fully capture the complexity of the constructs.

Future research

This study provides a foundation for further research in several areas. First, future research should examine the acceptance of circular fashion models across diverse demographic and cultural contexts to explore the role of contextual differences. It may be particularly interesting to examine differences between developed and emerging markets. An important direction for future research is to investigate how these acceptance patterns evolve across different cultural and demographic contexts, as well as which factors can increase the social embeddedness of models with lower acceptance.

Second, the research could be expanded by employing a longitudinal methodology, which would allow for the analysis of changes in consumer attitudes and behaviours over time, particularly regarding the dynamics of the spread of circular models.

Third, future studies should explore in greater depth the psychological and social mechanisms underlying these models, including the roles of perceived risk, trust and social norms. An integrated examination of these factors could contribute to a more nuanced understanding of circular consumption.

Fourth, further research is needed to examine the extent to which various communication and marketing strategies can influence the acceptance of specific models, particularly in the case of access-based models with lower acceptance rates.

Finally, the combination of qualitative and quantitative methods could be a promising direction for future research, as it would allow for a deeper, more context-sensitive understanding of consumer decisions.

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Specifics of institutionalising sustainability in democratic discourse

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Abstract: The article examines how “sustainability” is institutionalized in democratic discourse, treating “sustainability” not as a narrative-discursive construct produced under conditions of uncertainty and elite control over communication. It asks how the sustainability narrative is constructed, which obstacles hinder its institutionalisation as a democratic norm, and how political elites contribute to its deconstruction. The study fills a gap between legal-administrative analyses of green measures and purely normative debates by focusing on discourse itself. The theoretical framework combines Alexander’s sociocultural sphere, van Dijk’s socio-cognitive theory of symbolic elites, Blumenberg’s concept of political myth, Bacchi’s approach to problem representations, and Habermas’s discourse theory of democratic norm-formation. This presents a heuristic potential for narrative-construction analysis. Methodologically, the study applies WPR (What’s the Problem Represented to Be?) qualitative discourse analysis to United Nations texts, elite speeches, and media commentary, tracing how the United Nations’ mythic core of sustainable development is reworked as a moral imperative, an economic threat, mere branding, or an elitist ideology. The article argues that elite-driven institutionalisation both legitimises and undermines sustainability, thus creating a sincerity gap between rhetoric and practice that obstructs its stable institutionalisation. Theoretically, this refines understandings of sustainability as a contested myth in democratic civil spheres; practically, it highlights that strengthening sustainability norms requires constraining elite discursive deconstruction, and not merely adopting new policies.

Keywords: sustainability, democratic discourse, narrative construction, political myth, problem representation.

JEL classification: Q01, D72, Q56, Z13.

Introduction

For now, sustainability is widely presented in democratic discourse and can be considered as a norm. It is stated as one of the political priorities of all the governments in line with the UN agenda. As policy embraces sustainability and incorporates it into administrative and economic practices, it becomes part of the sphere of power redistribution. However, sustainability competes not only with sources that have different political priorities. More importantly, the aspect of political transformations competes for the attention of electorates (Banik, 2022).

The very essence of sustainability presupposes the spread of the worldview, ensuring long-term human well-being through balanced environmental protection, social equity, and economic resilience. Achieving the SDGs is impossible without behavioural and mindset changes. For that, “sustainability” needs to penetrate into the discourse and cultural sphere. This study will not address political transformations, specific administrative and legal practices, the introduction of “green measures”, or economic feasibility. Sustainability inevitably passes through discourse. Shifting the perspective on that sphere makes it possible to ask not what is being done to achieve the Sustainable Development Goals but how these goals are institutionalized and become part of politics.

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Emphasizing democratic discourse is determined by its demonstrativeness. Democratic discourse entails the presence of different actors, competing for the electorate's attention. Based on that, a hypothesis can be raised: the success of the institutionalisation of "sustainability" in a democracy depends on political elites, who have to make decisions within political cycles and rely on the narrative's competitiveness. The main questions can be stated as follows: how is the sustainability narrative constructed in democratic discourse and what obstacles to its institutionalisation exist within political systems?

Theoretical frame of narrative-construction

The article addresses the frame that allows us to consider "sustainability" not as a determined set of politics or a desired state of the world that some actors are willing to achieve while others set different priorities. Appropriate methodology allows to present "sustainability" as a narrative-discursive construction, which exists not as much because the problems it represents exist, but because society perceives it as a problem, and constructs the reality based on it. Of course, it is hard to deny existing problems such as climate change, inequality, and uncontrolled consumption of resources, but they have to be normatively structured and practically relevant to become a problem in social cognition.

Main theoretical basis

Methodological guidelines for that can be found in the works of *J. Alexander*. In "Cultural trauma and collective identity", he strives to complement the naturalistic "enlightenment" approach, which posits trauma as a semantic and causal relationship between two unrelated events, representations, or states. In the case of cultural trauma, he argued, there are traumatic events in the past and a sense of collective identity and unity in present. Instead of that, trauma might first be articulated by bearers, able to engage in "meaning-creation" (Alexander 2012, p. 7, 16).

Although that theoretical framework is more likely to present which elements and actors of communication are functioning than to describe the mechanisms that condition and predefine communication, it allows us to see the competitive nature of the formation of a civil mindset.

Returning to the phenomenon of cultural trauma, it should be noted that Alexander (2012) highlights its discursive nature. The narrative only becomes trauma when it spreads across large groups or throughout society. However, the audience should be able to perceive the narrative – they should carry the trauma (Alexander, 2012, p. 20).

The first point needed for understanding how "sustainability" spreads is how people acquire knowledge in general and what the role of discourse is in that process. *Teun A. van Dijk* (2014), introducing his social-cognitive analysis, states that "discourse" and "knowledge" should be considered inseparably (van Dijk, 2014, p. 16). Discourse and communication become a crucial dimension of knowledge acquisition. Within a field of communication, it becomes a reflection of reality that is being reproduced by different participants of communication in order to create a common language of communication and epistemic community, i.e. a group who share the same knowledge and worldview (Ibid., p. 141). Here knowledge is being organized as mental models that underlie global topics (Ibid., p. 326). This is how collective ideas are reinforced. Communication needs not only text, but context, too. In addition, for entering communication, individuals need to obtain knowledge that determines interaction. From an epistemological point of view, communicational knowledge can be justified as "true beliefs": socially validated and reproduced mental models. They become true because of conditioning human communication.

That principle of reality-correspondence was challenged by *H. Blumenberg* in his conception of political myth studies (Bottici, 2011). He highlighted that the naturalistic

approach of considering myth as a form of prejudices that do not correspond to reality is misleading. Instead of that, he draws attention to the need of cultural adaptation of individuals in situation of uncertainty that accompany us everywhere. The work of myth – is a sphere of structuring our experience that is needed to name the unnamed and explain the unexplained. Myth is a perceptive construction. Myth has a narrative at its core which succeeds only when it is able to create variety. That is the sphere of work on myth: it strengthens when individual's expectations based on the narrative can predict, explain the event, solve the conflict and help to adapt to changed circumstances. So, the work of myth can be corrected by culture.

As knowledge spreads in groups or society in large, it becomes social knowledge. It primarily spreads through institutional forms of communication, above all mass media, but also education and science. However, only limited groups, which in van Dijk's terms can be called the symbolic elites (media professionals, political leaders, top experts, academics), have regular, legitimate access to large audiences and they give access to public discourse for the narrative (Van Dijk, 2014, 122). Van Dijk's theory also presents how institutionalized communication shapes social cognition. They supply background knowledge and interpretive schemes that people use to build mental models of the world. People are given typical interpretations that become a toolkit for explaining the world. Especially, when the narrative is gained from school, it comes to look taken-for-granted. That means institutions of social communication become a form of cognitive control. They do not just reflect the reality, they define what counts as reality for people.

Therefore, a steady connection was observed between informational control exercised through symbolic power and control of institutions of that communication. "Sustainability" as well as all the types of social knowledge are acquired from the informational environment and from those who control discourse. This theoretical frame allows us to consider "sustainability" as a socially produced and selectively mediated narrative that is generated, stabilized and transformed through institutionalized communication under conditions of unequal access and power. It is not a neutral reflection of ecological facts but a debated cognitive and normative construct whose content and strength depend on how symbolic elites choose to "work" on its mythic nature and how their paradigms circulate in mass media, education and expert arenas.

According to theories, discourse demonstrates a tendency to self-regulation. That scheme is appropriate even for non-institutionalized and unofficial discourses. The entrance of the narrative into discourse is controlled by opinion leaders or those who appear to be the source of knowledge. They provide the mechanism of understanding.

Also, discursive theories suggest that discourse demonstrates a tendency toward self-regulation. Even in non-institutionalized and unofficial discourses, the entry of new narratives is not as chaotic. It is controlled by opinion leaders or those who are recognized as sources of knowledge. They provide mechanisms of interpretation that allow audiences to integrate new information into existing cognitive frames. Thus, discourse creates norms and regulates itself based on its norms, i.e. through giving the audience what is needed for understanding uncertain environments.

In this respect, *Carol Bacchi's (2017) "What's the Problem Represented to be?"* approach is crucial. It allows to see how political actors represent sustainability-related issues as particular "problems" (for example, a problem of competitiveness, of security, of intergenerational justice), and how these representations structure what solutions appear possible or necessary. Through problem representations, elites not only filter which sustainability narratives enter discourse but also define their shape and implications.

In politics, there are no predefined problems. They are actively constituted by policies (Tawell, McCluskey, 2021). When a government, party or international organization proposes a "solution" (e.g. a sustainability strategy, a climate law, a welfare reform), that proposal already contains an implicit problem representation – a particular way of saying what the problem is,

who or what is at fault, and what needs to be changed (Riemann, 2023, p. 155). So, this poststructuralist approach shifts the focus from the question of whether policy is effective or not towards asking how the meaning of the problem is produced in political discourse.

Methodologically, Bacchi operationalizes this move through a set of guiding questions that can be applied to any policy text or political proposal. The WPR method, consisting of 6 fundamental questions and a seventh step, is created to trace the problem representation and to reveal particular problems (Bacchi, 2017). Of course, that method can be applied to the case of “sustainability”; however, it allows for the acquisition of more significant conclusions for the present research. Theoretically, this means that “government” is understood broadly, in a Foucauldian governmentality sense, as the ensemble of institutions, discourses and knowledges that shape conduct: policies are not neutral tools but central sites where governing occurs through the production of problems.

In his theory of communicative action, *Jurgen Habermas (2001)* argues, that democratic discourse should ideally be based on communicative rationality, where norms like sustainability are justified through inclusive, reason-giving deliberation in which all affected can participate (Habermas, 2001, p. 92). All that forms the ethics of discourse, according to Habermas. From this perspective, the institutionalisation of narrative as a norm depends on whether its narrative emerges from processes approximating the “ideal speech situation” or from strategic communication dominated by powerful actors. Habermas thus provides criteria for evaluating when the discursive construction of narrative contributes to legitimate norm-formation (Habermas, 2001, p. 129).

Proper norm formation can proceed only in speech action. Discursive ethics also includes actors’ orientation in reaching an understanding. Their speech acts raise implicit validity claims: to truth (about facts), sincerity (about intentions), and normative rightness (about what is appropriate or just) (Habermas, 2001, p. 33). These claims can be accepted or challenged by other participants. Therefore, participants enter practical moral discourse. Moral is defined as a normative base that was already formed within the culture and ontological frame that participants enter into discourse with. Questioning the rightness of their norms, actors thus come to a new norm, a common conception. Hence, a core principle of discourse is formulated: only those norms become valid that could receive the informed, rational argumentation and be immersed in the new common normative frame for all affected by communication, under conditions of free and equal participation.

In his discourse theory of law and democracy, Habermas (1996) links this to institutional norm-formation in modern societies. He argues that legitimate law and political norms must emerge from democratically structured discourses in which citizens can participate directly or indirectly through public spheres, parties, and parliamentary procedures (Habermas, 1996, p. 111). Norms have democratic legitimacy when they can be traced, at least in principle, to such discursive processes and remain open to further contestation and revision in subsequent communication. In that way, discourse can involve a wider range of participants in order to approve the norm as a result of communicative actions.

Summary of theory used

The spreading of the narrative is defined by some factors:

- 1) Its correspondence with individual and social needs: the most significant need is for explanation. The sphere of politics feels distant to ordinary people. They do not have sufficient knowledge of politics and need simplified forms to perceive it, systematise it, and explain the actual environment.

- 2) Connected with the previous one – pertaining to relevant personal experience. Most of the non-specialized knowledge and common-sense stereotypical systems people acquire from everyday personal experience and interactions. So, they should not conflict with

specialized narrative – from society and from political environment such stimulus should be produced that would cause the reaction of approving the validity of the narrative.

The main source of narrative creation is a small group of intellectuals, which has access to public discourse. Spreading of the narrative among masses is carried out via institutionalized forms of communication under the control of the elite.

Taken together, these theoretical perspectives allow us to see sustainability as a narrative-discursive construct – the product of socio-cognitive processes that created a mythical framework under the circumstances of uncertainty and distance between the individual and political and global processes.

This sets the stage for the empirical part of the research, where we will map how the “sustainability” narrative is constructed, institutionalized and how it can function in democratic discourse.

Application of methodology

Narrative interpretations

In Alexander’s terms, sustainability becomes part of the dramatization of politics: the narrative can strengthen the moral structure of the civil sphere if it is linked to ideals of solidarity and justice, or it can be re-worked to support exclusionary and defensive projects.

As we can see, “sustainability” can function as a “myth-like” configuration of narrative variation. It serves as a cultural adaptation under uncertainty. As an individual faces the political system, he knows what rules exist and what the environment looks like. Being socialized in a given culture, individual are told about politics through official discourse and the educational system: “The global changes are taking place right now. We, people, have a great impact on it with our everyday behaviour. We should follow the particular program in order to save this world for future generations and try to make it better now”. Further perception and comprehension of politics arise from that frame, which becomes a fundamental tool.

In that way, narrative of “sustainability” reduces uncertainty about what actions individual should take in the political sphere and what actions they should consider as legitimate; they should name the unnamed risks for future and should offer scheme of actions. Furthermore, the “work on sustainability” can be tracked with the rework and the reshaping of the variations of the narrative core that took place. It can function in different dimensions with the same narrative core: as a moral imperative, as a threat to the traditional way of economy, as a response on global climate changes or just slogan for manipulation.

First, sustainability has been shaped as a moral imperative. Here the narrative emphasizes responsibility to future generations and global justice: sustainability becomes an ethical duty, and is seen as a categorical imperative to avoid harming others and the planet. Social-democratic and green movements in Europe, for instance, frame the EU Green Deal as a project of “just transition” that simultaneously delivers climate protection and social justice, presents ecological transformation as a moral obligation towards workers, vulnerable groups and future citizens. This line of framing strengthens the integrative and legitimizes the function of the sustainability myth in Blumenberg’s sense: it offers a coherent story about what a “good” democratic society owes to itself and to future generations.

Second, the same sustainability narrative has been reworked into an economic-threat story. In this line, political and economic elites accept climate change and sustainability goals in principle, but reframe specific policies as dangerous for growth, competitiveness and prosperity. British Conservatives provide a clear example: after a “vote blue, go green” phase in the 2000s, parts of the party have more recently supported diluting net-zero commitments, presenting them as an act of “economic self-sabotage” that would undermine industry and household finances (The Conversation, 2025). In Germany, business associations such as the

DIHK warn that current energy-transition policies could increase costs in the trillions and drive energy-intensive industries abroad (Association of German Chambers of Industry and Commerce [DIHK], 2025). That also shapes sustainability measures primarily as economic burdens. Here Blumenberg's "work on myth" is reactualized based on the situation and involvement of new actors into continuous reinterpretation. The narrative that once promised long-term security and stability is recoded as a risk and decline and is instrumentalized in opposite way. Resistance is legitimized and can shape symbolic power.

Third, sustainability has been reworked into a branding slogan in corporate communication. Firms increasingly deploy "sustainability" as a symbol of social responsibility and modernity, while the actual practices behind these claims can remain shallow. Policy debates around "greenwashing" show how sustainability is often used in promotional contexts with blurred, non-verifiable formulations like "sustainability through quality". Courts have treated it as mere advertising rather than substantive ecological commitment. In this line of reworking, the myth is domesticated: the same symbolic vocabulary of saving the planet and protecting the future is used, but it is subordinated to market objectives such as differentiation and reputational gain. The result is a narrative that retains the emotional and symbolic appeal of sustainability while emptying out much of its transformative political content.

Fourth, sustainability has been reworked as an elitist ideology within right populist discourse. Conservative elites increasingly frame climate and sustainability policies as part of an elitist cultural project: something that elites with their "heads in the clouds" impose on ordinary people through international agreements, regulations, and lifestyle demands. Think tanks like the Heritage Foundation's "Project 2025" propose a detailed program to dismantle federal climate policy, which is justified by a narrative of defending the people and the nation against technocratic, globalist environmentalism. Denial discourse became tied to Republicans. On the primaries of presidential elections for 2024 none of the candidates acknowledged a human-caused warning, which induces scepticism. Vivek Ramaswamy then declared that "the climate change agenda is a hoax" and called it a "wet blanket on our economy," explicitly rejecting not just particular policies but the broader political framing of climate action. The other approach was presented by Nikki Haley, who shifted the responsibility to other countries (Vox, 2023).

Of course, those narrative representation lines were accompanied by each other most of the time. Some actors still demonstrate their commitment to the principles of sustainability. Environmental NGOs (e.g. WWF, NRDC, Greenpeace) continue to defend strong climate and biodiversity goals and now often partner with cultural industries to mainstream sustainability norms. The European Green Deal is still the EU's central strategic project aiming at climate neutrality by 2050 and at least 55% emissions cuts by 2030 have been written into binding law via the European Climate Law. At the same time, the EU faces serious political pushback. Large-scale protests in 2024–2025 led the Commission to weaken or delay parts of the Green Deal related to agriculture (Euronews, 2025). Due to geopolitical circumstances some countries (e.g. Germany) face obstacles in achieving goals of carbon neutrality. While preserving the strong formal commitment to sustainability, these factors weaken the official discourse.

All in all, as communication developed, new sceptical forms of perception sustainability were legitimized. For now, "work on myth" has developed a form of attacking the legitimacy of the sustainability narrative itself: instead of a shared horizon of adaptation and justice, it becomes a symbol of cultural division and class domination, providing elites with a powerful justification for non-action or rollback.

Jurgen Habermas's theory of communicative action and the public sphere introduce a normative dimension into this picture. Habermas's discourse theory of democracy treats legitimacy as procedural: laws/norms are valid if they are produced through deliberative processes approximating communicative rationality. For sustainability, the institutionalization

of this heuristics test is as follows: whether it a “discursively constituted” norm from public reasoning (e.g., climate targets via citizen assemblies), or merely administrative obligation? It highlights tensions between sustainability’s universal claims (intergenerational justice) and democratic pluralism, and probes if discourse resolves conflicts rationally or through dominance.

This also reveals the role of democratic discourse in search of the cognitive-discursive nature of “sustainability”. Habermas thus offers both a procedural model (how norms should be formed through communication) and criteria for the critique of dominance of unequal symbolic power over communicative rationality. This framework shows that sustainability can become a democratic norm when claims about what sustainability requires (emission cuts, intergenerational justice, distribution of costs) are subjected to inclusive, reason-supplying public and institutional discourses, and when the resulting arrangements could be accepted by all those affected as reasonable.

The heuristic potential of Bacchi’s theoretical framework, constructed in WPR approach, firstly offers a precise instrument to dissect elite sustainability discourse. By systematically applying WPR questions to strategies, laws and speeches, competing problem representations can be identified. Secondly, WPR helps analyse how sustainability narratives produce particular subject positions (responsible consumer or responsible entrepreneur) and symbols (eco-product, green energy, sustainable development goals). In combination with van Dijk’s socio-cognitive model, Bacchi’s WPR shows not only how sustainability knowledge circulates and is normalized, but also how the argumentation is pre-structured by politics, what argumentation and particular concepts and paradigms of thinking are immersed into the discourse.

As official policy disguises the alternative interpretations and ways of problematization (for example, SDG as economical threat and risk for ordinary households, historical responsibility of the Global North in front of, etc.), it defines what narrative is more stable now. The examples of how prevailing narratives were changing in different countries were presented above. Therefore, it illustrates that political elites are taking role of opinion leaders who control the entries to the discourse and define what is normal. The emphasis on institutional forms of communications also directs the attention to the political elites who have the very control over these institutions.

Narrative core, actors and sources of “sustainability” institutionalization

The specifics of the institutionalization of “sustainability” are defined by the fact that sustainability came to politics from the UN. That source of conceptualization is related the political sphere, but moreover the sphere beyond national policy.

In 1983 that process was started by World Commission on Environment and Development established by the UN. Its 1987 report “Our Common Future” introduced and popularised the now-canonical definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” argued that poverty in the Global South and unsustainable consumption in the North were the twin drivers of global environmental crisis. It framed “sustainability” as a global integrative narrative. It can be considered as a narrative core, since all the work-on-myth transformation, observed previously, preserved that sense of “sustainability” as a source of global integration, environmental protection and problem-solving.

The UN General Assembly took up this narrative its resolution A/RES/42/187 (1987), endorsing the report and calling for a UN Conference on Environment and Development, which led to the 1992 Rio Earth Summit. From this moment, the UN system becomes a central author and amplifier of the sustainability narrative, embedding it in treaties, action plans and, eventually, the Sustainable Development Goals. The 2030 Agenda became part of the UN

system when it was formally adopted by the UN General Assembly in resolution 70/1 on 25 September 2015 at the UN Sustainable Development Summit in New York.

Although the UN viewed “sustainability” as a political problem, the ground of its actualization is related to civil society. In 1972, the Club of Rome commissioned the MIT team to produce “The Limits to Growth”. Their core claim was that exponential economic and population growth would overshoot the planet’s finite resources, leading to collapse in the 21st century. Avoiding collapse required a “condition of ecological and economic stability that is sustainable far into the future” (Meadows, Randers, Behrens, 1972, p. 24). However, the concept of “sustainable development” was not presented, they clearly problematized unlimited growth and highlighted the new ontological frame needed for problem-solving.

Definitely, the Club of Rome was a structure close to the consultant and advisory sphere. It was an authoritative think tank, but their role consisted in visioning and denoting the tendencies of changing political environment. Expertise discourse can be considered here as a first stage of conceptualization of “sustainability”. Expert discourse might work along the same scheme: it has its own language, norms of communication and moral in habermasian terms, which consist of previously developed theoretical conceptions and scientific mindset. Following the same logic, the ethics of expert communication might be distinguished easily because of the existence of scientific ethics, assuming equality of actors and validity of arguments. In fact, the position of visioner and consultant demands a mindset, close to philosophy, which Habermas treated like a judge and organizer for all sciences and professional cultures. This approach reasoned through distinguishing rapport between different mindsets. The expertise played the same role and did not provide explanation, but addressed policies through the appearance of new global tendencies.

Expert discourse is just a thin layer, whose transition towards political discourse was determined by some factors. After the end of the Second World War a wide environmentalist and conservationist movement arose. In “Silent Spring,” Rachel Carson drew attention to irrecoverable pollutions that were changing the very nature of the world. The book noted that human actions and products of our industries (chemicals, DDT, pesticides) destroyed forests, soil, living organisms (Carson, 1962, p.12). The proposals of Carson were based on research of that time were in the scope of a scientific approach to biological control. It was born by environmentalism, and actualized concerns about wilderness.

On 22 April 1970, a demonstration against environmental degradation gave rise to “Earth Day”. Activists, NGOs and grassroots campaigns framed environmental harms as systemic problems of industrial society and governance. As a consequence, some environmental laws were passed in US (NEPA 1969, Clean Air Act 1970, Clean Water Act 1972).

Unexpectedly, decolonization movements also became a factor. As Brett M. Bennett (Bennett 2017) describes, environmental activists learned civil disobedience and protest repertoires from colonial nationalists and anti-war movements that arose in 1960-1970’s. Imperialistic control over nature and natural resources as well as control over people were rejected. In new-born nations, environmentalism was integrated into the policy of sovereignty and, therefore, was supported by Western anti-colonialists.

As it was seen, after WWII the impact of industrial political system on the environment and society became obvious and caused concerns. The old order was put on trial, conservationist and environmentalist movements demanded responsible government and social equality. However, that factors did not formalise the problem of “sustainable development”. They articulated those mistakes of the industrial society that needed a response. In other words, it was a plain articulation of social demands: demands of explanation of uncertainty about how society and, what is more important, the government should respond to tackle the threats.

In addition, it was also an articulation of different angles for problem observation that would consequently be integrated in the “sustainable development” formula: finite resources

and growth limits, planetary climatic risk, systemic pollution and environmental injustice, industrial impact and corporate responsibility for decision-making.

Thereafter, the ingredients of that formula become a line of continuous “work on myth”. While the UN created an integrated narrative of responsibility for common future and its goals, governments and regional organisations institutionalized it in law and policy frameworks, NGOs and civil movements radicalized and moralized it, businesses technocratized and commercialized it, and parties re-framed it for electoral competition. Thus, the narrative was reworked for particular interests and institutional logics, and became part of common discursive norm.

To see exactly what the core of the myth looks like, the WPR method could be applied. Examining the content of the Brundtland Report (World Commission on Environment and Development, 1987) and the 2030 Agenda (United Nations General Assembly, 2015) by way of the suggested methodology, the problem of “sustainability” is presented as follows:

1) The UN’s myth core represents the problem as misaligned development. Human production proceeded in an ecologically destructive way, failing to meet the needs of the present poor and simultaneously threatening the ability of future generations to meet their needs. The problem is to integrate economic growth, social inclusion and environmental protection into a single coherent project of “sustainable development”

2) Presuppositions for such representations there as follows:

- Human well-being conceptualized in terms of needs and just distribution of sources;
- Integration of economic development and environmental protection in one development paradigm of sustainable growth;
- Reformism – sustainable development can be approached within the governmental and institutional system.

Those presuppositions frame “sustainability” as a rational and possible project, as a “win-win” situation.

3) Genealogy of this problem representation was already described. That problem was synthesized into a global political sphere based on the factors of polluting impact of industrialization, conservationists agenda, anti-inequality and anti-colonialist movements, which are met by planetary source limits. Those critical towards imperialistic development path tendencies were met by an expertly formed new framework of global development problematization.

4) What is left unproblematic. First of all, it is the capitalist system. “Sustainability” focuses on patterns of production and consumption, and suggests an environmentally harmless development within the already existing world economy system and accumulation of regimes. It is an attempt to reconcile the conflicts removing possible antagonisms of interests (for example, between fossil capital and global justice). Secondly, it turns a blind eye on the concept of degrowth as an alternative. That “silence” allows to address the narrative to a wide audience and be acceptable for most of the crucial actors.

5) What effects does this representation produce? The previous point describes what discursive categories are implemented into the narrative core and what context and way of thinking are needed for understanding the problem. Whole the narrative is organized around the concept of development as a global norm. The discourse of “sustainability” makes those who are involved consider progress and development (which are the foundation of the capitalist world system) as a global norm. While problematization uses integrative language to set the goals for whole the “humankind”, those who enter discourse without development as a part of their dogmatical system, will not succeed in communication about “sustainability”, will not perceive it and risk to be marginalized.

“Sustainable development” is normalized as universal and positive goals, as a preferable path to global future. It provides a master frame for actors (states, businesses, NGOs, civil societies) to position themselves as responsible and future-oriented, even when their concrete commitments differ. Those subjects who are positioned as responsible ones are getting legitimized. Those ones who are not aligning with SDG get antagonized. Research presents that in most of the cases legitimacy in “sustainability” discourse is considered as a socially constructed system of norms and values applied for pragmatic, moral and cognitive distinctions. This also comes to political legitimization in democratic terms, and is linked to just power relations (De Donà, 2026). Therefore, discourse of “sustainability” becomes a discourse of legitimation, and in addition it functions as toolkit for individual’s explanation and categorization of the world of politics.

6) How is this representation produced, disseminated, and defended? How could it be questioned? It is produced by UN commissions, expert groups and member states and then it is spread through NGOs, civil societies and education. It is defended as a consensus narrative, norm and part of positive mindset, and is orientated on saving the environment for future generations.

Questioning “sustainability” is tied to the risk of cancellation and accusation of irresponsibility. It makes the narrative very resilient, even despite possible faults of programming and norms implementation. However, as practice shows, strong questioning might come not outside problematization (for example, from post-developmentalism) but from inside the representation. “Sustainability” can be criticized for misbalancing economic and environmental priorities (as previously described in the case of the British Conservatives), or for unjust power distribution (as the case of the American Republicans reveals: critics against “sustainability” become a mechanism of globalist control over national institutions).

Returning to legitimacy, there are some factors that can be selected, and that define the success of institutionalizing “sustainability” in democratic discourse. First, it reflects democratic will and the inclusive process of defining goals in the interest of all people. Such a framework is the result of political problematization of “sustainability”. Politics seeks legitimacy and justifies decisions through the interests of people’s well-being, and supposes that people shall not go against their well-being.

As the outcome of inclusive deliberation, the narrative can further be maintained and conceptualized by civil society. Institutionalised ways of communication such as education and media can facilitate it, and can present “sustainability” as an agenda in demand. Therefore, civil society can claim that sustainability policies are not just instrumentally useful but are normatively legitimate.

Second, problematization is suitable for balancing interests: therefore it can facilitate the widening of the range of supporters, including the interests of producers and economic elites, and demonstrate openness for democratic contestation (Banik, 2022).

Third, based on van Dijk’s theory, “sustainability” is relevant for successful spread of narratives. Corresponding with social needs, “sustainability” gives an explanation of people’s path in circumstances of global changes and threats to humankind’s welfare. It explains what should really be prioritised and what values individuals can orientate themselves to in such a difficult world of politics.

Last, from a Habermasian perspective, in a democratic arena, norms must be discursively justified under conditions of publicity and pluralism. “Sustainability” meets all the claims to become a valid norm. Truth claim – propositions are supported by scientific expertise, limits of growth and undeniable global changes. Normative rightness claim consists in integrational global justice, responsibility for actions, saving our environment and preserving it for future generations. Difficulties can arise with the sincerity claim. This can be met when

politics do not hide behind a symbolic language, but demonstrate commitment through concrete programs and decisions.

Still, declaration of ambitious sustainability targets while expanding fossil fuel infrastructure, with a lack of will to act decisively, with greenwashing and slogans are used only for electorate mobilization, and may cause doubts about the sincerity “sustainability” and may ultimately delegitimize it.

Elite-driven deconstruction of the sustainability myth and obstacles to institutionalization

As seen above, a sincerity gap appears when political and economic elites embrace the language of sustainability while keeping their practical priorities largely unchanged. Ambitious targets are set, SDGs are celebrated, and talk about “green transitions” becomes loud, yet at the same time the elites still maintain fossil fuel expansion, protect carbon-intensive industries, and/or tolerate corporate greenwashing. All of this contributes to shifting “sustainability” towards a convenient, low-risk vocabulary of legitimation for the election cycle, without responsibility and real actions. As a result, citizens might doubt not only particular actors, but the credibility of the sustainability norm itself. That gap is damaging for “sustainability”: this is a norm that is constantly invoked but rarely backed by consistent action and therefore it loses its motivational power, making it harder to mobilise support for those deep, long-term changes that genuine ecological and social sustainability requires.

Democratic politics structurally pushes elites towards minimalist conceptions of policy and rapidly visible progress indicators. As the article on “Democracy and Sustainable Development” notes, one of the main criticisms of democracies is that “policies are often short-sighted, with politicians obsessed with being re-elected rather than looking for important long-term goals that may be politically unpopular” (Banik, 2022). This definitely influences politicians and their parties to adopt rhetorically appealing populist policies. Applied to sustainability, this means that instead of committing to deep changes in infrastructure and consumption and rapidly reaching carbon-neutrality, elites prefer light, popular versions of sustainability – light programs of low efficiency, that are mostly declarative. The result is that sustainability becomes an electoral brand and a set of incremental tweaks rather than a binding long-term program backed by strong political will, even though the problems it addresses are precisely the kind that cannot be solved within a policy cycle.

At the same time, strong decisions can be criticised for misbalancing economic and environmental priorities, or for unjust power distribution. That makes sustainability agenda remain deficient in order to withstand critics. However, this does not help now. As Republican 2024 primaries and D. Trump’s statements (U.S. Department of State, 2019) show, even the long-term program decisions of the past are becoming an object of deconstruction.

There is one more trap for “sustainability” discourse. Postponing the structural measures is determined by the needs of preserving the world capitalist system with its labour and productivity distribution. Sustainable development is considered as a synthesis of economic and technological growth (in other words – economical and financial interests) and environmental preservation. As a result, what served for social harmonisation and the spread of the narrative became a drawback for decision-making, and causes deligitimation.

Elitism becomes an even deeper and structural consequence of the democratic system, which functions as a drawback for sustainable development. The institution of representatives creates a limited group of stakeholders and participant initiatives as their lobby. At the same time, sustainable development presupposes extensive participation and collective decision-making. As the Foundation for Democracy and Sustainable Development states, it becomes a systematic reason why people lose loyalty to long-term initiatives, which cannot provide a sense of democratic involvement (Westall, 2023, p. 7).

At the same time, the global narrative of sustainability, created by UN, is considered to be stable at the level of national policy. In terms of global agenda, it fully corresponds with people's values and global threats. However, then the narrative is deconstructed by national elites, those who control institutionalized communication.

Summary

Constructivist and poststructuralist approaches present a significant theoretical and methodological frame, which allows for the consideration of "sustainability" not as a complex set of policies, social activism and administrative measures, but from the point of how its narratively-discursive nature is constructed, how it is problematized and institutionalizes through becoming a new cultural norm. From such a perspective, "sustainability" only becomes a problem and a goal when it is cognitively and normatively organized and rendered meaningful for collective actors. The main function of that mental paradigm is to give a toolkit to individuals for describing political environments and reducing the uncertainty of political sphere. With "sustainability" that sphere obtains a plain category of legitimation: what correlates with goals and values of global welfare, what demonstrates responsibility to people and future generations, and what is legitimate.

The core of that mental framework is constituted by the UN. Its problem representation is defined by the concept of a universal, desirable path to the future, the integration of economic priorities and environmental protection into one coherent project. The context needed for comprehension is in thinking in terms of growth and development within the world capitalist economy.

Sustainability becomes a real mental model by narrative acquisition through institutionalized forms of communication and elite control over discourse. Elites also become a source of "myth-working", which creates reinterpretations of the narrative core.

When applied for this purpose, it critiques elite problem representations that deconstruct sustainability, and links to empirical obstacles in institutionalization. It gives a perspective: that way of constructing "sustainability" backed as a dominant norm and moral imperative lies in the sphere of discourse. To constrain the deconstruction, some other political actors, having access to institutions of communication and electorate should appear and take their role. The narrative is suitable and valid for democratic systems and society, unless it is deconstructed. The drawbacks presented above, which come about through actions of elites and those who control discourse, can become part of a handbook for the re-construction of "sustainability", provided they are treated as obstacles to overcome while competing with the sustainable development agenda within political cycles.

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Determinants of Sustainable Consumption Behaviour and Their Implications for Start-up Business Development

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Abstract

This study examines the determinants of sustainable consumption behaviour and their implications for start-up support. Drawing on existing literature, this research focuses on four key factors – environmental awareness, price sensitivity, social influence, and green trust –, and examines their effects on green consumption behaviour as well as their subsequent impact on start-up development. Survey data from 81 respondents were collected from a consumer perspective complemented by qualitative insights from an interview. The results show that environmental awareness and green trust have significant positive effects on green consumption behaviour, while price sensitivity has a strong negative effect. In contrast, social influence was found to have no significant effect. Furthermore, green consumption behaviour was shown to have a positive effect on start-up support. These findings highlight the importance of affordability and trust in promoting sustainable consumption, while also showing that environmentally conscious consumers are more likely to support start-up businesses. This study contributes to the literature by linking sustainable consumption behaviour to entrepreneurial outcomes and provides practical insights for start-ups, marketers, and policymakers.

Keywords: sustainable consumption, green behaviour, price sensitivity, green trust, start-ups

JEL Codes: D12, M13, Q56

Introduction

In recent decades, growing environmental challenges such as climate change, pollution, and resource depletion have intensified the need for more sustainable patterns of production and consumption. These issues, largely caused by human activities, have raised concerns about the long-term sustainability of ecosystems and the quality of life for future generations (Xue et al., 2021). As a result, sustainable consumption has become an increasingly important research area, with particular attention to understanding the factors that influence consumers' environmentally responsible behaviours.

Green consumption behaviour, which includes the intention to purchase and the actual consumption of environmentally friendly products, has emerged as a key mechanism for reducing environmental impacts. However, despite increasing awareness of environmental issues, there is often a gap between consumers' positive attitudes toward sustainability and their actual purchasing behaviour. This discrepancy highlights the complexity of consumer decision-making, which is shaped not only by cognitive and emotional processes, but also by situational and economic factors (Figueroa García et al., 2018).

Existing research has identified a wide range of factors influencing green consumption behaviour. These factors include internal factors such as environmental awareness and values, as well as external factors such as price, social influence, and product-related attributes (Kharbanda & Singh, 2022). Among these factors, environmental awareness and green trust are often associated with positive behavioural outcomes, while price sensitivity is often identified

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as a key barrier. At the same time, the role of social influence remains less clear, and studies report mixed findings across contexts.

Much of the existing literature focuses on individual factors in isolation, with little attention paid to their combined effects. While previous studies have contributed significantly to understanding the determinants of green consumption behaviour, several limitations remain. Furthermore, broader implications of sustainable consumption for economic development and entrepreneurship have received relatively little attention. In particular, the relationship between green consumption behaviour and start-up support remains underexplored.

By addressing these gaps, the present study provides an integrated framework for examining the effects of environmental awareness, price sensitivity, social influence, and green trust on green consumption behaviour. Furthermore, it extends the analysis by examining the impact of green consumption behaviour on start-up support. In doing so, the study contributes to both sustainable consumption literature and the emerging debate on the role of consumer behaviour in fostering entrepreneurial activity and start-ups.

The study simultaneously examines survey data from a consumer perspective and qualitative insights from a start-up perspective to provide a more comprehensive understanding of the research question. This approach allows for statistical analysis and the contextual interpretation of the findings.

The rest of the paper is structured as follows. The next section reviews the relevant literature and develops the research hypotheses. This is followed by the methodology, results, and discussion sections. The paper concludes with practical implications, limitations, and suggestions for future research.

Literature review and hypotheses

To advance the understanding and advocacy of green consumption behaviour, an extensive body of research by scholars across the globe has examined influential factors from multidisciplinary perspectives (Zhao et al., 2025). Major environmental issues caused by widespread human activities, such as pollution, global warming, land degradation, and biodiversity loss, have a direct impact on the sustainability and quality of the environment and the ecosystem (Xue et al., 2021).

It is crucial to remember that consumer behaviour will be the result of cognitive, emotional, and motivational processes and that it will be influenced and even conditioned by several circumstantial factors, starting with the notion that altering individual consumption patterns calls for more sustainable consumer behaviour (Figuerola-García et al., 2018). Kharbanda & Singh (2022) examined thirty-two factors influencing green consumption behaviour, and divided them into five broad categories: endogenous, exogenous, situational, product characteristics, and demographic. The study found that these factors, individually or in combination, directly or indirectly influence sustainable consumption behaviour and sometimes act as moderating and mediating variables.

Business development policies cover both marketing and sales functions as they are very intertwined in most firms. Thus, managers should comply with the factors that influence sustainable consumption behaviour (Dimitrova et al., 2022). In practice, organizations must adapt their long-term strategies to meet changing societal demands, including environmental and social aspects in their product offerings and decision-making (Haessler, 2020).

Green consumption behaviour

Sustainable consumption encompasses both consumers' intention to purchase environmentally friendly products and their actual purchasing behaviour. Notably, consumer behaviour toward green products differs systematically from conventional consumption patterns, which makes it

essential to understand the factors that either encourage or hinder the adoption of sustainable choices. Identifying these factors is particularly important as they can inform strategies aimed at influencing consumer behaviour toward more environmentally responsible practices (Kharbanda & Singh, 2022).

The primary objective of green consumption is to reduce environmental degradation and limit the depletion of natural resources (Guan et al., 2024). In this context, green consumption behaviour refers to actions undertaken by consumers to minimize the negative environmental impact of their consumption activities, including the purchase, use, and disposal of products (Laukov & Wu, 2013). However, the conceptualization of green consumption behaviour is not entirely consistent across the literature. Some scholars equate it with green purchase behaviour, treating the two terms interchangeably (Sheng et al., 2019). Others argue that green purchase behaviour represents only a subset of the broader concept of green consumption behaviour, which encompasses a wider range of environmentally responsible actions beyond purchasing decisions (Yang & Zhang, 2020).

From a theoretical perspective, green consumption behaviour is often explained through behavioural models such as the Theory of Planned Behaviour. Research indicates that individuals' attitudes, perceived social pressures (subjective norms), and perceived behavioural control significantly influence their consumption intentions (Huang et al., 2021). Moreover, under certain conditions, perceived behavioural control may directly affect actual behaviour, which highlights the importance of both psychological and situational factors in shaping sustainable consumption (Rahman et al., 2023).

To better understand and promote green consumption behaviour, a substantial body of research has examined its determinants from multiple disciplinary perspectives. These factors are generally categorized into demographic, internal, and external influences. Demographic characteristics, such as age, gender, education level, and income, have been shown to significantly affect individuals' propensity to engage in sustainable consumption (Patak et al., 2021). In addition, internal factors, including attitudes, environmental awareness, ethical values, and beliefs, are positively associated with consumers' intention to adopt green products (Kharbanda & Singh, 2022).

Key influencing factors

Environmental awareness

Environmental awareness plays a crucial role in shaping sustainable consumption behaviour. Consumers' understanding of issues such as environmental degradation, climate change, waste management, and the benefits of recycling significantly influences their tendency to engage in responsible consumption practices (Jaiswal et al., 2018). In this context, eco-literacy serves as an important enabler of sustainable consumption even if its effectiveness depends on the presence of a positive environmental attitude. Without such an attitude, knowledge alone may not translate into actual behavioural change.

Empirical evidence further suggests that the relationship between knowledge and behaviour is complex. For instance, perceived environmental knowledge has been found to have an insignificant effect on green purchase intention in certain contexts, which indicates that awareness does not always lead directly to sustainable consumption (Jaiswal & Kant, 2018). Similarly, a lack of consumer knowledge, particularly regarding specific product categories such as organic food, has been identified as a key factor slowing the growth of green markets (Aertsens, 2011). More broadly, internal factors such as cognitive capacity, emotional states, and awareness levels collectively influence consumers' green consumption behaviour (Li et al., 2024).

Beyond individual-level effects, environmental awareness also exerts pressure on market dynamics. Increased consumer awareness of products such as green energy or environmentally friendly alternatives can encourage manufacturers to adopt sustainable practices and innovate production processes (Klimecka-Tatar et al., 2021). In response to growing environmental consciousness, firms have increasingly focused on eco-friendly packaging, green labelling, and certification systems for attracting consumers. In some countries, products undergo strict testing procedures before receiving eco-labels, which reflects the growing institutionalization of sustainability standards (Widjojo & Yudianto, 2015).

However, despite rising environmental awareness, a gap often remains between concern and actual purchasing behaviour. This gap is partly explained by limited knowledge and a lack of trust in eco-labels, which can discourage consumers from making green purchases even when they are aware of environmental issues (Liu et al., 2012; He & Zhan, 2018).

Price sensitivity

Price sensitivity is widely recognized as a critical determinant of green consumption behaviour. Consumers often evaluate the economic costs of green products against the perceived environmental benefits, a process commonly referred to as perceived value. When the perceived value is positive, consumers are more likely to adopt sustainable purchasing behaviours (Kharbanda & Singh, 2022).

However, a persistent gap exists between environmental concern and actual purchasing behaviour. Although consumers may express awareness of environmental challenges and support sustainability initiatives, this concern does not always translate into green purchasing decisions (Paco & Raposo, 2009). One key explanation for this inconsistency lies in the higher prices of green products. Studies show that a significant price differential between green and conventional products can weaken the positive effect of environmental concern on green purchase intention, thereby contributing to the attitude–behaviour gap (Hong et al., 2018).

The role of price is further complicated by the interaction between economic and psychological factors. While ethical beliefs and moral obligations can positively influence green consumption behaviour, consumers' willingness to pay a premium remains a decisive factor in actual purchase decisions (Ogiemwonyi et al., 2023; Cheng et al., 2022). In this context, green pricing strategies aim to balance consumers' price sensitivity with their willingness to pay for environmental performance (Dangelico & Vocalelli, 2017). Consumers are generally willing to pay a premium when the perceived environmental benefits outweigh the additional cost compared to conventional alternatives (Kharbanda & Singh, 2022).

In addition to price, product-related attributes such as quality also play a significant role in shaping green consumption behaviour. Research indicates that perceived quality and perceived price are among the most influential factors, particularly for non-essential products with high price sensitivity (Marakanon & Panjakajornsak, 2017; Medeiros & Ribeiro, 2017). High product quality can enhance consumer trust and reduce perceived risk, thereby increasing the likelihood of green purchasing (Kharbanda & Singh, 2022). Supporting this, several studies highlight that product quality significantly influences consumers' intentions and behaviours toward green products (Borin et al., 2011; Ritter et al., 2015).

Despite the dominant view that price acts as a barrier, some studies suggest a more nuanced perspective. For instance, Rasheed et al. (2024) argue that price may not always hinder green purchasing decisions, particularly when other factors such as perceived value or product benefits are strong.

Overall, the literature suggests that price remains one of the most influential external factors affecting green consumption behaviour. Higher prices tend to negatively influence purchase decisions (Liobikienė et al., 2017), particularly when consumers perceive limited added value. At the same time, trust in green products becomes increasingly important when

these products are positioned at premium prices as consumers must be confident that the environmental claims justify the additional cost (Kharbanda & Singh, 2022).

Social influence

Social influence represents the impact of others, such as family, friends, peers, and broader social networks, on an individual's consumption decisions. It is often conceptualized as a form of social pressure that affects whether a consumer chooses to engage in a particular behaviour, including the purchase of environmentally friendly products (Jaiswal & Singh, 2018; Zhang et al., 2019). This influence operates through what has been described as a primary pathway in shaping sustainable consumption, where individuals adjust their behaviour based on the observed actions and expectations of others.

The role of social influence is closely linked to social norms and values. Ethical values, including moral responsibility toward society and others, can shape consumption behaviour. However, empirical findings suggest that individualistic values may, in some cases, exert a stronger influence than altruistic motivations, particularly in the context of green product purchasing (Kharbanda & Singh, 2022). This indicates that social influence does not operate uniformly and may depend on the underlying value systems of consumers.

Cultural context also plays a significant role in determining the strength of social influence. In collectivistic societies, particularly in many Asian countries, social norms tend to have a stronger impact on green purchase intention and behaviour compared to more individualistic Western contexts (Othman & Rahman, 2014; Zhang et al., 2019). In such environments, individuals are more likely to align their consumption choices with societal expectations and group norms.

In addition, consumption behaviour is often driven by the desire to create a favorable social image. Individuals may seek approval, respect, and recognition from their social circles, and this motivation can influence their purchasing decisions including the adoption of green products (Kharbanda & Singh, 2022). The growing role of digital platforms further amplifies this effect. Social media, in particular, has emerged as an influential channel shaping green consumption behaviour, especially among younger populations (Ali et al., 2023).

Empirical research also highlights that social influence can be exerted indirectly through the broader social environment. Interactions with peers, family members, and reference groups can significantly shape consumer attitudes and behaviours toward green products (Gleim et al., 2013). Supporting this, Pilgrimienė et al. (2020) found that social environment has an indirect positive effect on green purchasing behaviour as part of external influencing factors.

From a practical perspective, these findings suggest that social networks can be leveraged to promote sustainable consumption. For example, targeted communication strategies through social media platforms can enhance awareness and encourage behavioural change toward more sustainable consumption patterns (Dimitrova et al., 2022).

Green trust

Green trust is a critical factor influencing consumers' adoption of environmentally friendly products. It refers to consumers' confidence in the environmental claims, credibility, and practices of companies offering green products (Hang et al., 2022). Trust is particularly important in the context of sustainable consumption, where product attributes are often difficult to verify directly. As such, consumer trust becomes a key prerequisite for establishing a viable market for eco-friendly products, especially when these products are priced at a premium (Kharbanda & Singh, 2022).

One of the primary roles of trust is its ability to reduce perceived risk. When consumers trust a product or brand, they are more likely to believe in its environmental benefits, which

positively influences green purchase intention (Daugbjerg et al., 2014). Empirical evidence from various countries, including Thailand, China, Taiwan, and Germany, confirms that trust significantly affects consumers' willingness to adopt new green products (Kharbanda & Singh, 2022). In many cases, trust serves as a motivating factor that enables consumers to purchase green products despite higher price levels.

Conversely, a lack of trust represents a major barrier to green consumption. Scepticism toward environmental claims and green marketing practices can reduce perceived value and discourage purchasing behaviour (Padilla, 2018). This issue is particularly evident in the case of eco-labels. While eco-labels are intended to signal environmental performance and guide consumer choices, their effectiveness depends heavily on consumer trust. Some studies have found no significant relationship between eco-labels and green purchase intention due to low levels of trust (Farzin et al., 2020).

At the same time, eco-labels can play a positive role when trust is established. From a company perspective, labelling helps legitimize environmental practices and enhance competitive advantage. From a consumer perspective, eco-labels reduce uncertainty and facilitate informed decision-making (Kharbanda & Singh, 2022). However, their impact on green purchase intention and behaviour is often mediated by factors such as trust, perceived price, and perceived risk (Kharbanda & Singh, 2022). Educating consumers about eco-labels and improving their ability to interpret such information can therefore strengthen trust and encourage sustainable purchasing (Taufique et al., 2014).

In addition to labelling, product quality also contributes to building trust. Higher perceived quality reduces perceived risk and enhances consumer confidence in green products (Kharbanda & Singh, 2022). Overall, trust has been consistently identified as a key determinant of consumers' purchasing intentions in the context of sustainable consumption (Lavuri et al., 2022).

Given its central role, building and maintaining consumer trust should be a priority for firms and policymakers aiming to promote green consumption. Transparent communication, credible environmental claims, and reliable certification systems are essential for strengthening trust and facilitating the adoption of sustainable products.

Green consumption behaviour and start-up support

Green consumption behaviour is closely linked to consumers' purchasing intentions, which ultimately translate into actual buying actions. Prior research suggests that beliefs and attitudes toward environmental sustainability play a crucial role in shaping purchase intentions, which in turn influence green purchasing behaviour (Kharbanda & Singh, 2022). This highlights the importance of understanding the drivers that encourage consumers to adopt sustainable consumption practices.

In this context, brand-related factors also play a significant role. Green brand image has been found to be closely associated with consumers' environmental awareness influencing their intention to purchase environmentally friendly products (Kharbanda & Singh, 2022). Empirical studies conducted in various countries, including Cambodia, Pakistan, and Taiwan, demonstrate that consumers' purchase intentions for green products are strongly influenced by their awareness levels, which are partly shaped by brand image and communication strategies (Okan & Yalman, 2014; Cheng et al., 2014; Siyal et al., 2021; Sahmsi & Siddiqui, 2017; Zhang et al., 2019).

Understanding the factors that drive green consumption behaviour is therefore essential for both policymakers and businesses. By identifying and leveraging these drivers, it becomes possible to encourage behavioural shifts toward more sustainable consumption patterns. Such shifts can create increased demand for environmentally friendly products, which in turn can stimulate business activities aligned with sustainability (Kharbanda & Singh, 2022).

From an entrepreneurial perspective, this growing demand presents opportunities for start-ups operating in green and sustainable markets. As consumers become more environmentally conscious and adopt sustainable consumption behaviours, they are more likely to support businesses that align with these values. This suggests that green consumption behaviour may extend beyond individual purchasing decisions and contribute to broader market support for innovative and sustainability-oriented start-ups.

Policy interventions can further strengthen this relationship. For instance, the use of subsidies has been found to be more effective than punitive measures in promoting green consumption, while a combination of both approaches can significantly increase the adoption of sustainable practices (Yang et al., 2023). Such policies can help create a supportive ecosystem that encourages both consumers and start-ups to engage in sustainable economic activities. Based on the reviewed literature and the proposed hypotheses, the conceptual framework of the study is presented in Figure 1.

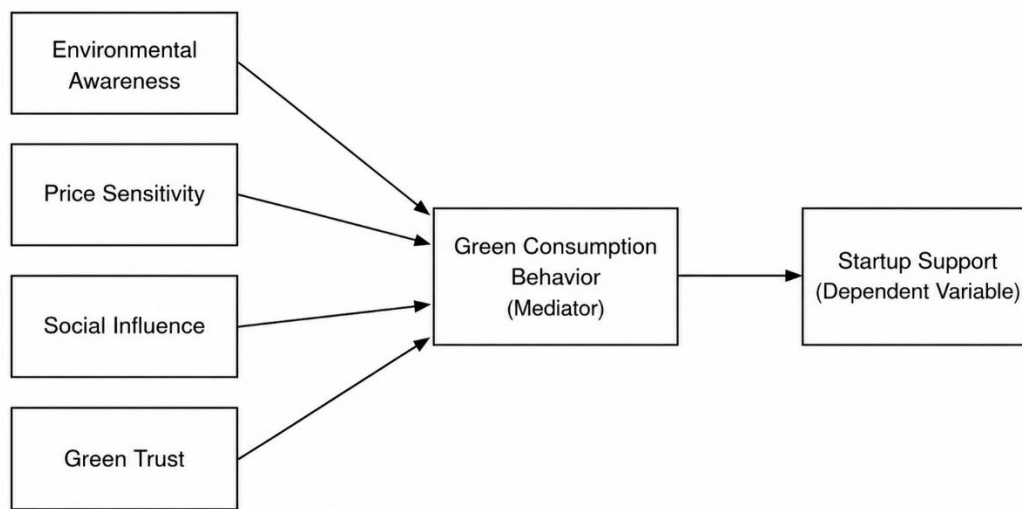


Figure 1: Conceptual framework of the study

Source: Author's own compilation based on the literature review

Hypotheses Development

Based on the above theoretical arguments and empirical evidence, the following hypotheses are proposed:

H1: Environmental awareness has a positive effect on green consumption behaviour.

H2: Price sensitivity has a negative effect on green consumption behaviour.

H3: Social influence has a positive effect on green consumption behaviour.

H4: Green trust has a positive effect on green consumption behaviour.

H5: Green consumption behaviour has a positive effect on start-up support.

Methodology

Research design

In order to examine the determinants of green consumption behaviour and their implications for start-up support this study adopts a quantitative research approach, complemented by qualitative insights. A structured survey was conducted to collect primary data, while an interview was used to provide a more contextual understanding of the findings from the

perspective of start-ups. This approach allows for a more comprehensive analysis by combining statistical results with practical insights.

Data collection and sampling

Primary data were collected through a questionnaire-based survey administered using Google Forms. The questionnaire was designed to measure respondents' perceptions of environmental awareness, price sensitivity, social influence, green trust, green consumption behaviour, and start-up support. To facilitate participation, the survey was made available in both English and German.

The questionnaire was distributed through the university portal and the SurveyCircle platform. Data were collected over a period of 14 days, which resulted in 81 valid responses, which were included in the analysis. Although the survey was open to participants from different countries, most respondents were based in Germany. Given the exploratory nature of the study, a convenience sampling approach was employed. Participation was voluntary and anonymous, and respondents were informed that the collected information would be used solely for academic research purposes.

In addition to the survey, a semi-structured interview was conducted with an experienced start-up consultant in Germany who evaluates approximately 70–80 innovative ideas each year. The interview consisted of 12 open-ended questions and was intended to provide additional insights into the relationship between sustainable consumption and start-up development. With the participant's consent, the conversation was audio-recorded and subsequently reviewed. The key observations extracted from the interview were used to support the interpretation of the quantitative findings and to provide practical perspectives on sustainable entrepreneurship.

Measurement of variables

This study included the following variables to test the hypotheses raised in the existing literature review:

- Independent variables: Environmental awareness, price sensitivity, social influence, green trust
- Mediating variable: Green consumption behaviour
- Dependent variable: Start-up support

Measurement items were adapted from prior literature. All variables were measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), which is widely used in consumer behaviour research. In addition, a multiple-choice question was included to identify respondents' perceptions of the most influential factors influencing participants' green consumption behaviour. This question provided additional descriptive insights to support the main analysis.

The measurement items were developed based on constructs identified in previous literature to ensure conceptual relevance.

Data analysis techniques

The data analysis was conducted using Microsoft Excel. First, descriptive statistics were calculated to summarize the main characteristics of the data, including means and standard deviations of the variables. This provided an overview of respondents' perceptions and helped identify general patterns in the dataset. Second, a correlation analysis was conducted to examine relationships among the variables and this provided initial insights into their associations.

Third, a simple linear regression analysis was performed to test the proposed hypotheses. Each independent variable was analysed separately to assess its effect on green

consumption behaviour, and this was followed by an additional regression analysis to examine the effect of green consumption behaviour on start-up support.

The regression analysis enabled the evaluation of:

- direction of relationships (positive or negative)
- strength of effects (regression coefficients)
- statistical significance (p-values)

These techniques are appropriate for examining relationships between variables in behavioural research.

Validity and limitations of measurement

The measurement items were based on constructs widely discussed in the existing literature, which supports the content validity of the study. However, due to the exploratory nature of the research and the use of a relatively small sample, formal reliability testing (e.g., Cronbach's alpha) was not conducted.

Therefore, the findings should be interpreted with caution, and future research is encouraged to apply more advanced statistical validation techniques.

Results

Correlation analysis

In this study, a correlation analysis was conducted to examine the relationships between the study variables. The results show that environmental awareness ($r = 0.417$) and green trust ($r = 0.457$) are positively associated with green consumption behaviour. In contrast, price sensitivity shows a strong negative correlation with green consumption behaviour ($r = -0.543$). Social influence shows a weak relationship with green consumption behaviour ($r = 0.064$). In addition, green consumption behaviour is positively correlated with start-up support ($r = 0.525$). These results provide initial insights into the relationships among the variables prior to regression analysis.

Table 1: Results of correlation analysis

Source: Author's own calculations based on the questionnaire survey data ($N = 81$)

	EA	PS	SI	GT	GCB	SS
EA	1					
PS	-0.128	1				
SI	0.109	0.144	1			
GT	0.399	-0.136	0.338	1		
GCB	0.417	-0.543	0.064	0.457	1	
SS	0.262	-0.376	0.270	0.325	0.524	1

EA=Environmental Awareness, PS= Price Sensitivity, SI=Social Influence, GCB= Green Consumption Behaviour, SS=Start-up Support.

Regression analysis

In this study, simple linear regression analyses were conducted to examine the relationships among the study variables. The results are summarized in Table 2.

Environmental awareness has a significant positive effect on green consumption behaviour ($\beta = 0.614$, $p < 0.001$), which explains 17.4% of the variance. This indicates that individuals with higher environmental awareness are more likely to engage in sustainable consumption.

Price sensitivity showed a significant negative effect on green consumption behaviour ($\beta = -0.590$, $p < 0.001$), which demonstrated the highest explanatory power among the predictors ($R^2 = 0.295$). This indicates that cost acts as a major barrier to sustainable consumption.

Green trust was also positively and statistically significantly related to green consumption behaviour ($\beta = 0.532$, $p < 0.001$), explaining 20.9% of the variance. This finding highlights the importance of consumer trust in influencing sustainable purchasing decisions. In contrast, social influence had no statistically significant effect on green consumption behaviour ($\beta = 0.064$, $p = 0.569$), which suggests that social factors may not play a determining role in this regard.

Finally, green consumption behaviour was found to have a positive and statistically significant effect on start-up support ($\beta = 0.441$, $p < 0.001$), explaining 27.5% of the variance. This result suggests that individuals who engage in sustainable consumption are more likely to support start-up businesses.

Table 2: *Results of regression analysis*

Source: *Author's own calculations based on the questionnaire survey data (N = 81)*

Relationship	β (Coefficient)	p-value	R²	Result
EA → GCB	0.614	<0.001	0.17	Supported
PS → GCB	-0.59	<0.001	0.30	Supported
SI → GCB	0.064	0.569	0.00	Not Supported
GT → GCB	0.532	<0.001	0.21	Supported
GCB → SS	0.441	<0.001	0.28	Supported

EA=Environmental Awareness, PS= Price Sensitivity, SI=Social Influence, GCB= Green Consumption Behaviour, SS=Start-up Support.

Discussion

This study examined the determinants of green consumption behaviour and its implications for start-up support. Environmental awareness, price sensitivity, social influence, and green trust play a role in shaping sustainable consumption behaviour.

Environmental Awareness:

Environmental awareness had a positive and significant effect on green consumption behaviour, which supports **H1**. This is consistent with previous research that emphasizes the importance of environmental knowledge in promoting sustainable behaviour (Jaiswal et al.,

2018). However, in line with previous studies (Jaiswal & Kant, 2018), awareness alone is not sufficient and needs to be supported by other factors such as trust and affordability.

Price Sensitivity:

Price sensitivity showed a significant negative effect, which supports **H2** and emerged as the strongest barrier to green consumption. This result confirms previous findings that higher costs limit sustainable purchasing (Paco & Raposo, 2009; Liobikienė et al., 2017). This result also supports the argument that price differences play a role in the attitude-behaviour gap (Hong et al., 2018). Interview insights further emphasize that consumers prioritize price and purchase convenience over sustainable purchase.

Social Influence:

Social influence was not found to be significant, which has led to the rejection of **H3**. This supports those studies that suggest that the impact of social norms is inconsistent and context-dependent (Othman & Rahman, 2014; Zhang et al., 2019). The findings indicate that individual and economic factors may outweigh social pressure in shaping green consumption.

Green Trust:

Green trust had a positive and significant effect on green consumption behaviour, which supports **H4**. This is consistent with the literature highlighting trust as a key factor in reducing perceived risk and encouraging green purchasing (Daugbjerg et al., 2014; Padilla, 2018). Trust is particularly important when green products are priced at a premium (Kharbanda & Singh, 2022).

Green Consumption Behaviour and Start-up Support:

Green consumption behaviour was found to positively influence start-up support, which supports **H5**. This extends existing research by linking consumer behaviour to entrepreneurial outcomes. The findings suggest that environmentally conscious consumers are more likely to support start-ups aligned with sustainability. Interview insights further highlight the role of founders' values and the importance of policy support in fostering green innovation.

Overall Interpretation:

Overall, green consumption behaviour is driven by awareness and trust, while it is constrained by price. Social influence appears to play a limited role. Importantly, the results demonstrate that sustainable consumption contributes not only to individual behaviour but also to broader market start-up support.

Implications

The findings of this study provide several implications for start-ups, marketers, and researchers. From a start-up perspective, pricing strategy emerges as a critical factor. The strong negative impact of price sensitivity on green consumption behaviour suggests that green start-ups need to carefully balance sustainability and affordability. Furthermore, since green trust significantly influences sustainable consumption, it is essential to build consumer trust. Therefore, start-ups should emphasize transparency and ongoing communication about their environmental practices. In addition, environmental awareness also influences sustainable consumption, which should prompt green start-ups to invest in target market awareness and the environmental impacts of green consumption.

From a marketing perspective, the results suggest that social impact alone is not enough to drive sustainable consumption behaviour. Instead, marketers should focus their marketing

strategies on increasing environmental awareness and building trust rather than rely solely on social trends or peer influence.

From a research perspective, the findings highlight the attitude-behaviour gap in sustainable consumption. This result suggests that although consumers may express positive awareness and attitudes toward sustainability, actual behaviour is still constrained by practical factors such as price. Future research should focus more on narrowing this gap and examine additional and indirect variables that may influence sustainable consumption behaviour.

Limitations and future research

Despite its contributions, this study has several limitations that should be acknowledged. First, the sample size is relatively small ($N = 81$), which may limit the generalizability of the findings. In addition, the use of convenience sampling may introduce selection bias as the respondents may not fully represent a broader population.

Second, the study relies primarily on self-reported data, which may be subject to response bias and may not fully reflect actual consumer behaviour. Furthermore, although the study adopts a mixed-method approach, the qualitative component is based on a single interview, which limits the depth and generalizability of qualitative insights.

Third, the analysis was conducted using basic statistical techniques in Microsoft Excel, focusing on correlation and simple regression. More advanced analytical methods, such as structural equation modelling, could provide deeper insights into the relationships between variables and should be considered in future research.

Finally, while this study examines key determinants of green consumption behaviour, other potentially relevant factors, such as cultural influences, policy environments, and technological accessibility, were not included in the model.

Future research is encouraged to address these limitations by using larger and more diverse samples, by applying more advanced analytical techniques, and by incorporating additional variables. Expanding the qualitative component through multiple interviews or case studies could also provide a more comprehensive understanding of sustainable consumption and its implications for start-up development.

Conclusion

This study examined the determinants of green consumption behaviour and their implications for start-up support. The findings indicate that environmental awareness and green trust have significant positive effects on green consumption behaviour while price sensitivity represents a strong barrier. In contrast, social influence was not found to have a significant impact. Furthermore, the results demonstrate that green consumption behaviour positively influences start-up support, which highlights its broader economic relevance.

These findings contribute to the existing literature by providing an integrated analysis of key determinants of sustainable consumption and by extending the discussion to entrepreneurial outcomes. In particular, the study highlights the importance of affordability and trust in promoting sustainable consumption while also revealing the limited role of social influence in this context.

The qualitative insights further support these findings by emphasizing that sustainable practices in start-ups are often driven by founders' core values while institutional support plays an important role in enabling green innovation. This suggests that both individual motivations and external support systems are essential in fostering sustainable entrepreneurship.

Overall, the study underscores the interconnected relationship between consumer behaviour and start-up development, which suggests that promoting sustainable consumption

can contribute not only to environmental outcomes but also to the growth of innovative businesses.

The findings of this study are largely consistent with previous research on sustainable consumption behaviour. Similarly to earlier studies, environmental awareness and green trust were found to positively influence green consumption behaviour while price sensitivity emerged as a significant barrier to sustainable purchasing decisions (Kharbanda & Singh, 2022; Hong et al., 2018). The findings, however, differ from those of some prior studies, which reported a significant positive effect of social influence on green consumption behaviour (Othman & Rahman, 2014; Zhang et al., 2019). In the present study, social influence was not found to be a significant predictor, which suggests that the impact of social influence may vary across contexts and populations.

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AI-Driven Knowledge Management: Empowering Future Leaders with Essential Skills

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Abstract

Artificial intelligence-powered knowledge management is transforming how organisations cope with the growing volume of information. By automating repetitive tasks, providing personalised solutions and supporting decision-making, artificial intelligence reduces overload, allowing managers to focus on more high-value work. However, these benefits also come with challenges; effective implementation is not just a technological competence but also requires leadership capabilities. Future leaders will need to improve skills such as emotional intelligence, ethical thinking, adaptability, and continuous learning. In addition, they need to be able to effectively collaborate with intelligent systems through targeted questioning, adaptive thinking, and responsible use, known as "fusion skills." The paper reviews recent literature and uses illustrative examples to show how artificial intelligence-supported knowledge management reduces information overload and shapes the competencies needed for sustainable leadership. Nevertheless, it is essential not to see this technology as a replacement for humans, but rather as a collaborative partner that augments human potential.

Keywords: Artificial Intelligence, knowledge management, human-machine synergy, future skills

Introduction

We live in a time where the knowledge worker deals with an astounding volume of information every single day—countless emails, endless notifications, meeting after meeting. For leaders, this volume can be overwhelming but it's not just for leaders; it affects everyone. We process more information each day than an individual in previous centuries would have faced in a lifetime. This challenge, called information overload, is a key issue in the digital age (Roetzel, 2019). As futurist John Naisbitt said, 'We are drowning in information, but starved for knowledge' (Naisbitt, 1982:24.) Although this quote is from 1982, it is more relevant today than ever. In the digital age, we have to process huge amounts of data every day. According to Statista, by 2024, around 402 million terabytes of data is generated worldwide every day, the equivalent of 402 quintillion bytes (China, 2024). This huge amount of data places a significant burden on individuals and organisations alike. Information overload not only reduces productivity and makes decision-making more difficult but can also lead to serious health problems (Arnold et al., 2023).

This situation creates a paradox: data is often called "the new oil" for its potential value, but it becomes useful only when we can turn it into insights and actions. Without the right tools and strategies, having too much data can be more of a problem than a solution. The connection between artificial intelligence (AI) and knowledge management (KM) is fundamentally changing the way data is processed, shared, and transformed into practical knowledge. Traditional KM systems have long depended on human expertise to filter, interpret, and apply information. This approach was time-consuming and inefficient. While AI is often promoted as the solution to managing this flood of information, it's not just about using AI. It's about

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developing the right skills to use AI effectively and it requires a specific mix of technical know-how, human judgement, emotional intelligence and ethical reasoning.

These skills empower leaders not only to handle large amounts of information but also to transform it into valuable, implementable outcomes. With the right skills, future leaders can work alongside AI as true collaborators - leading with insight, adapting quickly to new challenges, and encouraging innovation through a powerful synergy between human judgment and machine effectiveness. In the age of AI, this human-machine partnership will drive success.

Methodology

This paper is a broad review of relevant literature and illustrative cases, highlighting how AI-driven knowledge management shapes leadership competencies. The literature review draws on peer-reviewed articles, industry reports, and seminal books published between 2016 and 2025. Databases used include Scopus, Web of Science, and Institute of Electrical and Electronics Engineers (IEEE) Xplore; search terms featured “Artificial Intelligence”, “knowledge management”, “personalised knowledge management”, “future skills,” “human-machine synergy” and “human-machine collaboration.”

Literature Review

The literature on AI-driven knowledge management is extensive and continually evolving. For clarity, this section is organised into three primary streams:

1. AI in knowledge management
2. Essential future skills in the age of AI
3. Human-machine synergy

AI in knowledge management

Artificial intelligence is revolutionizing knowledge management by transforming vast amounts of data into usable and strategic knowledge. Because the human brain is not designed to process the vast amounts of information we encounter daily, this cognitive overload often leads to inefficiencies, missed opportunities and increased stress in decision-making. AI algorithms, including machine learning and natural language processing techniques, can rapidly sift through vast datasets, identify patterns, and generate insights that were previously inaccessible to human analysts.

However, the true transformative potential of artificial intelligence lies in its ability to enable personalised knowledge management, stepping in as a powerful ally. It can help filter, organise and prioritise information, allowing individuals and teams to focus on what really matters. By learning user preferences and adapting dynamically, AI systems enable more informed decisions, foster creativity and boost productivity at all organisational levels. This is achieved by continuously learning from users' behaviour and needs, thereby proactively adapting information to meet current goals. AI systems not only make information available but also provide tailored recommendations that aid decision-making and support individual and group development. This intelligent flexibility allows knowledge to be applied quickly and efficiently, while maintaining focus on the most important tasks. The personalised solutions provided by AI not only increase efficiency but also create space for innovation and creative thinking that are the foundations for success in modern organisations (Murtaza et al., 2022).

The rise of platforms like TikTok has highlighted a generational shift in learning preferences, emphasising the demand for bite-sized, engaging, and interactive content. Today's learners, especially those from Gen Z and millennials, have grown up consuming short-form content that aligns with their reduced attention spans and preference for instant,

visually rich information (Ghani et al., 2023). AI can amplify this approach by tailoring educational content to individual preferences and learning styles.

The KEAS (Knowledge Enhancement and Advisory System) case study demonstrates the power of personalised knowledge management in financial education for small and medium-sized enterprises. In a pilot involving 50 businesses, KEAS used machine learning to customize individual learning paths and real-time analytics, resulting in a 42% reduction in decision-making time and a 35% increase in confidence. In contrast to traditional methods, KEAS' personalised content delivery and predictive analytics resulted in a 50% increase in the use of advanced financial tools. Participants highlighted the tailored insights and collaborative network provided by KEAS that optimized cash flow and investment strategies, proving that personalised systems far outperform generic approaches (Bankole-Falaye, 2024).

In addition to personalised knowledge, the automation of routine tasks also enables a focus on high-value work. AI can perform repetitive, knowledge-intensive tasks that traditionally require hours of manual work. Case studies now support the tangible benefits of AI in KM. Global law firm Allen & Overy, for example, has launched an AI tool called "Harvey" that automates knowledge-intensive tasks such as document review, legal precedent analysis and case summarization (Wakeling, 2023). Likewise, in research-intensive fields such as biomedical science, AI systems can scan thousands of journal articles to identify potential correlations or emerging trends, enabling researchers to formulate hypotheses more efficiently (Topol, 2019). This automation dramatically reduces manual workload, freeing knowledge workers to focus on more strategic, complex problem-solving activities.

While AI holds great promise for transforming knowledge management, it comes with many challenges. Research shows that while AI tools can be highly effective, they require human oversight to avoid potential biases and errors. Scientific publications highlight issues such as data integration, ethical considerations and the need for robust validation processes. Ethical and regulatory considerations become paramount, especially as AI-driven KM begins to influence decisions with considerable social and economic impact (Floridi & Taddeo, 2018). Researchers stress the need for robust data governance frameworks and continuous model evaluation to mitigate these risks. The successful use of AI can be learned through a long process of trial and error. This journey involves continuous learning, adaptation and refinement of our methods and approaches. It is essential to view AI integration as an iterative process, in which each challenge presents opportunities for improvement and innovation. This is where the leaders of the future come in, who will need to develop critical skills to manage AI intelligently and responsibly.

Essential Future Skills in the Age of AI

The job market has undergone a major transformation in recent decades, but the speed and depth of change have reached unprecedented levels in the digital age. Some traditional jobs are disappearing, while new positions and professions are being created that require entirely new skill sets. This change is not just a technological question; it also has deep economic, social and educational implications. Companies and individuals alike must adapt to a rapidly changing environment based on new technologies, particularly artificial intelligence. (World Economic Forum, 2025).

This change requires new perspectives from both employees and employers. Organisations need to focus not only on meeting current skills needs, but also on preparing for the unknown future. "The Future of Jobs 2025" report reveals that 96% of employers plan to invest in employee training as an essential tool for organisational transformation. The report also highlights that technology skills are expected to grow faster in the next five years than

any other skill area. The fastest growing areas include AI and big data, followed by networking, cybersecurity and technology literacy. AI and big data are expected to see significant growth across almost all sectors, with more than 90% of respondents in the top 10 industries expecting greater use of these skills. The study also highlights the continued importance of human-centred skills in the face of rapid technological progress, such as creative thinking, resilience, flexibility and agility, and curiosity and lifelong learning. This demand underlines the importance of retraining and skills development initiatives to bridge skills gaps and ensure the workforce is prepared to meet the challenges of the future job market. (World Economic Forum, 2025).

These skills are grouped into three main categories: cognitive skills, interpersonal skills, and technical skills, connected by a fourth unifying dimension, referred to as fusion skills. (This is shown in Table 1) As a transformative set of abilities, they are key to adapting to an AI-driven environment. They are particularly important in leadership roles where the ethical and effective integration of AI-based solutions requires complex decision-making processes. These skills are not only essential for the successful application of technological innovation, but also for ensuring that the development of AI remains consistent with human values while responding to global challenges.

Table 3: *Key competences for future leaders.*

Source: *Author’s own editing based on research (World Economic Forum, 2025; Beck, 2017; Knight, 2024; European Commission, 2019; Pinski & Benlian, 2024).*

Category	Skills	Description	Impact
Cognitive Skills	Lifelong Learning	Staying updated on AI developments and fostering a culture of ongoing innovation.	Enables leaders to swiftly adopt new technologies and maintain a competitive edge in evolving AI environments.
	Ethical reasoning	Guiding the development and use of AI systems based on ethical principles such as fairness, transparency, and accountability.	Builds trust, prevents bias, and addresses ethical challenges in AI systems
Interpersonal Skills	Emotional Intelligence	Navigating social complexities and managing teams in ways AI cannot replicate.	Facilitating collaboration between human and AI teams while building trust in AI-integrated work environments.
	Adaptability and Resilience	Thriving in rapidly changing environments and embracing uncertainty.	Quickly responding to AI-driven innovations and disruptions.
Technical Skills	Data Literacy	Understanding and leveraging data	Improving the validation of AI insights and making reliable, data-driven decisions.
	AI Literacy	Understanding AI principles, applications, and limitations.	Enables conscious, ethical, and effective use of AI technologies while recognizing their limitations and risks.
Fusion Skills		The ability to seamlessly collaborate with AI, combining	Maximizes human-AI synergy

Given the growing importance of AI, big data, networking, and cybersecurity, developing technical skills is paramount for preparing for an AI-driven environment. Among these, data literacy, digital fluency, and AI literacy stand out as foundational skills for leaders and professionals. These skills not only facilitate the effective use of advanced technologies but also empower individuals to make informed, ethical, and strategic decisions.

Data Literacy

Data literacy is the ability to read, analyse, and interpret data effectively. In an era when AI systems generate vast amounts of data, leaders must develop the capacity to critically evaluate AI-driven insights. This includes understanding the methodologies behind data collection, processing, and visualisation. For instance, a leader skilled in data literacy can identify patterns and trends while questioning the reliability and biases inherent in datasets. Organisations that foster data-driven cultures are shown to outperform their competitors, highlighting the practical value of this skill in achieving strategic objectives (Data Literacy, 2023).

Digital Fluency and Latency Awareness

Digital fluency extends beyond basic technological skills, encompassing the ability to navigate and leverage digital tools to drive innovation and efficiency. Leaders who are digitally fluent understand how digital systems interact and can optimise workflows to reduce digital latency - minimising delays in processing, communication, or decision-making within digital infrastructures. This is particularly important in AI environments where real-time data processing and quick response times are crucial for maintaining competitive advantages.

AI Literacy

Although many studies assume an implicit understanding of AI literacy, this makes it challenging to distinguish it from other technological literacies, such as data or digital literacy. For example, while a digitally literate person knows how to use a smartphone with a virtual assistant (Siri or Google Assistant), an AI-savvy person understands how the AI behind the virtual assistant processes voice commands, learns from user interactions and uses data to create personalised responses. This deeper understanding will help them to use the technology more consciously and responsibly, recognising its limitations and potential risks.

AI literacy is therefore the comprehensive understanding and skills needed to work with AI technologies in a targeted, ethical and effective way. It includes knowledge of the principles, capabilities and limitations of AI, as well as competencies in critical evaluation, ethical considerations and the effective use of AI tools. In contrast to general digital or data literacy, AI literacy is distinguished by the specific characteristics of AI: autonomy, learning capabilities and inscrutability. The skills required for AI include understanding AI models, interpreting AI-generated data, recognising biases and dealing with ethical challenges (Pinski & Benlian, 2024).

While technical skills are essential, they must be paired with human-centric abilities like ethical reasoning, emotional intelligence, and adaptability. These skills ensure leaders can navigate the cultural and interpersonal challenges brought by AI while fostering innovation and fairness.

Lifelong Learning

In a world shaped by AI, relevant knowledge is never permanent; continuous development and learning are necessary to remain competitive. In the face of rapid technological advances, learning is becoming a lifelong process. A given technology or body of professional knowledge considered up-to-date today may become obsolete in a few years, giving way to new tools, methods and requirements. Continuous learning is therefore not only about updating technological skills, but also about developing critical thinking, creative problem-solving and emotional intelligence, which will be essential in an AI-driven future. A commitment to learning is more than just a competitive advantage: it is a mindset that enables us to act proactively, rather than simply adapt, in response to challenges.

Ethical reasoning

As AI systems make decisions that affect people's lives, leaders must ensure these systems operate fairly and transparently, and comply with ethical standards. The European Commission's guidelines on trustworthy AI emphasise the need for human oversight to prevent bias and discrimination. Ethical reasoning is essential to ensure that AI systems are developed and used in ways that are context-sensitive, consistent with ethical standards, and capable of addressing complex ethical challenges. This supports the development of an ethical culture, ensuring that AI systems contribute positively to society (European Commission, 2019).

Emotional Intelligence

Emotional intelligence (EI) will play a key role in the toolset of future leaders, as it will remain a unique human capability in AI-shaped workplaces. Empathy, conflict management and team building skills are essential to sustain team cohesion and innovation. 'Emotional aperture', or the ability to sense the emotional dynamics of a team, enables leaders to identify moods, potential tensions and missing perspectives (Knight, 2024).

According to an article in the Harvard Business Review, those who want to stay relevant in their profession need to focus on skills that AI has difficulty replicating - such as understanding others, motivating others and interacting with people. For example, a smart machine might be able to diagnose a disease and recommend a treatment, but only a human can understand a patient's life situation (finances, family, quality of life, etc.) and help choose the right treatment plan. The same is true for business problems: while AI can suggest solutions, managers need the emotional intelligence to motivate the team to act, avoid political conflicts and identify those who can best drive change (Beck, 2017).

Adaptability and Resilience

Adaptability, resilience, agility and flexibility are key skills not only for leaders but for everyone in an unpredictable future. These qualities not only enable us to adapt to change but also help us to proactively manage challenges while maintaining mental and emotional balance. Flexible thinking is of paramount importance, as it helps leaders avoid becoming inflexible in decision-making and consider multiple solutions, accept contradictions, and seek new perspectives. This approach creates a safe environment where team members can share ideas more freely, leading to better decisions and more innovative outcomes. In this context, relational self-awareness enables managers to recognise their own limitations and manage stress appropriately. This not only improves individual performance but also sets a positive example for team members. Actively soliciting feedback and building supportive relationships helps leaders respond more effectively to rapid change and unknown challenges (Beck, 2017).

Human-Machine Synergy

The real power of AI lies not in replacing humans, but in working with them. As Paul Daugherty and H. James Wilson show in their book *Human + Machine: Reimagining Work in the Age of AI*, the "missing middle" is a space where humans and AI work together, complementing each other's strengths, to achieve results that neither could achieve separately. AI is highly effective at processing data quickly and recognising recurring patterns, but lacks empathy, creativity and the ability to make ethical decisions. Humans, on the other hand, can adapt, think in context and make emotion-based decisions that technology cannot replace. The synergy of these two creates the potential for humans and machines to solve complex problems together (Daugherty, 2024).

Research from Harvard University confirms the power of this synergy: while AI alone scores diagnostic images with 92% accuracy, humans perform at 96%. But together they achieve 99% accuracy. This shows the power of collaboration, as AI speeds up decision-making while humans provide ethical and contextual judgment (Woo, 2020).

AI is not only making manufacturing processes more efficient, but also more personalised, with flexible intelligent systems that respond to real-time customer choices replacing rigid, 'dumb' robots. In addition, AI can also be used to create increasingly personalised user experiences through data analysis, which is of paramount importance in industrial transformation (Woo, 2020).

Among the practical applications of AI, the predictive policing software PredPol illustrates its power. This software enables the prediction of crime patterns, helping law enforcement agencies to allocate their resources more efficiently. Predictive policing has reduced crime rates by 10-20%. While this case illustrates the effectiveness of AI, it also raises the issue of moral standards, as there are serious concerns about privacy and discrimination (Deshmukh, 2024).

Another interesting example is the integration of AI into Zoom or Teams, which provides real-time transcripts, meeting summaries, real-time translation and noise filtering to improve the efficiency of virtual meetings. Studies show that such AI-based collaboration tools improve remote work productivity and team communication by 15-20%. This case illustrates that AI not only improves productivity but also opens up new horizons in remote collaboration. (Deshmukh, 2024)

Human-machine co-creation can take two basic forms: machines assisted by humans and humans assisted by machines. In the former, humans guide and train the systems, explain the results and ensure the ethical use of AI. For example, facial recognition systems are trained and continuously monitored by humans to ensure that they comply with privacy concerns. In the other model, AI complements human capabilities: it analyses data, makes recommendations, and allows people to focus on more complex, creative tasks. AI systems are particularly well suited to supporting lower-level employees, such as novice doctors analysing X-rays. AI systems can point out anomalies that less experienced professionals might overlook, while the final decision-making power remains with the human (Woo, 2020).

AI-assisted workflows are not only more efficient but also allow people to work more humanly and to develop their creativity and social skills. However, AI is not an automatic advantage for everyone. Those who are not willing to participate in lifelong learning may be left behind and emerge as a new social class. The overuse of AI, i.e. replacing human thinking, can lead to mental "clutter", which reduces critical thinking and the ability to innovate. It is therefore important that AI is always applied with human values and preferences in mind, where human decision-making remains central (Woo, 2020).

In the context of AI-driven workplaces, the concept of the "missing middle" refers to the critical space where people and machines work together to enhance business performance.

Successful collaboration in this area depends on specific roles and skills that connect human judgment with machine capabilities.

Key Roles are:

- Trainers: these professionals guide AI systems to learn and improve by providing the necessary data and feedback. They play a crucial role in ensuring that AI systems are effectively trained to perform their tasks.
- Explainers: Explainers make AI outputs comprehensible for different audiences. They translate complex algorithmic results into language that managers, employees, or clients can understand and trust.
- Sustainers: Sustainers are responsible for the ongoing effectiveness and ethical use of AI systems. They monitor AI performance and make necessary adjustments to ensure that the systems continue to operate as intended (Daugherty, 2024).

The following table (Table 2) highlights the essential skills required for effective collaboration with machines in the “missing middle”.

Table 4

Source: Author’s own editing based on Human + Machine: Reimagining Work in the Age of AI (Daugherty & Wilson, 2024)

Missing Middle	Fusion Skill	Definition	Aptitudes Identified
Humans Complement Machines	Rehumanizing time	The ability to increase the time available for distinctly human tasks like interpersonal interactions, creativity, and decision-making in a reimagined business process.	Interpersonal, Creative, Analytical, Practical
	Responsible normalizing	The act of responsibly shaping the purpose and perception of human-machine interaction as it relates to individuals, businesses and society.	Ethical, Contextual awareness, Analytical, Strategic
	Judgment integration	The judgment-based ability to decide a course of action when a machine is uncertain about what to do.	Analytical, Perceptive, Intuition, Ethical
Machines Complement Humans	Intelligent interrogation	Knowing how best to ask questions of AI, across levels of abstraction, to get the insights you need.	Business-savvy, Curious, Strategic

	Bot-based empowerment	Working well with AI agents to extend your capabilities and create superpowers in business processes & professional careers.	Tech-savvy, Practical
	Holistic melding	The ability to develop robust mental models of AI agents to improve process outcomes.	Intuition, Perception
Humans & Machines Together	Reciprocal apprenticing	Performing tasks alongside AI agents so they can learn new skills; and on-the-job training for people so they can work well within AI-enhanced processes.	Practical, Trustworthy, Ethical
	Relentless reimagining	The rigorous discipline of creating new processes and business models from scratch, rather than simply automating old processes.	Imaginative, Creative

Conclusion

This study has shown how AI-driven knowledge management offers both tangible opportunities (such as reduced cognitive load, personalised insights, and improved decision-making) and significant challenges in areas like ethics, data governance, and workforce readiness. By integrating case study findings with the broader literature, it becomes evident that the most effective leaders in AI-rich contexts possess a blend of technical acumen, emotional intelligence, and ethical sensibility. Fusion skills reflect a holistic approach, showing how humans and AI can work together, with AI supporting rather than replacing human abilities.

Nonetheless, responsible adoption of AI in KM requires robust oversight, including clear regulatory frameworks, transparent data practices, and ongoing model validation. Future research should focus on developing standardised measurement tools for AI-related skills and investigating how different organisational cultures either facilitate or obstruct this human-machine synergy. By adopting these strategies, leaders can harness AI's transformative power not only to tame information overload but also to drive sustainable innovation that aligns with evolving society and responds to newly emerging ethical challenges.

In conclusion, this study advocates for viewing AI not as a replacement for human expertise, but as a collaborative partner, one that enables the full realization of the information age's potential.

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Green Trade Barriers and Sustainable Market Access: Assessing Vietnamese Agricultural Export Performance to the European Union in the European Union - Vietnam Free Trade Agreement (EVFTA) Era

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Abstract:

The European Union - Vietnam Free Trade Agreement (EVFTA) has opened opportunities for Vietnam's agricultural exports to the European Union market. However, these advantages are significantly constrained by environmental protection requirements and sustainability regulations. This study aims to examine the impact of green trade barriers on Vietnam's agricultural exports by applying descriptive analysis and the gravity model for panel data. The gravity model is applied to panel data on Vietnam's agricultural exports to five major European Union markets (Germany, the Netherlands, France, Spain, and Italy) over 2015 - 2024. Findings reveal that European Union green trade barriers do not impose restrictions on Vietnamese agricultural exports. The influence of green barriers also weakens in the post-European Union - Vietnam Free Trade Agreement period, suggesting that Vietnamese exporters have adapted to the changes and taken full advantage of tariff elimination under the European Union - Vietnam Free Trade Agreement. Adapting to regulations requires close coordination among regulatory agencies, stronger government support for capacity building programs, and continuous self-improvement efforts from agricultural businesses to comply with evolving European Union sustainability standards and certification requirements. When these barriers are effectively addressed, Vietnam will fully realise its potential in green exports, promote sustainable agricultural practices, improve the livelihoods of rural smallholder farmers, and contribute to broader environmental protection goals. The findings are valuable to Vietnamese exporters, policymakers, and researchers studying trade-environment linkages in developing economies.

Keywords: Green trade barriers; EVFTA; Vietnam; agricultural exports; sustainable market access

JEL Classification: F13, F14, Q17, Q56, O24

Introduction

Agriculture has been a cornerstone of Vietnam's economic development, sustaining rural livelihoods and serving as a major source of foreign exchange earnings. Over the past three decades, the sector has shifted from subsistence farming toward an export-oriented model in global value chains. Specifically, in 2024, the agriculture, forestry and fishery sector contributed 11.86% of GDP, with total exports reaching 62.4 million and employing 27.8% of the total workforce (National Statistics Office, 2025; Hanh, 2025). Within this context, the European Union (EU) emerged as Vietnam's third-largest agricultural export market (Vu et al, 2024). The EU-Vietnam Free Trade Agreement (EVFTA) came into force in August 2020, marking a turning point in this relationship, as agricultural exports to the EU rose 42.95% over five years from 2019 to 2024 (Vietnam Economics News, 2025). The agreement initiated the immediate

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removal of 85.6% of tariff lines in 2020, with a phased approach intended to achieve 99.2% by 2027. This has narrowed the price gap with regional competitors and opened space for the expansion of Vietnam's key agricultural products (VNTR, 2020). However, there are still key issues remaining. The EU's regulatory framework has become significantly more stringent through the implementation of Technical Barriers to Trade (TBT) measures, Sanitary and Phytosanitary (SPS) measures, and the European Green Deal. This shift is further reinforced by the Farm to Fork Strategy, the EU Deforestation Regulation (EUDR), and the Carbon Border Adjustment Mechanism (CBAM). Disdier, Fontagné, and Mimouni (2008) gravity analysis estimates that the EU's SPS and TBT measures reduce developing-country agricultural exports. Vietnam itself has been a recurrent subject of RASFF notifications, particularly for pesticide residues in fresh vegetables and for veterinary residues in fish (Tuan, 2024). This creates structural tension in Vietnam's agricultural exports under the EVFTA. On one side, tariff elimination expands market access and promotes export growth. On the other hand, regulatory stringency raises compliance costs, demands investment in traceability and certification systems, and risks excluding firms that cannot meet requirements. Research conducted among 1,323 coffee growers in Vietnam highlights that ethnic minority smallholders face significant obstacles in meeting new standards. These challenges are rooted in limited regulatory knowledge, small-scale landholdings of under two hectares, and unresolved land-tenure documentation (Hoang et al, 2025).

Although green trade barriers have attracted growing attention from researchers, the existing literature still has gaps when applied to the Vietnam-EU context. Current empirical evidence on green trade barriers is mainly drawn from China, India, or developing countries in general, raising questions about how well these findings translate to Vietnam. Also, existing research has not fully engaged with the institutional shift brought about by the EVFTA. The agreement does more than lower tariffs, but it changes how trade liberalisation interacts with regulatory governance. This leaves an empirical question open: do green barriers primarily restrict trade, or do they push exporters to upgrade and adopt more sustainable production practices? Within this context, this paper aims to analyse the impact of green trade barriers on Vietnam's agricultural export to five major EU trading partners including France, Italy, the Netherlands, Germany and France during the period from 2015 to 2024. Using the gravity model, the investigation aims at achieving four objectives. Firstly, we identify the current state of Vietnam's agricultural exports and the trends in green barriers in Vietnam's main export markets. Secondly, we evaluate Vietnam's agricultural export performance to the EU by comparing pre- and post-EVFTA periods. Another objective of this study is to identify the relationship between green trade barriers and export performance, with particular attention to the differentiated impacts of TBT and SPS measures. Accordingly, this study offers strategic recommendations to advance agricultural development, ensure compliance with emerging green barriers, and secure long-term, sustainable access to the EU market.

Literature review

EVFTA and its impact on Vietnamese agricultural exports

The EVFTA is a landmark new-generation free trade agreement between the EU and Vietnam which came into force in August 2020. The agreement comprises 17 chapters, 2 protocols, and memoranda of understanding covering both traditional and new-generation free trade agreements (Europa, 2020). With comprehensive legal obligations including the elimination of tariffs, rules of origin, and regulatory standards, EVFTA has given Vietnamese exporters preferential access to the EU market. Nguyen et al. (2021) stated that the EVFTA contributes to promoting trade and investment accompanied by high standards of environmental protection and labour. The agreement dedicates a chapter to "trade and sustainable development",

emphasising the connection among economic development, social progress, and environmental protection. The sustainable development goals of the EVFTA include: (1) acknowledge the crucial role of sustainable employment, (2) encourage trade and investment in environmentally friendly goods and services, linked to issues such as climate change, conservation and sustainable management of biodiversity (including wildlife), forestry (including illegal logging), and fisheries; (3) enhance corporate social responsibility (Europa, 2020).

The EVFTA implementation has reshaped Vietnam's agricultural export at both the macro and sectoral levels. Data from the WTO Centre show that Vietnam's exports to the EU averaged USD 41.7 billion per year in the early years of implementation, up from USD 33.5 billion over 2016 - 2019 (VCCI, 2023). Also, the Ministry of Industry and Trade reports that around 94% of tariff lines on fruit and vegetable products was reduced to 0% as soon as the agreement took effect, giving Vietnamese products a clear advantage. By the end of November 2021, Vietnam's main agricultural exports to the EU had reached USD 2.2 billion, a 10.1% increase in 2020 (Vietnam Ministry of Trade, 2022). EVFTA also brings positive effects at the product level. In just the first month after entry into force, rice export prices to the EU climbed by USD 80-200 per tonne, vegetable exports jumped over 25% month-on-month, and coffee exports rose by nearly 35%. Shrimp exports grew by 15.7% during the same window, reaching USD 58.8 million (Tho, 2020). The upcoming year also shows an upward trend. Seafood exports in the first seven months were 18.2% higher than the same period a year earlier, and Vietnam's total exports to the EU hit USD 45.8 billion for the year, up 14.2% (Industry and Trade News, 2021). The pattern across these figures is consistent both volumes and prices responded quickly to tariff liberalisation.

Quantitative work has further shown the impact of EVFTA. Hoang and Ngan (2021) apply a SMART model to 17 agricultural product groups (2-digit HS codes) under a zero-tariff scenario and find that the rise in total agricultural exports outweighs trade creation. In other words, Vietnam captures market share partly by displacing less competitive exporters. Manh and Nguyen (2021) emphasise these findings through an analysis of World Bank data across two tariff-reduction scenarios. Their results indicate that while the most significant gains are concentrated in the seafood sector, these benefits remain dependent on Vietnam's competitive advantage. However, this may diminish if competitors secure comparable preferential trade agreements. Nui and Hoang (2024) take a gravity-model approach from 2018 to 2022, using GDP, tax rates, exchange rates, population, and distance as their main covariates. Their estimates show statistically significant gains for cashew nuts, pepper, and rice, while vegetables, fruits, coffee, and tea show a weaker trend. This shows that the agreement's effect varies by product. However, TBT, SPS, and traceability requirements continue to bind. Trang et al (2023) bring a firm-level perspective, showing that the EVFTA raises export volumes and sharpens competitiveness, but warn that firms unable to meet EU standards face the risk of exclusion.

Taken together, existing literature indicates that the EVFTA has lifted Vietnam's agricultural exports, but unevenly. Some products and firms have captured most of the gains while others have been left behind. Tariff reduction, better market access, and improved price competitiveness explain the upside, but the distribution of benefits depends on whether firms can meet the EU's standards. That makes the EVFTA more than a tariff agreement. It functions as a pressure test for transformation and quality upgrading in Vietnamese agriculture.

Overview of Green Trade Barriers

The concept of green trade barriers is widely referred to as green non-tariff barriers or environmental trade measures. This concept has evolved considerably since the 1990s, alongside the growing integration of environmental sustainability concerns into the global trading system (Zhao, 2024). Bhagwati and Srinivasan (1995) describe environmental trade

measures as the use of trade policy as a vehicle to achieve environmental objectives. This distinguishes them from other protectionist barriers by their ecological motivation. Currently, although there is no single universally accepted definition, scholars broadly agree that green trade barriers are policy measures, regulatory standards, or technical requirements imposed by importing countries that condition market access on the environmental performance of products or production processes (Ederington & Minier, 2003; Zhao & Gao, 2025). They are defined as non-tariff barriers and frequently used by developed countries in the context of global trade liberalisation to impede the export of agricultural products to the international market (Ren, 2018). These measures are intended to safeguard the ecological environment, natural resources, and human health (Wei, 2019; Fang & Shao, 2022). For developing countries that rely heavily on agricultural exports, these measures impose stricter quality and environmental criteria on agricultural goods, posing significant challenges to their agricultural exports (Broadstock et al, 2021; Zhang, 2025). The main forms and characteristics of the EU's green barriers can be considered from four aspects. (1) SPS measures set strict limits on pests, pesticide residues, veterinary drugs and contaminants in food and agricultural imports to protect human, animal and plant health. (2) TBT and broader technical regulations include environmental product and process standards maximum residue levels, and detailed rules on production methods. (3) Eco certifications and eco labelling schemes, such as organic and sustainability labels and carbon footprint-based requirements under the Green Deal and Farm to Fork strategies demand proof of environmentally responsible production. (4) EUDR and rules on “deforestation-free” products, and climate-related constraints on high-emission commodities act as green non-tariff barriers by conditioning entry on traceability, deforestation risk, and greenhouse gas performance (Disdier, 2018; Wei, 2019).

Causes of green trade barriers arise from a mix of environmental, food safety, and political-economic factors. Rising global concern about environmental degradation, climate change, biodiversity loss, and pollution has led many countries to introduce strict rules on pesticide residues, heavy metals, carbon emissions, and resource use. Therefore, trade measures are used to protect ecosystems and promote sustainable production. At the same time, consumers in high-income markets are increasingly demanding safe, high quality, and traceable food, so sanitary and phytosanitary standards, labelling, and certification systems are being expanded to protect human health (Wang, 2025; Ren, 2018). These environmental and health aims also interact with domestic economic interests. Specifically, governments may design high standards or complex procedures that also shield local farmers and industries from foreign competition, support green technology adoption at home, or strengthen their bargaining power in trade negotiations (Wang, 2025; Ren, 2018).

The impacts of green trade barriers on agricultural export have both sides. On the positive side, although these measures often increase compliance costs in the short run, research suggests that they can foster upgrading and strengthen competitiveness. Evidence from China and other developing economies shows that stricter green requirements may initially reduce export volumes, but over time are associated with higher export levels and broader market diversification as firms adjust and improve their production processes (Su, 2021). Compliance with more demanding environmental and quality standards encourages producers to adopt improved technologies, enhance management practices, and invest in green innovation. These changes contribute to higher product quality and greater technological sophistication in agricultural exports (Wei et al, 2025). In addition, green trade measures promote cleaner production methods and increase domestic value added. This supports a transition away from low-cost and low-quality export models toward more advanced and sustainable trade patterns (Sun et al., 2023). However, green trade barriers also become a prominent challenge for developing countries. Empirical evidence suggests that SPS measures and technical regulations imposed by the EU constrain agricultural exports from developing countries, while exerting a

comparatively limited effect on trade among developed economies (Broberg, 2010). Compliance with these standards entails substantial investments in cleaner production technologies, laboratory testing, certification procedures, traceability systems, and improved packaging. These additional requirements increase production and transaction costs, pushing smallholder farmers and SMEs to a competitive disadvantage or excluding them entirely from EU markets (Zhang, 2025). Moreover, evolving sustainability requirements under initiatives such as the European Green Deal and the Farm to Fork Strategy, as well as the need for deforestation-free supply chains, have intensified monitoring, reporting, and documentation obligations. For Viet Nam, these rules act as barriers, raising compliance costs and potentially reducing export volumes, particularly for SMEs (Mai, 2024). Specifically, many firms remain not adequately prepared to meet these protection-oriented requirements, which limits their ability to access and compete in the market (Le, 2024). In addition, meeting these standards requires investments in technological upgrading, certification, traceability systems, and conformity assessment procedures. As a result, those unable to comply with these standards face a greater risk of exclusion from the EU market (Khoi & Thuy, 2013).

Research methodology

Research model

The study applies descriptive analysis and the gravity model for panel data to examine the impact of green trade barriers on Vietnamese agricultural export performance to five major EU member states (Germany, the Netherlands, France, Spain, and Italy) over the period 2015 - 2024. To assess the effect of the EVFTA, the analysis is conducted separately for two sub-periods: 2015 - 2019 (pre-EVFTA) and 2020 - 2024 (post-EVFTA). The gravity model first applied to international trade by Tinbergen (1962) modelled bilateral trade as a positive function of the trading partners' economic sizes and an inverse function of the distance between them. It has since become the standard quantitative framework for analysing trade barriers (Anderson & Wincoop, 2003). The general log-linearized form is:

$$\ln(X_{ij,t}) = \beta_0 + \beta_1 \ln(GDP_{j,t}) + \beta_2 \ln(GDP_{i,t}) + \beta_3 \ln(POP_{j,t}) + \beta_4 \ln(DIST_{ij}) \\ + \beta_5 RER_{j,t} + \beta_6 OPEN_{j,t} + \beta_7 TBT_{j,t} + \beta_8 SPS_{j,t} + \beta_9 GRB_{j,t} + \beta_{10} L.grb_{j,t} + e_{ij,t}$$

where i denotes Vietnam, j denotes each EU member state, and t denotes the year. Variable definitions, signs and source of collection are summarized below:

Table 1: *Variables, definitions, signs, and data sources*
Source: *Author's own work*

Variable	Definition	Sign	Source
$X_{ij,t}$	Vietnam's agricultural export value to EU state j, year t (thousand USD, FOB)	Dependent	Trademap (ITC)
$GDP_{j,t}$	GDP of EU member state j	+	World Bank
$GDP_{i,t}$	GDP of Vietnam	+	World Bank
$POP_{j,t}$	Population of EU member state j in year t	+	World Bank

$RER_{j,t}$	Real exchange rate (LCU of j vs USD)	+	World Bank
$OPEN_{j,t}$	Imports of goods and services, % of GDP of j	+	World Bank
$TBT_{j,t}$	No. of TBT notifications by j on Vietnamese agri-products	–	WTO, Eping
$SPS_{j,t}$	No. of SPS notifications by j on Vietnamese agri-products	–	WTO, Eping
$GRB_{j,t}$	Sum of number of TBT and SPS	+	WTO, Eping

Vietnam's agricultural export value to each EU member state is computed as the total FOB-priced export value across all HS Chapters 01 - 24 (excluding Chapter 03), together with additional HS headings and codes designated under Annex 1 of the WTO Agreement on Agriculture. Annual product-level data are extracted from Trademap. Following prior literature, green barriers are measured by the annual count of TBT and SPS notifications retrieved from the WTO Environmental Database (Wood et al., 2019; Chen, 2019). TBT covers technical standards, labelling, testing, and certification. SPS covers food safety requirements, maximum residue limits, pest control, and border inspection. Standard gravity model controls are included: GDP of the importing EU member state and Vietnam, population of EU countries, the real exchange rate between the partner currency, and trade openness of the importing country measured as imports of goods and services as a percentage of GDP.

Data Analysis

STATA is used for data analysis. Eight model specifications are run and structured as four regulatory specifications across two sub-periods. The four regulatory specifications differ in how green trade barriers enter the model: (i) TBT only, (ii) SPS only, (iii) TBT and SPS combined as an aggregate green trade barrier index (GRB), and (iv) TBT and SPS entered jointly as separate, simultaneous regressors. Each of these four specifications is estimated separately for the pre-EVFTA period (2015 - 2019) and the post-EVFTA period (2020 - 2024), consisting of eight models in total. This design allows a direct comparison of whether the agreement has shifted the relationship between green trade barriers and Vietnamese agricultural export performance. The panel covers five EU markets (Germany, the Netherlands, France, Spain, and Italy), giving $n = 25$ for each sub-period.

Panel data techniques for regression analysis using OLS, and the Breusch-Pagan test to examine the presence of panel effects. Fixed Effects (FE), Random Effects (RE), and Hausman models are estimated to select the most appropriate model. We chose the Fixed Effects result because it accurately reflects the impact of green trade barriers and their components on the value of Vietnam's agricultural exports. At the same time, the Fixed Effects model was also considered more suitable because it controls for unobserved country-specific differences that may correlate with the explanatory variables, providing a more reliable estimate. Furthermore, to capture the potential dynamic effects and delayed responses in trade flows, the model incorporates one-period lagged policy variables, including L.TBT, L.SPS, and L.GRB. Given that the impact of green trade barriers is unlikely to occur immediately, as exporters typically need time to adjust production processes, comply with standards, and reorganize supply chains, this analytical approach is appropriate.

Empirical results

Descriptive analysis

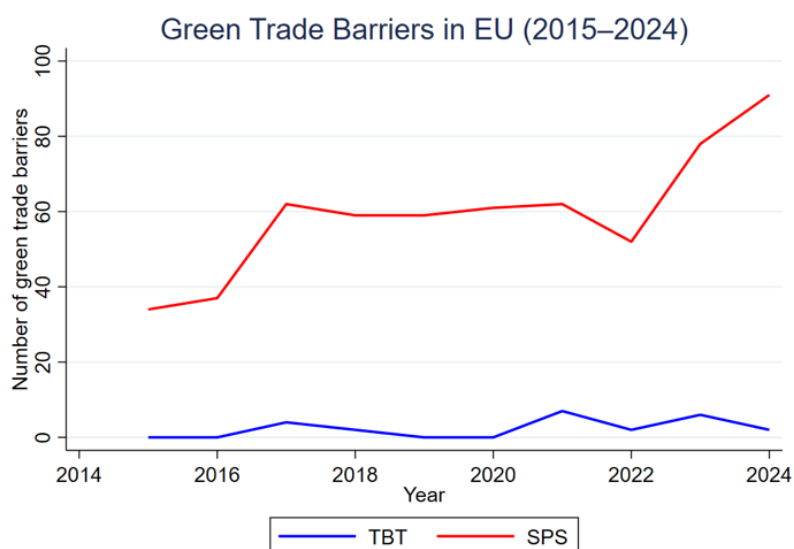


Figure 1: *Number of TBT and SPS Measures during 2015 - 2024 of EU market*

Source: *Author's Calculation*

After conducting a descriptive analysis and classification of green trade barriers based on the subjects of imposition, it can be seen that the number of green barriers from the EU fluctuates from year to year, but generally tends to increase over time. Also, SPS measures dominate throughout the period. TBT notifications remained low and stable, while SPS notifications were consistently several times higher. This reflects the EU's focus on food safety, animal health, and plant protection as the primary regulatory tools for agricultural imports. Second, the comparison between pre- and post-EVFTA reveals a clear regulatory pressure. SPS notifications averaged around 51 per year before the agreement came into force, rising to roughly 68 per year afterwards, an increase of about 33%. TBT notifications, by contrast, showed almost no change between the two sub-periods. For Vietnamese exporters, it can be noted that compliance pressure operates primarily through SPS channels rather than TBT, and this pressure intensified precisely during the period when the EVFTA was meant to ease market access.

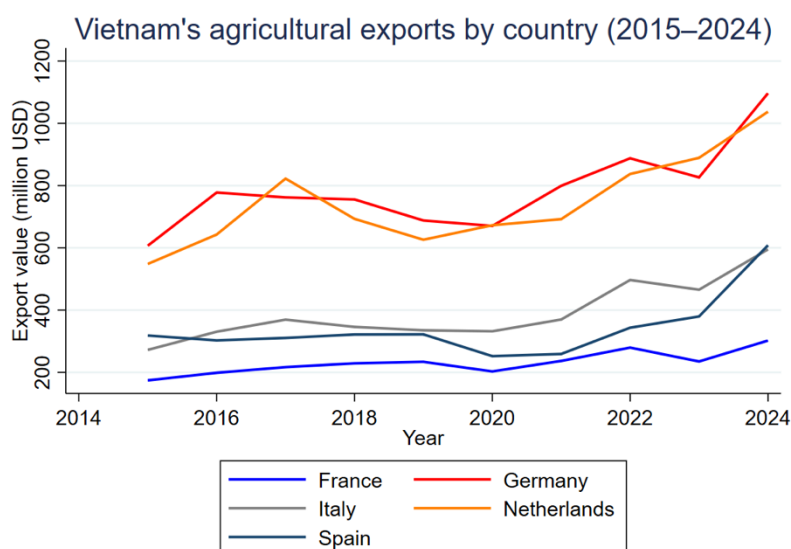


Figure 2: *Vietnam's agricultural products export value during 2015 - 2024 based on country (million USD)*

Source: *Author's Calculation*

Simultaneously, total agricultural export turnover fluctuated from 2015 to 2024 (decreasing during 2015-2020, then growing again during 2020-2024). Germany and the Netherlands are the largest importers of agricultural products from Vietnam. Among the five EU importing partners, France had the lowest import value and saw a slight increase over the years. In addition, the value of all agricultural products imported from Vietnam to Italy and Spain also continued to increase year by year.

Also, Figures 1 and 2 reveal a striking pattern about the Vietnam-EU agricultural trade relationship. The EU has tightened its green regulatory regime substantially over the past decade. Yet Vietnamese agricultural exports to its largest partners have continued to grow and accelerate in the post-EVFTA period. Therefore, it can be concluded that although green trade barriers, specifically SPS notifications have increased dramatically during the post EVFTA period, Vietnamese agricultural exporters have adapted well to these changes and taken advantage of tariff eliminations to enhance exports.

Impact of green trade barriers on Vietnamese agricultural export value

Table 2: *Results from running the Gravity model by Fixed effects with the difference in considering the green trade barriers*

Source: *Author's Calculation*

lnX	Coefficient(1)	Coefficient(2)	Coefficient(3)	Coefficient(4)
lnGDPj	1.055313**	0.9622337*	1.229103**	0.6269064
lnGDPI	-0.6588365**	-0.0807522	-0.6067058**	-0.5966133
lnPOPj	-2.805011	-3.132646	-3.059839	-2.398996

dist	0 (omitted)	0 (omitted)	0 (omitted)	0 (omitted)
rer	3.460848***	2.51121***	3.303065***	3.87473**
openj	0.0039668	- 0.0238264***	.0063228	-0.0131298
grb	0.0058163**			
L.grb	0.0055691***			
tbt		0.0245622**		0.0316742*
L.tbt		0.045488***		0.029745
sps			0.0054305**	0.0038272
L.sps			0.0048746*	0.0063446
Constant	49.105	48.05451	48.99862	50.17717*
R²	0.7613	0.7719	0.7454	0.7951

Model (1) is applied to understand the impact of green trade barriers, which is the sum of TBT and SPS on the export value of Vietnamese agricultural products. Models (2) and (3) consider green trade barriers as only TBT and only SPS to understand whether each type affects the dependent variable. Finally, model (4) considers both TBT and SPS in the model but separately.

Based on the results of model (1), the R² coefficient = 0.7613 indicates that the variables in the model (GDP, population, real exchange rate, import value to GDP ratio, and number of green barriers) explain more than 76% of the variation in exports across the observations. We observed a positive correlation between the number of green barriers and the value of Vietnam's agricultural exports, with coefficients for both the simultaneous variable and the one-period lagged variable being 0.005816 and 0.0055691, respectively. Vietnam's exports increased by 0.5% in value for each additional green barrier, with the overall impact distributed over time. This figure is considered quite large for export values reaching tens of billions of dollars per year. This positive correlation may reflect the adaptability of Vietnamese exporters to increasingly stringent technical and environmental regulations. In the short term, businesses can react by making immediate adjustments such as reallocating exports or complying with basic requirements. While in the long term, exporters invest in upgrading technology, improving quality, and adopting more efficient production systems.

The VIF test results show serious multicollinearity among the explanatory variables of green trade barriers, namely GRB, TBT, and SPS. Therefore, we put TBT and SPS into two separate

models as models (2) and (3) and put these two variables into the same model as two independent variables as model (4) to get more comprehensive results.

In model (2), the R² coefficient = 0.7719, indicating that the variables in the model (GDP, population, real exchange rate, import value to GDP ratio, and number of TBT) explain more than 77% of the variation in exports of the studied observations. The estimation results also show that TBT measures have a positive impact on the export value of Vietnamese agricultural products. The export value will increase by approximately 2.46% in the same period for each additional unit of TBT. In addition, the larger correlation coefficient for the lagged TBT variable (0.0455) indicates that the impact of TBT strengthens over time. This result suggests that exporters may initially face difficulties adapting to technical standards, but in the long term, they can gradually adjust by improving product quality, technology, and production processes.

The model estimation results (3), with R² = 0.7454, show that the variables in the model (GDP, population, real exchange rate, import value-to-GDP ratio, and number of sanitary and phytosanitary agreements) explain more than 74% of the variation in exports across the studied observations. The model results also show that SPS measures have a positive impact on the export value of Vietnamese agricultural products, with each additional unit of SPS increasing export value by about 0.54% over the same period. The impact of SPS is sustained over time, as indicated by a positive correlation coefficient for the lagged variable, suggesting that SPS helps maintain the ability of Vietnamese exports to meet international standards.

On the other hand, when TBT and SPS are included in the model (4) simultaneously, the results show that only the current effect of TBT is statistically weak, while the lagged effect of TBT, the current and lagged effects of SPS are no longer statistically significant. This result shows that TBT and SPS may reflect similar aspects of green trade barriers, leading to multicollinearity and reducing the individual explanatory power of each variable when included in the same model. Therefore, analysing each type of barrier separately may provide clearer information.

Furthermore, to examine whether the impact of green trade barriers changed after the EVFTA came into effect in 2020, we compared two research periods: ped1 (2015-2019) and ped2 (2020-2024). This comparison between two periods helps assess the impact of the EVFTA before and after its entry into force, determining whether the agreement altered the relationship between green trade barriers and Vietnam's agricultural exports.

Table 3: *Results of the Gravity Model (Fixed Effects) by Pre- and Post-EVFTA Periods*
Source: *Author's Calculation*

lnX	Coefficient(5)		Coefficient(6)		Coefficient(7)		Coefficient(8)	
	ped1	ped2	ped1	ped2	ped1	ped2	ped1	ped2
lnGDPj	1.307071***		1.036816**		1.584517***		1.034576	
lnGDPI	-2.074369***		0.0460485		-1.934382***		-1.703006**	
lnPOPj	-3.24291*		-3.211601*		-3.627399*		-3.018846	
rer	4.658416***		2.487189***		4.366181***		4.409676***	

openj	0.0153064**		-0.0205352**		0.0199015**		0.0004201	
grb	0.0080152***	0.0038841**						
L.grb	0.0110919***							
tbt			0.0364367**	-0.0207694			0.0261529	-0.0009411
L.tbt			0.036421**				0.0300615	
sps					0.0075421***	0.003722**	0.0057725	0.0033739**
L.sps					0.0099601***		0.0092725	
Constant	77.16537**		45.27325		75.49204**		72.74974**	
R₂	0.8157		0.7833		0.7922		0.8326	

Model (5) is applied to understand the impact of green trade barriers, which is the sum of TBT and SPS, on the export value of Vietnamese agricultural products. Models (6) and (7) consider green trade barriers as only TBT and only SPS to find out whether each type affects the dependent variable. Finally, model (8) considers both TBT and SPS in the model but separately. When interaction terms are added to lagged variables, the estimated coefficients are no longer statistically significant. This may be due to increased multicollinearity and a small sample size. Therefore, we only retain interaction variables for the current green trade barriers, while assuming that lagged effects and other independent variables remain unchanged between periods. The test results of model (5) show that the green trade barriers measured as aggregate (GRB) have a positive impact on Vietnam's agricultural exports. Still, the coefficient decreased from 0.0080 in the period before EVFTA to 0.0039 in the period after, indicating that the impact of green trade barriers is declining. When separating the components of green trade barriers in models (6) and (7), the test results show that TBT and the lagged variable of TBT both have a strong positive impact before EVFTA, but completely lose statistical significance in the period after. Similarly with SPS, this variable has only a lagged impact in the period before EVFTA, but is no longer statistically significant in the period after. The test results for model (8) with the simultaneous presence of both TBT and SPS show that neither variable is statistically significant in either period, due to the overlap in reflecting green trade barriers. Overall, prior to the EVFTA, green barriers were a driving factor in businesses' adaptation and upgrading

processes. However, after the EVFTA, the impact of green barriers has decreased, indicating a better ability of Vietnamese exporters to adapt to these standards.

Discussions of findings

The empirical results yield two main findings. First, over the period 2015 - 2024, EU green trade barriers are associated with a positive effect on Vietnamese agricultural exports. These findings are consistent with Su (2021) and Wei et al (2025), who posit that stringent regulations can stimulate innovation and enhance competitiveness rather than hinder market participation. In this context, Vietnamese exporters appear to have responded to EU regulatory pressures by upgrading production technologies, adopting internationally recognized certifications such as VietGAP and GlobalG.A.P., and strengthening quality control systems (Trang et al, 2023). The larger lagged effect of TBT measures further supports this interpretation as technological adaptation and compliance investments typically require time to materialize. Over time, such adjustments contribute to the accumulation of “compliance capital”, including technical capabilities, institutional knowledge, and reputational assets that facilitate continued access to the EU market and maintain sustainable export performance. Second, the impact of green trade barriers has weakened in the post-EVFTA period. On the one hand, firms that have already adapted to earlier regulatory requirements face lower marginal costs when complying with new standards. On the other hand, the EVFTA itself plays a facilitating role. Its provisions on TBT, SPS, and Trade and Sustainable Development (TSD) promote regulatory dialogue, transparency, and capacity building, while tariff reductions increase the returns to compliance. Consequently, the system has transitioned from one characterized by adjustment shocks to one in which compliance is integrated within exporters’ operational practices.

Also, the comparison between the pre- and post-EVFTA periods highlights the sustainability of market access for Vietnamese exports. Prior to the agreement, Vietnamese exports were highly sensitive to newly introduced barriers. In contrast, in the post-EVFTA period, the effects become smaller and statistically insignificant, suggesting that exporters have internalised compliance mechanisms. Certification systems, traceability infrastructure, residue testing, farmer training, and direct buyer relationships are now integrated within Vietnamese agricultural value chains. The EVFTA reinforces this evolution by institutionalizing sustainability within the trade framework. Thus, the agreement not only enhances market access but also establishes the conditions necessary for its long-term sustainability. Looking ahead, the regulatory environment is expected to become increasingly demanding. Initiatives such as the European Green Deal, the Farm to Fork Strategy, the EU Deforestation Regulation and the Carbon Border Adjustment Mechanism will further require more sustainability requirements. Hence, the evidence presented here is both encouraging and cautionary. On the one hand, Vietnamese exporters have demonstrated a capacity to adapt to stringent standards without compromising export growth. On the other hand, emerging requirements, such as geolocation-based land-use verification and carbon footprint reporting will necessitate more advanced monitoring, verification, and reporting systems. Sustaining market access will therefore depend on extending current upgrading initiatives into these new domains, with the EVFTA’s institutional framework serving as a key platform for continued cooperation and capacity building.

Conclusion and recommendations

This study examines how EU green trade barriers have shaped Vietnam's agricultural export performance during 2015-2024 using the gravity model on panel data covering five major EU markets. The empirical evidence suggests that contrary to the conventional "barrier-as-obstacle" framing, EU green trade barriers have not restricted Vietnamese agricultural exports. Once

exporters have time to adapt, both TBT and SPS measures are associated with positive export outcomes. It can be inferred that the ability to meet environmental, food-safety, and traceability requirements has been integrated into the production line of Vietnamese agricultural value chains. Market access in the EVFTA era is therefore inseparable from the sustainability performance of the agricultural production system. The pre- and post-EVFTA comparison further suggests that this access has become more durable. Before the agreement, Vietnamese exports were highly sensitive to newly introduced regulatory measures. After the EVFTA entered into force, several previously significant coefficients lost statistical significance. This shift does not reflect declining regulatory pressure but the integration of compliance capabilities in the operations of Vietnamese exporters. EVFTA has contributed to promoting cleaner production practices, improving traceability, and strengthening food-safety systems across Vietnamese agricultural value chains. The implications extend beyond export performance to the livelihoods of smallholder farmers integrated into certified chains and to broader environmental and food-safety objectives shared by Vietnam and the EU.

In the context that the EU's regulatory agenda continues to expand through the European Green Deal, the Farm to Fork Strategy, the EU Deforestation Regulation, and the Carbon Border Adjustment Mechanism, each of which introduces new compliance dimensions, may go beyond the systems Vietnamese exporters have already built. The capacity to convert regulatory pressure into upgrading in earlier periods is encouraging. Still, it does not guarantee the same outcome under these new instruments, particularly for smallholders and small and medium-sized exporters with limited financial and technical capacity. Therefore, several implications can be drawn. For Vietnamese policymakers, increased public investment in laboratory infrastructure, residue testing, traceability systems, land-use monitoring, and farmer training can help reduce compliance costs and accelerate adaptation. In particular, agencies such as the Ministry of Agriculture and Rural Development and the Ministry of Industry and Trade should further develop early-warning systems to translate evolving EU requirements into clear, actionable guidance for cooperatives and small exporters. Strengthening pre-export inspections and improving the organisation of certified value chains would also reduce border rejections and protect Vietnam's export reputation. Second, exporters and firms should integrate certification and sustainability reporting into their cost structures and build direct relationships with EU buyers. Moreover, the current concentration of exports in Germany and the Netherlands suggests a need to diversify into other EU markets to mitigate market risk. For the EU, as new frameworks such as EUDR and CBAM are implemented, enhanced technical and financial support for partner countries like Vietnam will be essential to ensure that higher standards promote global sustainability, rather than diverting trade toward less-prepared suppliers.

Although the findings provide valuable insights, the present study has several limitations that should be acknowledged and may serve as directions for future research. Firstly, the empirical analysis is based on a relatively small panel, which may constrain statistical power and affect the robustness of interaction terms. Future studies could enhance estimation precision by expanding the sample to all EU member states and extending the post-EVFTA period beyond 2024. In addition, the measurement of green regulatory barriers relies on TBT and SPS notifications as proxies for regulatory stringency. While commonly used in the literature, these indicators only capture the presence of regulatory actions and do not fully reflect important dimensions such as enforcement intensity, compliance costs, or the actual restrictiveness of individual measures across countries and sectors. Future research could improve measurement by constructing weighted or text-based indices that better capture the substantive burden of EU regulations.

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Tipping points in urban freight decarbonisation: When do low-emission logistics systems become self-reinforcing? Evidence from London

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Abstract

Urban freight transport has become a growing source of emissions and congestion in major cities, mainly driven by the rapid expansion of e-commerce and last-mile delivery demand. This study examines whether urban freight decarbonisation is approaching a tipping point at which low-emission logistics solutions become self-reinforcing and dominant. Using London as a qualitative case study, the research analyses secondary data from policy documents, industry reports, and corporate sustainability disclosures. The study is grounded in the concept of tipping points in complex systems, focusing on the emergence of reinforcing dynamics in logistics systems. The findings suggest that urban freight in London is nearing such a threshold, driven by the interaction of regulatory pressure — particularly the Ultra Low Emission Zone — declining costs of electric vehicles, and the diffusion of alternative delivery models such as cargo bikes and urban consolidation centres. These factors contribute to understanding how adoption, innovation, and cost reductions mutually reinforce one another. The study highlights that decarbonisation may become self-sustaining when business-level cost and operational advantages align with initial policy interventions, offering both theoretical and practical implications for urban logistics transitions.

Keywords: decarbonisation, urban freight, tipping points, sustainable logistics, last-mile delivery, London, urban sustainability

JEL classification: R41, R48, Q56, L91, O33

Introduction

Urban freight transport has become a critical challenge for sustainable cities, driven by the rapid expansion of e-commerce and increasing demand for last-mile delivery services (Dablanc, 2007; Allen et al., 2012). While urban logistics systems are essential for economic activity, they also contribute significantly to congestion, greenhouse gas emissions, and local air pollution. In major metropolitan areas, freight transport can account for a significant share of transport-related emissions (World Economic Forum, 2024), intensifying pressure on policymakers and industry actors to accelerate decarbonisation. In response, cities have introduced a range of regulatory measures aimed at reducing emissions from urban freight, including low-emission zones, vehicle restrictions, and financial incentives for cleaner technologies (Akgün et al., 2019). Among these initiatives, London's Ultra Low Emission Zone (ULEZ) stands out as one of the most comprehensive and influential policy interventions, implemented and expanded under the authority of Transport for London. At the same time, logistics companies have begun to adopt alternative delivery models, such as electric vehicles, cargo bikes, and urban consolidation centres, often driven not only by compliance requirements but also by emerging cost and efficiency advantages (Maxner et al., 2022; Toniolo et al., 2025).

Despite these developments, an important question remains partially explored: to what extent are current urban freight systems approaching a tipping point in decarbonisation, where low-emission solutions become self-reinforcing and dominant? Existing research has largely

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focused either on policy effectiveness or on technological adoption, but has paid less attention to the dynamic interaction between regulation, market forces, and operational innovation. This study addresses this gap by examining whether urban freight decarbonisation can evolve from a policy-driven process into a self-sustaining market dynamic. Building on the concept of tipping point, the paper investigates the conditions under which small and incremental changes — such as cost reductions in electric vehicles or incremental regulatory tightening — can trigger rapid and systemic transformation in logistics systems (Geels, 2002; Geels, 2019).

Using London as a qualitative case study, the research explores how regulatory pressure, declining technology costs, and operational innovation interact to create reinforcing feedback loops in urban freight transportation (Dablanc, 2007; Allen et al., 2012). The central argument is that decarbonisation becomes self-reinforcing when business-level cost and operational advantages align with initial policy interventions, enabling the transition to persist even if regulatory escalation ceases.

This paper makes three main contributions to the literature. First, it introduces a tipping point perspective to the study of urban freight decarbonisation, extending existing research on sustainability transitions to logistics systems. Second, it develops a conceptual framework that explains how regulatory pressure, cost dynamics, and operational innovation interact to create self-reinforcing adoption processes. Third, it provides a business-oriented interpretation of decarbonisation, highlighting how competitive and operational advantages can sustain the transition beyond initial policy interventions.

Literature review

Urban freight decarbonisation and business dynamics

Urban freight transport has received increasing attention in recent years due to its growing environmental impact and its central role in supporting urban economies (Dablanc, 2007; Allen et al., 2012). The expansion of e-commerce has led to a significant rise in last-mile deliveries, placing additional strain on urban infrastructure and contributing to emissions and congestion (Cherrett et al., 2012; Maxner et al., 2022). As a result, decarbonising urban logistics has become a key priority for both policymakers and industry actors (Dablanc, 2007; Allen et al., 2012). From a business perspective, logistics firms operate in highly competitive environments where cost efficiency, reliability, and service speed are critical (Akgün et al., 2019; Björklund et al., 2017). Traditionally, Internal Combustion Engine (ICE) vehicles have dominated urban freight due to their flexibility and relatively low upfront costs. However, recent technological developments — particularly in electric vehicles (EVs) — have started to reshape this landscape. While EVs initially faced higher capital costs and operational constraints, declining battery prices and lower operating costs (e.g., fuel and maintenance) are increasingly improving their economic viability (Nykvist & Nilsson, 2015; The International Energy Agency, 2024; The International Energy Agency, 2025). In parallel, alternative delivery models — such as cargo bikes and urban consolidation centres — are gaining traction, particularly in dense urban environments (Gruber et al., 2014; Apanasevic & Fjallström, 2026). These solutions can offer not only environmental benefits but also operational advantages, such as faster delivery times in congested areas and reduced parking constraints. As a result, decarbonisation strategies are increasingly aligned with business objectives, rather than driven solely by regulatory compliance (Björklund et al., 2017; Akgün et al., 2019). Recent research has also highlighted that the effectiveness of low-emission logistics solutions is highly context-dependent, particularly concerning urban density, infrastructure availability, and regulatory consistency (Maxner et al., 2022; Toniolo et al., 2025). In dense metropolitan areas, the operational advantages of alternative delivery models — such as cargo bikes and micro-depots — are more pronounced due to shorter delivery distances and higher congestion levels. Conversely, in less

dense urban environments, the economic case for such solutions may remain weaker, as longer delivery routes and lower drop densities limit efficiency gains. These spatial and structural differences suggest that the emergence of self-reinforcing dynamics in urban freight decarbonisation is not uniform across cities, but rather contingent on local conditions and policy frameworks. This further underlines the importance of integrating technological, economic, and institutional perspectives when analysing transition processes in urban logistics.

Policy as a catalyst for transition

Regulatory interventions play a crucial role in initiating and accelerating the decarbonisation of urban freight systems. Policies — such as low-emission zones, access restrictions, and emissions standards — create external pressures that incentivise firms to adopt cleaner technologies and rethink their logistics operations (Akgün et al., 2019). In London, the introduction and expansion of the Ultra Low Emission Zone (ULEZ) has significantly increased the cost of operating high-emission vehicles, thereby altering the economic calculations for logistics providers (Greater London Authority, 2018; Transport for London, 2024). However, while policy interventions are effective in triggering initial change, their long-term impact depends on whether they can stimulate self-sustaining dynamics within the market (Akgün et al., 2019; Paddeu, 2025). If low-emission solutions remain dependent on continuous regulatory support, the transition may slow down once political momentum weakens. If policy measures succeed in shifting cost structures and enabling innovation, they can create conditions in which market forces reinforce and accelerate the transition.

Tipping points and self-reinforcing transitions

The concept of tipping point originates in the study of complex systems and refers to a critical threshold (Farmer et al., 2019; Mealy et al., 2023) at which small changes can lead to rapid and irreversible transformations (Geels, 2002; Geels, 2012; Petrovic, 2024). In the context of sustainability transitions, tipping points are associated with the emergence of self-reinforcing dynamics, in which adoption, innovation, and cost reductions mutually accelerate one another. Within the framework of sustainability transitions, transitions are understood as non-linear processes shaped by interactions between technology, policy, markets, and social practices. While much of this literature has focused on energy systems, its application to urban freight remains limited.

This paper extends the tipping point perspective to urban logistics by proposing that decarbonisation may reach a stage at which feedback loops among adoption, innovation, and cost reduction drive further adoption independently of policy pressure. In this context, policy acts primarily as an initial trigger, while long-term transformation is sustained by business-level incentives and competitive dynamics.

Methodology

This study applies a qualitative case study approach to examine the emergence of tipping dynamics in urban freight decarbonisation. The research focuses on London as a critical case, given its advanced regulatory framework, dynamic logistics market, and early adoption of low-emission delivery solutions. A case study methodology is particularly suitable for exploring complex, non-linear transition processes, where interactions between policy, technology, and market dynamics play a central role. Rather than testing predefined hypotheses, the study adopts an exploratory and interpretive approach to identify patterns and mechanisms underlying the emergence of self-reinforcing dynamics in urban logistics systems. The analysis is based on three types of secondary data: policy and regulatory documents (e.g., Ultra Low Emission Zone

frameworks), industry reports on urban logistics or last-mile delivery, and corporate sustainability disclosures from major logistics and e-commerce companies.

These sources are used to trace key developments in London's urban freight system, with a particular focus on three dimensions: regulatory pressure, technological and cost developments, and operational innovation. The analytical framework is guided by the concept of tipping points in complex systems, emphasising the identification of reinforcing feedback loops between adoption, innovation, and cost dynamics (Stermann, 2000). The analysis follows a pattern-matching approach to identify mechanisms consistent with tipping point dynamics.

Case study: London

London provides a compelling context for analysing urban freight decarbonization, given its combination of strong regulatory intervention and a highly competitive logistics environment (Transport for London, 2024; Greater London Authority, 2025). The city has implemented one of the most comprehensive urban emissions policies through the Ultra Low Emission Zone (ULEZ), introduced and expanded under the authority of Transport for London (Transport for London, 2024; Greater London Authority, 2025). The ULEZ operates continuously and imposes charges on vehicles that do not meet strict emissions standards, significantly increasing the operating costs of high-emission freight vehicles (Transport for London, 2024). This policy has created a strong economic incentive for logistics providers to transition towards cleaner alternatives. Importantly, the impact of ULEZ extends beyond direct compliance, reshaping long-term investment decisions and operational strategies within the logistics sector.

At the same time, London's urban freight system is characterised by a high level of innovation and experimentation. Logistics companies have increasingly adopted electric delivery vans, cargo bikes, and micro-depots to improve efficiency in dense urban environments (Gruber et al., 2014; Levrey et al., 2025). These solutions are particularly suited to last-mile delivery, where congestion, parking constraints, and delivery time pressures create strong incentives for operational optimization. Cargo bikes, for example, have emerged as a viable alternative for short-distance deliveries in central areas, offering lower operating costs and greater flexibility compared to traditional vans. In addition, urban consolidation centres and micro-hubs enable the redistribution of goods closer to end customers, reducing vehicle kilometres and improving delivery efficiency (Browne et al., 2011).

In addition to technological adoption, large logistics providers and e-commerce companies have made public commitments to reduce emissions, further reinforcing the transition. These corporate strategies are driven not only by regulatory compliance but also by cost considerations, reputational factors, and rising customer expectations for sustainable delivery options (World Economic Forum, 2024).

Results and analysis: emerging tipping dynamics

Based on the findings, the paper proposes a conceptual framework of urban freight decarbonisation as a self-reinforcing system (Geels, 2002; Sterman, 2000). The framework identifies a feedback loop among regulation, adoption, innovation, and cost dynamics that together drive the transition towards low-emission logistics solutions. The analysis suggests that London's urban freight system is approaching a tipping point in decarbonisation, characterized by the emergence of self-reinforcing dynamics between policy, market forces, and operational innovation (Farmer et al., 2019; Mealy et al., 2023). A central mechanism identified in the case study is a reinforcing feedback loop in which regulatory pressure initiates adoption, which in turn drives innovation and cost reductions, leading to further adoption (Arthur, 1989; Sterman, 2000). This dynamic can be conceptualised as a self-reinforcing feedback loop (Figure 1). The conceptual framework presented in Figure 1 illustrates how

regulatory pressure, adoption, innovation, and cost dynamics interact to drive the transition towards low-emission logistics solutions.

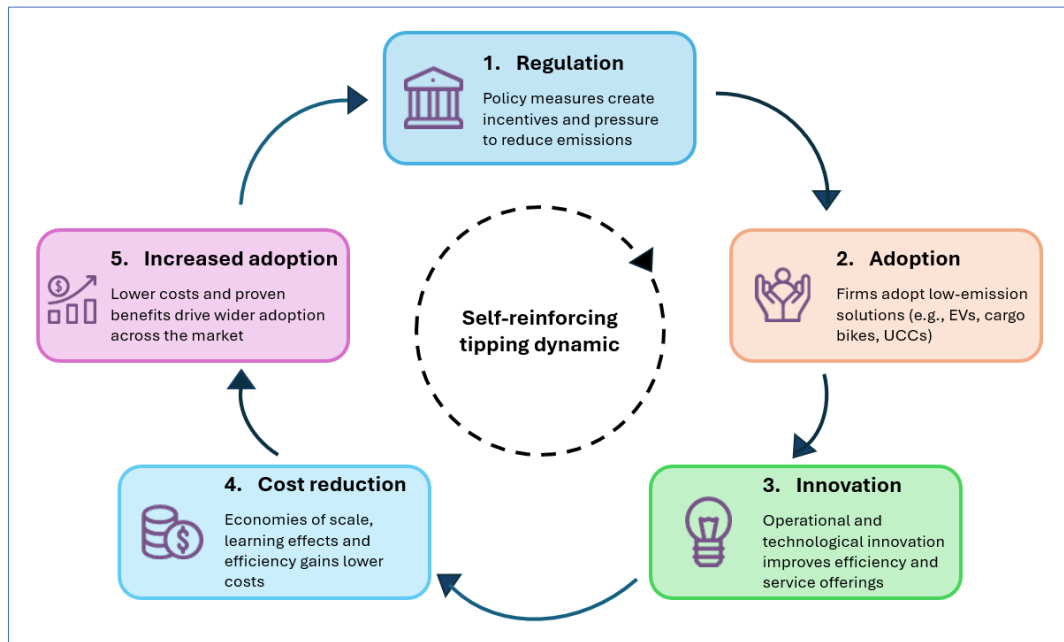


Figure 2: *Conceptual framework of self-reinforcing urban freight decarbonisation*
Source: *own editing based on Geels (2002) and Sterman (2000).*

Initially, regulatory measures — such as the ULEZ — increase the relative cost of high-emission vehicles, encouraging logistics firms to experiment with low-emission alternatives. As adoption increases, scale effects and learning processes contribute to technological improvements and cost reductions, particularly in electric vehicles and alternative delivery models (Nykqvist & Nilsson, 2015; Wu et al., 2015).

These cost reductions gradually shift the economic balance in favour of low-emission solutions, making them competitive — or even advantageous — compared to traditional options (Wu et al., 2015; Nykvist & Nilsson, 2015). At this stage, adoption is no longer driven solely by compliance but increasingly by business logic, including lower operating costs, improved efficiency in congested urban environments, and alignment with corporate sustainability strategies. The expansion of supporting infrastructure, such as charging networks and urban logistics hubs, further reinforces this dynamic by reducing operational constraints and increasing the feasibility of low-emission delivery models (Toniolo et al., 2025). As a result, the system begins to exhibit characteristics of a tipping point, where incremental changes accelerate and potentially become irreversible.

Importantly, the findings suggest that once a critical threshold is reached, the role of policy may shift from a primary driver to a supporting or stabilising function. In this phase, market forces and competitive dynamics sustain the transition, reducing dependence on continuous regulatory escalation.

Proposition 1: Urban freight decarbonisation becomes self-reinforcing when the total cost of low-emission delivery solutions falls below that of conventional alternatives.

Proposition 2: Early regulatory interventions accelerate tipping dynamics by reducing uncertainty and enabling initial adoption.

Discussion

The findings of this study suggest that urban freight decarbonisation may evolve from a policy-driven process into a self-sustaining market dynamic once specific conditions are met. This has important implications for both theory and practice. The findings also point to important variations in how tipping dynamics may unfold across different urban contexts. While London provides a case of relatively advanced regulatory intervention and market adaptation, other cities may experience slower or more fragmented transitions due to weaker policy frameworks, limited infrastructure, or lower levels of market competition. This suggests that tipping points in urban freight decarbonisation are not predetermined, but depend on the alignment of multiple enabling conditions (Geels, 2019). In particular, the interaction among policy stringency, technological maturity, and business incentives appears to be critical in determining whether a transition becomes self-reinforcing. Furthermore, the results highlight the importance of timing and sequencing in policy design. Early regulatory interventions, such as low-emission zones, play a crucial role in initiating change by altering cost structures and reducing uncertainty for firms. However, the long-term success of these measures depends on their ability to stimulate innovation and create market conditions that sustain adoption independently of continued policy escalation. This raises important questions regarding the optimal design of policy instruments, particularly in balancing short-term regulatory pressure with long-term market development.

From a broader perspective, the study contributes to ongoing debates on the role of market mechanisms in sustainability transitions. The findings suggest that, under certain conditions, environmental improvements can become aligned with economic rationality, enabling transitions to be driven not only by policy but also by competitive dynamics and operational efficiencies. This has implications beyond urban freight, suggesting that tipping-point dynamics may emerge in other sectors where technological change, regulatory intervention, and business incentives converge.

From a theoretical perspective, the results support and extend insights from sustainability transitions by demonstrating how tipping dynamics can emerge not only in large-scale energy systems but also in urban logistics (Geels, 2019; Petrovic, 2024). The analysis highlights that tipping points are not solely driven by technological breakthroughs or policy steps but rather by the interplay among regulatory pressure, business incentives, and operational innovation (Farmer et al., 2019). A key contribution of this study is the identification of reinforcing feedback loops at the firm and system levels (Sternman, 2000). As low-emission solutions are adopted, they generate learning effects, infrastructure development, and cost reductions, which in turn stimulate further adoption. This aligns with the concept of tipping point, where incremental changes can trigger an accelerated, potentially irreversible transformation once a critical threshold is reached.

From a business perspective, the findings indicate that decarbonisation is increasingly aligned with core operational objectives in urban logistics. Rather than representing a regulatory burden, low-emission delivery solutions can offer competitive advantages through lower operating costs, improved efficiency in congested urban environments, and enhanced customer value propositions (Arthur, 1989). This shift is particularly important, as it suggests that sustainability transitions may be sustained by market forces even in the absence of continuous policy escalation. At the same time, the role of policy remains crucial in the early stages of the transition (Paddeu, 2025; World Economic Forum, 2024). Measures such as the Ultra Low Emission Zone play a key role in altering cost structures and reducing uncertainty for firms. However, the findings suggest that the function of policy may evolve over time, from acting as a primary driver of change to serving as a stabilising and enabling framework.

These insights have practical implications for policymakers and business leaders. For policymakers, the results underline the importance of early and decisive intervention to trigger

transition dynamics, while also highlighting the need to design policies that enable market-based reinforcement mechanisms. For logistics companies, the findings emphasise the strategic importance of early adoption and experimentation with low-emission solutions, which may provide long-term competitive advantages as the system approaches a tipping point.

Conclusion

This paper examined whether urban freight decarbonisation is approaching a tipping point at which low-emission logistics systems become self-reinforcing. Using London as a qualitative case study, the analysis explored how regulatory pressure, technological developments, and business innovation interact to shape transition dynamics in urban logistics. The findings suggest that London's urban freight system is nearing such a tipping point. The interaction among regulatory measures, declining costs of electric vehicles, and the diffusion of alternative delivery models has created reinforcing feedback loops that accelerate the adoption of low-emission solutions (Toniolo et al., 2025; Paddeu, 2025). As a result, decarbonisation may increasingly be sustained by business-level incentives and operational advantages rather than relying solely on policy intervention. The study contributes to the literature by introducing a tipping-point perspective on urban freight decarbonisation and highlighting the role of business dynamics in sustaining sustainability transitions. It also provides practical insights for policymakers and industry actors, emphasising the importance of early intervention and the potential for market-driven acceleration.

Limitations and future research directions

This study has several limitations that should be acknowledged. First, as a single case study focusing on London, the findings may not be directly generalisable to other cities with different regulatory environments, infrastructure conditions, or market structures. Second, the analysis relies on secondary data sources, including policy documents, industry reports, and corporate sustainability disclosures. While these sources provide valuable insights, they may contain biases related to data availability, reporting practices, and firms' strategic communication. Third, the study adopts a qualitative, exploratory approach, which limits its ability to test the strength and direction of the identified relationships. Although the findings provide strong conceptual support for the existence of self-reinforcing dynamics, further research using quantitative methods would be necessary to validate these mechanisms more systematically.

Future research could address these limitations by incorporating primary data collection methods, such as interviews with logistics firms and policymakers, as well as by developing quantitative models or simulations of tipping dynamics in urban freight systems. Comparative studies across multiple cities could also provide deeper insights into how different contextual factors influence the emergence of tipping points in urban logistics.

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The Sustainable Development of Chinese New Energy Vehicles in the EU: Research Progress and Policy Recommendations

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Abstract

Driven by industrial policies such as Made in China 2025, China's new energy vehicle industry has rapidly emerged as a key player in the global green transition. However, its expansion into the European Union—a global leader in sustainability regulation—faces multiple challenges, including policy asymmetries, resource competition, and governance barriers within global value chains. Drawing on literature and policy analysis, this study adopts the global value chains governance framework and theories of sustainable transformation to examine the sustainable development prospects of Chinese new energy vehicles in the European Union. The findings reveal that while Chinese firms dominate midstream segments such as battery manufacturing, European Union policy instruments—such as the Critical Raw Materials Act and the Carbon Border Adjustment Mechanism—pose significant market barriers. Structural challenges, including technological asymmetries and limited Environmental, Social, Governance compliance capabilities, further constrain the upgrading of Chinese firms within the global value chains. In response, this study proposes a set of strategies: enhancing policy coordination mechanisms, co-developing circular economy infrastructures (e.g., battery recycling hubs), and promoting joint green innovation. These recommendations aim to reconcile China's cost-oriented modular governance model with the European Union's relational and sustainability-driven approach, thereby fostering a greener and more equitable Sino-European automotive value chain.

Keywords: Chinese new energy vehicles; EU sustainability; global value chains (GVCs); policy asymmetry; circular economy; Sino-European cooperation

Introduction

In recent years, China's new energy vehicle (NEV) industry has experienced rapid growth, driven by a combination of proactive industrial policy and technological innovation. It has emerged as a major force in the global transition toward sustainable transportation (Yeung, 2019; Kimble & Wang, 2013). Through national strategies such as Made in China 2025, China has achieved notable breakthroughs in core technologies, including battery systems and electric drivetrains, while accelerating its global market expansion through an export-oriented approach (Dzienis & McCaleb, 2024). At the same time, the European Union (EU)—a global leader in pursuing carbon neutrality—is promoting decarbonization in the transport sector through stringent emissions regulations and green industrial policies (Su et al., 2023). Against this backdrop, Chinese NEV firms such as BYD and NIO have entered the EU market, seeking to integrate into European green value chains through technology cooperation and localized production strategies (He et al., 2024).

However, the sustainable development of Chinese NEVs in the EU faces several structural and institutional challenges. First, EU industrial protection measures—such as the Critical Raw Materials Act—intensify competition for strategic resources, creating barriers to Chinese access to upstream supply chains (Bridge & Faigen, 2022). Second, regulatory mismatches in technical standards and data governance between China and the EU risk

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fragmenting the market and increasing entry costs for Chinese firms (Zhan, 2021). Third, amid the ongoing restructuring of global value chains, Chinese firms' capacity for green innovation still falls short of fully aligning with the EU's sustainability standards (Gereffi et al., 2005). Existing scholarship tends to focus on domestic policy frameworks or technology trajectories in isolation and lacks comprehensive analysis of the dynamic interactions between Chinese NEVs and the EU market, particularly regarding policy coordination and value chain governance (Gerócs, 2022; Antràs & Chor, 2013).

This study, grounded in literature and policy analysis, seeks to address the following questions: (1) What is the current status of Chinese NEVs' sustainable development in the EU? (2) How do EU regulatory frameworks affect Chinese NEV firms? (3) How can value chain upgrading and policy coordination foster mutually beneficial green cooperation between China and the EU? The findings aim to contribute to the theoretical understanding of transnational green technology collaboration and offer policy recommendations for the global strategy of China's NEV industry.

Literature Review

Theoretical Foundations: Global Value Chains (GVCs) and Green Transition

The theory of global value chain (GVC) governance provides a critical framework for analysing the integration of Chinese new energy vehicles (NEVs) into the European Union (EU) market. Gereffi et al. (2005) emphasize the power asymmetries and control mechanisms between lead firms and suppliers, offering insight into how Chinese enterprises leverage national policies and technological innovation to secure more active positions within global production networks. Complementing this, Antràs and Chor's (2013) "sequential production" model illustrates how spatial fragmentation within GVCs shapes patterns of industrial innovation, helping to explain China's comparative advantage in battery production and the EU's dominance in vehicle design, standard-setting, and regulatory leadership. More recently, scholars have extended GVC theory into the domain of green transformation, arguing that carbon neutrality goals and concerns over resource security are restructuring the architecture of global value chains and challenging existing governance models (Zhan, 2021; Lim et al., 2021).

Development of China's NEV Industry: Policy-Driven Growth and Globalization Challenges

From an industrial development perspective, China's NEV sector has evolved from a state-led strategic initiative into a globally competitive industry. Yeung (2019) attributes this transformation to the Made in China 2025 strategy, which supported the sector through subsidies, Research and Development (R&D) investments, and export incentives to establish a self-sufficient industrial ecosystem. Complementary studies by Kimble and Wang (2013) and He et al. (2024) highlight the strategic role of state-owned enterprises and China's dominance in midstream segments such as battery manufacturing. However, the international expansion of Chinese NEV firms remains constrained by several challenges. These include a high degree of dependency on critical raw materials such as lithium and rare earth elements, which raises supply chain security risks (Bridge & Faigen, 2022), and the stringent sustainability regulations and differing governance frameworks in the EU, which pose additional barriers to market entry (Su et al., 2023).

The EU's Policy Framework and Regulatory Barriers to Sustainability

On the demand side, the EU's policy instruments—such as the European Green Deal and the Circular Economy Action Plan—prioritize decarbonization and sustainable industrial development in the transport sector. While these initiatives offer opportunities for Chinese NEV firms, they also introduce higher entry thresholds. Su et al. (2023) note that the EU's “double materiality” principle imposes rigorous environmental and social governance (ESG) compliance requirements, creating significant regulatory pressure for Chinese firms that are accustomed to more lenient domestic oversight. Furthermore, the Critical Raw Materials Act (as discussed in Bridge & Faigen, 2022) reflects the EU's strategic intent to reduce reliance on Chinese-dominated supply chains, thereby intensifying global competition for essential materials. Studies of Hungary's role in the EU automotive GVC (Gáspár et al., 2023; Völgyi & Lukács, 2021) reveal a broader policy tension: while EU member states benefit economically from Chinese investment, concerns over excessive technological dependence persist, highlighting the EU's ambivalent stance toward deeper industrial cooperation with China.

Institutional Misalignments in Sino-EU GVC Collaboration

Institutional mismatches further complicate Sino-EU collaboration in the NEV sector. Zhan (2021) argues that divergences in technical standards (e.g., EV charging protocols) and data governance frameworks hinder Chinese firms' effective market integration. Geröcs (2022) underscores how the EU's “strategic autonomy” agenda constrains technology transfers, even in “integrated periphery” regions such as Hungary where Chinese investments have boosted local production capacity. GVC governance theory (Gereffi et al., 2005; Antràs & Chor, 2013) provides a useful lens here: Chinese firms tend to favour modular governance models that prioritize cost efficiency, whereas the EU promotes relational governance models that emphasise sustainability and supply chain transparency, thereby creating inherent frictions in cross-regional value chain coordination.

Resource Governance and Sustainability Challenges in the NEV Sector

The environmental promises of NEVs are increasingly entangled with geopolitical and resource governance risks. Kotz (2024) documents China's strategic expansion into lithium supply chains in Latin America, a move that strengthens its upstream control over GVCs. However, Lirong et al. (2023) warn that without robust circular economy practices, the resource-intensive nature of NEV production could undermine—or even offset—its climate benefits. Bilal et al. (2021) further argue that achieving a net-zero transition requires the co-evolution of green innovation and global value chain restructuring, offering important theoretical insights for advancing Sino-EU cooperation on sustainable NEV development.

Research Gaps and Future Directions

While existing literature has provided valuable insights into the evolution of Sino-EU NEV value chain integration, several key gaps remain. First, few studies have examined the interaction between specific EU policies—such as the Carbon Border Adjustment Mechanism (CBAM)—and China's NEV export strategies. Second, while Geröcs (2022) focuses on supplier dynamics in Hungary, little is known about how Chinese firms are adapting to the EU's stringent ESG standards and what concrete strategies they employ for value chain upgrading. Third, although battery recycling is widely recognized as essential to the development of the circular economy, empirical research on implementation mechanisms and industrial practices remains limited (Bridge & Faigen, 2022). This study seeks to address these gaps by providing

an integrated analysis of policy coordination, GVC upgrading, and sustainable resource governance in the context of Chinese NEVs in the EU.

Methodology

Research Design and Analytical Framework

This study adopts a dual-method approach combining literature analysis and policy analysis, underpinned by a multidimensional analytical framework that integrates global value chain (GVC) governance theory (Gereffi et al., 2005; Antràs & Chor, 2013) and sustainable transformation theory (Zhan, 2021). The analysis is structured across three levels: at the macro level, the focus lies on the interaction between Chinese and EU policy regimes and institutional differences; at the meso level, the study examines how Chinese NEV firms integrate into and upgrade within the global value chain; at the micro level, it addresses specific challenges related to resource governance and technological innovation. This layered framework enables a systematic exploration of both the opportunities and obstacles in Sino-EU cooperation in the NEV sector.

Data Sources and Literature Selection

To ensure the validity and reliability of the research, data were collected and analysed across two main dimensions: scholarly literature and policy documents.

For the literature review, the study conducted a systematic analysis of 25 peer-reviewed articles published between 2013 and 2024. Sources were retrieved primarily from Web of Science and Scopus, using keywords such as "new energy vehicles," "EU green transition," and "global value chains." Priority was given to studies focusing on the development of China's NEV industry, EU sustainability policies, and GVC governance dynamics (e.g., Yeung, 2019; Su et al., 2023). Selection criteria included theoretical rigor, empirical relevance, and contextual applicability to Sino-EU trade and industry relations.

For policy analysis, due to the complexity and evolving nature of regulatory frameworks, this study relies on critical assessments of secondary academic sources that interpret and discuss official documents. For instance, analysis of EU policies such as the Critical Raw Materials Act draws on the interpretation provided by Bridge and Faigen (2022), while Chinese strategies such as Made in China 2025 are examined through existing academic evaluations (Yeung, 2019; He et al., 2024). This approach ensures analytical consistency and coherence in interpreting policy effects across different institutional contexts.

Analytical Methods and Application

To conduct a comprehensive multilevel analysis, the study applies the following methods:

- **GVC Governance Analysis:** Drawing on the typology proposed by Gereffi et al. (2005), the study distinguishes between modular and relational governance models to assess Chinese NEV firms' positions within the EU value chain. This approach helps identify power asymmetries and structural constraints that hinder value chain upgrading.
- **Policy Coordination Assessment:** Using Gibbon et al.'s (2008) institutional coordination framework, the study systematically compares regulatory intensities, ESG compliance requirements, and resource allocation strategies between China and the EU. This enables an in-depth understanding of how policy misalignments affect NEV exports and bilateral industrial cooperation.
- **Sustainability Evaluation:** The study adopts the life cycle assessment (LCA) methodology, as proposed by Su et al. (2023), to evaluate the carbon footprint and mineral resource dependency of NEVs. This analysis highlights the environmental

sustainability challenges and long-term risks embedded in the current production and supply chain models.

Together, these methods provide a robust theoretical and analytical foundation for exploring sustainable development pathways for China's NEV industry in the European market.

Research Limitations

Despite careful methodological design and data selection, this study has several limitations. First, the reliance on secondary academic literature for policy analysis may not fully capture the latest developments in EU regulations—such as recent updates to the Carbon Border Adjustment Mechanism. Second, the inclusion of regional case studies—such as Hungary's experience (Gáspár et al., 2023)—may reflect specific local dynamics that are not fully generalizable to the broader EU context, particularly Western European markets. These limitations should be considered when interpreting the findings and evaluating their applicability to other regional contexts.

Analysis

The Current Position of Chinese NEVs in the EU Market and Their Role in the Value Chain

In recent years, Chinese new energy vehicle (NEV) companies such as BYD and NIO have achieved substantial market penetration in the European Union (EU), primarily by leveraging cost advantages and differentiated technological strategies (He et al., 2024). A particularly critical factor in this success is China's dominant position in battery manufacturing, which accounts for over 70% of global lithium-ion battery production (Bridge & Faigen, 2022). This has positioned Chinese firms as indispensable suppliers in the EU electric vehicle (EV) value chain. Nevertheless, their participation remains concentrated in the midstream segments—namely battery and component production—while European incumbents continue to dominate brand development and downstream services (Gereffi et al., 2005). This structure reflects the modular governance model described in global value chain theory: Chinese firms excel in cost-efficient manufacturing but lack influence over sustainability standards and consumer-facing innovation in downstream segments (Antràs & Chor, 2013).

From a policy perspective, China has actively promoted NEV exports through initiatives such as Made in China 2025, which combine industrial subsidies with strategic incentives to enhance global competitiveness (Yeung, 2019). In contrast, while the EU's Fit for 55 package aims to accelerate EV adoption, it also imposes additional trade barriers through instruments like the Carbon Border Adjustment Mechanism (CBAM), which penalizes carbon-intensive battery production—thereby exacerbating the regulatory challenges facing Chinese firms in the EU market (Su et al., 2023).

EU Policy Barriers and Institutional Challenges

The evolving EU regulatory landscape has placed mounting institutional pressure on Chinese NEV firms seeking integration into European markets and value chains. One major source of tension is resource competition. The Critical Raw Materials Act (CRM Act) explicitly prioritizes secure domestic access to strategic resources such as lithium and cobalt, aiming to reduce dependence on China-centric supply chains (Bridge & Faigen, 2022). For instance, Hungary—a key destination for Chinese NEV investment in Europe—has been encouraged by the EU to diversify away from reliance on Chinese-controlled raw materials (Völgyi & Lukács, 2021).

A second challenge lies in the EU's stringent sustainability regulations. The Battery Regulation and related ESG frameworks require detailed disclosures on carbon footprints and mandatory recycling quotas throughout the product life cycle (Su et al., 2023). For Chinese firms accustomed to less rigorous regulatory environments, compliance has proven difficult; for example, CATL's operations in Europe have faced scrutiny for delayed ESG alignment (Zhan, 2021). Furthermore, significant technical disparities—such as differences in EV charging standards (the EU's CCS vs China's GB/T)—have fragmented the market and increased adaptation costs for Chinese exporters (He et al., 2024).

Structural Barriers to GVC Upgrading for Chinese NEV Firms

From the perspective of global value chain upgrading, Chinese NEV firms face structural constraints in transitioning from modular suppliers to value chain orchestrators. Although they lead in battery manufacturing, Chinese firms remain heavily dependent on European firms for advanced technologies, particularly in software integration and autonomous driving systems—resulting in asymmetrical technological dependencies (Geröcs, 2022).

Additionally, the EU's growing emphasis on ESG performance, supply chain traceability, and ethical sourcing poses significant challenges for Chinese firms with limited transparency. For instance, rare earth mining activities linked to Chinese battery production have often failed to meet the EU's stringent human rights due diligence standards (Kotz, 2024). The Hungarian case further illustrates this dilemma: while Chinese investment in local battery factories has supported employment and industrial capacity, it has also raised concerns about environmental risks and constraints on technology transfer, leading to increased regulatory scrutiny (Gáspár et al., 2023; Völgyi & Lukács, 2021).

Sustainability Trade-Offs and Resource Risks in the NEV Sector

Although NEVs significantly reduce tailpipe emissions, their production processes introduce new sustainability risks—particularly in resource extraction and energy consumption. China's control over global lithium supply chains has created considerable geopolitical vulnerabilities for the EU, with approximately 80% of its lithium imports originating from Chinese-controlled mining operations in Latin America (Kotz, 2024; Lirong et al., 2023).

Moreover, the heavy reliance of Chinese battery production on coal-fired electricity undermines the overall climate mitigation potential of NEVs, leading to “carbon leakage” across the value chain (Su et al., 2023). Without effective circular economy mechanisms—such as rigorous battery recycling systems—the industry risks exacerbating resource depletion and negating environmental gains (Bridge & Faigen, 2022).

These findings highlight the need for Sino-EU cooperation on NEVs to address structural production risks, improve resource governance, and foster green technological innovation. Only through such comprehensive measures can both regions achieve a truly sustainable transformation of the automotive industry.

Conclusion

Key Findings and Discussion

This study finds that Chinese new energy vehicle (NEV) firms have successfully entered the European Union (EU) market, particularly in midstream segments such as battery and component manufacturing, largely due to policy support and cost advantages (Yeung, 2019; He et al., 2024). However, this market entry is constrained by structural limitations. Under a modular governance model (Gereffi et al., 2005), Chinese firms exert limited influence over

downstream innovation and sustainability standard-setting weakens within the EU value chain, thereby weakening their strategic autonomy and long-term competitiveness.

In addition, significant policy asymmetries persist between China and the EU. The EU's use of instruments such as the Carbon Border Adjustment Mechanism (CBAM) and the Critical Raw Materials Act reflects its pursuit of industrial strategic autonomy and stringent ESG compliance, thereby posing considerable market-entry barriers for Chinese firms (Su et al., 2023; Bridge & Faigen, 2022). Moreover, China's dominance in the global lithium supply chain (Kotz, 2024), coupled with its battery industry's reliance on coal-based electricity, has intensified EU concerns about decarbonization targets. These challenges underscore the urgent need for a more robust circular economy framework in the NEV sector (Lirong et al., 2023).

Policy Implications and Strategic Recommendations

In light of the above challenges, this study proposes the following policy directions to enhance the sustainable competitiveness and strategic alignment of Chinese NEV firms in the EU market. First, to strengthen GVC governance capabilities, Chinese firms should pursue upstream and downstream integration. Upstream, partnering with EU-recognized mineral suppliers—such as lithium mining projects in Africa—can diversify resource access and mitigate geopolitical risks (Zhan, 2021). Downstream, increased investment in localized R&D—particularly in charging infrastructure standardization and vehicle software integration—can help align with the EU's relational governance expectations (Antràs & Chor, 2013). Second, China and the EU should establish mechanisms for regulatory and policy coordination. This includes the mutual recognition of technical standards and ESG certification through the creation of joint Sino-EU working groups focused on harmonizing charging protocols and sustainability benchmarks (Bilal et al., 2021). Furthermore, Chinese firms should advocate for CBAM exemptions or reductions for NEVs that meet full life-cycle carbon standards, thereby facilitating fairer market access (Su et al., 2023). Third, efforts must be made to accelerate the development of a circular-economy framework for the NEV sector. Practical steps include establishing battery recycling centres in EU countries such as Hungary, where Chinese firms already have manufacturing operations. These centres should leverage Chinese technological and operational capacity alongside EU regulatory rigor to form a closed-loop recycling ecosystem (Bridge & Faigen, 2022). In addition, a joint China–EU green innovation fund could support the development of key technologies, such as solid-state batteries and low-carbon mineral extraction, thereby reducing resource dependence and enhancing long-term sustainability (Lirong et al., 2023). Finally, strategic communication and brand positioning are essential. Chinese firms should proactively showcase their contributions to green innovation—such as solar-powered manufacturing facilities and breakthroughs in battery recycling—to counter prevailing perceptions of China as a “high-pollution producer” and enhance their social legitimacy and brand value in the EU (Kotz, 2024).

In conclusion, only through multidimensional strategic coordination and the upgrading of value chain governance can China's NEV industry overcome current institutional barriers and achieve long-term sustainable development in the European market.

Limitations and Future Research

The present study relies primarily on secondary sources, including policy reports, academic literature, and statistical datasets, to examine the challenges and prospects of Chinese new energy vehicle (NEV) enterprises in the EU. Although this approach provides a systematic and multi-level synthesis of existing knowledge, it does not incorporate primary empirical evidence, such as stakeholder interviews or firm-level case studies. This absence inevitably constrains the extent to which the findings can be generalized to practical industry contexts. Future research

is therefore encouraged to complement the current policy-oriented analysis with empirical investigations, for example through case-based inquiry or qualitative interviews, in order to enhance the external validity and practical applicability of the conclusions drawn.

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Managerial Gender Diversity and Corporate Strategic Outcomes: A Systematic Literature Review within the Chinese Institutional Context

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Abstract

This paper provides a comprehensive review of the impact of managerial gender diversity on firm strategy and performance, focusing on Chinese listed companies. Drawing upon Upper Echelons Theory, this review systematically synthesises high-impact studies published between 2010 and 2025 through a structured screening process based on Web of Science, Scopus, and ScienceDirect databases, to evaluate how female representation in top management, teams shape corporate outcomes. The analysis explores gender as a cognitive proxy for risk aversion and ethical sensitivity, while considering the moderating roles of ownership structure and Confucian cultural norms. The findings highlight that while financial outcomes remain subject to institutional contingencies, gender diversity consistently promotes superior Environmental, Social and Governance performance, innovation efficiency, and strategic stability.

Keywords: Managerial Gender Diversity; Upper Echelons Theory; Corporate Performance; Environmental, Social, and Governance Stewardship; Chinese Listed Companies.

JEL Codes: G34; M14; J16; L25

Introduction

The modern corporate landscape is increasingly characterised by complexity, volatility, and uncertainty, placing the decision-making processes of top executives at the centre of contemporary organisational research. Within the specific context of China's institutional transition, the personalised experiences, cognitive frameworks, and demographic characteristics of strategic leaders serve as critical determinants of firm behaviour and long-term outcomes. As part of a systematic doctoral investigation into the multifaceted impact of managers' background characteristics encompassing dimensions of academic attainment, institutional ownership, and informal cultural institutions—this paper provides a focused in-depth synthesis of the literature concerning managerial gender diversity.

The representation of women in top management positions is no longer merely a matter of social equity; it has evolved into a strategic imperative for firms operating in emerging markets. In the Chinese context, the academic focus on gender has developed through distinct stages. Initially, foundational research primarily examined its impact on financial stability. Subsequently, the literature expanded to analyse risk mitigation strategies, while more recently, Environmental, Social, and Governance (ESG) stewardship has emerged as a dominant research frontier (Borges et al., 2025; Ojo, 2021). By analysing these factors as distinct pillars of evidence, this review provides a comprehensive synthesis that evaluates the holistic strategic influence of female leadership. While traditional financial

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there is a lack of comprehensive synthesis regarding how these individual characteristics interact with China's unique institutional landscape and cultural norms. By evaluating high-impact empirical evidence and theoretical developments published between 2010 and 2025, the following sections address these voids. This review clarifies how female representation in Top Management Teams interacts with Chinese institutional pressures, state involvement, and deep-seated Confucian values to shape corporate value and strategic sustainability (Li et al., 2024; Perera et al., 2023).

Theoretical Frameworks

The Upper Echelons Perspective: Cognitive Proxies and Perceptual Screens

The foundational theoretical lens for this review is the Upper Echelons Theory (UET), pioneered by Hambrick and Mason (1984). UET posits that organisations are reflections of their top managers, whose strategic choices are not purely objective but are filtered through a "perceptual screen" composed of their unique values, experiences, and cognitive bases. Because the underlying psychological constructs of managers are difficult to observe and measure directly, UET supports the use of observable demographic characteristics, such as age, education, and specifically gender—as reliable proxies for these underlying cognitive frameworks (Hambrick & Mason, 1984; Ojo, 2021).

In the context of gender diversity, the literature suggests that female executives often possess distinct "perceptual screens" shaped by different socialisation processes and professional trajectories. These cognitive differences manifest in two distinct strategic dimensions: risk sensitivity and ethical diligence. While these are independent constructs, they are frequently examined together in the literature to demonstrate how female leadership simultaneously influences both corporate responsibility and financial decision-making (Chen et al., 2022; Li & Kang, 2025). Recent Chinese studies have extended this framework by emphasising how gender-based cognitive diversity enhances the TMT's ability to process "soft information" and non-financial signals. This diverse cognitive pool allows the board to interpret environmental and social signals more effectively, thereby diversifying the firm's strategic vision and reducing the likelihood of managerial hubris (Gao & Li, 2025; Yu et al., 2025).

Integration of Agency and Resource Dependence Theories

Beyond the cognitive focus of UET, the literature frequently integrates Agency Theory and Resource Dependence Theory (RDT) to explain the gender dividend. From an agency perspective, gender diversity is viewed as a critical mechanism for enhancing board independence and monitoring quality. Female directors, often being "outsiders" to traditional male-dominated executive networks, are found to be more diligent in their oversight roles, leading to improved audit quality and a significant reduction in managerial opportunism and earnings management (Borges et al., 2025; Ye et al., 2010).

From an RDT perspective, female board members are seen as vital providers of diverse human and social capital. They bring unique perspectives, alternative problem-solving techniques, and external legitimacy that are increasingly essential for Chinese firms navigating complex global stakeholder environments. This is particularly relevant for firms pursuing internationalisation strategies, where female leaders can provide the necessary reputational capital and stakeholder links required to overcome the "liability of foreignness" in Western markets (Borges et al., 2025; Jing et al., 2025).

Methodology of the Systematic Literature Review

To ensure the rigour, transparency, and comprehensiveness of this review, a systematic search and screening strategy was employed across major international academic databases, including Web of Science, Scopus, and ScienceDirect. The search parameters were restricted to publications from 2010 to 2025 to capture the most recent empirical evidence and the rapid theoretical shifts in the Chinese A-share market over the last decade.

The primary search strings combined several thematic clusters: (1) Managerial characteristics (e.g., "Board Diversity," "Managerial Gender," "Female Directors"); (2) Strategic outcomes (e.g., "Corporate Performance," "ESG," "Innovation," "Risk-taking"); and (3) Institutional context (e.g., "Chinese Listed Companies," "SOEs"). Initial results yielded an extensive pool of over 200 articles. These were subsequently screened based on a three-tier criteria: first, the study must focus on the Chinese institutional environment to maintain context consistency; second, the research must utilize high-quality longitudinal panel data sourced from reputable databases, such as the China Stock Market and Accounting Research (CSMAR) database for Chinese listed companies and Zephyr for mergers and acquisitions data; and third, the outcomes must align with the core investigative pillars of this doctoral project. After a rigorous process of removing duplicates and low-impact studies, 30 core publications were selected for detailed qualitative synthesis and analysis. This multi-step process ensures that the findings presented herein are representative of the state-of-the-art research in East Asian corporate governance.



Figure 1: *PRISMA Flow Diagram of the Literature Selection Process*
Source: *Authors' own compilation based on the systematic literature review process*

The Chinese Institutional and Cultural Context

Ownership Structure and Managerial Discretion

A central and recurring theme in the literature is the stark contrast between State-Owned Enterprises (SOEs) and non-state-owned enterprises (Non-SOEs). In the Chinese context, ownership structure serves as the primary institutional moderator for executive behaviour. In SOEs, managerial selection and strategic decision-making are often intertwined with administrative objectives, political mandates, and social stability goals. This unique environment can significantly constrain the "managerial discretion"—the latitude for individual action of board members (Han et al., 2019; Peng & Chandarasupsang, 2023).

Empirical evidence consistently suggests that while gender diversity significantly improves financial and social performance in legal person-controlled or private firms, this effect is often diluted in SOEs. This dilution occurs because the state's dominant role often prioritises policy compliance over the innovative or risk-averse strategies that female directors might otherwise champion (Liu et al., n.d.). However, recent research indicates an interesting shift: in the realm of ESG and green governance, the state's oversight can act as a catalyst. Female directors in SOEs may leverage state-aligned institutional resources to meet national "Dual Carbon" targets more effectively than their counterparts in the less-regulated private sector (Wen et al., 2025).

The Role of Confucian Cultural Norms and Relational Ethics

Beyond formal legal and ownership structures, the informal institution of Confucianism remains a vital determinant of boardroom dynamics and gender-based influence. Confucian values emphasise hierarchy, collective harmony, and traditional gender roles (e.g., "men outside, women inside"), which historically created a formidable "glass ceiling" for female aspirants in corporate China (Han et al., 2019).

Nevertheless, contemporary literature reveals a much more complex relationship. As documented by Chen et al. (2022), the "Holistic Thinking" prevalent in Chinese culture—deeply rooted in Confucian and Taoist traditions—affects risk perception differently across genders. Female managers in regions with strong Confucian traditions exhibit greater risk sensitivity and ethical grounding than their male peers. This cultural backdrop helps explain why gender diversity in Chinese family firms is particularly effective; female family members often act as "ethical guardians" of the family's socio-emotional wealth and long-term reputation (Du, 2025). This synergy between gender and culture creates a unique form of "relational ethics" that mitigates corporate default risk and enhances default resilience (Wu & Wan, 2024).

Empirical Synthesis: Gender Diversity and Corporate Outcomes

Financial Performance: The Debate on Market versus Accounting Metrics

The relationship between board gender diversity and financial performance remains one of the most debated topics in corporate governance, characterised by what scholars term the "mixed results" debate (Gazzar & Khlefa, 2024; Li et al., 2024; Perera et al., 2023). In the Chinese A-share market, a dual narrative has emerged from the data. On one hand, extensive longitudinal studies demonstrate that higher female representation on boards leads to superior firm valuation (measured by Tobin's Q) and better information-processing efficiency (Li et al., 2024; Shi, 2023; Wang et al., 2021).

On the other hand, some critical perspectives argue that these gains primarily reflect an "external signalling effect" rather than improvements in internal accounting performance (such as ROA or ROE). Zhang et al. (2024) find that an increase in female board members may correlate with a temporary decline in internal accounting metrics in certain industries, even as market perception improves (Liu et al., n.d.). This suggests that the appointment of female directors signals progressive governance to the market, which can lower the cost of equity capital even before operational efficiencies are fully realised. Furthermore, the "Critical Mass Theory" proves essential here: the positive financial dividend is often statistically significant only once the board reaches a threshold of three or more women, moving beyond symbolic tokenism to substantive influence (Chu & Oldford, 2023; Liu et al., n.d.).

ESG Stewardship and Carbon Performance

The most consistent finding across the 2010-2025 literature is the positive impact of gender diversity on sustainability outcomes. In line with the "Ethics of Care" theory, female directors in China are found to be more sensitive to stakeholder interests and long-term environmental concerns (Huanhuan et al., 2025; Peng & Chandarasupsang, 2023). Research shows that gender-diverse boards promote both the quantity and quality of green innovations, often acting catalysing a firm's transition to a low-carbon model (Huang et al., 2025; Lin et al., 2022).

Huang et al. (2025) provide a ground-breaking analysis of female executive power and carbon performance (CCP). Their study reveals that female leadership positively affects CCP by accelerating corporate digital transformation and promoting green innovation initiatives. This effect is particularly vital in regions with inadequate government environmental regulation, where female executives act as "voluntary institutional substitutes." Furthermore, gender diversity has been linked to the successful issuance of green bonds, as female representation improves the firm's ESG ratings and enhances its credibility among green-minded institutional investors (Lei & Huang, 2025; Wen et al., 2025).

Innovation Efficiency and the Moderating Role of CEO Power

Contrary to the stereotype that female risk aversion stifles growth, the literature frames it as a strategic tool for enhancing the efficiency of innovation. During exogenous shock, such as the COVID-19 pandemic, firms with higher gender diversity exhibited significantly stronger survival and recovery capabilities (Yang et al., 2023). This organisational resilience is driven by stable strategic search prioritisation, which prevents firms from engaging in value-destroying "fire sales" or over-leveraging during crises (Gao & Li, 2025; Yang et al., 2023).

Dong et al. (2024) offer a granular analysis of the interaction between female directors and CEOs. Using panel data from 2008 to 2021, they find that female directors do not improve innovation in isolation; rather, they serve as a critical monitoring force. In firms with highly entrenched or powerful CEOs, female board members are essential for preventing "empire-building" R&D projects that lack economic viability. By providing disciplined oversight, female directors ensure that innovation initiatives are both productive and aligned with long-term firm value (Chu & Oldford, 2023; Dong et al., 2024).

Internationalisation and Cross-border M&A Performance

As Chinese firms pursue "Going Global" strategies, female executives have emerged as critical players in international expansion. The literature suggests that women in TMTs significantly reduce managerial hubris, which is a major cause of failure in cross-border mergers and acquisitions (M&A). Female-led or gender-diverse management teams exhibit better deal selection and more successful post-merger integration (Jing et al., 2025). This is further bolstered by the superior ESG performance associated with gender diversity, which serves as a vital "reputational passport" for Chinese firms entering highly regulated Western markets where environmental and labour standards are exceptionally high (Jing et al., 2025; Wen et al., 2025).

Governance Integrity, Audit Quality, and Brand Competitiveness

Beyond financial and strategic outcomes, gender diversity profoundly impacts the integrity of corporate governance. Expanding on Agency Theory, recent studies indicate that gender-diverse boards are associated with significantly higher audit quality and reduced earnings management (Borges et al., 2025; Ye et al., 2010). Female executives are found to be more ethical in their decision-making, which reduces the risk of corporate fraud and financial restatements. This commitment to transparency and ethical conduct not only protects shareholders but also

enhances the firm's brand competitiveness (Ni, 2025). In the manufacturing sector, the synergy between multiple large shareholdings and female directors further optimises the quality of information disclosure, fostering a culture of accountability (Huanhuan et al., 2025).

Discussion: The Perception Gap and Boundary Conditions

The Asymmetry between Internal Quality and External Stakeholder Evaluation

A sophisticated theme in recent literature (2024-2025) is the asymmetry between objective governance gains and external perceptions. While female leadership improves internal processes such as audit quality and R&D efficiency, these gains are not always immediately recognised by the market. Yu et al. (2025) identify a "perception gap," where firms with female board secretaries experience higher ESG rating divergence due to entrenched cognitive biases and stereotypes held by analysts (Yu et al., 2025). This suggests that the full strategic value of gender diversity in China remains undervalued, highlighting a critical need for cultural shifts in how stakeholders evaluate diverse leadership.

Boundary Conditions: Lifecycle and Industry Characteristics

The impact of female executives is not uniform but is contingent upon the corporate lifecycle and industry characteristics. Research shows that female leadership has the most profound effect on enhancing brand competitiveness during the start-up phase, where ethical reputation is being established. Furthermore, the role of women in promoting green governance is significantly amplified in "heavily polluting" industries, where stakeholder pressure for sustainability is highest (Lei & Huang, 2025; Ni, 2025). In the manufacturing sector, female directors are particularly effective at navigating the trade-offs between Research and Development investment and corporate social responsibility (Gao & Li, 2025).

Future Research Directions

Deconstructing the TMT Black Box and Power Dynamics

Future research must move beyond board-level demographic data to examine the informal power dynamics within the Top Management Team (TMT). Understanding how female chief executive officers (CEOs), chief financial officers (CFOs), and board secretaries negotiate strategic prioritisation under financial pressure remains underexplored. Future studies should employ more granular, perhaps qualitative, methods to understand the "micro-processes" of influence that female leaders exercise in the boardroom (Borges et al., 2025; Gao & Li, 2025; Han et al., 2019).

Synergistic Interaction between Managerial Education and Gender

A critical gap remains in the research regarding the intersectionality of managerial traits. Specifically, the interaction between managerial education and gender is rarely studied together. It remains unclear whether high academic attainment—such as holding a PhD or international degree—can act as a "status signal" that mitigates the systemic gender bias observed in external ESG ratings and market evaluations (Ojo, 2021; Yu et al., 2025). Integrating these dimensions would provide a more holistic view of how human and social capital co-evolve.

Longitudinal Integration in Global Subsidiaries

While the link between gender and M&A quality is well established, longitudinal evidence on the long-term survival and integration success of Chinese subsidiaries across diverse institutional environments remains scarce. Future research should examine whether the prudent risk management styles associated with female leadership lead to sustained resilience in complex international markets, particularly in regions like the European Union, where institutional standards are highly demanding (Jing et al., 2025; Ojo, 2021).

Theoretical and Practical Implications

Theoretical Contributions to Upper Echelons Research

This review advances the Upper Echelons Theory by demonstrating that gender is a potent proxy for cognitive frameworks that respond to specific institutional pressures in emerging markets. By integrating Critical Mass Theory and the Institutional Contingency perspective, the review clarifies the boundary conditions under which gender diversity functions. It suggests that in transition economies such as China, the predictive power of UET is heightened when managerial traits are analysed alongside ownership structures and informal cultural norms.

Practical Implications for Corporate Governance and Policy

For practitioners and policymakers, these findings support a transition from symbolic tokenism toward the substantive integration of diverse perspectives. Boards should aim for a threshold of at least three women to ensure that diversity translates into substantive change (Liu et al., n.d.). Furthermore, firms in high-Confucian environments must be proactive in addressing the "perception gap" by enhancing the transparency of their ESG disclosures, ensuring that the objective strategic value provided by diverse management teams is accurately reflected in market evaluations and ratings (Lei & Huang, 2025; Yu et al., 2025).

Conclusion

This systematic literature review has evaluated the multifaceted impact of managerial gender diversity on firms' strategy and performance within China's unique institutional landscape. By synthesising 15 years of theoretical and empirical developments—anchored by the Upper Echelons Theory—this paper concludes that female representation in leadership is a primary driver of corporate sustainability, strategic resilience, and governance integrity. The evidence synthesised herein suggests that female directors significantly enhance ESG disclosure, innovation efficiency, and financial transparency, particularly when a critical mass is achieved. While formal ownership structures and informal cultural norms continue to moderate these relationships, the long-term strategic benefits of gender-diverse leadership are increasingly clear. Ultimately, as Chinese firms continue to navigate global competition and institutional transitions, the balanced strategic perspective offered by gender diversity will remain an essential driver of both ethical and financial success in the globalised era.

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