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THE DETERMINING ROLE OF FIRM INNOVATIVENESS IN THE IMPLEMENTATION OF CIRCULAR BUSINESS MODELS: AN EMPIRICAL STUDY OF THE MANUFACTURING INDUSTRY IN BOSNIA AND HERZEGOVINA

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ABSTRACT

This paper conceptually and empirically examines the role of firm innovativeness as a determinant of circular business model (CBM) implementation in the manufacturing industry (NACE Section C) of Bosnia and Herzegovina. The theoretical framework builds on the Resource-Based View and the Dynamic Capabilities View, differentiating between technological (product and process) and non-technological (organisational and marketing) innovativeness and their complementary roles in slowing, closing, and narrowing resource flows. The methodological design employs standardised firm-level measures and appropriate statistical techniques to assess how these innovation dimensions relate to the degree of CBM implementation. The research is based on a sample of 159 manufacturing firms, using harmonised business statistics indicators. The analytical procedure includes factor analysis, descriptive and correlational statistics, as well as multiple regressions with robust standard errors (HC3). The findings indicate that technological innovativeness provides the material and process foundations of circularity, through eco-design, process efficiency, and digital traceability, while non-technological innovativeness creates organisational and market conditions for diffusion and scaling, such as servitisation, reverse logistics routines, and stakeholder alignment. The contribution of this study is threefold. Theoretically, it refines the link between the Resource-Based View and the Dynamic Capabilities View perspectives and contemporary CBM typologies. Methodologically, it operationalises and tests “hard” and “soft” forms of innovation in parallel. At the practical and policy level, the study outlines key measures to support standardisation, servitisation, and circular material flows consistent with EU standards, with implications for managerial practice and industrial policy.

KEYWORDS: *circular business models; technological innovativeness; non-technological innovativeness; manufacturing industry; Bosnia and Herzegovina.*
JEL CLASSIFICATION: *M11; O32; Q56*

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INTRODUCTION

The global manufacturing industry is undergoing a structural transformation in which technological progress, standardisation, and industrial policy are increasingly shaped by the principles of green production and the circular economy. In the European Union (EU), this process is guided by the Green Deal and the New Circular Economy Action Plan, which translate sustainability goals into practice through product design standards, digital product passports, and the "right to repair" initiative (European Commission, 2019, 2020). In the United States, the acceleration of technology transfer into manufacturing practices is supported by the Manufacturing USA network, which combines national measurement standards with a system of testbed institutes. This framework aims to validate and scale new technologies, such as additive manufacturing, advanced materials, and digital analytics, under clearly defined performance criteria (Manufacturing USA, 2023; NIST, 2024). China, on the other hand, integrates circularity directly into its industrial policy and digital resource-tracking systems. The Circular Economy Promotion Law and the 14th Five-Year Plan promote industrial symbiosis and remanufacturing, particularly within capital-intensive sectors (NDRC, 2021; Standing Committee of the National People's Congress, 2008). Regardless of different approaches, these practices suggest that innovation capacity and business model transformation should evolve together to achieve sustainable industrial exchange. Recent empirical studies have demonstrated that circular business models (CBMs) serve as a strategic mechanism through which firms can achieve both competitiveness and long-term sustainability (Geissdoerfer et al., 2018; Geissdoerfer et al., 2020; Lüdeke-Freund et al., 2019).

In Bosnia and Herzegovina (B&H), the manufacturing industry (NACE Section C) is a major pillar of the national economy, accounting for 22.7% of total turnover, 35.4% of production value, and 24.0% of value added. The sector includes 5,504 firms employing 171,590 workers (BHAS, 2025). Although the manufacturing industry continues to have a central economic role, its long-term competitiveness increasingly depends on innovation and a sustainability-oriented transformation. In this context, innovativeness and CBMs function as complementary levers of industrial renewal: technological innovation provides the material and process foundations, while organisational and market innovations create conditions for diffusion and scaling (Geissdoerfer et al., 2018; Geissdoerfer et al., 2020).

This research paper is based on the premise that the "slowing, closing, and narrowing" of resource loops (Bocken, de Pauw et al., 2016) and firm innovativeness are mutually reinforcing mechanisms of industrial transformation. Grounded in the Resource-Based Theory and the Dynamic Capabilities Theory, it conceptualises technological (product and process) and non-technological (organisational and marketing) innovativeness as complementary determinants of CBM implementation (Barney, 1991; Teece et al., 1997; Teece, 2007). The aim of this paper is to examine how these two dimensions of innovativeness influence the implementation of CBMs in B&H's manufacturing sector. The paper contributes theoretically by integrating the resource-based theory and dynamic capabilities theory with CBM typologies, methodologically by analyzing both "hard" and "soft" forms of innovation, and practically by offering policy implications for standardization, servitisation, and reverse material flows in line with EU practices.

LITERATURE REVIEW

Theoretical Foundation

The theoretical foundation for this study is the Resource-Based Theory (RBT) and the Dynamic Capabilities Theory (DCT). Combined, these theories explain how firms can develop the internal capabilities necessary for implementing CBMs. The RBT suggests that firms may achieve superior performance if their competitive advantage is based on resources that are valuable, rare, hard to imitate, and cannot be easily replaced (Barney, 1991). Among such resources, innovativeness plays a central role. It reflects a firm's ability to introduce new products and processes, improve organizational structures, and design creative marketing approaches (Hult et al., 2004; OECD, 2005; Wang & Ahmed, 2004). Through innovation, firms may achieve economic goals while their operations are aligned with environmental responsibility, thus creating new and lasting value.

The DCT extends this view by illustrating how firms adjust their resources in response to changing environments. It encompasses three capabilities: identifying opportunities or sensing, acting on them through investment and collaboration or seizing, and reshaping existing structures in response to new conditions or transforming (Teece et al., 1997; Teece, 2007). Within the circular economy, these capabilities enable firms to develop and adapt business models that prioritize efficient and responsible resource utilization. Innovativeness, therefore, aims to bridge the gap between the RBT and DCT. It turns strategic intent into concrete action and enables firms to implement recycling, product life extension, and reducing material demand (Bocken et al., 2016; Geissdoerfer et al., 2018).

Although the RBT and the DCT are often applied separately, recent empirical studies highlight their complementarities in explaining sustainability-oriented transformations. Research shows that resource endowments, such as technological knowledge or organisational routines, are insufficient without dynamic capabilities that allow firms to reconfigure those assets in response to regulatory and market pressures associated with the circular economy (De Giacomo & Bleischwitz, 2020; Dey et al., 2022). These findings indicate that the interplay between valuable resources and higher-order capabilities forms the basis upon which firms develop circular business models, particularly in contexts where structural change is incremental and externally induced.

Manufacturing Industry in B&H

Over the past ten years, manufacturing has consistently contributed 11 to 13% of Bosnia and Herzegovina's gross domestic product and, with construction, nearly one-fifth of total value added (World Bank, 2024; BHAS, 2025). Although this share is modest compared to more advanced European economies, the sector remains one of the country's structural anchors. Employment patterns reinforce this view. Almost one in five workers is employed in manufacturing, which is slightly above the European Union average (European Commission, 2023). The sector is dominated by metal and wood processing, non-metallic minerals, and food production, and most firms compete as suppliers in regional value chains, producing semi-finished goods for international buyers. This structure reflects persistent path dependence in resource- and energy-intensive activities and limits the industry's capacity to absorb advanced technologies or transition toward higher value-added production (UNDP, 2023).

Despite some progress among small and medium-sized enterprises, innovation performance remains weak. Bosnia and Herzegovina is classified as an emerging innovator, achieving about one quarter of the European Union average in the European Innovation Scoreboard (European Commission, 2024). Empirical evidence shows that firms most frequently innovate reactively. New products and processes typically emerge as responses to buyer requests or incremental technological upgrades, while original innovation or research-based development is rare. Collaboration between industry and academic institutions is sporadic, and firms largely rely on internal resources or foreign partners when adopting new equipment or skills (Pucar & Pepić, 2019; UNDP, 2023). Public and private spending on research and development remains among the lowest in the region, rarely exceeding 0.3% of GDP. These constraints slow the evolution of both technological and non-technological forms of innovativeness and hinder the sector's potential for structural transformation.

The transition toward CBMs is therefore gradual and uneven. The White Paper on Circular Economy in Bosnia and Herzegovina identifies several persistent barriers, including regulatory uncertainty, weak financial incentives, and organizational limitations (Abaspahić et al., 2022). These challenges are reinforced by a generally low level of awareness about the circular economy among firms. Even so, several firms have begun to integrate circular practices, largely driven by the requirements of international buyers and the country's gradual alignment with European environmental standards (OECD, 2023). Emerging support programmes, such as the EBRD's Go Digital and Green in the Western Balkans initiative, signal an incremental shift toward industrial modernisation. Although still limited in scope, these developments suggest that firm-level innovativeness, especially the ability to combine technological improvements with organisational and marketing changes, will shape the pace and depth of the manufacturing sector's transition to more sustainable and circular production.

Firm Innovativeness

Firm innovativeness is widely recognised as a mechanism through which firms achieve and sustain competitive advantage in dynamic environments. It is commonly defined as the capacity to generate, develop, and implement new products, processes, organisational practices, and market approaches (Hult et al., 2004; OECD, 2005; Wang & Ahmed, 2004). Recent studies emphasise that innovation in manufacturing, particularly in emerging and transition economies, often develops unevenly: technological improvements tend to be incremental, while organisational and marketing changes evolve more slowly and with greater internal resistance (OECD, 2018; UNDP, 2023). These patterns underscore the need to examine innovativeness holistically rather than treating its components in isolation.

The literature generally distinguishes between two core dimensions of innovativeness: technological and non-technological (Damanpour & Evan, 1984; Mothe & Nguyen Thi, 2010; OECD, 2005). Technological innovativeness refers to the introduction of new or substantially improved products and processes, whereas non-technological innovativeness encompasses changes in organisational structures, managerial routines, and marketing practices. Together, these dimensions form a complementary framework that explains how firms renew their value propositions, strengthen learning and coordination mechanisms, and adapt their business models to sustainability-oriented requirements, including those associated with circular economy transitions (Smajlović et al., 2019; Pieroni et al., 2019).

Technological innovativeness

Technological innovativeness refers to a firm's ability to introduce new or significantly improved products and processes that enhance productivity and reduce material and energy use (Damanpour & Evan, 1984; OECD, 2005). In manufacturing sectors increasingly shaped by efficiency and sustainability requirements, this capability determines how firms respond to shifts in demand, cost pressures, and regulatory change (Todorović et al., 2022). Evidence from emerging and transition economies shows that technological upgrading often proceeds incrementally. Firms tend to adopt improved machinery, digital tools, or process optimisation techniques rather than invest in more transformative technological solutions (World Intellectual Property Organization, 2021). Such patterns highlight the importance of complementary skills and organisational readiness when integrating new technologies.

Recent studies underline that Industry 4.0 technology, such as cyber-physical systems or data-driven production, can enhance performance only when firms possess the capabilities to deploy them coherently and align them with production routines (Črešnar et al., 2023). This dynamic is particularly relevant in manufacturing sectors characterised by structural rigidity or limited absorptive capacity. Research from Central and Eastern Europe further shows that technology upgrading is strongly conditioned by financial constraints, access to skilled labour, and embedded production structures inherited from earlier development paths (Stojčić et al., 2020).

The manufacturing sector in Bosnia and Herzegovina reflects these wider tendencies. Many firms continue to rely on resource-intensive production systems and face persistent challenges linked to outdated equipment and narrow cost-based strategies, which reduce opportunities for deeper technological renewal (Spasojević-Brkić et al., 2015). In such conditions, technological innovativeness becomes essential for improving competitiveness, supporting cleaner production, and enabling firms to progress toward circular business models through more efficient and resilient production architectures.

Non-technological innovativeness

Non-technological innovativeness has become important for understanding how manufacturing firms adapt to structural and environmental change. It encompasses new organisational and marketing practices that enhance a firm's ability to coordinate, learn, and respond to dynamic conditions (Mothe & Nguyen Thi, 2010; OECD, 2005). In manufacturing, these forms of innovation often determine whether technological progress can be effectively implemented in practice. They influence work organisation, knowledge sharing, and collaboration across the value chain, as suggested by Crossan & Apaydin (2010).

Organisational innovation rarely occurs as a single breakthrough. It develops through continuous adjustments in management routines, team structures, and communication patterns. These adjustments strengthen a firm's capacity to address new technological and sustainability challenges (Crossan & Apaydin, 2010). Previous research indicates that firms that integrate sustainability goals into their strategic planning and collaborate with external partners are more likely to innovate continuously (Sinkovics et al., 2021; Todorović et al., 2022). This is particularly relevant in Bosnia and Herzegovina, where many manufacturers continue to operate within rigid hierarchies and cost-driven strategies. Companies that experiment with more flexible governance and open communication tend to build stronger internal coordination and are better positioned to apply circular principles (Smajlović et al., 2025). Over time, such practices reinforce organisational learning and make circularity part of everyday decision-making.

Marketing innovation complements this process. It concerns how manufacturers create and communicate value through new approaches to customer relations, distribution, or service delivery that extend product lifetimes. Leasing, sharing, and take-back schemes are among the most common examples, encouraging reuse and recovery instead of disposal (Curtis & Lehner, 2019; OECD, 2018). For firms in Bosnia and Herzegovina's processing industries, where high cost sensitivity and export dependence limit investment in advanced technologies, such models can build customer loyalty, stabilise revenue streams, and reduce resource intensity (Bocken et al., 2014; Pieroni et al., 2019).

Despite their relevance, organisational and marketing innovations diffuse slowly across the sector. Progress depends on dynamic capabilities that enable firms to sense opportunities, mobilise knowledge, and reconfigure processes (Sjödin et al., 2023; Teece, 2010). In Bosnia and Herzegovina, where most manufacturers are small or medium-sized, this requires coordinated institutional support, stronger industrial networks, and targeted managerial training (Poljić, 2019). When these conditions converge, non-technological innovativeness becomes a substantive driver of transformation and a critical foundation for circular business model implementation.

Circular Business Models

The concept of circular business models (CBMs) emerged as a response to the limitations of linear production systems and the increasing pressure to align value creation with environmental and social objectives. CBMs describe how firms create, deliver, and capture value by applying circular economy principles and by replacing the one-directional "take–make–dispose" logic with models based on longevity, resource circulation, and regenerative practices. While traditional business models emphasise short-term profit maximisation, CBMs integrate economic performance with resource efficiency, reduced environmental impact, and broader societal outcomes.

Early conceptualisations by Mentink (2014) and Roos (2014) primarily framed CBMs through recycling and reuse, effectively treating circularity as an extension of the recycling economy. Such perspectives largely focused on end-of-pipe interventions within existing production arrangements. As the circular economy debate matured, CBM research shifted from operational adjustments toward a strategic and design-driven understanding of value creation. A significant turning point was introduced by Bocken and co-authors (2016), who formulated the foundational strategies of slowing, closing, and narrowing resource flows. These strategies emphasise durable and modular product design, extended product lifecycles, and the regeneration of materials and energy, thereby establishing the core architecture of circular value creation. Subsequent work expanded this foundation by linking CBMs to product architecture and design feasibility. Studies by Den Hollander and Bakker (2016) and Nußholz (2017) demonstrated how modularity, reparability, and component standardisation shape the economic and technical viability of circular strategies. Linder and Williander (2017) further highlighted a recurring challenge: even when circular technologies exist, firms often struggle to capture value embedded in post-use products, underscoring the need for organisational and relational capabilities alongside design innovations.

A major conceptual consolidation was offered by Geissdoerfer and colleagues (2020), who positioned CBMs as a distinct subset of sustainable business models and identified four archetypes: resource cycling, product life extension, intensifying resource use, and dematerialising. These archetypes describe alternative pathways for restructuring value creation systems. Resource cycling relies on reuse, recycling, remanufacturing, and industrial symbiosis. Product life extension aims to slow resource flows by enabling repair, refurbishment, and remanufacturing. The intensifying resource use model is grounded in access- and performance-oriented strategies that promote shared use of products through leasing, renting, and similar arrangements. Dematerialisation decouples value creation from physical goods by providing services or digital solutions, thereby lowering material intensity (Bocken et al., 2016; Lüdeke-Freund et al., 2019; Geissdoerfer et al., 2020).

Recent literature increasingly regards these archetypes not as isolated business model choices but as strategic configurations that depend on organisational capabilities, cross-stakeholder collaboration, and enabling institutional conditions. Empirical studies emphasise that circularity requires more than product redesign; it involves reconfiguring activities, forming new partnerships, and developing the capacity to integrate technological and non-technological innovation (Kirchherr et al., 2017; Zucchella & Previtali, 2019; Lüdeke-Freund et al., 2019). These insights highlight that CBMs are dynamic organisational systems rather than static templates, and that their success depends on firms' ability to adapt processes, upgrade competencies, and engage in continuous learning.

These theoretical insights are particularly relevant for emerging economies, such as B&H. Unlike EU member states, B&H is not yet embedded in a binding EU-level legal framework for the circular economy, which slows down the institutionalization of circular practices. Nevertheless, the country has committed to the Green Agenda for the Western Balkans and has developed a draft Circular Economy Roadmap, which identifies priority sectors and proposes policy measures for the period 2022–2027 (Abaspahić et al., 2022). The White Paper on the Circular Economy in B&H points to high potential for CBM adoption in construction, textiles, municipal services, and plastic waste management, and stresses the need for fiscal and regulatory incentives, green public procurement, and support for innovation and skills development (Abaspahić et al., 2022; RCC, 2025). Within this context, the manufacturing sector (NACE Section C) plays a dual role. On the one hand, it is a major user of materials and energy and a significant source of waste; on the other, it houses the technical and organizational capabilities needed to implement CBMs. Emerging business cases in B&H already illustrate different CBM archetypes in practice (Abaspahić et al., 2022; RCC, 2025). Although these initiatives are still fragmented and often operate in the absence of comprehensive policy support, they demonstrate the implementation of CBMs even under conditions of institutional and market constraints.

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Hypothesis Development

Firm Innovativeness and the CBM Implementation

Few empirical studies have examined how different dimensions of firm innovativeness may contribute to the implementation of circular business models. Prior studies highlight innovation as the central mechanism that enables firms to embed the principles of the circular economy within their business models (Bocken et al., 2014; Pieroni et al., 2019; Kuzma & Sehmen, 2022). The literature also shows that technological and non-technological innovations fulfil different functions in advancing circularity (Kuzma & Sehmen, 2022).

Technological innovation supports the redesign of products and processes, enabling the recovery and reuse of materials, as well as the extension of product lifespans. These mechanisms are closely aligned with *resource cycling* and *product life extension* business models. They depend on continuous improvements in production processes, design, and material efficiency. On the other hand, non-technological innovations, such as organizational and marketing initiatives, enable new modes of value delivery and customer engagement. When aligned with the principles of the circular economy, such innovations may lead to an *intensified resource-use* business model through sharing and leasing models, and foster *dematerialization* by replacing physical products with digital or service-based offerings. Extending these perspectives, Kuzma and Sehmen (2022) provided empirical evidence that both dimensions of innovativeness jointly strengthen firms' capacity to integrate circular practices into their operations. Building on these insights, the present study applies and adapts their conceptualization to the manufacturing industry in B&H.

In this regard, the following hypotheses are proposed:

H1: *There is a positive and statistically significant relationship between the level of firm innovativeness and the degree of circular business model implementation in the manufacturing industry of B&H.*

H1a: *Technological innovativeness positively and significantly contributes to the adoption of resource cycling practices within the business model.*

H1b: *Technological innovativeness positively and significantly contributes to the adoption of product and resource life extension practices.*

H1c: *Non-technological innovativeness positively and significantly contributes to the adoption of practices that intensify the frequency of resource use.*

H1d: *Non-technological innovativeness positively and significantly contributes to the adoption of product and process dematerialisation practices.*

Interactive Effects of Technological and Non-Technological Innovativeness and CBM

The transformation toward CBMs depends on both technological and non-technological innovation. Although these two forms of innovativeness work through different mechanisms, recent studies show that firms rarely achieve circularity through technology alone (Kuzma & Sehmen, 2022; Pieroni et al., 2019). Successful CBM implementation typically requires both organizational and market adaptation. Technological advances can support the principles of circularity in product and process design. However, only if product and process innovation is supported by organizational change, creative marketing, and active stakeholder engagement, can it fulfil its potential. When both dimensions interact, they reinforce each other, creating a synergistic effect that helps firms integrate circular practices across their value chains (Bocken et al., 2014; Geissdoerfer et al., 2020).

In B&H, this interdependence of technological and non-technological innovativeness is particularly relevant. Manufacturing in the country continues to be shaped by resource- and energy-intensive industries. Many firms operate within fragmented innovation systems and face weak institutional coordination, which limits both technological progress and the diffusion of organizational and marketing innovations. Progress toward circular business models, therefore, requires the effective use of modern technologies, as well as the capacity to realign internal processes, strengthen partnerships, and promote market awareness of circular solutions. The synergistic effect between technological and non-technological innovativeness is crucial for accelerating the implementation of CBMs in B&H's manufacturing sector (Abaspahić et al., 2022).

H2: The interaction effect of technological and non-technological innovativeness on circular business model implementation is statistically significant, with their combined effect exceeding the impact of each dimension individually.

METHODOLOGY

Sample

A survey method was used to collect data in the study. Prior to data collection, the questionnaire was validated by a six-person expert panel. The questionnaire was transformed into an online format using Google Forms. Brevo software was used for systematic distribution and sending iterative reminders. Between March and July 2025, a total of 1,419 individual invitations were sent. The response rate was 11.2% resulting in 159 validly completed questionnaires. The operational framework consisted of a validated Dun & Bradstreet (D&B) email database, which ensured standardised distribution and consistent tracking of contacted units.

The target population of the study were manufacturing companies in B&H with at least ten employees, as listed in the D&B register. The population includes 2,115 manufacturing firms in total, comprising 1,485 small, 521 medium-sized, and 109 large enterprises. For the fieldwork, a harmonized sampling frame of 1,550 firms with ten or more employees was used. This approach enabled the consistent maintenance of the sample structure across different firm sizes and ensured a close match between the defined population and the actual sample. To control for non-response, replacement units from the corresponding strata were introduced. This procedure ensured both internal validity and representativeness of the sample in relation to the target population.

The analysis is based on a sample of 159 manufacturing firms. The age structure is balanced, with 53 older, 53 middle-aged, and 53 younger firms. In terms of size, small enterprises account for 50.94%, medium-sized enterprises for 36.48%, and large enterprises for 12.58%. The educational profile of managers is stable across age cohorts, with higher education accounting for approximately 28 to 38%, and master's and doctoral degrees for about 30 to 36%; the share of managers with secondary education is higher in small firms, while those with master's and doctoral degrees are most prevalent in medium-sized and also present in large firms.

Measurement Instrument Reliability

The reliability of the measurement instrument was tested using Cronbach's alpha for each subscale. In the domain of innovativeness, the results showed very high internal consistency: product innovation $\alpha = 0.873$, process innovation $\alpha = 0.876$, organisational innovation $\alpha = 0.918$, and marketing innovation $\alpha = 0.926$.

In the domain of circular business models, the following reliability values were recorded: resource recycling ($\alpha = 0.880$) and resource dematerialization ($\alpha = 0.902$), indicating high reliability; product life extension ($\alpha = 0.785$) and intensifying resource use ($\alpha = 0.785$) demonstrate satisfactory reliability. All subscales exceed the threshold of acceptability and indicate consistent internal reliability of the measures.

The reliability analysis by item removal showed that excluding individual indicators would not lead to a methodologically significant improvement in reliability, except for a marginal increase within the *product life extension* subscale, where removing the item related to designing durable and long-lasting products would raise α from 0.785 to 0.800. Given the small number of items in this subscale and the minimal difference observed, the indicator was retained to preserve the construct's content validity.

RESULTS

Descriptive Statistics and Correlations

The following section presents the descriptive statistical parameters for eight subscales: four (4) measuring innovativeness and four (4) measuring circular business models, which serve as the basis for subsequent correlation and regression analyses.

Based on the results, the process innovation dimension recorded the highest mean score ($M = 3.94$) with very low dispersion, while the marketing innovation dimension had the lowest mean value ($M = 3.44$). Within the circular business model dimensions, resource recycling was the most prominent ($M = 3.60$), whereas resource dematerialization showed the lowest mean score ($M = 3.01$). The composite CBM index had a mean value of 3.27 and a moderate standard deviation of 0.63. Overall, the measures demonstrated stable and coherent response patterns across items. All measures showed high to very high reliability. Cronbach's alpha values ranged from 0.785 to 0.926, confirming strong internal consistency across subscales.

The results of the Kolmogorov–Smirnov test indicated deviations from normal distribution for all dimensions and for the composite index at the 5% significance level. Consequently, in the subsequent analysis, both Pearson's correlation coefficients and Spearman's rank-order correlations are reported, while robust standard errors are applied in the regression models.

All correlations are positive and statistically significant, ranging from moderate to high in magnitude. Within the innovation dimensions, the strongest relationship is observed between process and organisational innovation ($r = 0.804^{***}$), while in the CBM domain, the composite index shows high correlations with resource intensification ($r = 0.871^{***}$), resource dematerialization ($r = 0.840^{***}$), and product life extension ($r = 0.761^{***}$). The innovation dimensions are consistently correlated with the CBM index (e.g., product innovation $r = 0.627^{***}$; marketing innovation $r = 0.572^{***}$), indicating the integrative role of innovation in the development of circular practices. The relatively high intercorrelations among several predictors indicate potential multicollinearity, which was further assessed in the regression analyses.

TABLE 1 Mean Scores, Standard Deviations, and Reliability Coefficients for Innovativeness Dimensions

CODE	INDICATORS AND DIMENSIONS	M	SD	α
INO_PRO_1	We regularly launch new products and services for our market.	30.5	10.08	00.853
INO_PRO_2	We stand out by offering solutions tailored to our customers' specific needs.	30.65	10.02	00.849
INO_PRO_3	We continuously improve existing functionalities.	30.94	10.01	00.841
INO_PRO_4	When designing new products, we strive to minimize environmental impact.	30.91	00.98	00.843
INO_PRO_5	We quickly adapt our products to new technologies.	40.04	10.02	00.845
INO_PRO	**Product innovation**	**30.81**	**00.83**	**00.873**
INO_PROC_1	We continuously optimize our production and operational processes.	40.23	00.86	00.851
INO_PROC_2	We implement environmentally sustainable and more efficient technologies.	30.96	00.95	00.852
INO_PROC_3	We develop unique processes that boost productivity and reduce waste.	30.74	10.02	00.851
INO_PROC_4	We apply advanced technologies for monitoring and quality control.	30.8	10.14	00.85
INO_PROC_5	We actively innovate our supply chain in collaboration with partners and suppliers.	30.97	00.9	00.841
INO_PROC	**Process innovation**	**30.94**	**00.8**	**00.876**
INO_ORG	We foster an open culture of sharing ideas.	30.96	00.9	00.908
INO_ORG_2	We make innovation an integral part of employee development.	30.53	10.03	00.897
INO_ORG_3	We regularly adjust our organizational structure to enhance innovation.	30.74	00.95	00.908
INO_ORG_4	We encourage multidisciplinary problem-solving.	30.74	10.05	00.893
INO_ORG_5	We reshape our organization to increase agility and responsiveness to market changes.	30.89	00.94	00.892
INO_ORG	**Organizational innovation**	**30.77**	**00.85**	**00.918**
INO_MARK_1	We research and implement innovative marketing strategies.	30.45	10.02	00.91
INO_MARK_2	We utilize new technologies and platforms to expand our reach and increase engagement.	30.65	00.99	00.908
INO_MARK_3	We stand out with creative promotions that surpass those of our competitors.	30.4	10.04	00.911
INO_MARK_4	We develop unique channels and distribution models to improve accessibility.	30.3	10.11	00.915
INO_MARK_5	We continually refine our messaging to communicate value more effectively.	30.38	10.02	00.903
INO_MARK	**Marketing innovation**	**30.77**	**00.85**	**00.918**

TABLE 2 Mean Scores, Standard Deviations, and Reliability Coefficients for CBM Dimensions

CODE	INDICATORS AND DIMENSIONS	M	SD	α
CBM_REC_1	We collaborate with suppliers who use recycled materials.	3.45	0.86	0.864
CBM_REC_2	We educate employees about recycling in the workplace.	3.72	0.91	0.861
CBM_REC_3	We have clear processes for sorting and separating waste.	3.7	1.00	0.85
CBM_REC_4	We participate in packaging and product take-back programmes for recycling.	3.55	1.03	0.85
CBM_REC_5	We monitor and report the quantities of recycled materials.	3.58	1.1	0.843
CBM_REC	**Resource Recycling**	**3.6**	**0.81**	**0.88**
CBM_EXT_1	We design durable and long-lasting products.	3.79	0.83	0.8
CBM_EXT_2	We offer extended warranties.	3.58	0.85	0.723
CBM_EXT_3	We communicate the importance of product maintenance.	3.57	0.93	0.724
CBM_EXT_4	We run replacement programmes that include proper recycling of old products.	2.92	1.0	0.737
CBM_EXT_5	We adjust repair prices to encourage customers to fix their items instead of buying new ones.	2.94	1.11	0.731
CBM_EXT	**Product Life Extension**	**3.36**	**0.70**	**0.785**
CBM_INT_1	We promote the reuse of materials and equipment both within and outside the company.	3	1.1	0.785
CBM_INT_2	We participate in joint initiatives to improve resource efficiency.	3.33	0.91	0.71
CBM_INT_3	We organise product exchange events among users.	2.58	0.91	0.794
CBM_INT_4	We apply reusable packaging and materials.	3.21	1.01	0.708
CBM_INT_5	We value user feedback to support more intensive use of our products.	3.45	0.99	0.704
CBM_INT	**Intensifying Resource Use**	**3.12**	**0.72**	**0.758**
CBM_DEM_1	We develop and promote digital versions of products.	2.81	1.19	0.883
CBM_DEM_2	We encourage online services instead of physical products.	2.92	1.15	0.871
CBM_DEM_3	We design with minimalism in mind, aiming to reduce material consumption.	3.16	1.05	0.866
CBM_DEM_4	We educate customers about the benefits of digital solutions.	2.7	1.1	0.879
CBM_DEM_5	We digitalise internal processes to reduce paper and material waste.	3.48	1.09	0.899
CBM_DEM	**Dematerialisation of Resources**	**3.01**	**0.94**	**0.902**

TABLE 3 Descriptive Indicators, Normality Test, and Reliability by Subscales

SUBSCALES	N	Min	Max	M	SD	K-S test	α
INO_PRO	159	1	5	3.81	0.83	0	0.873
INO_PROC	159	1.4	5	3.94	0.8	0	0.876
INO_ORG	159	1	5	3.77	0.85	0.001	0.918
INO_MARK	159	1	5	3.44	0.91	0	0.926
CBM_REC	159	1	5	3.6	0.81	0	0.88
CBM_EXT	159	1	5	3.36	0.7	0.001	0.785
CBM_INT	159	1	4.6	3.12	0.72	0	0.785
CBM_DEM	159	1	5	3.01	0.94	0	0.902
CBM_INDEKS	159	1	4.75	3.27	0.63	0.002	

TABLE 4 Pearson Correlation Matrix between Innovativeness Dimensions and CBM Dimensions

	INO_PRO	INO_PROC	INO_ORG	INO_MARK	CBM_REC	CBM_EXT	CBM_INT	CBM_DEM	CBM_INDEX
INO_PRO	--								
INO_PROC	.528***	--							
INO_ORG	.515***	.804***	--						
INO_MARK	.570***	.660***	.635***	--					
CBM_REC	.557***	.457***	.336***	.395***	--				
CBM_EXT	.490***	.407***	.436***	.479***	.355***	--			
CBM_INT	.559***	.509***	.487***	.490***	.555***	.581***	--		
CBM_DEM	.418***	.310***	.292***	.468***	.388***	.556***	.667***	--	
CBM_INDEKS	.627***	.518***	.475***	.572***	.720***	.761***	.871***	.840***	--
***. Correlation at 0.001(2-tailed)									

FACTOR ANALYSIS

Factor Analysis of the Innovativeness Construct

The assumptions for factor analysis were met (KMO = 0.913; Bartlett's χ^2 = 2,589.55; df = 190; $p < 0.001$). A principal component analysis (PCA) with oblique rotation (Oblimin) extracted three factors that together explained 69.62% of the total variance (F1 = 51.63%; F2 = 10.18%; F3 = 7.82%). The factor structure was clear and theoretically interpretable: Factor 1 grouped organisational and process innovation items (adaptability, process optimisation, idea culture, advanced technologies, supplier coordination); Factor 2 included product innovation and customer-oriented items (eco-design, iterative improvements, rapid technological adaptation, product launches); while Factor 3 represented marketing innovativeness, characterised by negative loadings. For interpretative consistency, the scores for Factor 3 were reflected (×−1), so that higher values indicate greater innovativeness.

The identification of a strong and dominant organisational–process innovativeness factor (F1) indicates that most of the variability in firm innovative-

TABLE 5 Spearman Correlation Matrix between Innovativeness Dimensions and CBM Dimensions

	INO_PRO	INO_PROC	INO_ORG	INO_MARK	CBM_REC	CBM_EXT	CBM_INT	CBM_DEM	CBM_INDEX
INO_PRO	--								
INO_PROC	0.599***	--							
INO_ORG	0.525***	0.749***	--						
INO_MARK	0.545***	0.616***	0.581***	--					
CBM_REC	0.529***	0.458***	0.302***	0.325***	--				
CBM_EXT	0.518***	0.493***	0.431***	0.445***	0.235**	--			
CBM_INT	0.567***	0.525***	0.484***	0.502***	0.537***	0.573***	--		
CBM_DEM	0.454***	0.338***	0.302***	0.473***	0.356***	0.515***	0.604***	--	
CBM_INDEKS	0.633***	0.584***	0.487***	0.522***	0.652***	0.730***	0.856***	0.812***	--

***. Correlation is significant at the 0.001 level (two-tailed).

**. Correlation is significant at the 0.01 level (two-tailed).

The rank-order correlations confirm the Pearson results, showing slightly higher coefficients across several pairs, which is expected given the deviation from normality. The strongest monotonic associations are observed between the CBM index and resource intensification (ρ = 0.856***), product life extension (ρ = 0.730***), as well as the innovation dimensions of product innovation (ρ = 0.633***) and process innovation (ρ = 0.584***). All relationships remain positive and statistically significant, reinforcing the robustness of the findings.

TABLE 6 Explained Variance (Innovativeness Construct, PCA–Oblimin)

Factor	Eigenvalue	% variance	Cumulative %
1	10.33	51.63	51.63
2	2.04	10.18	61.80
3	1.56	7.82	69.62

ness is explained by the ability to enhance operational efficiency and system adaptability. This capability is essential for subsequent models examining the relationship between circular business models and firm performance. The clear separation of market–product (F2) and marketing (F3) practices allows for precise testing of differentiated hypotheses regarding which dimensions of innovativeness statistically predict specific aspects of organisational efficiency.

Factor Analysis of the CBM Construct

The assumptions for factor analysis were met (KMO = 0.850; Bartlett's χ^2 = 2,058.46; df = 190; $p < 0.001$). A PCA with oblique rotation (Oblimin) extracted five factors explaining 72.36% of the total variance (F1 = 40.07%; F2 = 12.49%; F3 = 7.32%; F4 = 6.64%; F5 = 5.84%). Factor 1 reflects dematerialisation and digitalisation of offerings; Factor 2 captures recycling systems and responsible waste management; Factor 3 represents durability and product life extension; Factor 4 refers to repair, return, and replacement (inverse ori-

TABLE 7 Explained Variance (CBM Construct, PCA–Oblimin)

Factor	Eigenvalue	% variance	Cumulative %
1	8.014	40.070	40.070
2	2.498	12.491	52.562
3	1.465	7.324	59.886
4	1.327	6.637	66.522
5	1.168	5.839	72.361

entation; scores reflected for consistency); and Factor 5 encompasses reuse and reusable packaging. Factor loadings are high and stable, with only marginal cross-loadings, confirming the metric coherence and robustness of the solution. (See Table 7.)

The dominance of the dematerialisation and digitalisation factor (F1) indicates that digital transformation, and particularly the substitution of physical products with digital services, explains most of the variance in circular business model practices in the sample. The separate factors related to recycling (F2), durability (F3), repair and return (F4), and reuse (F5) indicate that firms employ a range of approaches to reduce material inputs and enhance efficiency. This structure of CBM practices provides a clear and reliable basis for further correlation and regression analyses aimed at identifying which circular strategies contribute most to operational and market performance.

Hypothesis Testing

The hypotheses were tested using multiple linear regression on standardised variables (β coefficients), in line with the previously confirmed metric validity of the scales. The results are presented in two parts: first, a summary of the findings for Hypothesis H1 and its sub-hypotheses H1a to H1d across CBM dimensions, and then the results for Hypothesis H2, which examines the interaction effect between technological and non-technological innovativeness.

The aggregate model (H1) uses the composite CBM index as the dependent variable, while the sub-hypotheses (H1a to H1d) include the individual CBM dimensions: resource recycling, product life extension, intensifying resource use, and dematerialisation. Technological (TEH) and non-technological innovativeness (NET) are the main predictors. All models control for firm size, firm age, and manager education. Because of deviations from normality, estimations were performed using robust standard errors (HC3). Multicollinearity was tested (VIF < 3), and the assumptions of linearity and homoscedasticity were verified through residual inspection.

A summary of the effects is presented in a single-panel table, followed by a short description before and after the table.

H1 (aggregate relationship – innovativeness → CBM index) - Multiple regression analysis shows that a higher level of innovativeness is associated with a greater degree of circular business model implementation. Technological innovativeness has a significant positive effect on the CBM index ($\beta = 0.480$, $p < 0.001$), while non-technological innovativeness is positive but not statistically significant ($\beta = 0.141$, $p = 0.145$), controlling for firm size, age, and managers' education level. The model explains $R^2 = 0.529$ (adjusted $R^2 = 0.500$; $F(9,149) = 18.57$, $p < 0.001$; $N = 159$). Among the control variables, large firms and higher managerial education (university degree) contribute significantly and positively to the CBM index. All VIF values are below 3.0, indicating no serious multicollinearity. *Conclusion: H1 is supported, confirming a general (predominantly technological) relationship between firm innovativeness and the implementation of circular business models.*

H1a (Technological innovativeness → Resource recycling) - *Technological innovativeness significantly increases the adoption of resource recycling practices ($\beta = 0.534$, $p < 0.001$), controlling for covariates. The model exhibits good explanatory power ($R^2 = 0.405$, adjusted $R^2 = 0.373$; $F(8,150) = 12.742$, $p < 0.001$; $N = 159$). Among the control variables, medium-sized firms and middle-aged firms show additional positive effects. H1a is supported.*

H1b (Technological innovativeness → Product life extension) - Technological innovativeness has a significant positive effect on practices related to product durability, extended warranties, and maintenance ($\beta = 0.495$, $p < 0.001$). The model shows moderate explanatory power ($R^2 = 0.332$, adjusted $R^2 = 0.297$; $F(8,150) = 9.336$, $p < 0.001$; $N = 159$). Among the control variables, large firms exhibit an additional positive effect. H1b is supported.

H1c (Non-technological innovativeness →

TABLE 8 Results of Regression Models for H1 and H1a to H1d (β and p; Model Statistics)

Outcome / Hypothesis	Key Predictor(s)	β	p	R²_adj	F(df1, df2)	N
CBM index (H1)	Technological Innovativeness (TEH)	0.480	<0.001	0.500	18.57 (9.149)	159
	Non-Technological Innovativeness (NET)	0.141	0.145			
CBM – Cycling (H1a)	Technological Innovativeness (TEH)	0.534	<0.001	0.373	12.742 (8.150)	159
CBM – Extending (H1b)	Technological Innovativeness (TEH)	0.495	<0.001	0.297	9.336 (8.150)	159
CBM – Intensifying (H1c)	Non-Technological Innovativeness (NET)	0.500	<0.001	0.347	11.501 (8.150)	159
CBM – Dematerialising (H1d)	Non-Technological Innovativeness (NET)	0.349	<0.001	0.318	10.228 (8.150)	159

NOTES: **Reported coefficients are standardised (β). Each model includes control variables for firm size, firm age, and manager education. The estimates were obtained using robust standard errors (HC3). All VIF values were below 3, suggesting no meaningful multicollinearity. The comments on the hypotheses are based on the statistical output, including standardised coefficients (β), significance levels (p), and model statistics (R², adjusted R², F, and df).**

TABLE 8 *Results of Regression Model for H2 (β and p; Model Statistics)*

Tabl

Outcome	CBM index
Technological Innovativeness (z-TEH)	β = 0.461; p < 0.001
Non-Technological Innovativeness (z-NET)	β = 0.137; p = 0.158
Interaction (z-TEH × z-NET)	β = −0.042; p = 0.540
Model Statistics	R = 0.728; R² = 0.530; R²_adj = 0.498; F(10.148) = 16.687; p < 0.001; N = 159
Summary of Control Variables	Firm size (large) β = 0.196; p = 0.002; Higher education (university degree) β = 0.230; p = 0.001; master's/doctoral degree β = 0.137; p = 0.049; other control variable were not significant. all VIF values < 5

Intensifying resource use) - Non-technological innovativeness, expressed through organizational and market practices, shows a positive and statistically significant relationship with the intensity of resource use ($\beta = 0.500$, $p < 0.001$). The regression model explains a notable share of variance ($R^2 = 0.380$, adjusted $R^2 = 0.347$; $F(8,150) = 11.501$, $p < 0.001$; N = 159). Firms led by managers with higher education levels also tend to report stronger outcomes in this area. H1c is supported.

H1d (Non-technological innovativeness → Dematerialisation) - Firms with higher levels of non-technological innovativeness tend to show stronger progress toward dematerialising their products and production processes ($\beta = 0.349$, $p < 0.001$). The regression model explains a fair share of the variance ($R^2 = 0.353$, adjusted $R^2 = 0.318$; $F(8,150) = 10.228$, $p < 0.001$; N = 159). Among the control variables, large firms and those led by managers with higher education levels contribute more noticeably to this outcome. H1d is supported.

Hypothesis H2 (the interaction between technological and non-technological innovativeness) was tested by multiple linear regression with *standardized predictors (z-TECH, z-NONTECH, and their interaction term, z-TECH × z-NONTECH). Firm age, size, and managers' education were included as control variables. The dependent variable was the composite CBM index. Following the same analytical procedure as in earlier models, the regression was checked for linearity, homoscedasticity, and multicollinearity, with VIF and tolerance statistics reported. The model proved statistically significant overall.*

In the combined model, technological innovativeness remains a strong and statistically significant predictor of the CBM index. However, non-technological innovativeness loses significance once the interaction term is introduced. Notably, the interaction between the two dimensions (z-TECH × z-NONTECH) is negative and small ($\beta = -0.042$, $p = 0.540$), suggesting there is no meaningful joint effect beyond their separate contributions. *Therefore, H2 is not supported*. Also, this result remains the same after accounting for control variables, and multicollinearity diagnostics (tolerance > 0.20; VIF < 5) further confirm that the coefficient estimates are reliable.

DISCUSSION

The aggregate results (H1) show that technological innovativeness (TECH) strongly predicts overall CBM implementation. In contrast, non-technological innovativeness (NONTECH) does not have a statistically significant effect after controlling for firm-level factors. This highlights the importance of technological capabilities for redesigning value creation, delivery, and capture. This finding supports existing research that product and process innovation provide the necessary foundations for circularity (Geissdoerfer et al., 2018; Teece, 2010; Zott, Amit & Massa, 2011). In Bosnia and Herzegovina's manufacturing industry, where production is resource- and energy-intensive, these technological foundations appear essential for advancing circular practices.

The distinction between innovation types becomes more evident when examining CBM dimensions. Technological innovativeness significantly predicts resource cycling and product life extension (H1a–H1b). These outcomes arise from mechanisms such as eco-design, product modularity, and improvements in material efficiency, as well as technical feedback loops. These mechanisms help slow and close resource flows, especially in sectors with high material throughput (Bocken et al., 2016; De Giacomo & Bleischwitz, 2020). They are the main channels through which circularity is integrated into production systems.

By contrast, non-technological innovativeness has strong effects on intensifying resource use and dematerialisation (H1c–H1d). These CBM strategies depend more on organisational and market changes than on technical redesign. Examples include servitisation, platform-based exchange, access-oriented models, and new formats for value communication. These approaches change how the business model operates and encourage more efficient use of existing assets (Zott & Amit, 2010; Zott, Amit & Massa, 2011). The results indicate that, for manufacturing in B&H, non-technological innovativeness builds on technological foundations to create new ways to use resources and interact with customers.

Testing the interaction effect (H2) shows that combining high TECH and NONTECH does not yield significant synergy. This aligns with research suggesting complementarities arise only when firms coordinate technology, organisation, and value capture (Parida, Sjödin & Reim, 2019; Ringvold, Saebi & Foss, 2023). Without this coordination, complementarities remain potential rather than actual. The pattern in B&H suggests firms first build technological capabilities, then develop organisational and market routines. Additionally, firm size and managerial education consistently predict positive outcomes, supporting the view that translating innovativeness into circular practices depends on managerial cognition, human capital, and internal coordination.

Taken together, these findings clarify how different innovation types drive various aspects of circular transformation. Technological innovativeness brings material and process changes, while non-technological innovativeness supports changes in behaviour, organisation, and relationships. The lack of observed synergy suggests that firms in B&H are at an early stage of capability development, with innovation types acting independently. This supports the view that the business model serves as a coordination mechanism connecting value creation and capture, with different innovation types shaping separate parts of this system (Teece, 2010; Zott, Amit & Massa, 2011).

CONCLUSION

The results of the conducted research indicate that firm innovativeness plays a central and distinct role in the adoption of circular business models within Bosnia and Herzegovina's manufacturing sector. Technological innovativeness facilitates recycling and extends product lifecycles, whereas non-technological innovativeness promotes more intensive resource use and supports dematerialisation. The absence of a combined or reinforcing effect between these two forms of innovativeness underscores the significance of sequencing. Developing technological capabilities prior to business model adaptation exemplifies dynamic capabilities, which involve the ongoing alignment of resources with changing market and institutional conditions (Bocken et al., 2016; Teece, 2010).

Theoretically, this study contributes by explicitly connecting the Resource-Based Theory (RBT) and Dynamic Capabilities Theory (DCT) frameworks with typologies of circular business models (CBMs). Hard innovations, such as product and process innovations, establish the material and operational foundations for circularity. In contrast, soft innovations, including organisational and marketing innovations, shape value delivery and capture, thereby stabilising and scaling circular effects (Zott, Amit & Massa, 2011). This integration supports the view that the business model functions as a coordination mechanism between value creation and value capture, rather than as a set of isolated operational solutions.

The practical implications for the B&H context are twofold. Firms should simultaneously strengthen capabilities related to eco-design, modularity, reparability, and digital traceability, while developing servitisation contracts, subscription and leasing models, and reverse logistics networks. Public policies, in turn, need to ensure institutional support and infrastructure for circular material flows, along with financial support and grants. In this way, CBMs may emerge as strategic frameworks that simultaneously advance competitiveness, resilience, and environmental performance (Geissdoerfer et al., 2020).

This study has several limitations. The cross-sectional design restricts causal inference, and the use of self-reported data may introduce perceptual bias despite procedural controls. The sample is limited to one country and a single NACE section, which may affect the transferability of the findings. Therefore, future research should employ longitudinal designs, integrate survey data with objective operational indicators, and apply structural modelling approaches to examine how technological and organisational innovations evolve and interact over time. Comparative studies across sectors and countries would also help clarify how institutional conditions enable or hinder the implementation of circular business models.

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ULOGA INOVATIVNOSTI TVRTKE U PROVEDBI KRUŽNOG POSLOVNOG MODELA (CBM)

SAŽETAK

Ovaj rad konceptualno i empirijski ispituje ulogu inovativnosti tvrtke kao odrednice provedbe kružnog poslovnog modela (CBM) u prerađivačkoj industriji (NACE odjeljak C) Bosne i Hercegovine. Teorijski okvir temelji se na pristupu temeljenom na resursima i pristupu dinamičkih sposobnosti, razlikujući tehnološku (proizvod i proces) i netehnološku (organizacijsku i marketinšku) inovativnost te njihove komplementarne uloge u usporavanju, zatvaranju i sužavanju tokova resursa. Metodološki dizajn koristi standardizirane mjere na razini tvrtke i odgovarajuće statističke tehnike za procjenu kako se te inovacijske dimenzije odnose na stupanj provedbe CBM-a. Istraživanje se temelji na uzorku od 159 proizvodnih tvrtki, koristeći usklađene pokazatelje poslovne statistike. Analitički postupak uključuje faktorsku analizu, deskriptivnu i korelacijsku statistiku, kao i višestruke regresije s robusnim standardnim pogreškama (HC3). Nalazi pokazuju da tehnološka inovativnost pruža materijalne i procesne temelje kružnosti, kroz ekodizajn, učinkovitost procesa i digitalnu sljedivost, dok netehnološka inovativnost stvara organizacijske i tržišne uvjete za difuziju i skaliranje, poput servitizacije, rutina povratne logistike i usklađivanja dionika. Doprinos ove studije je trostruk. Teoretski, ona poboljšava vezu između perspektiva Resource-Based View i Dynamic Capabilities View te suvremenih tipologija CBM-a. Metodološki, ona operacionalizira i testira „tvrde“ i „meke“ oblike inovacija istovremeno. Na praktičnoj i političkoj razini, studija ocrtava ključne mjere za podršku standardizaciji, servitizaciji i kružnim tokovima materijala u skladu sa standardima EU, s implikacijama za upravljačku praksu i industrijsku politiku.

KLJUČNE RIJEČI: *kružni poslovni modeli, tehnološka inovativnost, netehnološka inovativnost, prerađivačka industrija, Bosna i Hercegovina.*

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