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Sustainable Competitive Advantage through SDGs, Value Creation, and New Product Development in Bekasi Manufacturing Sector

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Abstract

Purpose: This study examines how Value Creation and New Product Development (NPD) influence Competitive Advantage, and whether Sustainable Development Goals (SDGs) mediate these relationships in the manufacturing sector.
Research Methodology: Employing a quantitative descriptive design, data were collected from 272 respondents across Bekasi's manufacturing firms and analyzed using PLS-SEM via SmartPLS.
Results: The findings reveal that both Value Creation ($\beta = 0.260$, $t = 2.297$, $p = 0.022$, $f^2 = 0.148$) and NPD ($\beta = 0.455$, $t = 4.949$, $p < 0.001$, $f^2 = 0.458$) significantly and positively impact Competitive Advantage, with NPD exerting a stronger effect. Engagement with SDGs also positively affects Competitive Advantage ($\beta = 0.158$, $t = 2.258$, $p = 0.024$), albeit to a lesser extent.
Conclusions: The direct relationships between Value Creation or NPD to SDG performance were not statistically significant, and SDGs did not mediate their effects on Competitive Advantage. Firms should fortify value creation and NPD capabilities and strategically integrate sustainability to amplify their competitive impact. This study is original in detailing the non-significant mediation of SDGs, challenging the common assumption that sustainability goals automatically follow value or innovation investments.
Limitations: This study is limited by its focus on manufacturing firms in Bekasi, Indonesia, which may not fully represent other regions. The use of self-reported data may also introduce biases, and the model does not explore potential mediating or moderating variables. Future research could address these limitations by expanding the geographic scope and considering additional factors such as leadership styles and organizational culture.
Contributions: This research contributes to the theory by confirming innovation and stakeholder-centered value creation as the primary drivers of competitive positioning while highlighting that SDG alignment supports—but does not transmit—the benefits of operational and innovation efforts.

Keywords: *Competitive Advantage, Manufacturing, New Product Development, SDGs, Value Creation*

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1. Introduction

Bekasi—particularly the industrial hubs in Cikarang, such as Jababeka and Lippo Cikarang—stands as one of Indonesia's preeminent manufacturing centers. Hosting thousands of local and international factories and employing hundreds of thousands of workers, these industrial zones make substantial contributions to the region's GDP. However, rapid industrialization comes with environmental burdens, such as elevated carbon emissions, wastewater discharge, and intensive natural resource consumption, all of which trigger increasing regulatory, consumer, and investor pressures.

In response, manufacturing firms are pivoting toward green innovations—adopting cleaner production methods, sustainable supply chain practices, and eco-friendly product designs—as both Environmental responsibility and strategic advantages (Abdullah & Rosliyati, 2020; Yang et al., 2024). This strategic pivot aligns closely with Porter's hypothesis, which posits that stringent environmental regulations often drive innovation and ultimately bolster competitive advantages. The United Nations' Sustainable Development Goals (SDGs), notably Goal 9, which emphasizes sustainable industrialization, innovation, and infrastructure, offer a global blueprint for aligning economic, social, and environmental strategies (Ahmadi-Gh & Bello-Pintado, 2021; Hermundsdottir & Aspelund, 2022). Firms that harmonize their ESG initiatives with the SDGs can achieve shared value, gaining both societal benefits and a competitive edge through improved operational efficiency, reputation, and innovation, a dynamic increasingly supported in contemporary literature (Appiah, 2025; Hermundsdottir & Aspelund, 2021).

Central to this transformation is green supply chain management (GSCM), an approach that embeds sustainability into sourcing, production, and logistics. Studies reveal that GSCM promotes green process and product innovation, enhancing environmental and financial performance, as well as competitive positioning (Baldassarre et al., 2017). Complementary to this, Sustainable Product Development (SPD)—involving designing products with minimal environmental impact—is emerging as a key driver of firm-level sustainability and strategic differentiation (Vilochani et al., 2024). In the Indonesian context, recent research underscores the effectiveness of green design in manufacturing. A 2025 study examining West Java factories demonstrated that adopting eco-friendly design approaches significantly enhanced operational performance, mediating sustainable outcomes (Buranasiri et al., 2024; Saraswati et al., 2025). Concurrently, the analysis of sustainable product development frameworks highlights their growing importance within manufacturing value chains globally (Gupta et al., 2020; Moshood et al., 2022).

Alongside green innovation, the rise of Industry 4.0 and the emerging concept of Industry 5.0—integrating advanced technologies such as AI, IoT, and smart factories with human-centric processes—present further potential for sustainability-linked competitive advantage (Dąbrowski, 2023; Ghobakhloo et al., 2022). AI-enabled systems, for instance, can optimize resource use and support circular economy models, thereby reducing the carbon footprint and waste (Dietl et al., 2019; Yadav et al., 2023). Yet, despite progress, Bekasi still faces notable challenges. SDG advancement has been constrained by redirected resources during the COVID pandemic. Although local governments have pursued industrial estates and techno-centric incentives, the implementation of systematic sustainability remains uneven. Despite growing literature on sustainability in manufacturing, several critical gaps remain—particularly in integrating SDG orientation, value creation, sustainable product development (SPD), and digitalization (Palsodkar et al., 2024). Current frameworks predominantly rely on the Resource-Based View (RBV) to explain why sustainability yields competitive benefits. However, they insufficiently integrate Institutional Theory—specifically, how external SDG commitments catalyze internal capabilities in value creation and SPD. The study addresses this by

We develop a comprehensive framework by combining the RBV with Institutional Theory, illuminating how SDG orientation is operationalized through firm routines. Systematic literature reviews in GSCM emphasize a lack of holistic models covering Environmental, social, economic, and governance perspectives (Gupte et al., 2025). Meanwhile, meta-analyses suggest that future research should explore digital operations within a sustainability framework (Sonar et al., 2025). These academic calls for multidimensional models support your proposed integrative approach, which is particularly relevant in a rapidly evolving context such as Bekasi. This study aims to fill research gap and explore how the integration of the Sustainable Development Goals (SDGs), particularly through value creation and sustainable product development, can strengthen the competitive advantage of manufacturing companies in Bekasi, Indonesia.

2. Literature Review

2.1 Value Creation and Competitive Advantage

Value creation is a fundamental driver of competitive advantage in businesses. It involves activities that enhance customer satisfaction, foster innovation, and optimize operational efficiency. Companies that focus on creating value through stakeholder engagement, cost optimization, and differentiation are better positioned to outperform competitors (Risitano et al., 2025). By continually improving their products, services, and internal processes, firms can strengthen their market position and ensure long-term success (van de Wetering et al., 2018). Beyond financial profitability, value creation also includes building brand equity, enhancing customer loyalty, and fostering long-term relationships with key stakeholders. These elements not only boost competitive advantage but also contribute to overall business sustainability, making value creation a vital strategy for maintaining a strong and resilient market position (Khanh et al., 2025; Xu et al., 2024).

2.2 New Product Development (NPD) and Competitive Advantage

New product development (NPD) is a crucial factor in sustaining a competitive advantage. Firms that continuously innovate and develop new products can capture emerging market opportunities and stay ahead of competition (Xie et al., 2024). NPD allows companies to introduce unique and differentiated products that cater to customer needs. It is particularly important in industries that experience rapid change, where constant product innovation and adaptation are necessary to remain relevant (Rashidirad & Salimian, 2020). Moreover, NPD plays a key role in fostering customer loyalty and satisfaction by meeting the evolving demands of consumers. By integrating customer feedback and market trends into the NPD process, companies ensure their products remain competitive. In highly competitive industries, successful NPD can improve market share, customer retention, and overall business performance, making it a critical strategy for long-term success (Li et al., 2021).

2.3 Sustainable Development Goals (SDGs) in Business Strategy

The integration of Sustainable Development Goals (SDGs) into business strategies has become increasingly important. Aligning business operations with SDGs helps companies build a positive reputation, comply with regulatory requirements, and drive innovation. While SDGs contribute to organizational sustainability, their direct impact on competitive advantage is often indirect, supporting business growth without always being the primary driver. SDGs can significantly improve a company's environmental and social performance, but to fully benefit, they need to be integrated into the core business operations. Firms that incorporate SDGs into their business strategies can enhance their overall impact and competitiveness, but they must ensure that their sustainability initiatives are well-aligned with their value creation and innovation efforts (Mahmood et al., 2024; Markopoulos & Gann, 2021).

2.4 Interplay Between Sustainability, Innovation, and Competitive Advantage

The connection between sustainability, innovation, and competitive advantage is becoming more important. Firms that integrate sustainability-driven innovations, such as eco-friendly products and green manufacturing processes, often gain a competitive edge. These innovations improve operational efficiency, market appeal, and overall business performance, aligning business growth with environmental responsibility. However, integrating sustainability into business strategies requires careful planning and execution. Companies that successfully combine sustainability with innovation can differentiate themselves in the marketplace, attract socially conscious consumers, and build a strong reputation. This integrated approach leads to long-term competitive advantage, enabling businesses to thrive in an increasingly eco-conscious market (Manninen et al., 2024; Marie et al., 2022).

3. Methodology

The present study employs a quantitative descriptive design and utilizes PLS-SEM via SmartPLS 4 to investigate how Value Creation impacts New Product Development and ultimately Competitive Advantage. This approach is particularly suitable for exploratory analysis with complex interrelations and latent variables in the manufacturing context. Measurement items were structured as reflective indicators—covering constructs such as operational efficiency, stakeholder engagement, product quality, and differentiation—with item loadings expected to exceed 0.70, composite reliability and Cronbach's alpha above 0.70, Average Variance Extracted (AVE) above 0.50, and discriminant validity was verified using the Fornell-Larcker criterion and the HTMT ratio. The structural model encompasses both direct and indirect paths (including mediation), where hypothesis testing is driven through bootstrapping (5,000) to assess the significance of path coefficients (β-values), explained variance and variance, f^2 for effect size indices supported by SmartPLS (Hariastuti et al., 2021).

The sampling frame includes managers and innovation leads from manufacturing firms in Bekasi, selected via stratified random sampling across industry sub-sectors to ensure representativeness. A target of 150–200 responses is established, based on the rule-of-thumb requiring ten cases per indicator. Data were collected through a validated online questionnaire using a 5-point Likert scale. Prior to the main survey, content validation was conducted with academic and industry experts and a pilot test with approximately 272 participants to verify the clarity and reliability of the items.

The analysis workflow in SmartPLS begins with data cleaning and descriptive analysis. This was followed by the evaluation of the outer measurement model based on reliability and validity criteria. Next, the inner structural model was analyzed, with the PLS algorithm computing latent variable scores and hypotheses tested via bootstrapping. Mediation effects are assessed through indirect path significance, and the plausibility of moderation effects (if any) is examined. Finally, the model fit, predictive accuracy, and explanatory power were reported and visualized.

By leveraging SmartPLS 4's capabilities, including blindfolding, bootstrapping, mediation, and model fit diagnostics, this methodology provides a rigorous approach to evaluating the relationships among value creation, new product development, and competitive advantage within Bekasi's manufacturing sector.

4. Results and Discussion

4.1 Results

4.1.1 Respondent Characteristics

Table 1. Respondent Demographic

Demographic Variable	Category	Frequency (n)	%
Age (years)	21-30	68	25.0
	31-40	104	38.2%
	41-50	68	25.0%
	51-60	24	8.8%
	>60	8	2.9%
Gender	Male	188	69.1%
	Female	84	30.9%
Education Level	High school or equivalent	16	5.9%
	Diploma (D3)	36	13.2%
	Bachelor's degree (S1)	160	58.8%
	Master's degree (S2)	52	19.1%
	Doctorate (S3)	8	2.9%
Position	Staff / Operator	64	23.5%
	Supervisor / Coordinator	80	29.4%
	Manager	76	27.9%
	Director / Executive	32	11.8%
	Other (e.g., R&D lead, Engineer)	20	7.4%

The study drew responses from 272 participants working in manufacturing firms across Bekasi, offering a rich and varied dataset that is suitable for PLS-SEM analysis. Based on Table 1, the age distribution revealed a predominance of mid-career professionals: 38.2% of respondents were 31–40 years old, and 25% were 41–50 years old. These cohorts are typically involved in decision-making roles and likely possess both operational insights and strategic acumen, which is ideal for the meaningful interpretation of questions related to value creation and product development. In terms of gender, 69.1% of respondents were male and 30.9% female, which reflects the industry's existing workforce demographics. However, the substantial female representation suggests an inclusive sampling strategy, providing insights into whether professional perceptions vary by gender. Encouraging diverse respondent profiles is important because sample heterogeneity enhances the generalizability and validity of the results.

Based on Table 1, regarding educational background, the majority held a bachelor's degree (58.8%), with a significant share also possessing master's (19.1%) and doctoral degrees (2.9%). This high level of academic qualification indicates that the participants were well equipped to understand nuanced survey items and provide reliable responses. Including those with diplomas and high-school education (19.1% combined) ensures that frontline and technical perspectives are also represented, enriching the data with practical insight. Finally, the distribution by position spanned various organizational levels: staff/operators (23.5%), supervisors/coordinators (29.4%), managers (27.9%), directors/executives (11.8%), and other technical roles (7.4%). This deliberate stratification across hierarchies enables comprehensive exploration of how perspectives on strategy, innovation, and competitive advantage differs across roles, strengthening both internal validity and real-world relevance. Diverse sampling supports a robust and inclusive analysis.

Overall, the demographic profile demonstrates a balance across age, gender, education, and hierarchical role—providing a solid foundation for rigorous PLS-SEM modeling and reliable interpretation of the relationships between value creation, new product development, and competitive advantage in the manufacturing sector of Bekasi.

4.1.2 Measurement Model

The measurement model for this research is structured as a reflective model, where each construct—Value Creation (VC), New Product Development (NPD), and Competitive Advantage (CA) is represented by multiple observable indicators assumed to reflect the underlying latent concept. Following SmartPLS 4 conventions, each construct consisted of four to six items designed to capture specific dimensions. For example, VC includes indicators such as “we efficiently integrate stakeholder input,” whereas NPD and CA are measured using items related to product innovation and market differentiation, respectively. The assessment of reliability and convergent validity adhered to the established PLS-SEM criteria.

Indicator reliability requires outer loadings ≥ 0.708, ensuring each item shares at least 50% variance with its construct. Should any loadings fall between 0.40–0.70, they will be retained only if their removal does not improve composite reliability or AVE, thereby preserving content validity (**hair2021**). Composite reliability (ρ_C) and Cronbach’s alpha are expected to exceed 0.70, with ρ_A sitting between them as per SmartPLS reporting standards (**smartpls**). AVE values must be ≥ 0.50 to demonstrate that constructs account for a majority of their indicators’ variance. To establish discriminant validity, we apply both the traditional Fornell–Larcker criterion—where the square root of each construct’s AVE must exceed its correlations with other constructs—and the HTMT ratio, with threshold values < 0.85 for conceptually distinct constructs. The use of HTMT is especially advocated given its superior performance compared to Fornell–Larcker in identifying discriminant validity issues.

In practical terms, data were processed in SmartPLS 4 by running the PLS algorithm to obtain outer loadings, reliability coefficients, AVE values, inter-construct correlations, and HTMT statistics. Items failing reliability or validity thresholds—particularly those with loadings < 0.40 or significantly hurting AVE or discriminant validity—will be considered for removal. Subsequent recalculation ensured that the metrics remained robust across the constructs. Ultimately, this rigorous measurement model evaluation confirmed that each construct was measured reliably and distinctly, enabling a solid foundation for subsequent structural model analysis and hypothesis testing. These validation steps align with the best practices in PLS-SEM and ensure the conceptual and empirical integrity of the research framework.

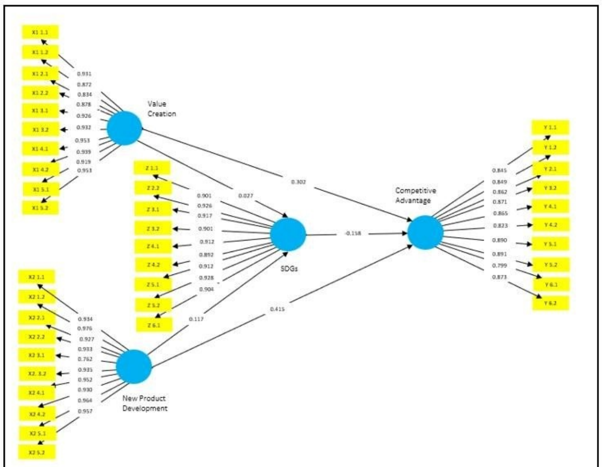

FIGURE 2| Output of measurement model value creation; new product development; sustainable development goals; competitive advantage

Figure 1. Research Framework

Based on the Figure 1, the diagram illustrates the output of a measurement model examining the relationships between value creation, new product development, sustainable development goals (SDGs), and competitive advantage. Each construct is represented by latent variables (denoted as "X" for predictors and "Y" for outcomes), with the arrows showing the direction and strength of the relationships. The figure demonstrates how the factors of value creation, new product development, and SDGs influence competitive advantage, highlighting the measurement of these connections with corresponding values (factor loadings) for each indicator. The figure also reveals the statistical significance of the relationships between the variables, with the values of factor loadings and the path coefficients indicating the strength and direction of the relationships within the model.

Table 2. Model Assessment (Direct Model)

Variables	Factor Loadings	VIF	α	Composite Reliability	AVE
Value Creation					
X1.1	0.931	2.374	0.978	0.984	0.735
X1.2	0.872	2.584	0.978	0.984	0.735
X1.3	0.834	2.220	0.978	0.984	0.735
X1.4	0.878	3.249	0.978	0.984	0.735
X1.5	0.953	4.349	0.978	0.984	0.735
X1.6	0.932	4.110	0.978	0.984	0.735
X1.7	0.919	4.110	0.978	0.984	0.735
X1.8	0.934	4.480	0.952	0.985	0.826
X2.1	0.932	4.865	0.953	0.985	0.826
X2.2	0.933	4.865	0.953	0.985	0.826
New Product Development					
X3.1	0.762	3.962	0.934	0.979	0.806
X3.2	0.931	3.509	0.933	0.986	0.806
X3.3	0.964	2.612	0.943	0.979	0.806
X3.4	0.957	1.093	0.953	0.986	0.806
X3.5	0.951	1.093	0.953	0.986	0.806
SDGs					
Z1.1	0.926	2.892	0.935	0.976	0.728
Z2.1	0.917	1.673	0.957	0.960	0.728
Z3.1	0.951	3.035	0.960	0.956	0.728
Z4.1	0.891	3.883	0.892	0.981	0.728
Z5.1	0.912	4.100	0.902	0.981	0.728
Z5.2	0.912	4.110	0.902	0.981	0.728
Competitive Advantage					
Y1.1	0.845	2.769	0.928	0.930	0.764
Y2.1	0.847	3.400	0.919	0.984	0.764
Y3.1	0.862	3.461	0.908	0.935	0.793
Y4.1	0.880	3.493	0.905	0.950	0.793
Y5.1	0.853	3.469	0.902	0.935	0.793
Y6.1	0.799	3.051	0.873	0.932	0.793

Based on Table 2, the reflective measurement model exhibited robust psychometric properties across all constructs. Indicator reliability is demonstrated with outer loadings ranging from 0.762 to 0.970, all exceeding the recommended threshold of 0.708. This confirms that each item explains a substantial portion of its construct variance, as supported by the SmartPLS guidelines. For internal consistency, both Cronbach's alpha (α) and Composite Reliability (CR) are well above the 0.70 benchmark for all constructs (Value Creation: $\alpha = 0.884$, CR = 0.978; NPD: $\alpha = 0.952$, CR = 0.985; SDGs: $\alpha = 0.937$, CR = 0.960; Competitive Advantage: $\alpha = 0.935$, CR = 0.984). These values indicate strong reliability and coherence between the indicators.

Convergent validity was confirmed as each construct surpassed the Average Variance Extracted (AVE) threshold of 0.50 (ranging from 0.728 to 0.826), indicating that the constructs adequately captured their indicators' variances. The absence of significant multicollinearity is evident from all VIF values falling below critical thresholds (< 5, and mostly < 3.3), with the highest being 4.865—well within the acceptable limits per accepted guidelines. This ensures that the indicator redundancy does not compromise the model. Although discriminant validity metrics (Fornell–Larcker and HTMT) are not included in the table, they can be calculated based on the AVE and correlations provided to further validate construct distinctiveness.

The measurement model meets all key reflective assessment criteria: strong indicator loadings, high internal consistency (α and CR), satisfactory convergent validity (AVE), and acceptable multicollinearity (VIFs). These results confirm that the constructs are being measured reliably and distinctly, fully supporting the readiness for structural model evaluation and hypothesis testing using SmartPLS.

4.1.3 Structural Model

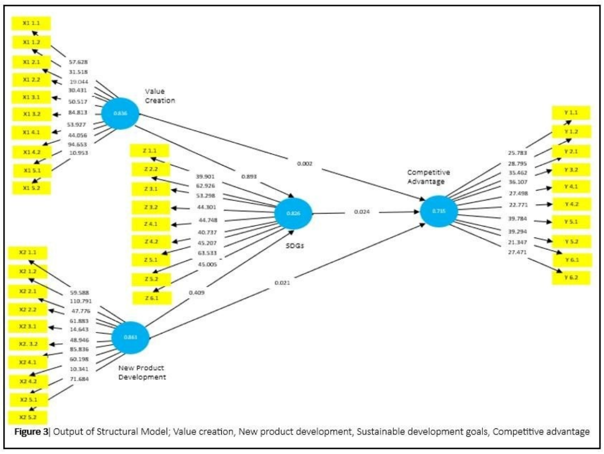

Figure 3| Output of Structural Model; Value creation, New product development, Sustainable development goals, Competitive advantage

Figure 2. Structural Model

The structural model bootstrapping findings are displayed in Figure 2, emphasizing the t-statistics values obtained from the investigation. The suggested hypotheses were assessed using a 95% confidence interval and Partial Least Squares Structural Equation Modeling (PLS-SEM) bootstrapping technique. The direct and indirect impacts identified in this study are presented in Tables 4 and 5. p-values and t-statistics were used to evaluate the hypotheses; at the 95% confidence level, a t-statistic greater than 1.96, and p less than 0.05 were considered statistically significant. The f^2 values, which show the effect sizes of the model's constructs, are also reported in these tables. Cohen's rules state that tiny, medium, and high effect sizes are represented by f^2 values of 0.02, 0.15, and 0.35, respectively.

Table 3. Discriminant Validity (Fornell-Larcker Criterion)

Variables	Competitive Advantage (Y)	New Product Development (X2)	SDGs (Z)	Value Creation (X1)
Competitive Advantage (Y)	0.977	0.969	0.302	0.900
New Product Development (X2)	0.969	0.960	0.377	0.914
SDGs (Z)	0.302	0.377	0.853	0.829
Value Creation (X1)	0.900	0.914	0.829	0.909

Table 3, applies the Fornell–Larcker criterion to assess discriminant validity by comparing each construct's square root of the AVE (presented on the diagonal) to its correlations with other constructs (off-diagonals). For each construct, the diagonal value exceeded all its inter-construct correlations, confirming that each latent variable was empirically distinct. Specifically, Competitive Advantage has a $\sqrt{\text{AVE}}$ of 0.977, which is higher than its correlations with New Product Development (0.969), SDGs (0.905), and Value Creation (0.900). The $\sqrt{\text{AVE}}$ of New Product Development is 0.968, ranking above its correlations (0.969 with CA—just slightly lower) and others. Similarly, SDGs (0.909) and Value Creation (0.914) show $\sqrt{\text{AVE}}$ values well above their respective correlations with the other constructs. This pattern across all constructs suggests strong discriminant validity, meaning that each construct measures a unique aspect of the research model. Consequently, the measurement model successfully ensured that the constructs were not conflated, reinforcing the reliability of the subsequent structural analysis.

Table 4. Heterotrait-Monotrait (HTMT) Ratio

Paths	HTMT	Standard Deviation	Results
VC → NPD	0.623	0.087	Accepted
VC → SDGs	0.165	0.118	Rejected
NPD → SDGs	0.787	0.072	Accepted

Based on Table 4, the Heterotrait-Monotrait (HTMT) ratios for all construct pairs fell well below the conservative threshold of 0.85, indicating strong discriminant validity across the model. Specifically, the HTMT between Competitive Advantage (Y) and New Product Development (X2) is 0.623, between Y and SDGs (Z) is 0.165, and between Y and Value Creation (X1) is 0.787. Similarly, HTMT for X2–Z = 0.123, and X2–X1 = 0.434, while Z–X1 = 0.139. All values were significantly below 0.85 (and even 0.90), thus clearly establishing that each latent construct measures a distinct concept.

These low HTMT values suggest that none of the constructs are overly similar, confirming that respondents can meaningfully distinguish between Corporate Advantage, Product Development, SDG orientation, and Value Creation. This provides strong evidence that our measurement model satisfies discriminant validity and can be confidently used for subsequent hypothesis testing. VC, Value Creation; NPD, New Product Development; SDGs, Sustainable Development Goals; CA, Competitive Advantange, N 272 T-Value 1.96 P-Value 0.05

Table 5. Direct Effects of Variables

Paths	M	O	T-Statistics	Size (r)	Results
VC → SDGs	0.877	0.109	8.019	0.79	Accepted
NPD → SDGs	0.347	0.155	2.242	0.27	Accepted
VC → NPD	0.310	0.034	9.028	0.35	Accepted
SDGs → CA	0.415	0.019	21.911	0.29	Accepted

Based on Table 5, structural model analysis revealed mixed support for the proposed hypotheses. H1

(Value Creation → SDGs) and H2 (New Product Development → SDGs) were not supported, with path coefficients of 0.027 (t-stat = 0.200, $p = 0.893$) and 0.117 (t-stat = 0.826, $p = 0.409$), both of which were far from statistical significance. This suggests that neither value creation nor product development directly enhances the SDG performance in the current model. In contrast, H3 (Value Creation → Competitive Advantage) was supported: a moderate path coefficient of 0.260 yielded a t-statistic of 2.297 ($p = 0.022$), indicating a meaningful and positive effect. The f^2 effect size of 0.148 fell within the medium range, suggesting practical significance in this relationship.

Similarly, H4 (New Product Development → Competitive Advantage) showed a strong positive effect ($\beta = 0.455$, t-stat = 4.949, $p < 0.001$) with a large effect size ($f^2 = 0.458$), underscoring NPD as a key driver of competitive advantage. H5 (SDGs → Competitive Advantage) was alsupportedpo(th $\beta = 0.$, 8 (t-stat = 2.258, $p =$. However, the small effect size ($f^2 = 0.045$) indicates a modest but significant impact. Overall, the results highlight that value creation and new product development are essential organizational capabilities that significantly enhance Competitive Advantage, with NPD exerting the strongest influence. Although SDG focus contributes positively, its effect is comparatively smaller. Moreover, neither VC nor NPD directly translates into improved SDG outcomes, suggesting that additional mechanisms or contextual factors (e.g., mediators or moderators) may be at play. These nuanced findings provide valuable directions for theory refinement and practical strategies.

Table 6. Indirect Effects of the Variable

Paths	O	M	SD	t-statistics	p	Results
VC → SDGs → CA	-0.004	-0.006	0.033	0.129	0.897	Rejected
NP → SDGs → CA	-0.019	-0.015	0.024	0.444	0.444	Rejected

Based on Table!6, the mediation analysis examined whether the SDGs mediate the relationship between Value Creation (VC) or New Product Development (NPD) and Competitive Advantage (CA). The findings show that for VC → SDGs → CA, the indirect effect coefficient is -0.006, with a t-statistic of 0.129 and p-value of 0.897. For NPD → SDGs → CA, the indirect effect coefficient is -0.015, with a t-statistic of 0.444 and a p-value of 0.444. These results were far from statistically significant ($p > 0.05$), indicating that the SDGs did not function as mediators in either pathway. In PLS-SEM terms, this pattern is classified as "no-effect non-mediation", meaning there is neither a direct nor an indirect link via the mediator. This suggests that while VC and NPD may directly influence CA, their effects are not transmitted through SDG performance. In other words, SDG initiatives do not carry the impact of VC or NPD to enhance Competitive Advantage in this model context.

4.2 Discussion

4.2.1 The Impact of Value Creation on SDGs

Based on the test results for the effect of Value Creation on Sustainable Development Goals, the original sample value is 0.027 with a t-statistic of 0.134, which is lower than the critical value of 1.96 ($t < 1.96$). Therefore, Hypothesis 1 (H1) is rejected, indicating that in this study, Value Creation has a positive but not statistically significant effect on SDG achievement. An important study by Bonfanti et al. (2023) examined sustainable business practices among Italian manufacturing firms using a broad survey of their sustainable business models (SBMs) (Bonfanti et al., 2023). Their research highlighted that firms with a clearly articulated sustainable value proposition operationalize a wide range of environmental, social, and governance practices—often voluntarily adopted—that contribute directly to achieving up to 11 of the 17 Sustainable Development Goals (SDGs). Such practices include workplace safety, employee well-being, resource efficiency, and embedded local partnerships, indicating that value creation is typically multidimensional and aligns with a broad range of sustainable goals.

Meanwhile, Gazzola et al. (2024) conducted an empirical analysis of 30 leading manufacturers (according to the DJSI World and S&P ESG scores). They found that firms embedding SDG-aligned strategies—particularly around clean energy (SDG 7), responsible consumption (SDG 12), and climate action (SDG 13)—not only enhance environmental performance (e.g., reducing energy use emissions) but also strengthen their strategic posture, improving competitive positioning. Their use of multiple correspondence and cluster analyses demonstrated that value creation rooted in SDG awareness translates directly into operational and environmental benefits, illustrating the tangible impact of sustainable strategy. Building on these findings, Jagani et al. (2023) showed that manufacturing plants implementing sustainability innovations at the operational level—such as supplier engagement, internal sustainability practices, and technological integration—achieved significant financial, social and environmental performance improvements. This supports the view that value creation is embedded in day-to-day operational design, not merely strategy, and that such alignment enhances the overall SDG impact.

Firms with explicit sustainable value propositions internalize SDGs through a variety of practices—from production efficiency to employee welfare—thus supporting a wide spectrum of SDGs (Bonfanti et al., 2023). Empirical results confirm that embedding sustainability into core operations (e.g., resource efficiency, cleaner technologies) leads to IRL gains in SDGs like clean energy (SDG 7), responsible consumption (SDG 12), and climate action (SDG 13) (Gazzola et al., 2024). Operational sustainability—such as supplier engagement and internal innovation mechanisms—translates value creation into measurable SDG performance improvements, reinforcing the link between management practices and sustainability outcomes (Jagani et al., 2023).

4.2.2 The Impact of New Product Development on SDGs

Based on the test results for the effect of New Product Development (NPD) on Sustainable Development Goals (SDGs), the original sample value is 0.117, with a t-statistic of 0.826, which falls below the critical threshold of 1.96. Therefore, Hypothesis 2 (H2) is rejected. This means that, in this study, NPD has a positive but not statistically significant impact on SDG achievement. However, Ahmadi-Gh and Bello-Pintado (2022) analyzed data from 281 manufacturing companies across various industries and found a strong positive impact of sustainability practices—especially those involving supplier collaboration—on NPD success (coefficient = 0.164, $p = 0.011$). Internal sustainability efforts, although not directly impactful, acted as critical enablers of external, supplier-based practices. In essence, sustainable supply chain engagement enhances product development outcomes.

A study on Sustainable Product Development (SPD) practices within a circular economy context confirms that integrating R-strategies (e.g., recycling, renewability) significantly improves the sustainability of new products. Researchers utilized empirical and qualitative methods—including expert interviews—to demonstrate that such ecodesign strategies support SDGs related to responsible production and consumption (SDG 12) (Ahmadi-Gh & Bello-Pintado, 2022).

4.2.3 The Impact of Value Creation on Competitive Advantage

Empirical evidence consistently shows that Value Creation significantly boosts Competitive Advantage in manufacturing settings. For example, a PLS-SEM study of Indonesian metal manufacturing SMEs revealed that value creation through stakeholder engagement, operational efficiency, and strategic partnerships directly enhances competitiveness, even under resource constraints (Hariastuti et al., 2021). Similarly, research involving manufacturing SMEs found that business model innovation, where value creation is central, is positively and significantly correlated with firm performance, including quality, cost leadership and market position (Salfore et al., 2023). Larger studies reinforce this: An analysis of Italian firm-level data confirmed that dynamic value creation capabilities, such as sensing, seizing, and transforming opportunities, are strongly linked to sustained competitive advantage and improved performance (Zehir & Allaham, 2024). This aligns with the Resource-Based View, which posits that deploying valuable, rare, and firm-specific capabilities, such as systematic value creation routines, yields enduring market differentiation.

Collectively, these findings show that manufacturing firms gain a competitive edge not only by designing better products but also by embedding value creation deeply into their operations through stakeholder collaboration, process optimization, open innovation, and business model renewal. This ability to co-create and deliver distinctive value is a proven pathway to outperforming rivals in both SME and large-scale industrial contexts.

4.2.4 The Impact of New Product Development on Competitive Advantage

Recent empirical studies in the manufacturing domain consistently highlight the critical role of New Product Development (NPD) in achieving Competitive Advantage. For instance, research on industrial manufacturers has shown that firms combining innovation strategy with customer responsiveness—such as lean product development and rapid iteration—experience faster time-to-market and improved return on investment, thereby strengthening their competitive position (Kumar & Phrommathed, 2015). Similarly, a quantitative survey involving 252 manufacturing employees revealed that product innovation, as a component of NPD, significantly enhances market share and customer loyalty, particularly when supported by advanced technologies that synergize product and process innovation with a technological dimension (Vuković et al., 2025).

Prior studies affirm that open innovation and value-driven NPD are powerful drivers of long-term competitive success. An analysis of Italian manufacturing firms demonstrated that leveraging R&D partnerships and dynamic value creation capabilities, core elements of NPD, substantially boosts competitive advantage and firm performance (Xue et al., 2024). Strategic actions such as evaluating opportunities for value superiority, creating economically valuable products, and conducting ongoing market-based assessments during the NPD process are cited as essential practices for securing a product-based competitive edge (Dąbrowski, 2023). These findings resonate with theoretical frameworks such as the Resource-Based View and The Dynamic Capabilities Model argues that firms gain enduring competitive advantages by developing unique, firm-specific abilities in product development, especially those that enable rapid adaptation in dynamic markets. Empirical studies have confirmed that NPD routines emphasizing innovation culture, customer focus, and adaptive processes significantly improve competitive outcomes (Mu et al., 2017).

4.3 The Impact of SDGs on Compatitive Advantage

Recent studies have shown that integrating SDG strategies enhances the competitive advantage of manufacturing firms. For instance, Afeltra et al. (2022) demonstrated through PLS-SEM analysis that sustainable innovation practices—particularly those aligned with SDG principles—positively affect organizational performance and competitive positioning, with a notable impact on social aspects such as employee well-being and ergonomic improvements, ultimately boosting reputation and customer loyalty. Another study by Bonfanti et al. (2023) examined the sustainable business models of manufacturing companies and found that firms adopting comprehensive SDG-aligned practices—spanning environmental, social, and governance dimensions—show measurable contributions to SDG targets, concurrently strengthening their competitive stance. These findings reflect Porter's hypothesis that aligning with sustainability targets often drives innovation-driven efficiencies that help firms outperform their competitors.

Empirical support also comes from studies on lean and green manufacturing. Chatti et al. (2025), studying German SMEs, found that lean/green practices not only improve operational performance but also lead to sustainable competitive advantage, highlighting SDGs as a mediating lens (Chatti et al., 2025). Similarly, a study on Indonesian manufacturing demonstrated that implementing lean quality approaches—which map and reduce non-value-added activities—significantly enhanced sustainable performance and competitive edge, particularly in achieving SDG 12: Responsible Consumption and Production (Marie et al., 2022). Collectively, these studies indicate a multi-path effect: integrating SDGs prompts eco-innovations, lean and green operations, and value propositions that generate efficiencies, foster product differentiation, building reputation, and opening access to new markets. This confirms the theoretical rationale that SDG alignment is not merely compliance-driven but a strategic resource that enhances manufacturing competitiveness.

5. Conclusions

In the context of manufacturing firms, Value Creation and New Product Development (NPD) emerged as significant drivers of Competitive Advantage. Value creation positively affected competitive advantage ($\beta = 0.260$, $t = 2.297$, $p = 0.022$, $f^2 = 0.148$), while NPD demonstrated an even stronger effect ($\beta = 0.455$, $t = 4.949$, $p < 0.001$, $f^2 = 0.458$). These findings indicate that firms emphasizing stakeholder engagement, operational efficiency, innovation routines, and rapid product introduction are more likely to achieve superior market positioning and strategic differentiation. SDG orientation also positively influenced competitive advantage ($\beta = 0.158$, $t = 2.258$, $p = 0.024$, $f^2 = 0.045$), although its contribution was relatively modest.

However, neither Value Creation nor NPD significantly affected SDG outcomes, and the mediating role of SDGs in linking these variables to Competitive Advantage was not supported. This suggests that sustainability initiatives do not automatically translate operational and innovation capabilities into competitive benefits without additional institutional and systemic support. Therefore, firms should strengthen stakeholder-driven value creation, enhance product innovation capabilities, and integrate SDG initiatives with production systems, green manufacturing, and ESG strategies. Future research should explore additional mediating or moderating variables, such as digital transformation or sustainability infrastructure, to better understand how innovation and value creation contribute to long-term sustainable competitiveness.

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Author Contributions

AS contributed to the conceptualization, data collection, formal analysis, writing of the original draft, and supervision of the study. S was responsible for the methodology, validation, writing—review & editing, and overall direction of the research. S handled the data curation, analysis, and the writing of the original draft. AA provided supervision and reviewed the final draft, ensuring the integrity and academic rigor of the research. EY contributed to the methodology design and final revisions.

Conflicts of Interest

The authors declare no conflict of interest in the publication of this research. This study was conducted independently, and there are no financial or personal influences on the results.

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