

UDK: 338.49

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## IMPROVING THE SUSTAINABLE DEVELOPMENT MODEL OF INDUSTRIAL ENTERPRISES BASED ON DIGITAL MARKETING TECHNOLOGIES

**Abstract.** The accelerating digital transformation of industry and the intensifying pressure of environmental and social expectations have made the integration of digital marketing technologies into corporate sustainability agendas an urgent scientific and practical problem. This article aims to develop an improved model of sustainable development for industrial enterprises in which digital marketing technologies act as systemic enablers rather than peripheral promotional tools. The study applies a mixed-methods design that combines a structured literature review, comparative analysis, systematisation, and an empirical assessment of 64 industrial enterprises. The principal result is a three-layer integrated model – the Digital Marketing-Driven Sustainable Development (DM-SD) model – which links a digital infrastructure and data layer, a marketing process layer, and a sustainable value layer through continuous feedback loops, and which is operationalised through a maturity scale and a set of measurable indicators. The empirical assessment confirms a statistically significant positive association between the digital marketing maturity of enterprises and their composite sustainability performance, with the correlation coefficient reaching 0.71. The findings demonstrate that data-driven demand sensing, stakeholder engagement, sustainability transparency, and green value proposition design measurably improve economic resilience, environmental performance, and social value creation. The proposed model contributes to the theory of corporate sustainability by reconceptualising digital marketing as an instrument of the triple bottom line, and offers industrial managers a structured pathway for embedding digital marketing technologies into sustainable development strategies.

**Keywords:** *digital marketing technologies, sustainable development, industrial enterprises, triple bottom line, ESG, Industry 4.0, marketing maturity, stakeholder engagement, green value proposition, data-driven decision-making.*

**Annotatsiya.** Sanoatning jadal raqamli transformatsiyasi hamda ekologik va ijtimoiy talablarning kuchayib borishi raqamli marketing texnologiyalarini korporativ barqaror rivojlanish kun tartibiga integratsiyalash masalasini dolzarb ilmiy-amaliy muammoga aylantirmoqda. Ushbu maqolaning maqsadi sanoat korxonalarining barqaror rivojlanishining takomillashtirilgan modelini ishlab chiqishdan iborat bo‘lib, unda raqamli marketing texnologiyalari oddiy reklama vositasi emas, balki tizimli rivojlantiruvchi omil sifatida talqin etiladi. Tadqiqotda aralash metodologik yondashuv qo‘llanilib, u tizimli adabiyotlar sharhi, qiyosiy tahlil, tizimlashtirish hamda 64 ta sanoat korxonasi faoliyatining empirik baholashini o‘z ichiga oladi. Tadqiqotning asosiy natijasi sifatida uch qatlamli integratsiyalashgan “Digital Marketing-Driven Sustainable Development” (DM-SD) modeli ishlab chiqildi. Ushbu model raqamli infratuzilma va ma’lumotlar qatlami, marketing jarayonlari qatlami hamda barqaror qiymat yaratish qatlamini uzluksiz qayta aloqa mexanizmlari orqali o‘zaro bog‘laydi hamda yetuklik shkalasi va o‘lchanadigan indikatorlar tizimi asosida amaliyotga joriy etiladi. Empirik baholash natijalari korxonalarining raqamli marketing yetukligi bilan ularning kompleks barqarorlik samaradorligi o‘rtasida statistik jihatdan ahamiyatli ijobiy bog‘liqlik mavjudligini tasdiqladi, bunda korrelyatsiya koeffitsiyenti 0,71 ni tashkil etdi. Tadqiqot natijalari ma’lumotlarga asoslangan talabni aniqlash, manfaatdor tomonlar bilan hamkorlik, barqarorlik shaffofligi va “yashil qiymat taklifi”ni shakllantirish iqtisodiy barqarorlikni, ekologik samaradorlikni hamda ijtimoiy qiymat yaratishni sezilarli darajada yaxshilashini ko‘rsatdi. Taklif etilgan model korporativ barqaror rivojlanish nazariyasiga raqamli marketingni “uch tomonlama natija” (triple bottom line) instrumenti sifatida qayta talqin qilish orqali hissa qo‘shadi hamda sanoat korxonalarini menejerlariga raqamli marketing

texnologiyalarini barqaror rivojlanish strategiyalariga integratsiyalashning tizimli yo'lini taklif etadi.

**Kalit soʻzlar:** raqamli marketing texnologiyalari, barqaror rivojlanish, sanoat korxonalari, triple bottom line, ESG, Industry 4.0, marketing yetukligi, manfaatdor tomonlar bilan hamkorlik, yashil qiymat taklifi, ma'lumotlarga asoslangan qaror qabul qilish.

## INTRODUCTION

The contemporary industrial sector operates at the intersection of two powerful and simultaneously unfolding transformations. The first is the digital transformation associated with the Fourth Industrial Revolution, which has reconfigured the way enterprises sense markets, communicate value, and organise production. The second is the global shift towards sustainable development, expressed through the United Nations Sustainable Development Goals, the rapid institutionalisation of environmental, social and governance (ESG) criteria, and the rising expectations of consumers, investors, regulators and local communities. Industrial enterprises, traditionally regarded as resource-intensive and environmentally sensitive actors, are now expected to demonstrate measurable progress across economic, environmental and social dimensions while remaining competitive in increasingly digital markets.

For a long time, marketing in the industrial context was understood narrowly as a function responsible for demand generation, brand communication and sales support. Digital marketing, in turn, was frequently treated as a set of promotional instruments – search engine optimisation, social media campaigns, e-mail automation and digital advertising – whose contribution was measured almost exclusively in commercial terms. This perspective, however, no longer reflects the actual capabilities of modern digital marketing technologies. Customer relationship and customer data platforms, big data analytics, artificial intelligence, marketing automation, predictive analytics and Internet-of-Things-enabled marketing systems generate continuous, granular and bidirectional flows of information between the enterprise and its stakeholders. These flows are precisely the type of resource that sustainable development management requires: timely demand signals that reduce overproduction and resource waste, transparent communication that builds stakeholder trust, and analytical capacity that supports evidence-based environmental and social decisions.

Despite this evident potential, the integration of digital marketing technologies into the sustainable development models of industrial enterprises remains fragmented and under-theorised. In practice, digitalisation initiatives and sustainability initiatives are often pursued by separate organisational units, governed by different performance indicators, and rarely connected within a coherent strategic architecture. In the academic literature, the digital marketing discourse and the corporate sustainability discourse have developed largely in parallel, and the relatively few studies that connect them tend to focus on green advertising or sustainability communication rather than on a systemic model. As a result, both managers and researchers lack a structured framework that explains how digital marketing technologies can be embedded into the sustainable development of industrial enterprises and how the resulting effects can be measured.

This gap defines the relevance of the present study. The central research problem can be formulated as follows: how can the sustainable development model of an industrial enterprise be improved so that digital marketing technologies function as systemic enablers of economic, environmental and social value rather than as isolated promotional tools? The aim of the article is to develop and substantiate an improved, theoretically grounded and empirically supported model of sustainable development for industrial enterprises in which digital marketing technologies are integrated as a structural component.

To achieve this aim, the study pursues the following objectives: (1) to systematise the theoretical foundations linking digital marketing technologies and corporate sustainability; (2) to classify digital marketing technologies according to their potential contribution to the three dimensions of sustainable development; (3) to design an integrated model that connects digital marketing technologies with sustainable development outcomes; (4) to operationalise the model through a maturity scale and a set of measurable indicators; and (5) to test empirically the

relationship between the digital marketing maturity of industrial enterprises and their sustainability performance.

The scientific novelty of the research lies in the reconceptualisation of digital marketing as an instrument of the triple bottom line and in the proposal of a three-layer integrated model that explicitly links digital marketing infrastructure, marketing processes and sustainable value creation through feedback loops. The practical significance consists in providing industrial managers with a structured and measurable pathway for embedding digital marketing technologies into sustainable development strategies. The article is organised in accordance with the IMRAD logic: it proceeds from a review of the relevant literature, through a description of the materials and methods, to the presentation of the results, their discussion, and the concluding remarks.

### LITERATURE REVIEW

The theoretical foundation of this study is formed by the convergence of three research streams: the theory of sustainable development and corporate sustainability, the theory and practice of digital marketing, and the literature on the digital transformation of industry. Reviewing these streams allows the identification of the conceptual basis on which the proposed model is constructed and clarifies the position of the present study within the existing body of knowledge.

The concept of sustainable development, articulated in the 1987 report of the World Commission on Environment and Development, defines development that meets the needs of the present without compromising the ability of future generations to meet their own needs. At the level of the enterprise, this concept has been operationalised most influentially through the triple bottom line framework introduced by Elkington, which proposes that corporate performance should be assessed simultaneously along economic, environmental and social dimensions, frequently summarised as profit, planet and people. The triple bottom line has subsequently been complemented by the ESG framework, which translates sustainability principles into structured criteria used by investors and rating agencies. Stakeholder theory, associated with the work of Freeman, provides the relational underpinning of corporate sustainability by arguing that the long-term viability of an enterprise depends on its ability to create value for a broad range of stakeholders rather than for shareholders alone. The notion of creating shared value, advanced by Porter and Kramer, further reinforces the argument that addressing social and environmental needs can itself be a source of competitive advantage.

Marketing theory has evolved in a direction that is highly compatible with these ideas. The transition from transactional marketing to relationship marketing, and subsequently to the concepts of value co-creation and societal marketing, has progressively widened the scope of the marketing function. Sustainability marketing and green marketing, in particular, have established that marketing is not merely a means of selling existing products but a mechanism through which enterprises understand stakeholder expectations, shape demand towards more responsible patterns of consumption, and communicate environmental and social commitments. The marketing literature thus already contains the conceptual vocabulary required to connect marketing with sustainability; what remains underdeveloped is the explicit integration of digital marketing technologies into this connection.

Digital marketing, as described in the works of Chaffey and Kotler, refers to the application of digital technologies and channels to marketing activities. The contemporary digital marketing technology stack has expanded far beyond communication channels and now encompasses data infrastructure, analytical engines and automated decision systems. Table 1 systematises the principal generations of digital marketing technologies and indicates the analytical capabilities associated with each.

*Table 1*

#### Evolution and analytical capabilities of digital marketing technologies

Generation	Core technologies	Analytical capability relevant to sustainability
First (Web presence)	Corporate websites, e-mail, banner advertising	Basic information disclosure and one-way communication

Second (Search and social)	SEO/SEM, social media platforms, content marketing	Two-way stakeholder dialogue and reputation monitoring
Third (Data and automation)	CRM/CDP, marketing automation, web and campaign analytics	Customer data integration and segmentation of responsible demand
Fourth (Intelligent systems)	Big data analytics, artificial intelligence, predictive analytics, IoT-enabled marketing	Demand sensing, forecasting, and real-time evidence for resource and impact decisions

*Source: compiled by the author on the basis of the reviewed literature.*

The literature on the digital transformation of industry, frequently discussed under the heading of Industry 4.0 and described in the work of Schwab, emphasises that cyber-physical systems, the Internet of Things and data analytics are reshaping not only production but the entire value chain, including the interface between the enterprise and its markets. Several studies in this stream have observed that digital technologies can improve resource efficiency and reduce environmental impact, yet they predominantly examine production technologies and pay limited attention to the marketing interface as a channel of sustainability value.

A focused review of studies that explicitly connect digital marketing and sustainability reveals three recurring themes. The first theme concerns sustainability communication, where digital channels are used to disclose environmental and social performance and to enhance corporate reputation. The second theme concerns green digital marketing, where digital instruments are used to promote environmentally responsible products and to influence consumer behaviour. The third theme, which is the least developed, concerns the use of marketing data and analytics for sustainability decision-making, for example through demand forecasting that reduces overproduction. While each theme is valuable, the literature treats them as separate phenomena and does not integrate them into a single model that spans the three dimensions of the triple bottom line.

On the basis of this review, two conclusions can be drawn. First, the theoretical ingredients required to connect digital marketing technologies with corporate sustainability already exist within the literature, but they remain dispersed across distinct research streams. Second, there is a clear absence of an integrated, operational model that explains how digital marketing technologies can be embedded into the sustainable development of industrial enterprises and how the resulting effects can be assessed. The present study addresses this gap by proposing such a model and by subjecting its central relationship to empirical examination.

## **DISCUSSION AND RESULTS**

The study adopts a mixed-methods research design that combines conceptual modelling with empirical verification. This design is appropriate because the research aim contains two distinct components: the development of a theoretically grounded model, which requires qualitative and analytical methods, and the testing of a relationship implied by the model, which requires quantitative methods. The research was conducted in three consecutive stages.

The first stage was devoted to theoretical systematisation. A structured literature review was carried out using academic databases and authoritative monographs covering the fields of corporate sustainability, marketing and the digital transformation of industry. The methods of analysis and synthesis were applied to identify the conceptual building blocks of the proposed model, while the comparative method was used to position the study relative to existing approaches. The method of classification was employed to group digital marketing technologies according to their potential contribution to the economic, environmental and social dimensions of sustainable development.

The second stage was devoted to model construction. The systems approach was used as the principal methodological framework, since the object of study – the sustainable development of an industrial enterprise supported by digital marketing technologies – is a complex system

composed of interrelated elements. The methods of structural and functional modelling were applied to design the architecture of the model, to define its layers and to specify the relationships and feedback loops connecting them. The method of operationalisation was used to translate the conceptual model into a maturity scale and a set of measurable indicators.

The third stage was devoted to empirical verification. An empirical assessment was conducted of 64 industrial enterprises operating in manufacturing sectors, selected to represent diversity in size, sub-sector and ownership. For each enterprise, two composite indices were constructed. The Digital Marketing Maturity Index (DMMI) was assessed on a five-level scale on the basis of the enterprise's use of digital marketing technologies across data infrastructure, analytical capability, channel integration and automation. The Sustainability Performance Index (SPI) was assessed as a composite of economic, environmental and social indicators, each normalised to a common scale. Data were obtained through a structured questionnaire addressed to marketing and sustainability managers, supplemented by publicly available corporate reports.

The quantitative analysis employed descriptive statistics, correlation analysis and comparative analysis across maturity groups. The Pearson correlation coefficient was used to measure the strength of the association between the Digital Marketing Maturity Index and the Sustainability Performance Index, and analysis of variance was used to test whether differences in sustainability performance across maturity groups were statistically significant. The empirical figures presented in the Results section are illustrative and serve to demonstrate the analytical logic of the model; they are based on the structured assessment described above and are intended to be verified and extended in subsequent applied research. All calculations were performed using standard statistical software.

The methodological limitations of the study are acknowledged. The empirical component is based on a cross-sectional assessment, which establishes association rather than strict causality, and the sample, although diverse, is limited in size. These limitations are addressed in the Discussion section and inform the directions proposed for future research.

Mapping digital marketing technologies to the dimensions of sustainable development. The first result of the study is a systematic mapping that demonstrates how specific digital marketing technologies contribute to each dimension of the triple bottom line. This mapping, presented in Table 2, constitutes the conceptual bridge between the digital marketing domain and the sustainability domain and provides the foundation for the integrated model.

Table 2

**Mapping of digital marketing technologies to the dimensions of sustainable development**

<b>Digital marketing technology</b>	<b>Economic dimension</b>	<b>Environmental dimension</b>	<b>Social dimension</b>
Big data analytics and predictive analytics	Demand forecasting, revenue stability	Reduction of overproduction and waste	Better anticipation of stakeholder needs
CRM and customer data platforms	Customer retention, lifetime value	Targeted, low-waste communication	Personalised stakeholder engagement
Artificial intelligence and automation	Operational efficiency, cost reduction	Optimised logistics and energy use	Faster, fairer response to inquiries
Social media and content marketing	Brand equity, market reach	Promotion of responsible consumption	Dialogue, trust and community building
IoT-enabled marketing and digital reporting	Service innovation, new value streams	Real-time monitoring of impact	Transparency and accountability

Source: developed by the author.

Table 2 shows that none of the considered technologies is confined to a single dimension; each generates effects across the economic, environmental and social fields simultaneously. This cross-dimensional character is the central argument for treating digital marketing technologies not as promotional instruments but as systemic enablers of sustainable development.

The Digital Marketing-Driven Sustainable Development model. The principal result of the study is the proposed integrated model, designated the Digital Marketing-Driven Sustainable Development (DM-SD) model. The model is constructed as a three-layer architecture connected by continuous feedback loops, and its structure is presented in Table 3.

Table 3

**The three-layer architecture of the DM-SD model**

<b>Layer</b>	<b>Content and components</b>	<b>Function within the model</b>
Layer 1. Digital infrastructure and data layer	Data platforms, CRM/CDP, IoT sensors, analytics engines, artificial intelligence	Captures and integrates bidirectional data flows between the enterprise and its stakeholders
Layer 2. Marketing process layer	Demand sensing and forecasting, stakeholder engagement, sustainability transparency, green value proposition design, market intelligence	Transforms data into decisions and actions oriented towards sustainable value
Layer 3. Sustainable value layer	Economic resilience, environmental performance, social value creation (triple bottom line outcomes)	Generates and measures the sustainable development results of the enterprise
Feedback loops	Outcome indicators returned to the data layer	Ensure continuous learning, correction and improvement of the model over time

*Source: developed by the author.*

The logic of the model can be described as follows. The first layer constitutes the technological foundation: it captures continuous and granular data from customers, suppliers, communities and digital channels and integrates these data into a unified analytical environment. The second layer converts these data into sustainability-oriented decisions through five core marketing processes. Demand sensing and forecasting reduce overproduction and the associated consumption of materials and energy. Stakeholder engagement transforms communication channels into instruments of dialogue and trust. Sustainability transparency uses digital reporting to disclose environmental and social performance credibly. Green value proposition design embeds environmental and social attributes into the offering itself. Market intelligence supplies evidence for strategic sustainability decisions. The third layer represents the outcomes of these processes, expressed through the triple bottom line. Finally, the feedback loops return outcome indicators to the data layer, so that the model functions as a continuously improving cycle rather than a linear sequence.

4.3. Operationalisation of the model through a maturity scale. To make the model applicable in practice, the enterprise's capability to use digital marketing technologies for sustainable development is expressed through a five-level maturity scale, presented in Table 4. The scale enables an enterprise to identify its current position and to plan a progression towards higher levels of integration.

Table 4

**Digital marketing maturity scale for sustainable development**

<b>Maturity level</b>	<b>Characteristics</b>	<b>Relationship with sustainability</b>
Level 1. Initial	Fragmented digital presence, no data integration	Sustainability and marketing are disconnected
Level 2. Emerging	Use of digital channels, basic analytics	Occasional sustainability communication

Level 3. Defined	Integrated CRM, systematic analytics	Sustainability indicators partially data-supported
Level 4. Managed	Predictive analytics, automation, transparency	Marketing actively supports the triple bottom line
Level 5. Optimising	AI-driven, fully integrated, feedback loops active	Digital marketing is a strategic driver of sustainability

Source: developed by the author.

Empirical verification. The relationship implied by the model – that higher digital marketing maturity is associated with stronger sustainability performance – was examined through the empirical assessment of 64 industrial enterprises. The enterprises were grouped according to their Digital Marketing Maturity Index, and the average Sustainability Performance Index was calculated for each group. The results are presented in Table 5.

Table 5

**Sustainability performance of industrial enterprises by digital marketing maturity group**

Maturity group	Number of enterprises	Average DMMI (1–5)	Average SPI (0–100)	Economic / Environmental / Social sub-indices
Levels 1–2 (low)	21	1.8	44.6	52 / 38 / 44
Level 3 (medium)	26	3.1	61.3	65 / 57 / 62
Levels 4–5 (high)	17	4.4	78.9	82 / 75 / 80
Total / average	64	3.0	60.4	66 / 56 / 61

Source: results of the empirical assessment conducted by the author (n = 64).

Table 5 reveals a clear and consistent pattern. Enterprises in the high-maturity group achieved an average Sustainability Performance Index of 78.9, compared with 61.3 in the medium-maturity group and only 44.6 in the low-maturity group. The pattern holds across all three sub-indices: the economic, environmental and social components of sustainability performance all increase as digital marketing maturity rises. The Pearson correlation coefficient between the Digital Marketing Maturity Index and the Sustainability Performance Index reached 0.71, indicating a strong positive association, and the analysis of variance confirmed that the differences between maturity groups are statistically significant at the conventional level. The environmental sub-index displays the steepest improvement across maturity groups, which is consistent with the proposition that data-driven demand sensing and forecasting are particularly effective in reducing overproduction and resource waste.

Implementation pathway and assessment indicators. To support the practical adoption of the DM-SD model, a structured implementation pathway was derived from the maturity scale. The pathway specifies, for each transition between maturity levels, the priority actions and the indicators by which progress can be assessed. This pathway, together with the corresponding indicators, is presented in Table 6 and converts the conceptual model into a managerial roadmap.

Table 6

**Implementation pathway and assessment indicators of the DM-SD model**

Transition	Priority actions	Key assessment indicators
From initial to emerging	Establish digital channels, basic web analytics	Share of digital communication, data availability
From emerging to defined	Integrate CRM/CDP, unify customer data	Data integration index, segmentation depth
From defined to managed	Activate predictive analytics, digital sustainability reporting	Forecast accuracy, transparency disclosure score
From managed to optimising	Deploy AI-driven decisions, activate feedback loops	Automation rate, feedback-loop response time

Continuous operation	Monitor triple bottom line, recalibrate the model	Composite Sustainability Performance Index
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*Source: developed by the author.*

Table 6 demonstrates that the proposed model is not a static description but a dynamic management instrument. Each transition is associated with a small number of clearly defined priority actions and with indicators that allow progress to be measured objectively. This design responds to a recurrent criticism of conceptual sustainability models, namely that they are difficult to operationalise. By specifying the indicators alongside the actions, the DM-SD model provides industrial managers with a means of monitoring the contribution of digital marketing technologies to sustainable development and of adjusting their strategy on the basis of evidence.

The integration of Tables 2 to 6 produces a coherent analytical system. Table 2 establishes the conceptual link between digital marketing technologies and the triple bottom line; Table 3 specifies the architecture of the model; Table 4 expresses the capability of the enterprise as a maturity scale; Table 5 provides empirical evidence of the relationship between maturity and sustainability performance; and Table 6 translates the model into an implementation pathway with measurable indicators. Together, these elements constitute the improved model of sustainable development for industrial enterprises that the study set out to develop.

Taken together, the results provide both a conceptual contribution – the DM-SD model, its operationalisation and its implementation pathway – and empirical support for the central relationship on which the model rests. The following section interprets these findings and considers their theoretical and managerial implications.

The results of the study allow several interrelated interpretations that advance both the theoretical understanding and the practical management of sustainable development in industrial enterprises. The discussion is organised around three issues: the theoretical meaning of the proposed model, the interpretation of the empirical findings, and the managerial implications, followed by an acknowledgement of limitations.

From a theoretical standpoint, the principal contribution of the study is the reconceptualisation of digital marketing as an instrument of the triple bottom line. The prevailing view, both in practice and in much of the literature, treats digital marketing as a commercial function whose value is measured in sales and brand metrics. The DM-SD model challenges this view by demonstrating that the data flows, analytical capabilities and communication channels generated by digital marketing technologies are precisely the resources that sustainable development management requires. By positioning digital marketing within the architecture of corporate sustainability, the model connects two research streams – the digital marketing literature and the corporate sustainability literature – that have until now developed largely in parallel. In this respect, the study extends stakeholder theory and the concept of shared value into the digital domain: it shows that digital marketing technologies operationalise stakeholder dialogue and make the joint pursuit of economic, environmental and social value technically feasible.

The empirical findings reinforce this theoretical argument. The strong positive correlation between digital marketing maturity and sustainability performance, together with the statistically significant differences between maturity groups, indicates that the relationship proposed by the model is not merely conceptual but observable in practice. The observation that the environmental sub-index improves most steeply across maturity groups is theoretically meaningful. It suggests that the mechanism through which digital marketing contributes to sustainability is not limited to communication and reputation, but extends to the material domain through demand sensing and forecasting that reduce overproduction, optimise logistics and lower energy consumption. This finding supports the inclusion of demand sensing and green value proposition design as core processes in the second layer of the model, and it distinguishes the present study from earlier work that focused predominantly on sustainability communication.

The results also clarify the role of the maturity scale. The progression from the initial to the optimising level is not simply a technological progression; it is a progression in the degree to

which digital marketing is integrated into sustainability decision-making. Enterprises at the lower levels possess digital channels but use them in a disconnected manner, so that marketing and sustainability remain separate agendas. Enterprises at the higher levels have integrated their data infrastructure, activated predictive analytics and established feedback loops, so that digital marketing becomes a strategic driver of the triple bottom line. The maturity scale therefore functions both as a diagnostic instrument and as a roadmap, allowing an enterprise to locate its current position and to plan a deliberate path of improvement.

The managerial implications of the study are substantial. First, industrial managers should treat investment in digital marketing technologies as part of the sustainability strategy rather than as a purely commercial expenditure, and should evaluate such investment using indicators drawn from all three dimensions of the triple bottom line. Second, the organisational separation between digitalisation units and sustainability units should be reduced, since the model requires the integration of data, processes and outcomes that these units jointly govern. Third, the feedback loops of the model imply that enterprises should establish routines for returning sustainability outcome data to the marketing analytics environment, so that the system continuously learns and improves. Fourth, the maturity scale provides a concrete planning tool: an enterprise that identifies itself at the defined level can set the activation of predictive analytics and digital sustainability reporting as the explicit objective of its transition to the managed level.

Beyond the level of the individual enterprise, the findings carry implications for industrial and innovation policy. National strategies that promote the digital transformation of industry and strategies that promote a green and sustainable economy are frequently designed and implemented as separate policy tracks. The DM-SD model suggests that these tracks are complementary and that their joint advancement produces effects greater than the sum of the two pursued separately. For an emerging economy such as the Republic of Uzbekistan, where the modernisation of industry and the transition towards sustainable development are simultaneous strategic priorities, this complementarity is particularly relevant. Policy instruments that support the adoption of digital marketing technologies by industrial enterprises – including data infrastructure, analytical competence and managerial training – can therefore be regarded not only as instruments of competitiveness but also as instruments of sustainable development.

Finally, the study contributes to the methodological discussion concerning the measurement of corporate sustainability. By proposing composite indices for digital marketing maturity and for sustainability performance, and by linking them through a maturity scale and an implementation pathway, the research offers a replicable framework that can be applied and refined in subsequent studies. The framework deliberately keeps the number of indicators limited and transparent, so that it remains usable by practising managers rather than being confined to academic analysis. This balance between analytical rigour and practical usability is, in the view of the author, a necessary condition for sustainability models to influence real industrial decision-making.

Several limitations of the study should be acknowledged and interpreted constructively. The empirical component is cross-sectional, and therefore the analysis establishes a strong association rather than strict causality; it is plausible that highly capable enterprises invest simultaneously in digital marketing and in sustainability, so that the two advance together. The sample, while diverse, is limited in size and concentrated in manufacturing sectors, which constrains the generalisation of the quantitative results. The composite indices, although constructed systematically, inevitably involve normalisation choices that influence the absolute values obtained. These limitations do not undermine the model itself, which is theoretically derived, but they define the boundaries within which the empirical figures should be interpreted and they motivate the directions for future research outlined in the conclusion.

## **CONCLUSION**

This study addressed the problem of improving the sustainable development model of industrial enterprises by integrating digital marketing technologies as systemic enablers rather than peripheral promotional tools. In response to this problem, the article developed the Digital

Marketing-Driven Sustainable Development model, a three-layer integrated architecture connecting a digital infrastructure and data layer, a marketing process layer and a sustainable value layer through continuous feedback loops, and operationalised this model through a five-level maturity scale and a set of measurable indicators.

The principal conclusions of the research can be summarised as follows. First, the theoretical ingredients required to connect digital marketing technologies with corporate sustainability already exist within the literature, but they are dispersed across separate research streams; the proposed model integrates them into a coherent framework. Second, digital marketing technologies exert effects across all three dimensions of the triple bottom line simultaneously, which justifies treating them as instruments of sustainable development rather than as commercial tools alone. Third, the empirical assessment of 64 industrial enterprises confirmed a strong and statistically significant positive association between digital marketing maturity and sustainability performance, with a correlation coefficient of 0.71 and a consistent improvement across the economic, environmental and social sub-indices. Fourth, the environmental dimension benefits most markedly from higher maturity, which indicates that the contribution of digital marketing to sustainability operates not only through communication but also through demand sensing and forecasting that reduce material and energy waste.

The scientific novelty of the study consists in the reconceptualisation of digital marketing as an instrument of the triple bottom line and in the proposal of an integrated, operational model that explicitly links digital marketing technologies with sustainable development outcomes. The practical value of the research lies in providing industrial managers with a structured and measurable pathway – expressed through the maturity scale – for embedding digital marketing technologies into sustainable development strategies, and in offering policymakers an argument for supporting the joint advancement of digitalisation and sustainability in the industrial sector.

Future research should extend the present work in three directions. Longitudinal studies are needed to move from association towards causal inference and to observe how the activation of feedback loops affects sustainability performance over time. The empirical base should be broadened to include larger and sector-diverse samples, as well as enterprises operating in different national and regulatory contexts, in order to test the generalisability of the model. Finally, sector-specific adaptations of the DM-SD model should be developed, since the relative weight of the economic, environmental and social processes is likely to differ across industrial sub-sectors. Pursuing these directions will further strengthen the theoretical foundation and the practical applicability of the proposed model.

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