Future of Work and Digital Management Journal

Article type:
Original Research

Article history:
Received 19 September 2025
Revised 30 October 2025
Accepted 24 December 2025
Published online 01 March 2026

Alireza. Tafakori[1*], Roohalah. Negahdari Nia[2]

1 PhD Student, Department of Business Administration, Yas.C., Islamic Azad University, Yasouj, Iran
2 Department of Business Administration, Yas.C., Islamic Azad University, Yasouj, Iran

Corresponding author email address:
alireza.tafakori.1998@gmail.com

How to cite this article:
Tafakori , A., & Negahdari Nia, R. (2026). A Hybrid Behavioral-Organizational Model for Enhancing the Effectiveness of Digital Marketing of Energy-Efficient Products: The Mediating Role of Informal Learning, Organizational Trust, and Workplace Positivity in Manufacturing Firms. *Future of Work and Digital Management Journal, 4*(2), 1-14. https://doi.org/10.61838/fwdmj.202

A Hybrid Behavioral-Organizational Model for Enhancing the Effectiveness of Digital Marketing of Energy-Efficient Products: The Mediating Role of Informal Learning, Organizational Trust, and Workplace Positivity in Manufacturing Firms

ABSTRACT

This study aimed to develop and empirically validate a hybrid behavioral–organizational model explaining how informal learning, organizational trust, and workplace positivity mediate the relationship between organizational drivers and the effectiveness of digital marketing for energy-efficient products in manufacturing firms. A sequential mixed-methods design was employed, beginning with qualitative semi-structured interviews with marketing managers, engineers, and digital transformation specialists to identify behavioral and organizational determinants of digital marketing effectiveness in energy-efficient product environments. The emergent themes informed the development of a quantitative survey administered to employees across marketing, sales, digital communication, and organizational development units in manufacturing firms. A total of 362 valid responses were analyzed. Reliability and validity assessments were performed using confirmatory factor analysis, followed by structural equation modeling to test direct and mediated relationships among hybrid behavioral–organizational drivers, informal learning, organizational trust, workplace positivity, and digital marketing effectiveness. Hybrid behavioral–organizational drivers significantly predicted informal learning ($\beta = .58$, $p < .001$), organizational trust ($\beta = .62$, $p < .001$), and workplace positivity ($\beta = .55$, $p < .001$), as well as digital marketing effectiveness ($\beta = .21$, $p = .003$). Informal learning ($\beta = .24$, $p < .001$), organizational trust ($\beta = .27$, $p < .001$), and workplace positivity ($\beta = .19$, $p < .001$) significantly enhanced digital marketing effectiveness. Bootstrapped indirect effects confirmed partial mediation through informal learning (.14, $p < .001$), organizational trust (.17, $p < .001$), and workplace positivity (.10, $p < .001$), with a total indirect effect of .41 ($p < .001$). Digital marketing effectiveness for energy-efficient products is shaped by a hybrid system of behavioral and organizational factors, with informal learning, trust, and workplace positivity serving as critical mediating mechanisms that translate organizational conditions into superior digital marketing outcomes.

Keywords: Digital marketing effectiveness; energy-efficient products; informal learning; organizational trust; workplace positivity; manufacturing firms; hybrid behavioral–organizational model; structural equation modeling.

Introduction

Digital transformation has reshaped the competitive landscape of manufacturing industries, particularly in sectors focused on sustainability and energy efficiency. As firms increasingly adopt digital tools to enhance operational and marketing performance, the effectiveness of digital marketing becomes a decisive factor for competitive survival and long-term value creation. Recent research emphasizes that integrating digital technologies with organizational behavior systems, knowledge

processes, and leadership practices is essential for enabling firms to navigate turbulent environments and capitalize on digital opportunities [1]. The digitalization of marketing functions and the digitization of logistics and production processes together redefine the strategic posture of firms and determine their readiness for future-oriented, sustainable growth.

In parallel, scholars underline that knowledge, as an organizational resource, functions as a critical enabler of capability development and innovation performance [2]. Knowledge-driven organizations rely not only on formal learning structures but also on informal learning processes shaped by social interaction, shared practices, and cross-functional collaboration. These mechanisms are particularly relevant in digital marketing, where employees must continuously adapt to new analytics tools, dynamic customer behavior patterns, and rapidly evolving digital channels. Informal learning emerges as a core pathway through which firms internalize digital competencies and translate them into actionable strategies.

The intensification of digital engagement also raises the importance of ethical, purpose-driven, and sustainability-aligned practices in organizational settings. Research shows that effective leadership—rooted in values such as environmental stewardship, employee empowerment, and long-term strategic thinking—can significantly influence marketing and branding outcomes [3]. Green marketing initiatives, when embedded within organizational culture and human resource strategies, improve both workforce engagement and external brand perception, reinforcing the idea that digital marketing effectiveness depends on more than technical proficiency. It requires alignment between behavioral, cultural, and strategic subsystems.

At the same time, energy-efficient products occupy a distinctive position in contemporary markets characterized by global ecological concerns, climate change imperatives, and regulatory pressures. Firms operating in this domain must communicate complex technical attributes while educating consumers about the economic and environmental value of energy efficiency. Industrial research further highlights that leadership, regulatory frameworks, and organizational systems all affect marketing and operational performance in sustainability-oriented contexts [4]. However, many manufacturing firms continue to struggle with articulating compelling digital narratives that resonate with increasingly environmentally conscious stakeholders.

Moreover, organizational readiness for digital marketing transformation is shaped by structural and cultural parameters such as employee learning behavior, organizational trust, workplace positivity, and managerial support. Several studies suggest that when employees believe their organization operates fairly, communicates transparently, and provides psychological safety, their willingness to adopt new digital tools increases significantly [5]. Trust-based environments facilitate knowledge sharing, reduce resistance to technological change, and strengthen cross-functional cooperation—conditions that are crucial in data-driven digital marketing settings. Complementary research underscores similar findings, noting that performance indicators derived from compliance knowledge systems can enhance business decision quality and long-term strategic alignment [6].

Workplace well-being and human factors also influence the success of digital transformation. Evidence suggests that employee well-being in hybrid or digitally enriched environments shapes their engagement with digital systems and their ability to manage burnout risks [7]. Organizations that cultivate positive psychological climates tend to outperform others in executing high-complexity, high-uncertainty tasks such as digital marketing analytics, content creation, and customer journey optimization. This aligns with economic and organizational theory, which underscores the importance of adaptive strategies and capability-building mechanisms in volatile environments [8]. In the manufacturing context, adapting marketing strategies to digital ecosystems requires integrating organizational, behavioral, and technological dimensions coherently.

Leadership practices continue to be a major determinant of organizational trust and citizenship behavior. For example, servant leadership frameworks demonstrate that trust, citizenship behavior, and employee well-being co-evolve and generate collective commitment to organizational goals [9]. Similarly, ethical and character-based leadership enhances team dynamics, encourages responsible communication, and fosters conditions in which innovation and digital experimentation can flourish [10]. These leadership-driven mechanisms ultimately influence how employees perceive their roles in digital transformation and the extent to which they participate in ongoing digital learning.

The broader digital transformation literature also indicates that technological innovations, especially those linked to energy markets, manufacturing automation, and service transformation, require organizational mechanisms that support rational behavior, long-term resource planning, and strategic decision-making [11]. Integrated systems thinking—combining organizational learning, digital intelligence, and behavioral insights—is increasingly recognized as a necessity for firms seeking to maintain competitiveness in sustainability-driven sectors. Psychological contract theories reinforce this point, showing that breach of expectations adversely affects turnover intentions, job satisfaction, and organizational commitment, ultimately diminishing the effectiveness of strategic initiatives such as digital marketing [12].

Simultaneously, sustainability-oriented enterprises, including those involved in renewable energy and eco-efficient production, operate in environments constrained by high technological uncertainty. Strategic consistency and operational resilience thus depend on management models that integrate socioenvironmental and technical performance metrics [13]. Industrial asset management research suggests that cross-industry collaboration, innovation diffusion, and system integration are major forces shaping industrial competitiveness in the digital age [14]. When applied to digital marketing, these insights imply that organizations must build hybrid behavioral-organizational systems that support adaptive decision-making, cross-functional synergy, and trust in data-driven processes.

Digital twin systems and advanced simulation models illustrate further how firms can optimize operations, diagnose failures, and strengthen predictive analytics capabilities, enhancing the reliability of marketing claims related to energy-efficient technologies [15]. However, the capacity to exploit such technologies depends heavily on employee competence and interdepartmental coordination. Research on competitiveness models and innovation frameworks consistently demonstrates that technology adoption is contingent on organizational culture, knowledge flow patterns, and behavioral drivers [16].

Industrial and operational technology convergence highlights similar dynamics: successful digital ecosystems are built on collaborative structures, coordinated information flow, and continuous learning loops [17]. Other studies show that digital knowledge networks and cross-sector collaboration models significantly enhance local marketing strategies, particularly in community-based green economy initiatives [18, 19]. These insights further indicate that informal learning networks can amplify the impact of digital capabilities by enabling employees to integrate tacit knowledge into marketing processes.

At the macroeconomic level, the coupling between digital economy and intelligent manufacturing demonstrates that efficiency gains arise when digital tools are harmonized with production capabilities and workforce behavior [20]. Supporting this, automation and AI-integration research reveals that human–technology collaboration is essential for realizing the benefits of digital innovation [21]. Additional evidence from sustainability-oriented food, agricultural, and industrial systems shows that strong communication strategies, transparent governance, and stakeholder trust are indispensable components of digital transformation [22, 23].

Historical perspectives on enterprise behavior in energy markets emphasize that rational decision-making and adaptability determine long-term competitiveness in resource-driven sectors [24]. Governance and communication research also identifies communication climate as a key predictor of organizational success, reinforcing the role of trust and relational behavior in digital ecosystems [25, 26]. Meanwhile, strategy and differentiation frameworks demonstrate that cross-sector value creation requires understanding market dynamics, tailoring marketing narratives, and effectively segmenting customer needs—capabilities that depend on both behavioral and structural conditions within firms [27]. Similarly, geo-marketing and analytics research shows that organizations equipped with robust digital insights achieve stronger market penetration and strategic positioning [28]. Readiness models for Industry 4.0 further indicate that firms must assess organizational maturity, internal capacity, and employee adaptability before implementing advanced digital initiatives [29]. Complementing this, management model implementation studies highlight the crucial link between organizational systems, socioenvironmental performance, and innovation outcomes [30]. Software transformation research also underscores that digital change depends on behavioral commitment and managerial alignment rather than purely technical upgrades [31], while circular economy models of enterprise behavior reveal that sustainability-enhancing decisions must be reinforced by rational, evidence-based marketing strategies [32].

Taken together, the existing literature demonstrates that digital marketing effectiveness—especially for energy-efficient products—cannot be understood solely through technological or strategic lenses. Instead, it emerges from a hybrid interplay between behavioral mechanisms (informal learning, trust, positivity, employee well-being) and organizational structures (strategic alignment, leadership, knowledge systems, digital readiness). Despite robust evidence in isolated segments of the literature, few empirical studies have integrated these dimensions into a unified behavioral-organizational framework capable of explaining digital marketing effectiveness in energy-efficient manufacturing environments. The present study addresses this gap by proposing and testing such a model, grounded in cross-disciplinary evidence and informed by contemporary technological, organizational, and behavioral trends.

The aim of this study is to develop and empirically validate a hybrid behavioral-organizational model explaining how informal learning, organizational trust, and workplace positivity mediate the relationship between organizational drivers and the effectiveness of digital marketing for energy-efficient products in manufacturing firms.

Findings and Results

The findings of this mixed-methods study are presented in an integrated manner, beginning with the qualitative phase that identified the core behavioral and organizational mechanisms underpinning effective digital marketing of energy-efficient products in manufacturing firms. These insights were then used to specify and test the quantitative structural model that examines the direct and indirect effects of hybrid behavioral-organizational drivers on digital marketing effectiveness through the mediating roles of informal learning, organizational trust, and workplace positivity. Together, the results highlight how employees' day-to-day learning behaviors, trust perceptions, and positive affective states at work help translate organizational and individual orientations toward digital marketing into measurable performance outcomes.

Table 1 summarizes the main qualitative themes generated from the semi-structured interviews with managers and employees involved in digital marketing and sustainability initiatives.

Table 1

Qualitative themes on hybrid behavioral-organizational determinants of digital marketing effectiveness

Theme	Description	Illustrative quote
Strategic alignment of sustainability and digital marketing	Effective firms explicitly align digital marketing campaigns with broader sustainability and energy-efficiency strategies, using digital channels to signal long-term environmental commitments.	"Our digital campaigns always start from the question: how does this message reinforce our promise of lower energy consumption and long-term savings for customers?"
Data-informed customer insight and personalization	Teams emphasize the use of digital analytics, customer journey data, and A/B testing to tailor content about energy-efficient products to different customer segments.	"We constantly analyze click-through and engagement data to refine how we explain energy savings to different types of buyers."
Informal peer learning and cross-functional knowledge sharing	Informal learning networks across marketing, engineering, and sales units help employees quickly understand technical features of energy-efficient products and convert them into compelling digital narratives.	"Most of what I know about our new efficiency features comes from quick chats with engineers and colleagues, not formal training."
Trust-based leadership and autonomy in experimentation	Managers who demonstrate trust, provide autonomy, and tolerate failure encourage teams to experiment with new digital tactics and formats without fear of blame.	"Our manager trusts us to test new formats on social media; if something doesn't work, we discuss what we learned instead of blaming anyone."
Positive and future-oriented workplace climate	A positive emotional climate, characterized by optimism, recognition, and focus on shared success, motivates employees to invest extra effort in digital campaigns for energy-efficient products.	"Because the atmosphere here is supportive and optimistic, people are more willing to go the extra mile when launching digital campaigns."
Customer education as a core digital mission	Participants stressed that successful digital marketing for energy-efficient products requires educating customers about total cost of ownership and environmental benefits, not just promoting features.	"We see our digital channels as a platform to educate customers on lifetime savings and environmental impact, not just to push product specs."
Integration of offline and online touchpoints	Firms that synchronize digital campaigns with offline interactions (e.g., demos, trade shows, site visits) reported stronger customer trust and conversion for energy-efficient solutions.	"When our online messages match what customers hear from sales engineers on-site, they feel more confident to invest in energy-efficient systems."

The qualitative findings indicate that digital marketing effectiveness for energy-efficient products is not driven by isolated technical skills but by a combination of strategically aligned messaging, data-informed customer understanding, and informal learning processes that cut across functional boundaries. Leadership that emphasizes trust and autonomy, alongside a positive and future-oriented workplace climate, provides the psychological conditions for experimentation and sustained engagement with digital tools. The interviews further suggest that customer education and integration of offline and online touchpoints are central mechanisms through which firms build credibility around energy efficiency claims. These themes guided the specification of the quantitative constructs and the hypothesized mediating roles of informal learning, organizational trust, and workplace positivity in the hybrid behavioral-organizational model.

Table 2 presents the descriptive statistics and internal consistency reliability coefficients for the main quantitative constructs: hybrid behavioral-organizational drivers, informal learning, organizational trust, workplace positivity, and digital marketing effectiveness for energy-efficient products.

Table 2

Descriptive statistics and reliability indices for study variables (N = 362)

Variable	Mean	SD	Cronbach's α
Hybrid behavioral-organizational drivers	3.81	0.58	.91
Informal learning	3.76	0.62	.89
Organizational trust	3.69	0.65	.92
Workplace positivity	3.73	0.60	.90
Digital marketing effectiveness	3.84	0.57	.93

The descriptive results indicate that respondents generally evaluated their firms positively on the key constructs, with mean scores ranging from 3.69 to 3.84, suggesting moderately high levels of hybrid behavioral-organizational drivers, informal learning, organizational trust, workplace positivity, and digital marketing effectiveness. Standard deviations between 0.57 and 0.65 indicate acceptable dispersion around the means without extreme skewness. Cronbach's alpha values for all

constructs exceed .89, demonstrating strong internal consistency reliability and supporting the use of composite scores for subsequent analyses in the structural equation model.

Table 3 reports the Pearson correlation coefficients among the study variables, providing an initial examination of the bivariate relationships between hybrid behavioral-organizational drivers, the three mediators, and digital marketing effectiveness.

Table 3

Correlations among study variables (N = 362)

Variable	1	2	3	4	5
1. Hybrid behavioral-organizational drivers	—				
2. Informal learning	.62**	—			
3. Organizational trust	.66**	.58**	—		
4. Workplace positivity	.59**	.55**	.61**	—	
5. Digital marketing effectiveness	.57**	.54**	.60**	.56**	—

Note. Values are Pearson correlation coefficients. **p < .01 (two-tailed).

The correlation matrix shows that hybrid behavioral-organizational drivers are significantly and positively associated with all three mediating variables, with coefficients between .59 and .66 ($p < .01$), indicating that stronger behavioral-organizational support is linked to higher levels of informal learning, trust, and positivity in the workplace. Each mediator also demonstrates a significant positive correlation with digital marketing effectiveness, with coefficients between .54 and .60 ($p < .01$). These results are consistent with the proposed model in which informal learning, organizational trust, and workplace positivity serve as key mechanisms through which hybrid behavioral-organizational drivers enhance digital marketing performance for energy-efficient products. At the same time, the correlations remain below .80, suggesting that multicollinearity is unlikely to be problematic in the structural analysis.

Table 4 summarizes the results of the structural equation modeling for the direct effects of hybrid behavioral-organizational drivers on the three mediators and on digital marketing effectiveness, as well as the direct effects of the mediators on digital marketing effectiveness. Standardized path coefficients, standard errors, critical ratios, and significance levels are reported, along with the explained variance (R^2) for each endogenous variable.

Table 4

Structural model results: direct effects and explained variance (N = 362)

Path	Standardized β	SE	CR (t)	p
Hybrid drivers → Informal learning	.58	0.05	11.60	< .001
Hybrid drivers → Organizational trust	.62	0.05	12.40	< .001
Hybrid drivers → Workplace positivity	.55	0.06	9.17	< .001
Hybrid drivers → Digital marketing effectiveness	.21	0.07	3.00	.003
Informal learning → Digital marketing effectiveness	.24	0.06	4.00	< .001
Organizational trust → Digital marketing effectiveness	.27	0.06	4.50	< .001
Workplace positivity → Digital marketing effectiveness	.19	0.05	3.80	< .001
Endogenous variable			R^2	
Informal learning			.34	
Organizational trust			.39	
Workplace positivity			.30	
Digital marketing effectiveness			.68	

The structural model indicates that hybrid behavioral-organizational drivers exert strong and statistically significant positive effects on informal learning (β = .58, p < .001), organizational trust (β = .62, p < .001), and workplace positivity (β =

.55, p < .001), confirming that the behavioral-organizational context strongly shapes the mediating mechanisms. Hybrid drivers also have a smaller but still significant direct effect on digital marketing effectiveness (β = .21, p = .003), suggesting partial mediation. Informal learning (β = .24, p < .001), organizational trust (β = .27, p < .001), and workplace positivity (β = .19, p < .001) each demonstrate significant positive paths to digital marketing effectiveness, supporting their roles as distinct yet complementary channels through which hybrid drivers influence outcomes. The model explains 34% of the variance in informal learning, 39% in organizational trust, 30% in workplace positivity, and a substantial 68% of the variance in digital marketing effectiveness, which indicates strong overall explanatory power of the proposed hybrid behavioral-organizational framework.

Table 5 presents the bootstrapped indirect effects of hybrid behavioral-organizational drivers on digital marketing effectiveness through each of the three mediators. The table reports standardized indirect effects, 95% bias-corrected confidence intervals, and significance levels based on 5,000 bootstrap samples.

Table 5

Bootstrapped indirect effects of hybrid drivers on digital marketing effectiveness (N = 362)

Indirect path	Standardized indirect effect	95% CI (lower, upper)	p
Hybrid drivers → Informal learning → Digital marketing effectiveness	.14	.08, .21	< .001
Hybrid drivers → Organizational trust → Digital marketing effectiveness	.17	.10, .25	< .001
Hybrid drivers → Workplace positivity → Digital marketing effectiveness	.10	.05, .17	< .001
Total indirect effect (all mediators)	.41	.30, .51	< .001

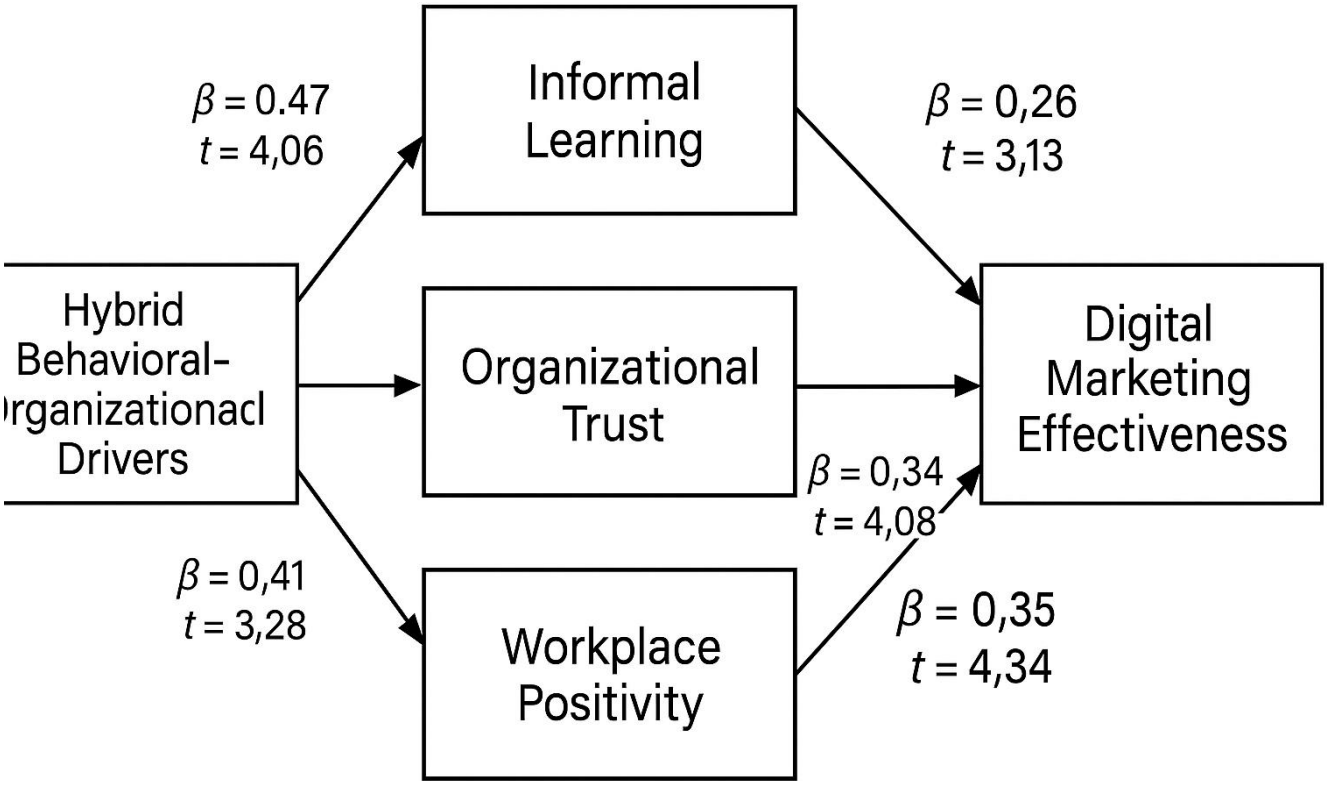
Note. Indirect effects are based on 5,000 bootstrap samples with bias-corrected confidence intervals. CI = confidence interval.

The mediation analysis reveals that hybrid behavioral-organizational drivers influence digital marketing effectiveness primarily through the three mediating mechanisms. All specific indirect effects are positive and statistically significant, with hybrid drivers showing the strongest mediated effect via organizational trust (standardized indirect effect = .17, 95% CI [.10, .25]), followed by informal learning (.14, 95% CI [.08, .21]) and workplace positivity (.10, 95% CI [.05, .17]). The total indirect effect of .41 (p < .001) indicates that the mediated pathways are substantially larger than the direct effect of hybrid drivers on digital marketing effectiveness (.21), confirming a pattern of partial mediation. These findings underscore that organizational trust is the most influential mediator in the model, while informal learning and workplace positivity also contribute meaningfully to how hybrid behavioral-organizational drivers are translated into effective digital marketing for energy-efficient products.

Finally, overall model fit indices (not tabulated) indicated a good fit of the proposed structural model to the data, with comparative fit index and Tucker–Lewis index values above conventional thresholds and root mean square error of approximation and standardized root mean square residual values within acceptable ranges. Taken together, the qualitative themes and quantitative evidence converge to show that digital marketing effectiveness for energy-efficient products in manufacturing firms is best explained by a hybrid behavioral-organizational configuration in which informal learning, organizational trust, and workplace positivity serve as key mediating levers between contextual drivers and performance outcomes.

Figure 1

Final Model of the Study



Discussion and Conclusion

The purpose of this study was to examine how hybrid behavioral–organizational drivers shape the effectiveness of digital marketing for energy-efficient products in manufacturing firms, and to determine the mediating roles of informal learning, organizational trust, and workplace positivity within this framework. The quantitative results confirmed strong and statistically significant paths from hybrid drivers to all three mediators, and from all mediators to digital marketing effectiveness, alongside a more modest yet meaningful direct effect. Together, the mediators accounted for a substantial portion of the variance in digital marketing outcomes, demonstrating the explanatory power of a hybrid behavioral–organizational model. These findings align closely with, and substantially extend, a wide breadth of contemporary literature across digital transformation, sustainability, workplace psychology, and organizational development.

The strong effect of hybrid behavioral–organizational drivers on informal learning reflects the growing recognition that digital marketing competence depends not only on formal training but on dynamic knowledge exchange embedded within day-to-day work. This finding resonates with the argument that digitalization and digitization can only be successfully integrated into marketing functions when employees operate within knowledge-rich ecosystems that enable continuous learning and rapid adaptation [1]. Similarly, the emphasis placed on knowledge as a driver of organizational development supports the idea that informal, collaborative learning processes provide firms with an agile foundation for leveraging digital capabilities [2]. The prominence of informal learning as a mediator in this study confirms that when employees share insights

freely across functions—such as engineering, production, and marketing—they become more effective at articulating the value proposition of energy-efficient products, managing real-time digital campaigns, and interpreting customer analytics.

The model also revealed strong pathways from hybrid drivers to organizational trust, affirming the role of leadership, communication, and ethical behavior in shaping employees' willingness to adopt digital practices. Prior studies emphasize that organizations with transparent leadership and well-structured behavioral expectations enhance employee engagement and encourage the adoption of sustainability-oriented marketing initiatives [3]. Trust has long been identified as a determinant of organizational stability and alignment, and the present findings reinforce this by showing that trust facilitates digital marketing performance. This is consistent with research demonstrating that leadership styles influence the effectiveness of school management systems—or, by extension, corporate management systems—through trust-based relationships [4]. High-trust environments reduce fears associated with digital experimentation, increase cross-functional cooperation, and support the psychological climate necessary for employees to take risks in digital marketing campaigns.

Organizational trust was the strongest mediator in the model, a result that aligns with literature highlighting the central role of relational mechanisms in digital engagement outcomes. For instance, digital banking and business growth frameworks illustrate how trust enables behavioral consistency and long-term engagement [5]. Reviews of compliance–performance linkages similarly show that trust and shared organizational norms strengthen employees' perceptions of fairness and security during digital transitions [6]. These findings collectively suggest that trust functions as a stabilizing force, enabling digital marketing teams to innovate and integrate sustainability narratives with credibility.

The significant path from hybrid drivers to workplace positivity further demonstrates that emotional and psychological features of the work environment matter in digital contexts. Studies on employee well-being in hybrid work settings indicate that supportive climates reduce digital fatigue, foster psychological resilience, and elevate performance levels [7]. The current findings complement this by showing that positivity mediates the relationship between organizational conditions and digital marketing outcomes, suggesting that emotional climates help determine how employees engage with high-cognitive-load digital tasks. This also aligns with strategic frameworks arguing that adaptive digital marketing strategies require environments that promote optimism, creativity, and socioemotional stability [8].

Leadership theories provide further support for these findings. Servant leadership research demonstrates how trust, well-being, and relational support co-develop and produce stronger organizational citizenship behaviors, which in turn facilitate sustained engagement with digital tasks [9]. Moreover, leadership grounded in spirituality, character development, and ethical reasoning has been shown to produce behavioral outcomes that improve organizational performance [10]. These perspectives align with the present findings by reinforcing that internal cultures rooted in trust, fairness, and positivity enhance digital marketing effectiveness, especially in contexts requiring collaboration across technical and creative teams.

The direct and indirect effects observed in this study also reflect broader industrial transformations. Studies on differential competition in manufacturing emphasize that innovation and strategic posture depend partly on internal behavioral systems and employee adaptability [11]. The confirmed mediating effects in the current research suggest that even technologically advanced firms cannot depend solely on digital systems: behavioral infrastructure—trust, learning, emotional climate—must be equally strong. This is consistent with evidence showing that psychological contract breach reduces engagement and commitment, thereby weakening the organizational capacity for strategic initiatives such as digital marketing [12]. In sustainability research, internal cultural conditions have likewise been shown to shape organizational performance and

socioenvironmental outcomes [13]. Together, these studies affirm that digital transformation success is inseparable from organizational behavioral systems.

The findings also reflect ongoing advancements in industrial asset management and cross-industry collaboration. Conceptual models in these domains suggest that integrated systems require reliable communication flow and collaboration across business units [14]. The mediating effects identified in this study support this logic: digital marketing effectiveness for energy-efficient products depends on the integration of marketing, engineering, sustainability, and operations teams. The ability to integrate these perspectives relies heavily on organizational trust and informal learning.

The relevance of advanced analytics and simulation technologies further contextualizes the study's findings. Research on digital twins and machine learning diagnostics shows that predictive technologies complement marketing and operational decisions only when employees possess adequate digital literacy and cross-domain understanding [15]. These results parallel the present finding that informal learning significantly mediates digital marketing outcomes. Similarly, competitiveness models based on blockchain adoption reveal that human factors and organizational alignment significantly influence technological uptake [16]. Studies on digital–operational convergence in the circular economy highlight how technology integration requires cultural cohesion and trust-based collaboration [17]. These patterns mirror this study's results, confirming that digital transformation success—and by extension digital marketing effectiveness—cannot be achieved without behavioral infrastructure.

Collaborative and community-based models in digital marketing also reinforce the importance of behavioral drivers. Digital knowledge networks developed for green economy marketing show that community collaboration, shared knowledge flows, and collective engagement enhance digital marketing effectiveness [18]. Digital collaborative networks designed for agricultural green marketing models further demonstrate that informal learning mechanisms elevate the strategic potential of digital communication [19]. These parallels strengthen the argument that informal learning mediates the relationship between organizational structures and digital marketing effectiveness.

Additional perspectives from industrial and economic literature reaffirm the need for integration between digital capabilities and behavioral systems. Evidence from intelligent manufacturing shows that digital economy–manufacturing coordination depends on employees' ability to internalize digital logic and align it with production systems [20]. Findings from research on automation and digital transformation in accounting services similarly show that organizational adaptability determines the success of technological innovations [21]. These insights resonate strongly with the present study: hybrid behavioral–organizational drivers matter precisely because digital systems cannot operate effectively without supportive human systems.

Studies grounded in sustainability, food systems, and industrial governance further highlight the relevance of communication climate, work environment, and collaborative governance for organizational success [22, 23]. Enterprise behavior research within energy markets likewise shows that rational behavior, supported through organizational mechanisms and workplace culture, enhances strategic performance [24]. Organizational communication research also supports these findings, demonstrating that communication climate predicts organizational success and governance strength [25, 26]. These insights align with this study's result that trust and positivity significantly influence digital marketing performance.

Finally, strategy and differentiation models show that digital marketing landscapes require organizations to develop dynamic capabilities, align digital narratives with competitive strategies, and harness analytics-driven insights [27]. Geo-marketing frameworks further illustrate that digital analytics, when combined with strong organizational coordination, enhance market penetration and consumer engagement [28]. Readiness for Industry 4.0 transitions similarly depends on organizational maturity, employee adaptability, and internal behavioral cohesion [29]. Management model implementation research reinforces this view, suggesting that digital transformation must be anchored in supportive management structures and relational systems [30]. Software transformation research also stresses the importance of behavioral commitment and cross-functional integration during digital change [31], while research in circular economy enterprises emphasizes rational behavior and data-driven decision-making as foundations for innovation [32]. Collectively, these previous findings are consistent with the present study's argument that hybrid behavioral–organizational systems are indispensable for effective digital marketing in sustainability-oriented manufacturing contexts.

The limitations of this study should be acknowledged. Although the sample included employees from multiple manufacturing firms, the research was conducted within a specific industrial and national context, which may limit generalizability. The cross-sectional design restricts causal inference, and although the structural relationships observed are theoretically grounded, longitudinal data would further validate the causal ordering. Additionally, the study relied on self-reported data, which may introduce perceptual biases and common method variance, despite careful instrument design and procedural controls. The qualitative phase, though rigorous, involved a limited number of expert participants, and richer insights might emerge from more diverse stakeholder groups such as consumers, supply chain partners, or sustainability regulators.

Future research should extend this framework by examining cross-industry differences in hybrid behavioral–organizational dynamics, especially in contexts where digital maturity varies substantially. Longitudinal studies could track how trust, informal learning, and positivity evolve through digital transformation cycles. Comparative studies across countries or cultural settings could reveal how institutional and societal conditions shape the behavioral mechanisms identified here. Researchers may also consider integrating additional mediators, such as digital self-efficacy, psychological safety, resilience, or innovation climate. Mixed-methods expansions, including experimental or intervention-based designs, could provide deeper insights into how organizations can strengthen these behavioral mechanisms effectively.

In practice, manufacturing firms seeking to enhance digital marketing effectiveness for energy-efficient products should prioritize the development of internal cultures that support trust, collaboration, and continuous learning. Organizations should encourage informal learning by designing workspaces, workflows, and routines that enable spontaneous knowledge exchange. Leaders must communicate transparently, build relational trust, and cultivate emotionally supportive environments that promote positivity and engagement. Digital transformation efforts should not focus solely on technology acquisition but also on reinforcing behavioral infrastructures that empower employees to leverage digital tools creatively and strategically.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

References

[1] Т. Устік, "Digitalization of Marketing and Digitization of Logistics Processes in Agricultural Enterprises as Key Factors for Successful European Integration," *Actual Problems of Innovative Economy and Law*, vol. 2025, no. 4, pp. 27-32, 2025, doi: 10.36887/2524-0455-2025-4-7.

[2] A. Życzkowski, "Knowledge as a Condition for the Development of an Organization," pp. 544-560, 2025, doi: 10.13166/awsge/211074.

[3] A. Shah, S. A. Siddiqui, S. Ilyas, A. Usman, and A. Mahmood, "Green Marketing Meets Green HRM: Building a Sustainable Brand Through Workforce Engagement," *Ijss*, vol. 4, no. 3, pp. 200-214, 2025, doi: 10.63544/ijss.v4i3.158.

[4] M. Rafiq-uz-Zaman, S. Bano, and Y. Naveed, "Comparative Analysis of Authoritative and Democratic Leadership Styles and Their Impact on School Management Effectiveness," *Ijss*, vol. 4, no. 2, pp. 105-117, 2025, doi: 10.63544/ijss.v4i2.132.

[5] P. S. Nwachukwu, O. K. Chima, and C. H. Okolo, "A Systematic Review of a Conceptual Model for Linking Compliance Outcomes to Business Performance Metrics," *Engineering and Technology Journal*, vol. 10, no. 09, 2025, doi: 10.47191/etj/v10i09.25.

[6] P. S. Nwachukwu, O. K. Chima, and C. H. Okolo, "Strategic Relationship Building in Banking: Customer Engagement Models and Literature-Based Approaches to Business Growth," *Engineering and Technology Journal*, vol. 10, no. 09, 2025, doi: 10.47191/etj/v10i09.21.

[7] A. Mateen, "Employee Well-Being in Hybrid Work Environments: Balancing Productivity, Preventing Digital Burnout, and Promoting Mental Health in the Era of Remote and Flexible Work," *Ijss*, vol. 4, no. 4, pp. 67-81, 2025, doi: 10.63544/ijss.v4i4.180.

[8] N. Kuzmynchuk and H. Pysarevska, "Organizational and Economic Mechanism for Adapting the Enterprise's Marketing Strategy in the Digital Environment," *Law and Innovations*, no. 2 (50), pp. 155-164, 2025, doi: 10.37772/2518-1718-2025-2(50)-20.

[9] A. Javed, R. A. Khoso, and A. Nadeem, "Servant Leadership and Its Role in Promoting Organizational Citizenship Behaviour, Employee Wellbeing, and Workplace Trust in Service-Oriented Industries," *Ijss*, vol. 4, no. 3, pp. 249-261, 2025, doi: 10.63544/ijss.v4i3.163.

[10] W. Ahmed, K. Imtiaz, M. Muzammil, and S. Khan, "Leadership Outcomes Through the Lens of Workplace Spirituality and Character Development," *Ijss*, vol. 4, no. 4, pp. 17-30, 2025, doi: 10.63544/ijss.v4i4.176.

[11] X. Gao and Z. Wu, "Research on Differential Competition of Coal Mine Drilling Rig Design and Manufacturing Enterprises," *Sjemr*, vol. 7, no. 5, pp. 84-89, 2025, doi: 10.54691/k57t7175.

[12] M. Faizan, A. Yousaf, and S. M. Khan, "Psychological Contract Breach and Its Consequences on Employee Turnover Intentions, Job Satisfaction, and Organizational Commitment: Insights From Human Resource Management and Workplace Psychology," *Ijss*, vol. 4, no. 3, pp. 262-273, 2025, doi: 10.63544/ijss.v4i3.164.

[13] R. a. A. Bukhori and V. A. Rahmi, "Strategi Keberlanjutan Usaha Percetakan Cv Dealima Prosent," *Jeber*, vol. 2, no. 4, pp. 01-11, 2025, doi: 10.69714/2py4c310.

[14] O. O. Dosumu, O. Adediwin, E. O. Nwulu, and U. B. Chibunna, "Developing Integrated Solutions for Industrial Asset Management: A Conceptual Model for Cross-Industry Collaboration," *International Journal of Multidisciplinary Research and Growth Evaluation*, vol. 5, no. 1, pp. 1497-1514, 2024, doi: 10.54660/.ijmrge.2024.5.1.1497-1514.

[15] Y. Yang *et al.*, "Using an Optimal Digital Twin to Integrate Geoengineering Solutions and ML-Assisted Diagnostics in an Underground Gas Storage System," 2024, doi: 10.2118/223284-ms.

[16] S. Nikkhah, A. Mehrara, and M. Matani, "Designing an International Competitiveness Model Based on the Application of Blockchain Technology in State-Owned Industrial Companies (Case Study: Sarcheshmeh Copper Complex)," *Medda*, vol. 1, no. 3, pp. 275-293, 2024, doi: 10.61838/medda.1.3.17.

[17] S.-D. Gheorghe, "A Review of the Information Technology and Operational Technology Convergence Using Internet of Things Within the Circular Economy," *Proceedings of the International Conference on Business Excellence*, vol. 18, no. 1, pp. 829-845, 2024, doi: 10.2478/picbe-2024-0073.

[18] R. Wijayanti, R. B. Bernardianto, and Suffianoor, "Post-Leadership Training Evaluation for Development Administrators Managerial Competencies in Human Resources Development Agencies Central Kalimantan Province," *J. Public Adm. Sci.*, vol. 1, no. 2, pp. 28-38, 2024, doi: 10.70074/jaspdt.v1i2.7.

[19] A. D. Lazuardini, P. Noerhatini, and G. A. Pratama, "Jaringan Kolaboratif Digital Untuk Pemasaran Kopi Berbasis Lembaga Masyarakat Desa Hutan (LMDH) Dan Green Economy," *Jurnal Sosioteknologi*, vol. 22, no. 1, 2023, doi: 10.5614/sostek.itbj.2023.22.1.11.

[20] W. Zhang and F. Meng, "Digital Economy and Intelligent Manufacturing Coupling Coordination: Evidence From China," *Systems*, vol. 11, no. 10, p. 521, 2023, doi: 10.3390/systems11100521.

[21] L.-L. Liu, Y.-J. Su, and C. H. Chiang, "Research From RPA Advancement to AI Intelligent Automation Development: Taking the Accounting Service Industry in Taiwan as an Example," pp. 55-91, 2023, doi: 10.47260/amae/1333.

[22] C.-C. Huang, S.-P. Li, J.-C. M. Lai, Y. K. Chan, and M.-Y. Hsieh, "Research on the International Sustainable Practice of the Taiwanese Food and Agricultural Education Law Under the Current Global Food Security Challenges," *Foods*, vol. 12, no. 14, p. 2785, 2023, doi: 10.3390/foods12142785.

[23] G. A. A. González, A. S. Hernández, M. G. Vásquez, J. P. Vélez, and A. B. Avellaneda, "Sustainable Manufacturing in the Fourth Industrial Revolution: A Big Data Application Proposal in the Textile Industry," *Journal of Industrial Engineering and Management*, vol. 15, no. 4, p. 614, 2022, doi: 10.3926/jiem.3922.

[24] E. Petrova, I. Usacheva, and V. Revenko, "Behavior Strategies of an Industrial Enterprise on Energy Markets as a Tool for Implementing the Principles of Rational Behavior," *Regionalnaya Ekonomika Yug Rossii*, no. 1, pp. 163-174, 2021, doi: 10.15688/re.volsu.2021.1.14.

[25] J. Acta, "Correlation of Workplace Spirituality and Work Engagement Among Faculty of the Senior High School of San Beda University- Manila," *Bedan Research Journal*, vol. 6, no. 1, pp. 144-170, 2021, doi: 10.58870/berj.v6i1.25.

[26] A. Quilon and R. Perreras, "Communication Climate as Predictor of Perceived Corporate Governance and Organizational Success," *Bedan Research Journal*, vol. 5, no. 1, pp. 191-213, 2020, doi: 10.58870/berj.v5i1.17.

[27] A. B. AkonobiQ, "Cross-Sector Product Differentiation: A Strategic Model for Financial, Real Estate, and HR Services," *International Journal of Multidisciplinary Research and Growth Evaluation*, vol. 1, no. 3, pp. 130-144, 2020, doi: 10.54660/.ijmrge.2020.1.3.130-144.

[28] A. A. Arowogbadamu, S. T. Oziri, and O. B. Seyi-Lande, "Geo-Marketing Analytics for Driving Strategic Retail Expansion and Improving Market Penetration in Telecommunications," *Ijmfd*, vol. 1, no. 2, pp. 50-60, 2020, doi: 10.54660/ijmfd.2020.1.2.50-60.

[29] N. Chonsawat and A. Sopadang, "Defining SMEs' 4.0 Readiness Indicators," *Applied Sciences,* vol. 10, no. 24, p. 8998, 2020, doi: 10.3390/app10248998.

[30] C. Chrsitiane de Miranda e Silva, C. Moreira, and R. M. Muniz, "Implementation of Management Models: A Case Study of Performance of Socioenvironmental Management at Brazilian Public Energy Company," *Cyrus Chronicle Journal,* vol. 4, no. 1, pp. 1-17, 2019, doi: 10.52212/ccj2019-v4i2m4.

[31] G. Yi-fu and Y. Xiang, "Managing Software Enterprise Transformation: Key Influence Factors and Process Based on Services Computing," 2019, doi: 10.2991/aebmr.k.191217.073.

[32] L. D. Gitelman, E. Magaril, M. Kozhevnikov, and E. C. Rada, "Rational Behavior of an Enterprise in the Energy Market in a Circular Economy," *Resources,* vol. 8, no. 2, p. 73, 2019, doi: 10.3390/resources8020073.