

A Hybrid Organizational–Behavioral Model to Enhance Digital Marketing Effectiveness for Energy-Efficient Products: Mediating Role of Organizational Trust & Informal Learning and Moderating Role of Organizational Governance

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ABSTRACT

This study aimed to develop and empirically test a hybrid organizational–behavioral model explaining how organizational digital capability enhances digital marketing effectiveness for energy-efficient products through organizational trust, informal learning, and governance mechanisms. A sequential mixed-methods design was employed consisting of an exploratory qualitative phase followed by a quantitative validation phase. The qualitative phase involved semi-structured interviews with 18 experts in digital marketing, sustainability, and organizational development to identify thematic drivers of digital marketing effectiveness. These insights informed the development of a measurement model tested in the quantitative phase using survey data from 387 employees and managers in energy-related organizations engaged in marketing energy-efficient products. Measurement validation was conducted through confirmatory factor analysis, and the structural model was assessed using structural equation modeling. Mediation tests were performed via bias-corrected bootstrapping, and moderation effects were examined using interaction analysis. Organizational digital capability exerted significant direct effects on digital marketing effectiveness ($\beta = .28, p = .001$) and strong indirect effects through organizational trust ($\beta = .20, p < .001$) and informal learning ($\beta = .17, p < .001$). Both trust ($\beta = .33, p < .001$) and informal learning ($\beta = .29, p < .001$) independently predicted digital marketing effectiveness, confirming dual mediation. Organizational governance significantly moderated the effects of trust ($\beta = .12, p = .004$) and informal learning ($\beta = .09, p = .027$) on digital marketing effectiveness, with stronger governance amplifying these relationships. The final model explained 62% of the variance in digital marketing effectiveness. Digital marketing effectiveness for energy-efficient products is maximized when technological capability is complemented by trust-based relationships, informal learning processes, and supportive governance structures, demonstrating the interdependence of organizational, behavioral, and institutional drivers.

Keywords: Digital capability; organizational trust; informal learning; organizational governance; digital marketing effectiveness; energy-efficient products; mixed-methods study; structural equation modeling

Introduction

Global commitments to decarbonization and energy transition have intensified pressure on firms to accelerate the diffusion of energy-efficient technologies and products. Yet, despite advances in engineering and energy systems, the market penetration of energy-efficient solutions remains uneven and often slower than technological



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progress would allow (1, 2). The development of energy services markets and low-carbon business models depends not only on technical feasibility and regulatory incentives but also on the ability of organizations to communicate value propositions convincingly and to shape customer behavior in favor of energy-saving alternatives (3, 4). Liberalization and restructuring of energy markets have further transformed competitive dynamics, forcing energy suppliers and related enterprises to adopt more market-oriented strategies and proactive customer engagement approaches (5, 6). These changes highlight the strategic importance of effective digital marketing in bridging the gap between engineering capabilities, energy policy goals, and actual consumer choices for energy-efficient products (7-9).

At the same time, the broader business landscape is being reshaped by Industry 4.0 technologies, advanced analytics, and platform-based ecosystems, which alter how firms create, deliver, and capture value (10, 11). Digitalization enables the integration of real-time data, automation, and remote monitoring across energy systems and industrial operations, creating new opportunities for efficiency and service innovation (3, 12). However, realizing these opportunities requires organizations to redesign their internal processes, decision-making structures, and marketing practices so that digital tools and data-driven insights are effectively translated into customer-oriented strategies (13, 14). Digital transformation initiatives that focus solely on technological deployment without considering organizational behavior and human resource dynamics often fail to deliver expected performance gains, particularly in complex sectors such as energy and manufacturing (15-17).

Digital marketing has moved from a peripheral function to a central driver of business development, allowing firms to reach segmented audiences, personalize content, and measure campaign performance with unprecedented precision (18, 19). In energy-related industries, digital channels enable firms to explain the technical and economic benefits of energy-efficient appliances, renewable solutions, and smart services in accessible ways, thereby reducing information asymmetries that often hinder adoption (20, 21). Research on digital marketing in industrial and service contexts underscores the need for coherent organizational strategies, integrated digital platforms, and standardized processes to support consistent and data-driven execution of campaigns (11, 22, 23). For energy-efficient products, firms must design narratives that connect technical performance with broader sustainability values, and must do so across search, social media, and e-commerce interfaces that shape consumer journeys (24, 25).

Consumer decisions regarding energy-efficient products are influenced not only by price and technical features but also by perceptions of risk, credibility, and trust in providers and information sources (26, 27). Studies on social marketing and energy consumption show that trust in institutions, brands, and communicators significantly enhances the effectiveness of interventions aimed at promoting energy-saving behaviors (26, 28). In the digital environment, electronic word-of-mouth, online reviews, and influencer endorsements can either reinforce or undermine trust, thereby shaping purchase intentions for energy-efficient appliances and related solutions (27, 29). Customer-centric research further indicates that e-marketing quality, product attractiveness, and reputation are intertwined: firms that manage digital touchpoints consistently and transparently tend to be perceived as more reliable and innovative, which in turn improves their standing in competitive markets (28, 30). Nevertheless, most of this literature conceptualizes trust primarily at the customer interface, with limited attention to the organizational conditions inside firms that facilitate trustworthy and effective digital communication.

Internally, organizations differ widely in their capacity to leverage digital technologies for marketing and innovation. Digital capability encompasses infrastructure, data analytics, and platform integration, but also involves

managerial competencies and cross-functional collaboration (14, 15). Empirical studies in various sectors demonstrate that digital capability and IT-enabled process integration can enhance productivity, innovation, and overall business performance when aligned with organizational strategy and culture (17, 31). In the energy and industrial domains, digital platforms have been shown to support new forms of small-scale energy networks, demand-side management, and integrated service offerings that rely on continuous data flows between firms and customers (1, 7). For these technological potentials to translate into effective digital marketing for energy-efficient products, internal organizational mechanisms—such as learning routines, communication structures, and governance frameworks—must be capable of transforming data and expertise into compelling, trustworthy messages and customer experiences (22, 32).

Organizational trust represents a central behavioral mechanism through which digital initiatives influence employee engagement, knowledge sharing, and innovation. Research on workplace dynamics shows that trust in supervisors and the organization increases employees' willingness to experiment, share tacit knowledge, and support organizational change (33, 34). In contexts where digital transformation introduces uncertainty and role reconfiguration, trust reduces perceived risk and facilitates buy-in for new processes and tools (14, 16). Specifically, investigations of informal learning and workplace fun reveal that trust mediates the relationship between supportive organizational climates and employees' readiness to engage in self-directed and peer-based learning activities (34, 35). From a marketing and innovation standpoint, higher organizational trust can enable cross-functional teams to co-create digital campaigns, experiment with new formats, and refine messages about energy-efficient products without fear of blame for short-term failures (31, 32). Yet, empirical models that link organizational trust to digital marketing effectiveness, particularly in energy-efficiency contexts, remain underdeveloped.

Informal learning constitutes another crucial mechanism by which organizations build and adapt digital marketing capabilities. Rather than occurring only through formal training programs, much of the knowledge required to manage digital platforms, interpret customer analytics, and design content flows through informal networks, communities of practice, and hybrid online–offline interactions among employees (35, 36). Studies in supply chain management and entrepreneurship indicate that organizational learning capabilities enhance marketing capabilities and, ultimately, firm performance, especially when they foster rapid feedback loops and cross-departmental collaboration (32, 36). Hybrid educational and capacity-building platforms demonstrate how digital tools can support informal learning among dispersed user groups, creating spaces for experimentation and peer exchange that are highly relevant for the continual refinement of digital marketing strategies (14, 35). Nonetheless, existing research rarely examines informal learning as a mediator between organizational digital capability and specific marketing outcomes such as the effectiveness of campaigns aimed at energy-efficient products.

These behavioral processes unfold within broader organizational governance structures that define roles, decision rights, performance criteria, and accountability mechanisms. Governance in energy and industrial enterprises has traditionally focused on ensuring reliable supply, regulatory compliance, and capital efficiency (2, 4). With the rise of competitive markets and digitalization, governance also needs to support flexibility, innovation, and responsiveness to customer needs (3, 5). Research on organizational and economic support for engineering integration into energy security systems underscores the importance of process-oriented governance models that coordinate technical and commercial activities (8, 9). In parallel, studies on digital marketing capability, digital platforms, and enterprise digital transformation emphasize that governance mechanisms—such as data standards, cross-functional steering committees, and incentive systems—shape the way digital initiatives are prioritized,

resourced, and evaluated (11, 19, 22). In the agricultural and industrial sectors, digital transformation of organizational and economic mechanisms in supply chains demonstrates how governance arrangements can either enable or hinder the effective integration of digital tools and market-oriented strategies (13, 37).

Despite these insights, the nexus between organizational governance and the behavioral mechanisms of trust and informal learning in shaping digital marketing outcomes has not been sufficiently theorized. Existing work on digital transformation, e-marketing, and reputation points to the need for governance frameworks that align digital initiatives with customer-centric objectives and brand values (18, 30). Sector-specific studies on marketing of solar energy equipment and energy-efficient appliances show that success depends on coordinated efforts across technical, marketing, and policy interfaces, yet they stop short of articulating how governance conditions the internal relational and learning dynamics that underpin digital campaign effectiveness (21, 25, 27). Similarly, analyses of market-oriented strategic innovation in energy distribution and service delivery emphasize strategic orientation and innovation capabilities but devote less attention to the micro-foundations of trust-based collaboration and informal learning within organizations (28). As a result, there is limited empirical evidence on how governance may moderate the relationship between internal behavioral drivers and the effectiveness of digital marketing for energy-efficient products.

Taken together, the literature points to several gaps. First, studies on energy efficiency and energy services underscore the need for more effective market mechanisms and customer engagement, yet they typically emphasize technical, policy, or macroeconomic factors without integrating organizational behavior and digital marketing perspectives (1, 2, 7, 12). Second, research on digital transformation and marketing highlights the strategic value of digital capabilities and standardized processes, but often treats trust, informal learning, and governance as contextual or background conditions rather than as central constructs in explanatory models (14, 15, 23, 31). Third, while there is growing recognition of the role of trust in social marketing for energy efficiency and of informal learning in building marketing capabilities, the combined mediating effects of these behavioral constructs on the link between organizational digital capability and digital marketing effectiveness have not been examined systematically (26, 33, 34, 36). Finally, the moderating role of organizational governance—particularly in energy-related and industrial contexts—has rarely been modeled in relation to digital marketing outcomes, despite evidence that governance strongly shapes the success of transformation initiatives and market strategies (8, 13, 37).

In response to these gaps, the present study focuses on organizations involved in the production, distribution, or promotion of energy-efficient products and proposes an integrated framework that links digital capability, organizational trust, informal learning, and governance to digital marketing effectiveness. The study leverages insights from research on energy services and efficiency, digital transformation, marketing strategy, and organizational behavior to conceptualize a hybrid organizational–behavioral model that captures both technological and human dimensions of performance (11, 21, 27, 28, 32). Accordingly, the aim of this study is to develop and empirically test a hybrid organizational–behavioral model that explains how organizational digital capability, through the mediating roles of organizational trust and informal learning and under the moderating influence of organizational governance, enhances the effectiveness of digital marketing for energy-efficient products.

Methods and Materials

This study employed a mixed-methods sequential exploratory design that integrated qualitative exploration with quantitative validation to develop and test a hybrid organizational–behavioral model explaining the effectiveness of

digital marketing for energy-efficient products. The qualitative phase aimed to uncover deep organizational, behavioral, and governance-related dynamics that shape digital marketing effectiveness, particularly focusing on how organizational trust and informal learning processes evolve within the context of energy-efficiency initiatives. In this phase, data were gathered from senior marketing managers, digital transformation specialists, sustainability officers, and organizational development experts from leading Iranian energy, home appliance, and renewable-technology firms. Participants were selected using purposive and theoretical sampling to ensure sufficient diversity of perspectives and achieve conceptual saturation. Interviews continued until no new thematic insights emerged, which occurred after 18 semi-structured interviews conducted with experts who had an average of eight to fifteen years of experience in digital marketing, energy-efficiency product development, or organizational governance.

The subsequent quantitative phase aimed to empirically test the relationships identified in the qualitative stage using a large sample of employees directly involved in digital marketing, branding, innovation management, and sustainability functions within organizations producing or promoting energy-efficient products. The target population consisted of employees and middle managers from manufacturing companies, energy-sector organizations, and green-technology firms who were actively engaged in digital marketing activities over the prior two years. Stratified random sampling was used to ensure representation across organizational levels and industry segments. Based on guidelines for structural equation modeling and the number of latent constructs in the conceptual model, a minimum of 300 participants was required; however, to improve model robustness, reduce sampling error, and strengthen the validity of multi-group moderation analysis, 420 questionnaires were distributed. After removing incomplete responses and outliers identified through Mahalanobis distance screening, 387 valid cases were retained for the final analysis, satisfying the assumptions for both covariance-based and variance-based SEM techniques.

Data collection involved two sets of instruments aligned with the sequential mixed-methods approach. In the qualitative phase, data were gathered using a semi-structured interview protocol designed to elicit rich narratives about organizational behavior, digital marketing practices, and the internal mechanisms that support or hinder the marketing of energy-efficient products. The interview guide contained broad, open-ended questions exploring organizational culture, informal learning exchanges, digital capabilities, trust formation, governance systems, and perceived barriers to marketing environmentally sustainable products. Follow-up questions were used flexibly to probe deeper into emergent concepts. All interviews were conducted either face-to-face or via secure video conferencing platforms, recorded with participant consent, and transcribed verbatim for analysis.

For the quantitative phase, a comprehensive survey instrument was developed based on the qualitative results and validated measurement constructs from the organizational behavior, digital marketing, learning theory, and governance literature. The instrument included scales assessing digital marketing effectiveness for energy-efficient products, organizational trust, informal learning, and organizational governance mechanisms, along with demographic and organizational background items. All items were measured on a five-point Likert scale ranging from strongly disagree to strongly agree. To ensure content validity, the questionnaire was reviewed by a panel of five experts in digital marketing, organizational psychology, and sustainability management; revisions were made based on their feedback to improve item clarity, conceptual alignment, and cultural relevance. A pilot test was conducted with 35 respondents to assess face validity, internal consistency, wording clarity, and the performance of newly developed items. Cronbach's alpha and composite reliability values exceeded recommended thresholds, confirming acceptable reliability for the full-scale administration.

Data analysis followed a two-stage sequential approach consistent with the mixed-methods design. In the qualitative phase, interview transcripts were examined using thematic analysis with an inductive–deductive strategy. Initially, open coding was used to identify meaningful units of text reflecting organizational behaviors, interaction patterns, governance structures, and digital marketing processes. These codes were refined through axial coding to develop categories and conceptual groupings that reflected underlying mechanisms such as informal learning dynamics, trust-building processes, and governance constraints. Selective coding was then used to integrate these categories into a coherent preliminary model that linked organizational trust, informal learning, and governance to digital marketing effectiveness within the context of energy-efficient product promotion. Coding and analysis were supported by MAXQDA software to ensure systematic handling of qualitative data, maintain audit trails, and facilitate researcher triangulation. Saturation was confirmed when no new codes or categories emerged from additional interviews.

In the quantitative phase, the hypothesized structural model derived from the qualitative stage was tested using structural equation modeling. The analysis proceeded with two main steps: measurement model evaluation and structural model testing. Confirmatory factor analysis was performed to assess factor loadings, convergent validity, discriminant validity, and reliability. Average variance extracted, composite reliability, and heterotrait–monotrait ratios were examined to ensure the adequacy of the measurement model. After confirming measurement quality, the structural model was evaluated to test the direct effects of organizational trust and informal learning on digital marketing effectiveness, as well as the mediating roles these variables play in shaping outcomes. The moderating effect of organizational governance was examined through multi-group analysis and interaction term testing. Model fit indices such as CFI, TLI, RMSEA, and SRMR were used to determine the adequacy of model representation, while bootstrapping with 5000 resamples was employed to assess the significance of mediation and moderation pathways. All analyses were conducted using SmartPLS and AMOS to take advantage of both variance-based and covariance-based modeling approaches, thereby ensuring the robustness of findings and enhancing the generalizability of the hybrid organizational–behavioral model.

Findings and Results

The findings of this mixed-methods study integrate in-depth qualitative insights with robust quantitative evidence to explain how organizational and behavioral mechanisms shape the effectiveness of digital marketing for energy-efficient products. The qualitative phase revealed a coherent set of themes showing that organizational trust, informal learning networks, and governance practices jointly define the conditions under which digital marketing strategies are translated into tangible outcomes. These insights were then operationalized into a structural model tested with survey data from 387 employees and managers in energy-related and green product organizations. The quantitative results support a hybrid organizational–behavioral model in which organizational digital capability exerts a strong positive effect on digital marketing effectiveness both directly and indirectly through organizational trust and informal learning, while organizational governance strengthens the performance impact of these mediators. Together, the model explains a substantial proportion of variance in digital marketing effectiveness, highlighting the central role of trust-based relationships, informal knowledge flows, and supportive governance structures in leveraging digital tools for the promotion of energy-efficient products.

Table 1. Qualitative Themes and Subthemes on Organizational–Behavioral Drivers of Digital Marketing Effectiveness for Energy-Efficient Products

Theme	Subthemes	Description	Illustrative quote
Trust as the foundation for digital experimentation	Psychological safety; Reliability of leadership; Transparent communication	Participants emphasized that employees engage more actively with data-driven and experimental digital campaigns for energy-efficient products when they perceive leaders as reliable, open, and willing to support calculated risk-taking. Trust reduces fear of failure and encourages testing of new creative formats and channels.	“When I know that management will not blame us for a campaign that doesn’t hit the target immediately, I am more willing to test new formats to explain the benefits of our energy-saving products.” (Marketing manager, appliance firm)
Informal learning networks as hidden digital infrastructure	Peer-to-peer learning; Cross-functional conversations; Communities of practice	Informal learning was depicted as a powerful yet often invisible infrastructure enabling rapid sharing of digital know-how, best practices, and insights about customer responses to green messages. Hallway conversations, messaging groups, and informal meetups were repeatedly described as key mechanisms for refining digital campaigns.	“The real learning happens in our informal chats after a campaign launch. We dissect what worked and what didn’t, and that feeds directly into the next digital push for our efficiency line.” (Digital specialist, energy utility)
Governance as enabler or constraint	Clarity of roles and rules; Strategic alignment; Flexibility of procedures	Organizational governance emerged as a double-edged sword. Clear policies and aligned strategies were seen as essential to coordinate digital marketing around sustainability goals, but overly rigid procedures and fragmented decision rights sometimes slowed response to market signals and undermined campaign agility.	“We need governance to avoid chaos, but too many approvals kill the momentum. For energy-efficiency campaigns, timing is everything, and slow governance can make us miss the wave.” (Head of marketing, green technology company)
Alignment of green values and digital marketing narratives	Shared sustainability vision; Authentic messaging; Employee identification	Participants stressed that digital marketing for energy-efficient products becomes more effective when the organization’s sustainability values are genuinely shared across employees and reflected in internal practices. Authenticity in messaging and employees’ identification with green goals were seen as crucial for creating credible digital narratives.	“Our digital campaigns resonate because our people truly believe in reducing energy use. Customers feel that authenticity when they interact with our online content.” (Sustainability officer, appliance manufacturer)

The qualitative results summarized in Table 1 show that organizational trust, informal learning, governance structures, and value alignment form an interrelated system that conditions the success of digital marketing efforts for energy-efficient products. Trust and psychological safety provide the emotional basis for experimentation with new digital tools and messages, while informal learning networks operate as a non-formal infrastructure for diffusing practical knowledge and campaign insights. Governance arrangements, when both clear and flexible, help channel these behavioral dynamics toward strategic sustainability objectives, whereas excessive rigidity constrains responsiveness and innovation. Finally, the alignment of shared green values with digital narratives ensures that external communication is experienced as authentic, reinforcing customer engagement and brand credibility. These themes directly informed the conceptualization and operationalization of the latent constructs used in the quantitative phase, particularly the mediating roles of organizational trust and informal learning and the moderating influence of organizational governance.

Table 2. Sample Characteristics of Quantitative Respondents (N = 387)

Characteristic	Category	n	%
Gender	Male	221	57.1
	Female	162	41.9
	Prefer not to say / Other	4	1.0
Age (years)	< 30	76	19.6
	30–39	163	42.1
	40–49	103	26.6
	≥ 50	45	11.6

Organizational tenure (years)	< 5	129	33.3
	5–9	154	39.8
	≥ 10	104	26.9
Sector	Energy utilities	118	30.5
	Appliance manufacturing	142	36.7
	Green tech / renewables	93	24.0
	Other energy-related services	34	8.8

As shown in Table 2, the final quantitative sample was reasonably diverse in terms of gender, age, tenure, and sectoral affiliation, providing a robust empirical basis for testing the proposed hybrid model. Slightly more than half of respondents were male, and the largest age group was 30–39 years, reflecting a workforce that combines early-career digital specialists with more experienced managers. Nearly two thirds of participants had at least five years of organizational tenure, suggesting sufficient familiarity with internal governance practices, trust dynamics, and informal learning processes. Sectorally, appliance manufacturing and energy utilities accounted for the majority of the sample, complemented by substantial representation from green technology and renewable firms as well as other energy-related service providers. This composition is consistent with the study's focus on organizations that design, promote, or implement energy-efficient products and solutions, thereby strengthening the external validity of the findings.

Table 3. Descriptive Statistics, Internal Consistency, and Correlations Among Key Variables

Variable	M	SD	α	1	2	3	4	5
1. Digital marketing effectiveness (DME)	3.74	0.69	.89	—				
2. Organizational digital capability (ODC)	3.81	0.72	.91	.58**	—			
3. Organizational trust (OT)	3.67	0.71	.90	.52**	.61**	—		
4. Informal learning (IL)	3.79	0.65	.88	.49**	.57**	.54**	—	
5. Organizational governance (OG)	3.62	0.73	.87	.44**	.50**	.48**	.46**	—

The descriptive statistics and correlations in Table 3 indicate generally positive perceptions of digital marketing effectiveness, organizational digital capability, organizational trust, informal learning, and governance, with mean scores ranging from 3.62 to 3.81 on a five-point scale and moderate variability. All constructs demonstrated good to excellent internal consistency, with Cronbach's alpha values between .87 and .91. The correlation matrix shows strong and statistically significant associations among all variables, with digital marketing effectiveness positively related to organizational digital capability ($r = .58$), organizational trust ($r = .52$), informal learning ($r = .49$), and organizational governance ($r = .44$). Organizational digital capability is highly correlated with both organizational trust ($r = .61$) and informal learning ($r = .57$), supporting the premise that more digitally capable organizations also tend to foster trusting relationships and active informal knowledge exchange.

Table 4. Measurement Model: Factor Loadings, Composite Reliability, and Average Variance Extracted

Construct	Number of items	Standardized loading range	Composite reliability (CR)	Average variance extracted (AVE)
Digital marketing effectiveness (DME)	5	.73–.88	.93	.71
Organizational digital capability (ODC)	5	.76–.89	.94	.72
Organizational trust (OT)	4	.74–.87	.92	.70
Informal learning (IL)	4	.72–.86	.91	.68
Organizational governance (OG)	4	.71–.84	.90	.61

The measurement model summarized in Table 4 provides strong evidence for the reliability and convergent validity of the latent constructs used in the structural equation modeling. For each construct, standardized factor

loadings ranged from the low .70s to high .80s and were all statistically significant, indicating that the observed indicators are robust reflections of their underlying latent variables. Composite reliability values exceeded the recommended threshold of .70 for all constructs, ranging from .90 to .94, and average variance extracted values were all above .60, satisfying conventional criteria for convergent validity. These results suggest that digital marketing effectiveness, organizational digital capability, organizational trust, informal learning, and organizational governance are each measured consistently and capture a substantial proportion of variance in their respective indicators. Together with the correlation pattern observed in Table 3, this supports proceeding to test the hypothesized mediation and moderation relationships in the structural model.

Table 5. Structural Model Results: Direct, Indirect (Mediated), and Moderated Effects on Digital Marketing Effectiveness

Path	B	β	SE	t	p	95% CI (lower, upper)
Direct effects						
ODC $\rightarrow$ OT	0.61	.61	0.05	12.20	< .001	0.51, 0.72
ODC $\rightarrow$ IL	0.58	.57	0.06	10.04	< .001	0.46, 0.69
ODC $\rightarrow$ DME	0.27	.28	0.08	3.38	.001	0.11, 0.44
OT $\rightarrow$ DME	0.32	.33	0.07	4.57	< .001	0.18, 0.47
IL $\rightarrow$ DME	0.28	.29	0.07	4.00	< .001	0.14, 0.43
Moderation (interaction terms)						
OT $\times$ OG $\rightarrow$ DME	0.11	.12	0.04	2.87	.004	0.03, 0.19
IL $\times$ OG $\rightarrow$ DME	0.09	.09	0.04	2.21	.027	0.01, 0.17
Indirect (mediated) effects						
ODC $\rightarrow$ OT $\rightarrow$ DME	0.20	.20	0.04	5.00	< .001	0.13, 0.28
ODC $\rightarrow$ IL $\rightarrow$ DME	0.17	.17	0.04	4.25	< .001	0.10, 0.25
ODC $\rightarrow$ OT, IL $\rightarrow$ DME (total indirect)	0.37	.37	0.06	6.17	< .001	0.26, 0.48
ODC $\rightarrow$ DME (total effect)	0.64	.65	0.07	9.14	< .001	0.50, 0.78

The structural model results presented in Table 5 support the proposed hybrid organizational–behavioral framework. Organizational digital capability shows strong positive effects on both organizational trust ($\beta = .61$, $p < .001$) and informal learning ($\beta = .57$, $p < .001$), and a smaller yet significant direct effect on digital marketing effectiveness ($\beta = .28$, $p = .001$), indicating that digitally capable organizations are more likely to achieve higher levels of performance in marketing energy-efficient products. Organizational trust ($\beta = .33$, $p < .001$) and informal learning ($\beta = .29$, $p < .001$) each exert significant positive effects on digital marketing effectiveness, confirming their roles as key behavioral mechanisms. The indirect effects reveal that digital capability influences digital marketing effectiveness substantially through both trust ($\beta = .20$, $p < .001$) and informal learning ($\beta = .17$, $p < .001$), with a combined mediated effect of $\beta = .37$. The significant direct effect of digital capability on digital marketing effectiveness alongside the mediated paths indicates partial mediation, meaning that digital capability improves outcomes both by directly enhancing campaign sophistication and by indirectly strengthening trust and informal learning processes. The interaction terms show that organizational governance significantly moderates the relationships between organizational trust and digital marketing effectiveness ($\beta = .12$, $p = .004$) and between informal learning and digital marketing effectiveness ($\beta = .09$, $p = .027$). In organizations with stronger governance mechanisms—characterized by clear roles, aligned strategies, and flexible yet coherent procedures—the positive effects of trust and informal learning on digital marketing effectiveness are amplified, resulting in higher levels of explained variance in digital marketing performance ($R^2 = .62$). Overall, these findings corroborate the qualitative themes and empirically validate a model in which organizational digital capability, trust, informal learning, and governance combine to enhance the effectiveness of digital marketing for energy-efficient products.

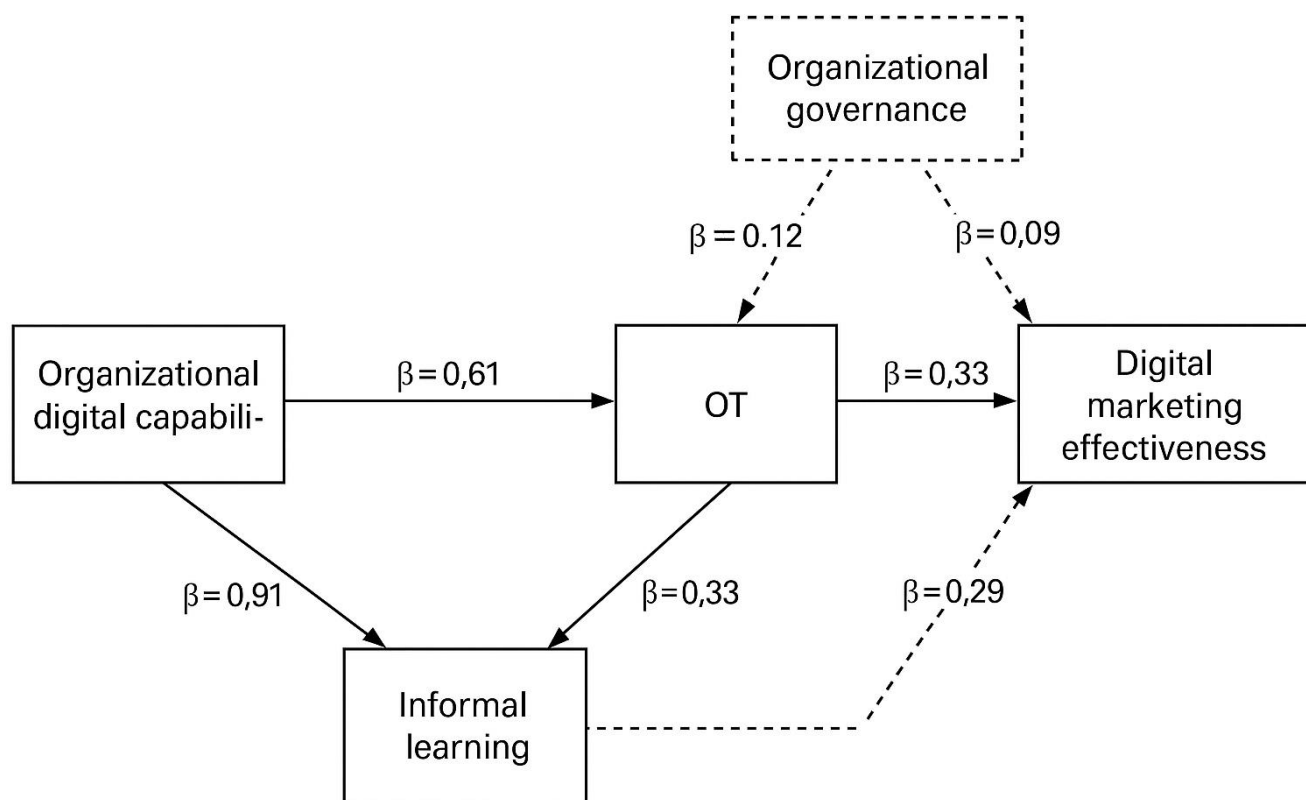


Figure 1. Final Model of the Study

Discussion and Conclusion

The purpose of this study was to examine how organizational digital capability enhances digital marketing effectiveness for energy-efficient products through the mediating roles of organizational trust and informal learning, and under the moderating influence of organizational governance. The results of both the qualitative and quantitative phases demonstrate that digital capability exerts strong direct and indirect effects on digital marketing performance. At a foundational level, the finding that organizational digital capability significantly improves digital marketing effectiveness aligns with several studies emphasizing that digital transformation equips firms with the technological infrastructure, data analytics, and platform integration required to strengthen marketing execution (11, 15, 17). In energy-related and industrial sectors, the importance of such capability is amplified because marketing messages must communicate complex technical and economic value propositions to customers (1, 2, 9). The significant effect observed in this study reinforces insights from prior work showing that when organizations invest in digital systems and enable real-time data flows, they improve their ability to target customers, personalize content, and evaluate campaign performance (18, 24).

The results also confirmed the mediating role of organizational trust in translating digital capability into digital marketing effectiveness. The positive relationship between digital capability and trust is consistent with research suggesting that digital transformation initiatives often require employees to rely on shared information systems, transparent communication, and cross-functional collaboration—all of which benefit from a climate of trust (14, 16). Moreover, trust was found to significantly contribute to digital marketing effectiveness, supporting social marketing

literature that underscores the centrality of trust in influencing both internal alignment and external customer response (26, 27). Inside organizations, trust reduces resistance to new digital tools, encourages experimentation, and enables teams to adopt iterative approaches to refining campaigns (33, 34). The finding that trust mediates the relationship between digital capability and marketing effectiveness extends prior work by demonstrating that internal behavioral conditions—not only technological readiness—shape firms' ability to execute effective digital marketing strategies for energy-efficient products. This insight complements energy efficiency research showing that customers often require credible, transparent information to adopt energy-saving technologies; thus, internal trust may parallel external trust building (21, 28).

Informal learning also emerged as a significant mediator, echoing studies that highlight the value of non-formal, peer-driven learning processes in building digital skills and marketing capabilities (35, 36). The findings indicate that informal learning mechanisms enable employees to exchange practical insights, adjust digital tactics in real time, and translate complex technological information into compelling narratives. This result aligns with research in energy and industrial systems where decentralized knowledge flows and hybrid learning environments have been shown to accelerate innovation and improve performance (7, 13). Furthermore, informal learning contributed directly to digital marketing effectiveness, supporting studies in supply chain and organizational learning that emphasize its crucial role in developing responsive, agile marketing functions (32, 33). The dual mediation findings suggest that digital capability enables not just technical readiness but also deeper human and social processes that collectively enhance marketing performance.

Another important finding concerns the moderating role of organizational governance. The results demonstrate that governance strengthens the relationship between both organizational trust and informal learning with digital marketing effectiveness. This moderating effect is consistent with literature emphasizing that governance mechanisms—such as clear roles, coordinated decision-making, standardized processes, and supportive policies—shape the degree to which digital initiatives succeed (19, 22). In sectors with historically rigid structures, such as energy, governance frameworks must balance discipline with flexibility to foster innovation and ensure that strategic objectives—such as promoting energy-efficient products—are met (8, 12). The significance of governance as a moderator complements research showing that digital transformation of organizational and economic mechanisms depends heavily on institutional arrangements that facilitate coordination across technical, managerial, and marketing functions (13, 37). The results of this study extend this insight by demonstrating that governance not only supports digital transformation but also amplifies the behavioral pathways—trust and informal learning—through which digital capability influences marketing outcomes.

Taken together, these findings contribute to the literature in several ways. First, they offer empirical support for a hybrid organizational-behavioral model of digital marketing effectiveness in the context of energy-efficient products, a context in which such integrative frameworks have been lacking. Prior studies have largely focused either on technological readiness (15, 17) or on customer-facing drivers of product adoption (26, 27), whereas the present model incorporates internal behavioral dynamics and governance structures. Second, the results highlight that digital capability does not operate in isolation; instead, it exerts its strongest influence when trust and informal learning mediate employee engagement with digital tools and campaign development processes. This insight broadens existing explanations of digital marketing performance by shifting the focus from purely technical determinants to socio-organizational mechanisms, echoing findings in organizational behavior and human resource literature on the importance of trust-based and learning-oriented climates (33, 34). Third, the moderating role of

governance provides a valuable extension to studies that call for process-oriented, integrated governance in digital transformation and energy systems management (8, 9). This study offers empirical validation that governance not only ensures procedural coherence but also enhances the effectiveness of relational and learning-based pathways that drive marketing performance.

The empirical support for both mediation and moderation effects highlights the interdependence between technology, behavior, and institutional frameworks. The inclusion of trust and informal learning reflects behavioral micro-foundations often overlooked in digital transformation research that tends to prioritize infrastructure and innovation readiness (14, 15). Meanwhile, the moderating effect of governance demonstrates the importance of operational coherence and strategic alignment for initiatives to succeed, consistent with studies on engineering integration, energy security, and low-carbon transformation emphasizing that innovations require structured organizational support to scale effectively (1, 2, 8).

Overall, the study advances theoretical, contextual, and practical understanding of how organizations can strengthen digital marketing strategies for energy-efficient products by simultaneously cultivating digital capability, trust, informal learning, and supportive governance structures. These insights address critical gaps identified in prior research and create pathways for designing more effective digital marketing systems in industries where sustainable product adoption is of strategic importance.

Although this study offers valuable contributions, several limitations must be acknowledged. First, the sample represents organizations involved in the energy-efficient product domain within a specific national context, which may limit generalizability to other regions with different market structures, regulatory frameworks, or cultural characteristics. Second, while the mixed-methods design enhances depth and robustness, the quantitative phase relied on self-reported data, which may be influenced by response bias. Third, despite using structural equation modeling to capture mediation and moderation effects, causal inference remains constrained by the cross-sectional nature of the data. Longitudinal or experimental designs could better capture dynamic interactions over time. Fourth, while the model includes key organizational and behavioral constructs, additional variables such as leadership style, digital culture, and external environmental pressures may further enrich explanatory power. Finally, qualitative data were obtained through interviews with experts who may have perspectives that differ from those of frontline employees, potentially influencing the emergent themes.

Future studies should replicate and expand this model in different national settings and industry contexts to enhance generalizability. Researchers could also apply longitudinal research designs to examine how trust, informal learning, and governance evolve through different stages of digital transformation. Incorporating additional constructs—such as leadership behavior, digital maturity frameworks, or external stakeholder influences—may yield more comprehensive models. Moreover, future work could employ multi-level approaches that capture both organizational and team-level factors. Comparative studies between organizations with varying degrees of digital sophistication could also illuminate which governance mechanisms are most effective under different conditions. Experimental or quasi-experimental designs might further clarify causal pathways between digital capability, behavioral mechanisms, and marketing outcomes.

Organizations seeking to enhance digital marketing effectiveness for energy-efficient products should invest not only in digital infrastructure but also in building a climate of trust and encouraging informal learning through collaborative platforms and cross-functional engagement. Governance systems should be designed to provide clarity and coordination while maintaining enough flexibility to support innovation. Managers should integrate

behavioral and technological initiatives by aligning digital training programs with trust-building strategies and by incentivizing knowledge sharing. Finally, firms should ensure that digital marketing teams have the autonomy, resources, and organizational support needed to translate complex energy-efficiency information into compelling content that resonates with diverse customer segments.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

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.

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References

1. Deshko V, Kovalko O, Novoseltsev O, Yevtukhova M. A Result-Oriented Framework to Support the Low-Carbon Transformation of Energy Services Markets. *Journal of New Technologies in Environmental Science*. 2020;5(2):25-41. doi: 10.30540/jntes-2020-2.2.
2. Fedirko M, Huhul O, Brych B. Theoretical and Applied Aspects of Developing the Energy Services Market in Ukraine. *Herald of Economics*. 2019(1(87)):7-19. doi: 10.35774/10.35774/visnyk2018.01.007.
3. Lisin E, Kurdiukova G. Energy Supply System Development Management Mechanisms From the Standpoint of Efficient Use of Energy Resources. *Iop Conference Series Earth and Environmental Science*. 2021;666(6):062090. doi: 10.1088/1755-1315/666/6/062090.
4. Petrova E, Usacheva I, Revenko V. Behavior Strategies of an Industrial Enterprise on Energy Markets as a Tool for Implementing the Principles of Rational Behavior. *Regionalnaya Ekonomika Yug Rossii*. 2021(1):163-74. doi: 10.15688/re.volsu.2021.1.14.
5. Shvedkyi V. Trends in the Development of Energy Resources Enterprises-Suppliers in the Conditions of Energy Market Liberalization. *Management of Economy Theory and Practice Chumachenko's Annals*. 2021(2021):307-14. doi: 10.37405/2221-1187.2021.307-314.

6. Pulka C, Dzyadykevitch Y. Energy Saving as the Main Tendency of the Enterprise Energy Policy: Foreign Experience. *Galic Kij Ekonomičnij Visnik*. 2021;68(1):16-25. doi: 10.33108/galicianvisnyk_tntu2021.01.016.
7. Lypov V. "Mosquito Flotilla" on the Energy Front: Small Energy Networks Based on Digital Platforms. *Ekonomična Teoriâ*. 2023;2022(2):53-70. doi: 10.15407/etet2023.02.053.
8. Arefieva O, Horal L, Arefiev S, Попович ОВ. Organizational and Economic Support for the Integration of Engineering Into the Energy Security System of Enterprises on the Basis of Process Approach. *The Problems of Economy*. 2024;3(61):149-55. doi: 10.32983/2222-0712-2024-3-149-155.
9. Kalyuzhny A, Romanenko NG. Determination of Ways to Increase Energy Efficiency by Analyzing the Power Consumption of Enterprises in the Shipbuilding and Ship Repair Industry. *Vestnik of Astrakhan State Technical University Series Marine Engineering and Technologies*. 2024;2024(4):18-25. doi: 10.24143/2073-1574-2024-4-18-25.
10. Miśkiewicz R, Wolniak R. Practical Application of the Industry 4.0 Concept in a Steel Company. *Sustainability*. 2020;12(14):5776. doi: 10.3390/su12145776.
11. Fonseca SS, Benito PA, Ramírez CP. Digital Horizons in Construction: A Comprehensive System for Excellence in Project Management. *Buildings*. 2024;14(7):2228. doi: 10.3390/buildings14072228.
12. Dolunay Ö. Geostrategic Renewable Energy Transition in Turkey: Organizational Strategies Towards an Energy Autonomous Future. *Politics and Governance*. 2020;8(3):199-210. doi: 10.17645/pag.v8i3.2968.
13. Stepantsevich MN, Aliyev M, Eder AV, Khudyakova E, Gorbachev MI. Digital Transformation of Grain Complex Enterprises and Development of Standards for Their Digitalization in the BRICS Countries. *Bio Web of Conferences*. 2024;139:14012. doi: 10.1051/bioconf/202413914012.
14. Suwanda S. Digital Transformation in Industrial Management: Challenges and Opportunities. *Jecoa*. 2023;1(02):89-97. doi: 10.58471/jecoa.v1i02.3871.
15. Cai D, Chen B. Digital Intelligence Empowerment and New Quality Productivity of Listed Enterprises in Fujian Province. *Proceedings of Business and Economic Studies*. 2025;8(3):96-100. doi: 10.26689/pbes.v8i3.11188.
16. Kinyua J. Impact of Digital Transformation on Organizational Innovation in SMEs in Kenya. *Journal of Business and Strategic Management*. 2025;10(9):17-27. doi: 10.47941/jbsm.2959.
17. Puri A. Impact of Information Technology on Organizational Business Performance. *Spectrum of Emerging Sciences*. 2024;4(2):1-6. doi: 10.55878/ses2024-4-2-1.
18. Humeniuk A. Digital Marketing as a Priority Direction of Business Development. *Economies Horizons*. 2024(4(29)):48-55. doi: 10.31499/2616-5236.4(29).2024.314335.
19. Zhylynska O, Sviderska N. Streamlining Marketing Activities: Essential Tools for Organizational Success. *Technology Audit and Production Reserves*. 2024;1(4(75)):27-32. doi: 10.15587/2706-5448.2024.298828.
20. Yapanto LM. Digital Marketing System for Fishery Industry Products (Literature Review). *Ijbde*. 2024;3(1):73-8. doi: 10.51699/ijbde.v3i1.3333.
21. Rezvanian MH, Haghshenas F, Karimizand M. Developing a Marketing Model for Solar Energy Production Equipment Based on a Combined Grounded Theory and Partial Least Squares Approach. *Msesj*. 2024;6(1):1-8. doi: 10.61838/msesj.6.1.1.
22. Tataryntseva Y. Methodological Recommendations for the Formation of Organizational and Economic Provision of Digital Marketing at the Enterprise. *Market Economy Modern Management Theory and Practice*. 2023;22(3(55)):158-72. doi: 10.18524/2413-9998.2023.3(55).300666.
23. Li H. Analysis of the Digital Transformation Path of Chinese E-Commerce Companies. *Fe*. 2024;1(9). doi: 10.61173/qfpxw170.
24. Lv X. Research on Marketing Strategy of Technical Products of Coal Mine Enterprises in the Digital Information Age. *Frontiers in Business Economics and Management*. 2025;18(3):285-7. doi: 10.54097/b7bxhz29.
25. Rezvanian MH, Haghshenaskashani F, Karimizand M. Identification and Prioritization of Factors Affecting the Marketing of Solar Energy Production Equipment Based on a Combined Approach of Content Analysis and Fuzzy Delphi. *Ijimob*. 2023;3(4):180-6. doi: 10.61838/kman.ijimob.3.4.20.

26. Issock PBI, Roberts-Lombard M, Mpinganjira M. The Importance of Customer Trust for Social Marketing Interventions: A Case of Energy-Efficiency Consumption. *Journal of Social Marketing*. 2020;10(2):265-86. doi: 10.1108/jsocm-05-2019-0071.
27. Thành ND. The Impact of Media Publicity and Online Product Reviews on Consumers' Purchase Intentions of Energy-Efficient Appliances. *Vnu University of Economics and Business*. 2023;3(6):77. doi: 10.57110/vnujeb.v3i6.232.
28. Nnabueze SB, Filani OM, Okojie JS, Abioye RF, Okereke M, Enow OF. Market-Oriented Strategic Innovation for Enhancing Energy Distribution, Service Delivery, and Business Sustainability. *International Journal of Advanced Multidisciplinary Research and Studies*. 2024;4(4):1411-26. doi: 10.62225/2583049x.2024.4.4.4936.
29. Permatasari HI, Rany TAP, Firizqi H, Firdaus HY. Online Customer Reviews vs Influencer Endorsements: Which Drives Purchase Intention Through Trust? *Sebelas Maret Business Review*. 2025;9(2):119. doi: 10.20961/snbr.v9i2.98544.
30. Mkalaf KA, Kadhum AAL, Al-Hadeethi RH, Al-Bazi A. Navigating the Digital Landscape: How E-Marketing and Product Attractiveness Shape Company Reputation From a Customer-Centric Perspective. *Journal of Contemporary Marketing Science*. 2024;7(2):140-57. doi: 10.1108/jcmars-06-2023-0019.
31. Zega WTP, Napitupulu VN, Saribu AD, Siahaan RDD, Manullang TT, Marpaung I, et al. Inovasi Dalam Pemasaran : Mengukur Kinerja Dan Meningkatkan Efisiensi Serta Produktivitas Bisnis Dengan Menggunakan Sistem Mpa. *Jurnal Daya Saing*. 2025;11(2):445-51. doi: 10.35446/dayasaing.v11i2.2255.
32. Ansari A, Ansari A, Abzari M, Dasineh M, Rostamijaz H. Designing a Model for Enhancing Organizational Efficiency With an Emphasis on the Role of Social Network Marketing at Pegah Company. *BMF Open*. 2025;2(1):21-34. doi: 10.61838/bmfopen.2.1.3.
33. Soelton M, Paijan P, Sugiharjo RJ, Rahmat A, Parwoto P, Supriyatno S, et al. Exploring Factors That Influence Organizational Citizenship Behavior in the Advertising Industry. *Wseas Transactions on Business and Economics*. 2023;20:526-40. doi: 10.37394/23207.2023.20.48.
34. Tafakori A. Modeling the Effects of Workplace Fun on Employees' Informal Learning With the Mediating Role of Organizational Trust: An Integrated Approach in Human Resource, Industrial, and Business Management. *Journal of Information Systems Engineering & Management*. 2025;10(3):1416-28. doi: 10.52783/jisem.v10i3.10712.
35. Sumiyarsih S, Wahyuningsih T, Subarjo S, Santosa A. Aplikasi Sepasar Sebagai Platform Edukasi Hybrid Untuk Meningkatkan Kapasitas Pedagang Pasar Beringharjo Di Masa Pandemi Covid-19. *Abimanyu Journal of Community Engagement*. 2023;4(2):53-65. doi: 10.26740/abi.v4n2.p53-65.
36. Peridawaty P, Toendan RY, Wenthe IK. The Effects of Entrepreneurial Orientation and Organizational Learning on Marketing Capability in Supply Chain Management. *Uncertain Supply Chain Management*. 2021:21-30. doi: 10.5267/j.uscm.2020.12.005.
37. Dibirov AA. Problems of Digital Transformation of the Organizational and Economic Mechanism of Contractual Integration in the Supply Chain of Products in the Agro-Industrial Complex. *Экономика Сельского Хозяйства России*. 2025(4):55-63. doi: 10.32651/254-55.