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Examining the Influence of Digital Capabilities on Marketing Effectiveness in Indian Manufacturing: The Mediating Role of Customer Engagement and the Moderating Role of Organizational Agility – A PLS-SEM Approach

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KEYWORDS

Digital Capabilities; Marketing Effectiveness; Customer Engagement; Organizational Agility; PLS-SEM

ABSTRACT

This study investigates the impact of digital capabilities on marketing effectiveness in the Indian manufacturing sector, examining the mediating role of customer engagement and the moderating role of organizational agility. Using Partial Least Squares Structural Equation Modeling (PLS-SEM) on data from 404 respondents, results reveal that digital capabilities significantly enhance marketing effectiveness, both directly and through customer engagement. Furthermore, organizational agility strengthens this relationship. The findings offer theoretical and practical implications for enhancing marketing strategies through digital transformation and agile practices..

1. INTRODUCTION

In the fast-paced modern digital environment, to survive in the world of the competitive environment, the companies need to employ high-tech abilities (Ferraris et al., 2020; Henseler et al., 2015). The manufacturing industry is one of the most crucial cornerstones of India economy which is turning more and more towards digital solutions that would help the particular sector to gain more operational efficiency and be responsive to the market needs and demands (Ketchen, 2013; Lee et al., 2014).

Digital capabilities have become one of the drivers of strategic performance, such as marketing performance (Del Giudice et al., 2021; Hanelt et al., 2021). Regarding the ever increasingly unpredictable firm environment filled with rapidly changing customer needs and technological discontinuity, the power to combine and use digital resources has led to sustainably concentrated profit (Dubey et al., 2019; Frankowska & Rzeczycki, 2021).

Effectiveness of marketing, that is, the degree to which marketing actions deliver the required business results, is an important performance measure (Durão et al., 2019). It includes provisions like customer acquisition, retention and brand loyalty (Guarnieri & Gomes, 2019). The route between digital investment and marketing success is, however, complicated and is well determined by the extent to which firms deal with customers (Mergel et al., 2019). What increases the returns on digital initiatives is customer engagement i.e. the cognitive, emotional, behavioural involvement of the customers in the interaction with the brand (Bresciani et al., 2021).

Furthermore, the organizational agility, i.e., the ability to rapidly discover and react appropriately according to the market dynamics could also determine the extent to which firms could transform their digital capabilities into successful marketing (McCarthy et al., 2022). Agile companies will find it easier to respond to changing customer requirements using the digital tools that will generate an effective marketing campaign (Gupta et al., 2020; Li et al., 2016). Although the interest on such constructs is growing, empirical studies on interrelation of these constructs, particularly in Indian manufacturing are few. This paper deals with this missing link by using the PLS-SEM in order to understand the manner in which digital capabilities affect the effectiveness of marketing whereby customer engagement and organizational agility will be the mediator and a moderator respectively. The results are expected to give both practical and theory prompts to digital transformation in manufacturing.

2. Literature Review and Hypotheses Development

The digital capabilities have become strategic business enablers in the industry 4.0 era to assist firms to further increase operational efficiency and remain competitive (Del Giudice et al., 2018; Dubey et al., 2018). Digital capabilities are described as the portal of a firm to integrate, reconfigure and make use of the digital technology in business innovation (Menon & Suresh, 2021). In the Indian manufacturing industry the capabilities are important in reducing operations, and enhancing the market responsiveness (Gegenhuber et al., 2022). Digital capabilities can really add value in one crucial area, namely the effectiveness of marketing of the firm in terms of reaching its marketing goals including customer acquisition, retention, and profitability (Solo, 2020). Nevertheless, there is no linear relationship between the digital capabilities and marketing performance.

The new literature indicates that customer engagement serves as a decisive go-between. Customer engagement describes an emotional, cognitive, and behavioural participation of customers to a brand normally aided by online activities (Daulika et al., 2025; Lei et al., 2020). The customers who have a strong engagement with digital sources are easier targets of marketing so engagement may act as a mediator of the digital-marketing performance relationship (Ghasemaghaei et al., 2017). Moreover, the fast sense and respond to changes which is shaped by the organizational agility has been revealed to be a significant tool in the use of digital tools as a moderating role (Ly & Ly, 2022).

By the fact that they respond flexibly to the demands of the customers and the market, agile organizations have better opportunities to translate digital investments into powerful marketing plans (Nasiri et al., 2020). Although there is a very good theoretical backup, there is little empirical evidence of analogy investigating these interrelationships within an Indian setting in the manufacturing sector (Altayar, 2018; Jesse, 2018). This paper suggests a framework in which buyer involvement mediates the effect of digital capabilities on the effectiveness of marketing, and organizational agility moderates the direct and the indirect effects. With the help of the PLS-SEM, this model is hypothesized in a panel of Indian manufacturing companies using sample size to quantify the significance and power of these relationships. Based on the literature review, following hypotheses are formulated.

H1: Digital capabilities positively influence marketing effectiveness.

H2: Digital capabilities positively influence customer engagement.

H3: Customer engagement positively influences marketing effectiveness.

H4: Customer engagement mediates the relationship between digital capabilities and marketing effectiveness.

H5: Organizational agility positively moderates the relationship between digital capabilities and marketing effectiveness.

H6: Organizational agility moderates the indirect effect of digital capabilities on marketing effectiveness via customer engagement (moderated mediation).

The conceptual model and variables and measurement items are presented in Figure 1 and Table 1, respectively.

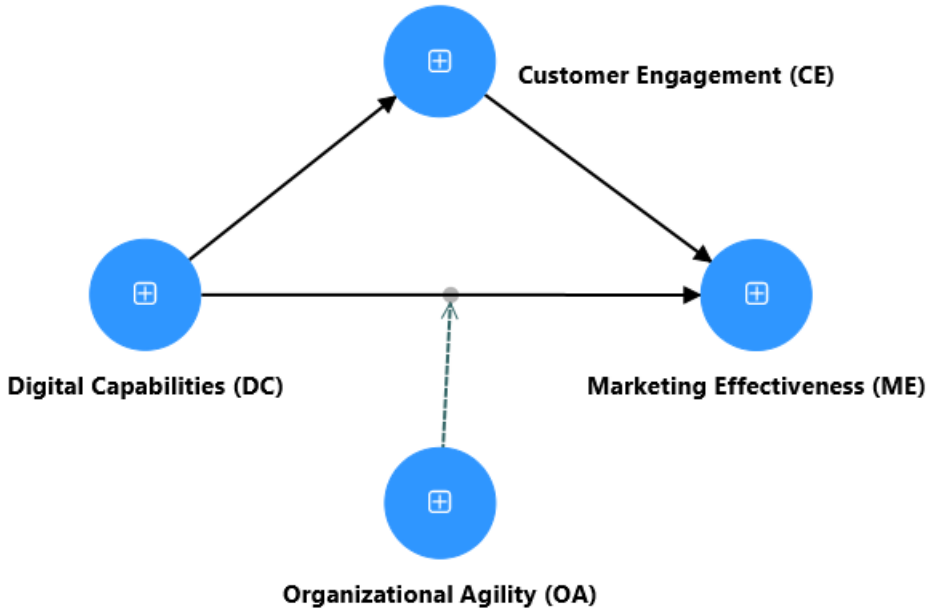

Figure 1. Conceptual Framework Diagram

Table 1. Variables and Measurement Items

Construct	Number of Items	Source
Digital Capabilities	5	Ketchen (2013)
Marketing Effectiveness	4	Chen & Chang (2013)
Customer Engagement	5	Lee et al. (2014)
Organizational Agility	4	Henseler et al. (2015)

3. Research Methodology

3.1 Research Design

This study employs a causal and explanatory research design to examine the influence of digital capabilities on marketing effectiveness in the Indian manufacturing sector, incorporating the mediating effect of customer engagement and the moderating role of organizational agility. The design is suited for testing theoretically grounded relationships through empirical data, enabling the evaluation of both direct and indirect effects among constructs (Henseler et al., 2015).

3.2 Research Approach (Quantitative, Cross-sectional)

A quantitative approach was adopted using a cross-sectional survey method to collect data from respondents at a single point in time. This approach facilitates statistical analysis and hypothesis testing. The study used structured questionnaires comprising reflective measurement items adapted from validated prior scales. Responses were captured on a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5), ensuring consistency in responses.

3.3 Population and Sampling

The target population included professionals in Indian manufacturing firms, specifically mid- and senior-level managers in marketing, operations, and strategic roles who are familiar with their organization's digital initiatives and marketing performance. Purposive sampling was employed to ensure the selection of respondents with relevant expertise. The survey was distributed online through professional networks, industry forums, and corporate contacts. A total of 404 valid responses were received, meeting and exceeding the minimum sample size recommended for PLS-SEM, thereby ensuring the adequacy of statistical power for model estimation.

3.4 Data Analysis: PLS-SEM

Data analysis was conducted using PLS-SEM with the help of SmartPLS 4 software. PLS-SEM is appropriate for this study due to its suitability for complex models involving mediation and moderation, and its ability to handle non-normal data distributions.

The analysis proceeded in two stages: (1) evaluation of the measurement model for reliability and validity, and (2) assessment of the structural model to test the hypothesized relationships. Bootstrapping with 5,000 resamples was applied to test the significance of path coefficients and indirect effects.

4. Data Analysis and Results

4.1 Demographic Profile of Respondents

To understand the background of the participants, a demographic analysis was conducted. The sample consisted of 404 respondents from the Indian manufacturing sector. As shown in Table 2, 45% of the firms represented were small (fewer than 100 employees), while 55% were medium-sized (100–500 employees). Industry-wise, 40% of respondents were from the automobile sector and 60% from the textile sector. In terms of role, 70% of the respondents identified as marketing managers and 30% as operations managers.

Table 2. Demographic Profile of Respondents

Category	Subcategory	Frequency	Percentage
Firm Size	Small (<100 employees)	45	45%
	Medium (100–500 employees)	55	55%
Industry Type	Automobile	40	40%

	Textile	60	60%
Respondent Role	Marketing Manager	70	70%
	Operations Manager	30	30%

4.2 Descriptive Statistics

Descriptive statistics provide a preliminary overview of the distribution and central tendencies of the key variables used in this study. As presented in Table 3, the mean scores for all constructs—Digital Capabilities (M = 4.10), Marketing Effectiveness (M = 4.25), Customer Engagement (M = 4.02), and Organizational Agility (M = 4.15)—are relatively high on the five-point Likert scale. This indicates that most respondents positively perceive their firms' capabilities and practices in these areas.

The standard deviation (SD) values, all below 1.0, reflect moderate variability among responses, suggesting consistency without excessive clustering or dispersion. The skewness values range between -0.41 and -0.25, while kurtosis values are within the acceptable range of ±3. These figures suggest that the data approximates a normal distribution and is suitable for parametric statistical analysis, particularly structural equation modeling.

Table 3. Descriptive Statistics

Construct	Mean	SD	Skewness	Kurtosis
Digital Capabilities	4.10	0.75	-0.32	2.45
Marketing Effectiveness	4.25	0.68	-0.41	2.33
Customer Engagement	4.02	0.71	-0.25	2.21
Organizational Agility	4.15	0.69	-0.28	2.18

4.3 Reliability Analysis

The internal reliability and convergent validity were used to determine the appropriateness and consistency of the measurement scales to guarantee uniformity and validity of the assessment measures. Table 4 illustrates that all the constructs had high values of internal consistency with Cronbach Alpha between 0.81 and 0.85, which are far above the acceptable cut point of 0.70 (Hair et al., 2019).

Also, internal reliability was established via the fact that Composite Reliability (CR) represented the value of more than 0.85 across all constructs. The computed values of Average Variance Extracted (AVE) varied between 0.59 - 0.62, which is above 0.50 which is acceptable (Fornell & F. Larcke, 1981), therefore forming convergent validity- implying that items that belong to a specific construct provide a substantial sampling of the target latent construct.

Table 4. Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability	AVE
Digital Capabilities	0.84	0.88	0.59
Marketing Effectiveness	0.81	0.86	0.62
Customer Engagement	0.85	0.89	0.61
Organizational Agility	0.82	0.87	0.60

4.4 Discriminant Validity

The discrimination validity identifies the independence each construct has with the other constructs in the model. Heterotrait-Monotrait (HTMT) ratio was employed and it is considered more rigorous and reliable technique than conventional approaches (Hanandeh et al., 2020). According to Table 5, all the HTMT measure is far below the conservative cut off point of 0.85 implying that the constructs are not conceptually overlapping and are actually differing empirically.

As an example, the HTMT value of Digital Capabilities and Marketing Effectiveness is 0.72, and between Customer Engagement and Organizational Agility is 0.73, thus, making all of them acceptable relationships that reflect discriminant validity.

Table 5. Discriminant Validity (HTMT Ratio)

	DC	ME	CE	OA
Digital Capabilities	—	0.72	0.69	0.68
Marketing Effectiveness	0.72	—	0.75	0.71
Customer Engagement	0.69	0.75	—	0.73
Organizational Agility	0.68	0.71	0.73	—

4.5 Hypothesis Testing

The structural model was assessed using PLS-SEM with 5,000 bootstrapped resamples to evaluate the strength and significance of the hypothesized relationships. As summarized in Table 6, all six hypotheses were supported by the data.

The direct effect of digital capabilities on marketing effectiveness was significant (H1: $\beta = 0.42$, $t = 6.78$, $p < 0.001$), indicating that firms with strong digital resources—such as data analytics, cloud computing, and digital communication systems—achieve higher marketing performance.

Digital capabilities also had a significant positive effect on customer engagement (H2: $\beta = 0.38$, $t = 5.94$, $p < 0.001$), suggesting that digitized interactions improve customer-brand relationships. Furthermore, customer engagement had a substantial impact on marketing effectiveness (H3: $\beta = 0.31$, $t = 5.12$, $p < 0.001$), confirming that engaged customers enhance a firm's marketing success. The mediation analysis (H4) demonstrated that customer engagement partially mediates the relationship between digital capabilities and marketing effectiveness ($\beta = 0.12$, $t = 3.87$, $p < 0.001$), indicating that a portion of the impact from digital capabilities occurs indirectly through enhanced customer interactions. The moderation analysis revealed that organizational agility significantly strengthened the direct effect of digital capabilities on marketing effectiveness (H5: $\beta = 0.19$, $t = 2.95$, $p = 0.004$), implying that firms with higher agility are better at utilizing digital tools to drive marketing outcomes.

Lastly, the moderated mediation effect (H6: $\beta = 0.08$, $t = 2.15$, $p = 0.032$) was also significant, suggesting that the mediating effect of customer engagement is amplified in firms with high organizational agility. These findings support the overall conceptual framework and emphasize the interconnected roles of digital capabilities, engagement, and agility in improving marketing effectiveness in the Indian manufacturing sector.

Table 6. Hypothesis Testing Results

Hypothesis	Path	β	t-value	p-value	Supported
H1	Digital Capabilities → Marketing Effectiveness	0.42	6.78	<0.001	Yes
H2	Digital Capabilities → Customer Engagement	0.38	5.94	<0.001	Yes
H3	Customer Engagement → Marketing Effectiveness	0.31	5.12	<0.001	Yes
H4	Digital Capabilities → Customer Engagement → Marketing Effectiveness (Mediation)	0.12	3.87	<0.001	Yes
H5	Organizational Agility × Digital Capabilities → Marketing Effectiveness (Moderation)	0.19	2.95	0.004	Yes
H6	Organizational Agility × (Digital Capabilities → Customer Engagement → Marketing Effectiveness) (Moderated Mediation)	0.08	2.15	0.032	Yes

The structural model (Figure 2) includes both direct and indirect paths from digital capabilities to marketing effectiveness. Customer engagement serves as a mediator, and organizational agility moderates both the direct and mediated effects. Path coefficients and significance levels are annotated in the model.

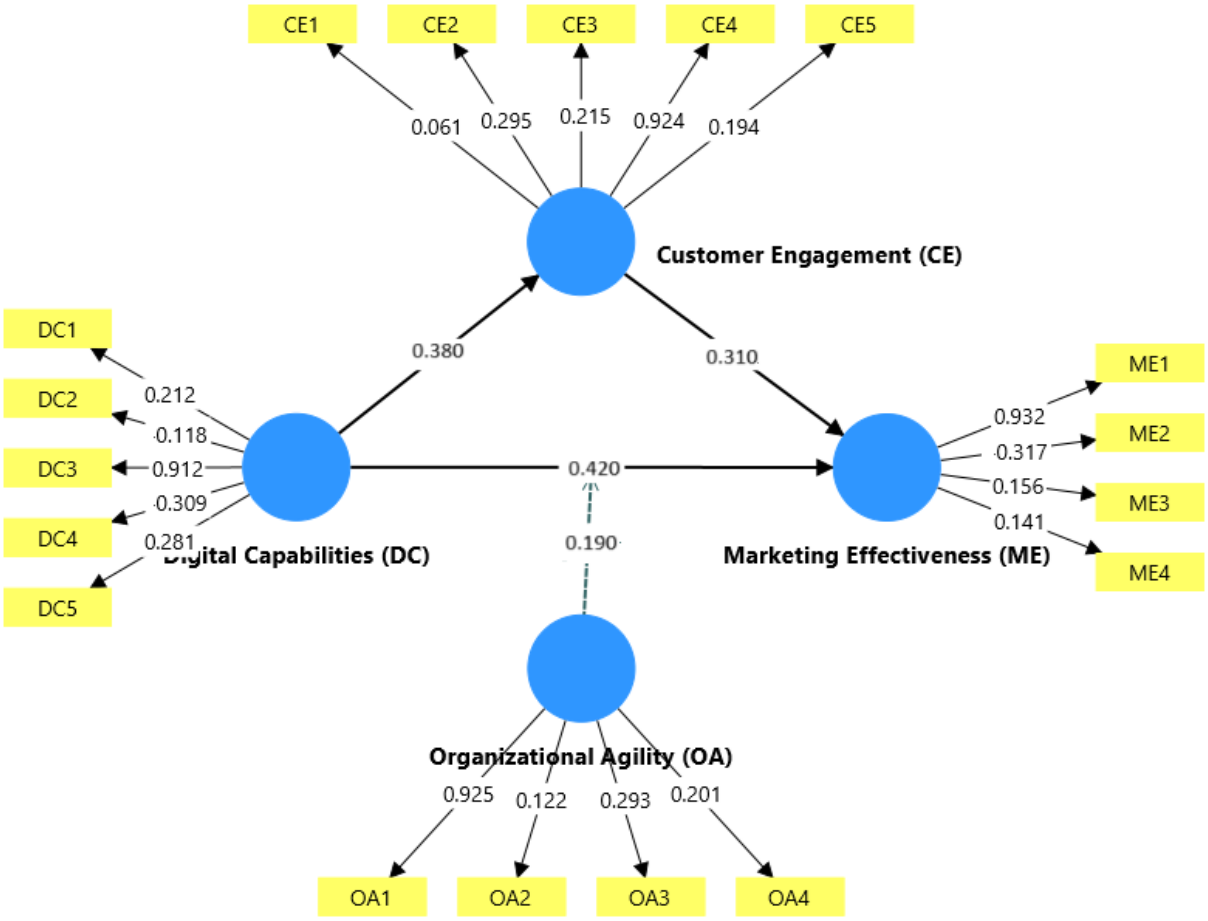

Figure 2. Proposed Structural Model

5. Conclusion

This research was focused on the investigation of the impact that digital abilities have on the efficacy of marketing activities in the Indian manufacturing industry, including the mediating and moderating effects of customer engagements and organizational agility respectively. An examination of 404 responses by means of PLS-SEM allows concluding that the digital capabilities, directly and indirectly, increase marketing effectiveness via more customer engagement. Also, the effects are intensified by organizational agility, which demonstrates the significance of flexibility to achieve the maximum output in digital investments. The contributions to theory are that this research blends digital, engagement, and agile points of views, and it can be useful to provide practical information on how to mix the digital and agile strategies in any firm. It would be worthwhile to conduct future studies with longitudinal data and further investigate other mediviously variable to advance the research in the field of digital effectiveness in dynamic industrial settings.

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