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ARTICLE

# DIGITAL COMPETITIVE INTELLIGENCE AS A STRATEGIC DRIVER OF MARKETING INNOVATION IN INDUSTRIAL MARKETS

# INTELIGÊNCIA COMPETITIVA DIGITAL COMO MOTOR ESTRATÉGICO DA INOVAÇÃO EM MARKETING EM MERCADOS INDUSTRIAIS

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## ABSTRACT

**Purpose:** This study examines the association between Digital Competitive Intelligence (DCI) and Marketing Innovation in the ceramic industry. Specifically, it investigates whether firms that demonstrate stronger capabilities in digitally enabled competitor monitoring, market sensing, customer insight generation, and analytical interpretation also report higher levels of marketing innovation.

**Methodology/approach:** The study adopts a quantitative, explanatory, cross-sectional survey design. Data were collected through a structured questionnaire administered to managerial and marketing-related employees working in ceramic firms. The instrument used a five-point Likert scale to measure the two focal constructs: Digital Competitive Intelligence and Marketing Innovation. The data were analyzed through descriptive statistics, reliability analysis, exploratory factor analysis, correlation analysis, and linear regression.

**Originality/Relevance:** The study contributes to the competitive intelligence literature by treating DCI not as a generic digitalization practice, but as a strategic intelligence capability through which firms systematically acquire, interpret, and use digitally generated market knowledge for marketing-related decision-making. This distinction is important in industrial markets, where intelligence routines shape responsiveness, positioning, and differentiation under conditions of technological change and competitive pressure.

**Key findings:** The findings indicate a statistically significant positive association between DCI and Marketing Innovation. Firms with stronger DCI practices tend to report greater innovation in product positioning, branding, channel strategy, and customer engagement. The results suggest that intelligence quality, rather than mere data availability, is an important condition for marketing adaptation in industrial settings.

**Theoretical/methodological contributions:** The study refines the conceptual positioning of DCI as a market-facing strategic capability and provides empirical evidence from a traditional manufacturing context. Methodologically, it offers an operational framework for examining the DCI-marketing innovation relationship in industrial sectors and supports future work that may extend the model through additional variables and more advanced analytical designs.

**Keywords:** Digital Competitive Intelligence. Marketing Innovation. Competitive Intelligence. Industrial Markets. Ceramic Industry. Strategic Capability.



**DOI:** https://doi.org/10.37497/eagleSustainable.v16i.631

**RESUMO**

**Objetivo:** Este estudo examina a associação entre Inteligência Competitiva Digital (Digital Competitive Intelligence – DCI) e Inovação em Marketing na indústria cerâmica. Especificamente, investiga se empresas que demonstram maiores capacidades de monitoramento digital de concorrentes, sensoriamento de mercado, geração de insights sobre clientes e interpretação analítica também apresentam níveis mais elevados de inovação em marketing.

**Metodologia/abordagem:** O estudo adota um desenho de pesquisa quantitativo, explicativo e transversal, baseado em survey. Os dados foram coletados por meio de um questionário estruturado aplicado a funcionários com funções gerenciais e relacionadas ao marketing em empresas do setor cerâmico. O instrumento utilizou uma escala Likert de cinco pontos para medir os dois construtos centrais: Inteligência Competitiva Digital e Inovação em Marketing. Os dados foram analisados por meio de estatísticas descritivas, análise de confiabilidade, análise fatorial exploratória, análise de correlação e regressão linear.

**Originalidade/Relevância:** O estudo contribui para a literatura de inteligência competitiva ao tratar a DCI não como uma prática genérica de digitalização, mas como uma capacidade estratégica de inteligência, por meio da qual as empresas adquirem, interpretam e utilizam sistematicamente conhecimentos de mercado gerados digitalmente para a tomada de decisão em marketing. Essa distinção é particularmente importante em mercados industriais, onde rotinas de inteligência moldam a capacidade de resposta, o posicionamento e a diferenciação em contextos de mudança tecnológica e pressão competitiva.

**Principais resultados:** Os resultados indicam uma associação positiva estatisticamente significativa entre DCI e Inovação em Marketing. Empresas com práticas mais robustas de DCI tendem a apresentar maior inovação em posicionamento de produtos, branding, estratégia de canais e engajamento com clientes. Os achados sugerem que a **qualidade da inteligência**, e não apenas a disponibilidade de dados, constitui uma condição importante para a adaptação em marketing em contextos industriais.

**Contribuições teóricas/metodológicas:** O estudo refina o posicionamento conceitual da DCI como uma capacidade estratégica orientada ao mercado e apresenta evidências empíricas provenientes de um contexto tradicional de manufatura. Metodologicamente, oferece um framework operacional para examinar a relação entre DCI e inovação em marketing em setores industriais, além de apoiar pesquisas futuras que possam expandir o modelo com variáveis adicionais e desenhos analíticos mais avançados.

**Palavras-chave:** Inteligência Competitiva Digital. Inovação em Marketing. Inteligência Competitiva. Mercados Industriais. Indústria Cerâmica. Capacidade Estratégica.

## 1. INTRODUCTION

An environment that represents a modern business is marked by a swift digitalization process, abundance of data, international business competition, and swiftly evolving customer expectations. Under these circumstances, companies are no longer able to base their strategic planning on conventional methods and periodic market reports, as well as make decisions intuitively. Rather, competitive advantage lies in having the capacity to constantly scan the external environment, pick up on the weak market signals, decipher moves by competitors and convert information into timely managerial action. This reasoning has formed the core of digital transformation studies, where digital technologies are no longer viewed as working tools but as strategic enablers, which change the structure of the organization, the process of value creation, and competitive action (Gong and Ribiere, 2021; Verhoff et al., 2021). In this view, the speed of information processing, market responsiveness and quality of intelligence has become a key performance determinant.

The latest management research also indicates that digital transformation is not a one-off technological phenomenon, but a wider organizational restructuring that alters the ways in which firms feel the opportunities, decision-making, and innovation in functions. This change is especially important to production companies in unstable domestic and global markets whose customers, operating cost, sustainability, and channel systems are evolving concurrently. According to Hanelt, Bohnsack, Marz, and Marante, (2021) and Nadkarni and Prugl (2021), digital transformation is becoming a major component of strategy, organizational learning, and capability development, and the key competitors of long-term competitiveness is becoming the digital intelligence resources. As a result, companies that are able to discover, process, and utilize the market knowledge more successfully, are in a better position to survive and innovate in uncertain conditions.

In this changing environment, the Digital Competitive Intelligence (DCI) has become a particularly valuable capability. DCI can be defined as the methodical application of digital technologies, digital information streams, and analytical software to gather, process, interfere, and utilize data relating to rivals, consumers, market trends, technological changes, and sales channel trends. In contrast to the traditional competitive intelligence that was based extensively on periodic field reports, trade fairs, published journals/books and personal networks, DCI is delivered in real time via websites, e-commerce platforms, social media, customer reviews, search behavior, pricing dashboards, distributor data, and digital communication ecosystems. In this regard, DCI is not only a technological skill, it is also a managerial skill: it involves having the infrastructure needed to gather and analyze information, but also routines that help in linking external indicators to strategic decision making. Studies of digital transformation in the sphere of business model and strategic management revealed that digital enabled intelligence was becoming more and more associated with the ability to get flexible, create value, and be innovative (Kraus et al., 2021; Vaska, Massaro, Bagarotto, and Dal Mas, 2021).

The significance of DCI is even more evident when analyzed in terms of marketing innovation. Marketing innovation entails introduction of new or highly enhanced methods of presenting and pricing of products, promoting, communicating, segmenting, branding, distributing and engaging with customers. Such innovation will not be usually created in isolation in high paced markets, rather it is usually guided by the skills of the firm to know the new customer requirements, the competitive positioning, market gaps, and change in demand patterns. This is the reason why digital transformation research tends to focus more on the importance of customer value creation and market-facing capabilities to organizations in an industrial context. It is demonstrated by Matarazzo, Penco, Profumo, and Quaglia (2021) that traditional firms create value by digitalization when it is associated with the capabilities that build customer understanding and strategic responsiveness. In the same vein, OECD (2021) observes that digitalization enhances the ability of businesses, particularly those in SME, to receive information, engage in markets, and promote growth based on innovation.

Marketing scholarship also supports the opinion that digital settings have massively increased the amount, immediate, and strategic efficacy of market information. The digital and social media platforms have increased customers touchpoints and generated new observable behavior which have created unparalleled opportunities by firms to learn more about preferences, sentiment and market movement. Nevertheless, this richness of information also poses a complexity since not each of the digital signals can be considered equally valuable or interpretable. Dwivedi et al. (2021) claim that the future of digital marketing research is to learn how companies can transform the stained digital communication into coherent and actionable information. Similarly, Huang and Rust (2021) describe that AI is transforming marketing in terms of prediction and personalization, automation, and quality of decisions. These lessons can be very useful to DCI since they demonstrate that digital intelligence has ceased being a competitor tracking tool; it has turned into a tool of ongoing customer behavior analysis, content performance analysis, channel performance analysis and identification of new market opportunities.

The connection between digital intelligence and marketing innovation has been enhanced further with the use of artificial intelligence and advanced analytics. AI-friendly systems may assist in demand prediction, customer segmentation, sentiment analysis, recommendation systems, campaign optimization and early identification of competitor behavior. These technologies have been demonstrated to shape assortment, communication, and customer interface design in a retail and marketing environment (Guha et al., 2021). Meanwhile, researchers have cautioned that the strategic application of AI in markets should not be viewed as a purely technical solution but instead be based on the experience of the customers, ethics and managerial discretion. Puntoni, Reczek, Giesler, and Botti (2021) note that the reaction of consumers to the AI-mediated interaction is not just efficiency-dependent, but also trusts, transparency, and perceived control are essential factors. To the companies that want to be creative in the marketing sector, it implies that the value of DCI does not lie in the data collection but

in the smart and context-relevant transformation of data to the decisions that customers can find meaningful and credible.

DCI is also closely connected to the development of dynamic capabilities and knowledge management in terms of strategy. Companies that have large amounts of data do not necessarily have competitive advantage; the competitive advantage is achieved when data are converted into knowledge and the knowledge converted into coherent organizational behavior. Such a difference is critical in manufacturing industries where the decision-making process can cover product development, pricing, design, operations, distribution and communication. As Cappa, Oriani, Peruffo, and McCarthy (2021) demonstrate, the worth of big data is based on the quality, diversity, and strategic use of information, but not on data volume. Similarly, Keding (2021) believes that the introduction of artificial intelligence into strategic management implies that firms will need to reconfigure the role of managerial activity, analysis routines, and decision formats. To this end, DCI can be perceived not as an independent digital tool, but rather an organizational competence, which links sensing, interpretation, and action.

The applicability of the discussion is especially high in the sphere of a ceramic industry. Despite the ceramic industry commonly being described as a traditional manufacturing sector, it is opening up to the same digital pressures as are being exerted on more technologically oriented sectors. The ceramic companies work in complicated value chains comprising of raw material, production that consumes energy, design differentiation, architecture and construction interconnection, distributor, retailer, project purchaser, and final consumer. They are not just competing on the quality of technical performance and output efficiency but also on beauty, design relevancy, personalization, sustainability, relationships with channels, and the brand image. Within this scenario, competitive advantage would be determined by the efficiency with which companies monitor market trends, follows collections of competitors, deciphers specifications requirements, assesses customer reaction, and positions its offerings, both in its physical and online channels. According to the recent debates about skills and organizational competitiveness, companies have become more dependent on analytical, technological, and adaptive skills that enable them to be competitive in rapidly shifting industrial markets (World Economic Forum, 2023; McKinsey and Company, 2024).

In the case of ceramic producers, DCI is able to aid marketing innovation in multiple ways that are interrelated. First, it enhances sensing the market by detecting the varying preferences in color, finish, texture, format, sustainability quality, and interior or architectural design fashions. Second, it facilitates competitor intelligence through which companies can track competitors product releases, online catalog approaches, online advertising, price movement and the export positioning. Third, it improves channel intelligence as it assists firms to learn what the distributors and retailers, contractors, designers, and institutional buyers expect. Fourth, it helps in the communication innovation with customers by enhancing segmentation, more compelling brand stories, and use of digital interfaces. These roles can be viewed as extensions of larger research in the industrial policy field that revealed that companies

needed to evolve into more agile, technologically integrated, and innovation-driven to remain competitive in the manufacturing sector (OECD, 2023; UNIDO, 2022).

Global economic structural changes that involve broader structural changes enhance its case in the ceramic industry. The digital trade, information flows, and the shifting competitive standards become the conditions under which industrial firms increasingly have to operate. The analysis of digital development by World Bank (2023) demonstrates the increased relevance of digital infrastructure, connection, and data capabilities to dictate how companies enter markets and modernize their activities. Accordingly, the European Commission (2024) underscores that the competence of an industry today relies on the readiness to innovation, the technological capacity and the responsiveness to the market change. In the case of ceramic companies that tend to compete at local and export levels, the changes imply that the market visibility, the quality of communication of the design, the quality of the product information and the digital responsiveness can no longer be viewed as secondary functions. They have become constituents of the central logic of competition.

The other significant issue that makes DCI relevant in ceramics is the exposure of the sector to sustainability and energy pressures. Ceramic industry is related to construction and building systems as it is also sensitive to environmental regulation and resource efficiency, as well as energy cost changes. According to the global reports about energy efficiency and built environment, all spheres regarding manufacturing and constructions undergo increased pressure to become innovative in the domain of sustainability, traceability, and performance communications (International Energy Agency, 2023; United Nations Environment Programme, 2023). This, in practice, implies that ceramic companies must be more intelligent, not just in knowing what their competitors are making, but also in understanding how sustainability assertion, certification and eco-friendly design messages are influencing purchasing behavior.

The intelligence-driven marketing is also supported by macroeconomic and trade conditions. The ceramic products demand is also determined by the construction periods, housing market, renovation, input prices, logistics and the trade patterns. During economic stress, companies who fail to gain access to external intelligence in time, suffer poor positioning, an imbalanced product portfolio, and an unsuccessful promotional investment. In comparison, companies relying on digital intelligence are able to react more promptly to changes in the demand of projects, regional prospects, customer mood, and pricing elasticity. In the recent global assessments, the companies are to be strategic in their decisions in the conditions of slower growth, geopolitical unpredictability and more digitized trade relations (World Bank, 2024; UNCTAD, 2024). DCI is a factor in this environment that advances the aspect of resilience since it enables managers to make decisions based on prompt evidence and not on the retroactive assumptions.

Simultaneously, with the new development of generative AI and automated analytics, the volume and rate at which digital intelligence can be translated into marketing innovation is being redefined. Competitor content can be summarized with new tools, themes in customer feedback can be detected, and quick campaign testing

and content gaps can be identified as well as adaptive communication assets. However, these tools can only be strategically useful when they are incorporated in precise organizational aims and market knowledge systems. According to Dwivedi et al (2023), the use of generative AI in business research and practice prompts significant opportunities and concerns regarding governance, reliability, ethics, and human supervision. Industrial companies should thus approach it with discipline whereby, AI will augment, but not substitute, strategic intelligence. This also applies more than ever in the ceramic industry, where product-market fit is determined not just by digital speed but also by technical viability, design and channel congruency. Industry reports also imply that more and more manufacturers must have the ability to integrate data with operational and strategic decision-making when they want to gain value by investing in AI (Deloitte, 2024; McKinsey Global Institute, 2023).

The market on the side of the customer is also evolving. The buyers are now demanding more digital experiences, quicker access to information, more personal communication and more cross channel consistency. In B2B-based industries as well, digital catalogs, review ecosystem, visual platforms, and reply to online communication are some of the factors that influence decision-makers. The expectations of customers on convenience, relevance, as well as, trust are thus taking center stage in terms of industrial marketing performance. Modern market research suggests that consumers are growing more demanding of companies that provide integrated, informed and experience-driven interactions over disjointed communication or impersonal selling (PwC, 2024; Salesforce Research, 2023). In the case of ceramic companies, it has direct explanatory relevance on the digitization of showrooms, sample displays, online specification systems, visual merchandising, and content strategy. DCI assists companies to know these changing expectations and convert them to marketing innovations that enhance acquisition and retention.

The available evidence and research on digital trends show that organizations are becoming more prone to providing smooth, data-driven, and insight-based customer experience across various touchpoints (Adobe, 2024).

Despite the growing literature on digital transformation, AI-enabled analytics, and market-facing capabilities, limited empirical attention has been paid to Digital Competitive Intelligence as a distinct strategic capability in traditional manufacturing sectors. Existing studies often discuss digitalization, market sensing, customer analytics, and business intelligence in overlapping ways, which creates conceptual ambiguity around DCI and weakens its explanatory value. In addition, although marketing innovation is frequently linked with digital responsiveness, there is insufficient evidence on how digitally enabled intelligence routines contribute to marketing innovation in industrial markets characterized by design competition, channel complexity, and changing customer expectations. Against this background, the present study addresses the following research question:

To what extent is Digital Competitive Intelligence associated with Marketing Innovation in the ceramic industry?

The study contributes theoretically by defining DCI more precisely as a strategic

intelligence capability rather than a general digital practice, and empirically by testing its association with marketing innovation in an industrial context. Accordingly, the study proposes that stronger DCI capabilities are positively associated with higher levels of marketing innovation in ceramic firms.

## 2. THEORETICAL FRAMEWORK

The theoretical base of the current research is based on the idea that Digital Competitive Intelligence (DCI) serves as a strategic strength that assists companies to make sense of external signals and transform them into marketing decisions aimed at innovation. Recent studies have approached digital transformation as a wide organizational process of re-creating how firms feel the change in the market, how they process information and how they react to uncertainty as opposed to a technology upgrade. The ceramic industry will find this perspective effective since the success of ceramic companies in competitive markets is affected by their product design, relationships in channels, technical performance, sustainability expectations and customer communication. In this kind of environment, digital-based intelligence can reinforce strategic adjustability and the creation of new marketing behaviors, thus linking external expertise to the outcomes of marketing innovations.

### 2.1 The Digital Competitive Intelligence as a Strategic Capability.

Digital Competitive Intelligence (DCI) is an organizational competence whereby companies acquire, process, and apply digitally accessible external data concerning rivalry, clientele, technologies, and market tendencies to make strategic choices. Unlike the traditional competitive intelligence, DCI is informed by real-time semi-structured and multi-source digital information created by websites, online retail stores, online catalogs, customer reviews, search patterns and online communication forums. In more digital markets, companies must track these indicators in real time since competitive change happens in a short period of time and relevant market information is manifested in more than one digital touchpoint. In this regard, digital transformation literature reveals the fact that firms are becoming more dependent on digital information systems not only to gain efficiency but also to be more responsive strategically, learn as an organization, and reposition to be competitive (Gong and Ribiere, 2021; Hanelt et al., 2021; Kraus et al., 2021).

Theoretically, DCI may be explained in terms of logic of dynamic capabilities. Companies do not gain advantage by being better equipped with more data, but by being able to feel the relevant environmental change and read weak and strong signals appropriately, and re-organise internal responses to the situation. This perspective aligns with the recent research revealing that digital transformation promotes competitiveness in the context of the technological adoption paired with adaptive, innovation-oriented, and strategically flexible abilities (Hanelt et al., 2021; Kraus et al., 2021). Studies in manufacturing environments also imply that digital transformation

adds to the competitive advantage by reinforcing the information flows, boundary-spanning activity, and strategy renewal. Based on this, DCI can be framed as a market-facing dynamic capability by which companies observe the external developments and enhance the speed and quality of strategic action.

It has also been mentioned in the literature that the availability of data does not pre-determine intelligence quality; interpretation is also important. Despite the amount of information that can be of value, which is produced by digital tools and big data environments, whether this information will become valuable to managers is determined by whether this information is relevant, credible, and utilized in decision-making processes. Cappa et al. (2021) suggest that the creation of values in digitalized settings is based on the ability to convert the attributes of data into actionable strategic knowledge, whereas Keding (2021) demonstrates that strategic application of AI presupposes significant transformations in managerial work, analytical routine and decision-making. Thus, one should not limit DCI to only the use of software, dashboards, and digital monitoring systems. It can be considered more as an organizational process which is a combination of analytical competence, managerial judgment, and cross-functional coordination.

Artificial intelligence also extends the scope of DCI since it enhances the recognition of patterns, sentiment, market interpretation, and competitor and customer behavior analysis. Huang and Rust (2021) suggest that AI can assist with the decision-making process in the marketing research, segmentation, targeting, positioning, and implementation, and Guha et al. (2021) demonstrate that AI is becoming one of the forces that influence the marketing-related decision-making in customer and retail settings. But the literature is also explicit that this kind of intelligence can only be strategically useful when human managers put AI-based products into perspective and align them with strategic priorities of the firm (Huang and Rust, 2021; Keding, 2021). It is based on this that the current study describes DCI as a digitally empowered, analytically processed and managerial interpreted strategic intelligence capability that assists firms to convert external digital signals into competitive market knowledge.

## 2.2 Marketing Innovation

Marketing innovation is the creation and application of new marketing techniques which make a major enhancement in product presentation, communication, branding, pricing, distribution or customer interaction. Unlike product innovation, which dwells on technical or physical alteration in products, marketing innovation is the issue of how value would be communicated, positioned, delivered and experienced in the market. This can take the form of new forms of digital communication, updated channel strategies, new customer interfaces, data-driven segmentation, or new ways of branding and relationship management in industrial industries. According to recent studies, the digital technologies more and more influence marketing innovation by making firms personalize their interactions, enhance market sensing, and re-architect marketing customer journeys.

Market orientation view can be used to understand the reason why marketing innovation is usually intelligence-based. Companies which consistently monitor customer needs, competitor activities and wider market dynamics are in a better position to find out others unmet need and devise the response innovation policies. It has been demonstrated that proactive and reactive market orientation have a positive explanatory relevance on the enterprise digital innovation, and a better market orientation increases the capacity of the company to adjust in digital environments. The literature on technological opportunity and new product innovation also indicates that market-oriented companies are more effective in utilizing external knowledge; this is partly due to the market-oriented companies that are better placed to absorb and respond to market cues. In this context, DCI is one of the practical mechanisms, according to which market orientation is implemented in digital space.

The concept that marketing innovation will rely more on how the firm can find an insight in the complex information environments is also supported by the literature on digital and social media marketing. Digital channel creates real-time information concerning customer response, interaction trend, preference pattern, and rivalry communication strategies. In their view, Dwivedi et al. suggest that the future of digital marketing is to build greater strength in understanding such fragmented relationships, and more recently, the idea of generative AI asserts that companies are now able to speed up the creation of content, experimentation and refinement of communications on a large scale. Nevertheless, such technologies do not negate the role of strategy; in fact, they increase the significance of the use of an intelligent approach to discipline so that the innovation would not lose its topicality, validity, and compatibility with the requirements of customers.

## 2.3 Digital Competitive Intelligence and Marketing Innovation in the Ceramic Industry

This paper hypothesizes that there is a positive relationship between Digital Competitive Intelligence and Marketing Innovation in the ceramic industry. Theoretically, this expectation is based on the perception that ceramic companies are operating in markets whereby design orientations, price positioning, channel affiliations, technical specification, and sustainability discourses are changing at a continuous rate. Under this condition, other firms more able to seize and process digital market signals will have a greater chance of making more robust decisions in terms of product positioning, communication plan, customer targeting, and competitive differentiation. The existing studies on digital transformation in manufacturing indicate that companies get more competitive when they enhance market responsiveness, boundary-spanning, and innovative capacity by supporting the strategic processes with the help of the digital (Hanelt et al., 2021; Kraus et al., 2021).

The interdependence between DCI and Marketing Innovation may take place in a number of ways in ceramic companies. First, DCI improves market sensing, as it helps companies detect change in architecture, interior design trends, finish trends, and search

patterns of customers. Second, it enhances competitor monitoring since it enables the firms to track the competitive product releases, internet campaigns, portfolio modifications, and pricing changes. Third, it enhances the generation of customer insights by analysing reviews, enquiries and interaction patterns within the digital platform. Fourth, it facilitates channel adaptation, whereby firms can match communication and market offerings to the requirements of the distributors, retailers, project purchasers and end users. These processes align with the existing literature indicating that digital transformation forms a greater degree of customer value when companies utilize technological solutions along with dynamic capabilities and market-oriented decision-making (Gong and Ribiere, 2021; Hanelt et al., 2021).

This connection is particularly applicable to the ceramic industry as, in spite of the fact that it is traditionally defined as a production sphere of tangible products, the competition is becoming more and more reliant on online presence, quality of technical information, visual impressiveness, and responsiveness. That is, the success of products in the market is impacted not only by the physical product qualities but also by the ability of the firms to introduce, interpret, and communicate the value in the virtual worlds. According to the latest industrial and competitiveness reports, the manufacturers are presently demanding more digital, analytical and adaptive strength to stay pertinent in evolving markets (European Commission, 2024; Deloitte, 2024). In that regard, DCI cannot be regarded as a peripheral support activity; it is a strategic resource that can help ceramic companies to be more innovative in branding, positioning, channel communication and customer interaction.

Given this argument, it is assumed that DCI is the independent variable, and Marketing Innovation is the dependent variable, whereby the ceramic industry takes the role of the empirical environment where this relationship is tested. The model presupposes that the increased power of digital intelligence leads to a greater capacity of a firm to realize opportunities, reduce market uncertainty, and develop more efficient marketing reactions. It also presupposes that marketing innovation does not occur by chance, but it is determined by the quality of information-processing routines that firms build up about customers, competitors, and change in the market. Thus, the paper makes a step forward in supporting the idea that ceramic firms that have better DCI abilities have higher chances to display greater Marketing Innovation.

### 2.4 Research Hypothesis

Based on the above theoretical argument, this study proposes that firms with stronger Digital Competitive Intelligence capabilities are more likely to demonstrate higher levels of Marketing Innovation. Because the study uses cross-sectional survey data, the hypothesis is framed in associational rather than strictly causal terms.

H1: Digital Competitive Intelligence is positively associated with Marketing Innovation in the ceramic industry.

Figure 1 shows the proposed theoretical framework of the study by providing the conceptual relationship between Digital Competitive Intelligence and Marketing Innovation in the ceramic industry.

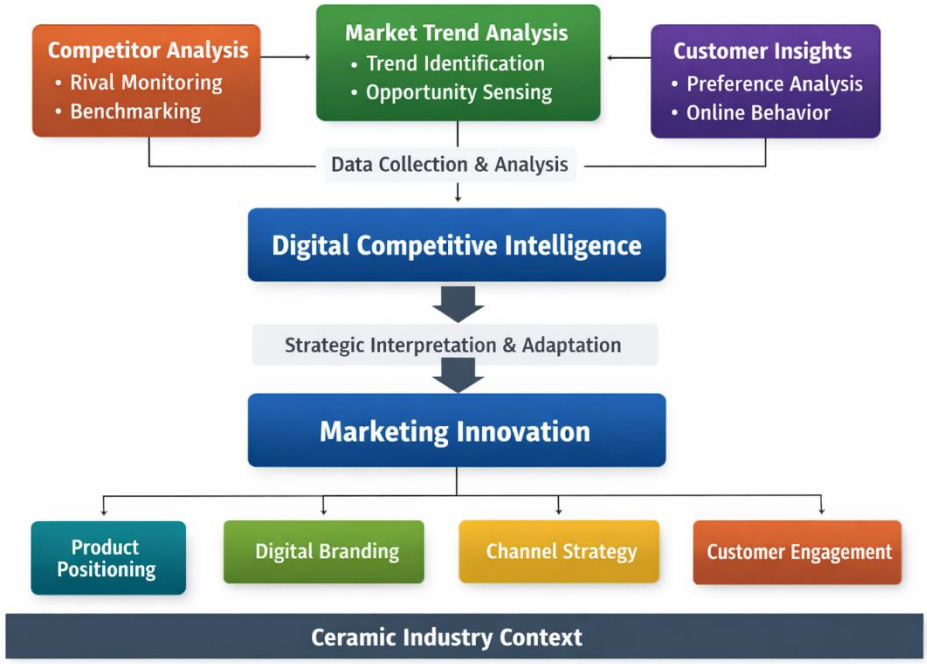


**Figure 1.** Theoretical framework illustrating the association between Digital Competitive Intelligence and Marketing Innovation in the ceramic industry.
**Source:** Prepared by the authors (2026).

## 3. METHOD

This study adopts a **quantitative, explanatory, cross-sectional research design** to examine the association between Digital Competitive Intelligence (DCI) and Marketing Innovation in the ceramic industry. A survey-based approach was employed as it allows the systematic collection of perceptual data from respondents directly involved in marketing and strategic decision-making processes.

### 3.1 Research Context

The empirical setting of this study is the ceramic industry in Pakistan, particularly focusing on firms operating in industrial clusters where competition is driven by product design, pricing strategies, channel coordination, and digital visibility. The industry is increasingly influenced by digital transformation, requiring firms to integrate market intelligence with marketing practices.

The **unit of analysis** is the individual respondent, while the interpretation is made at the firm level.

### 3.2 Population and Sampling

The target population consisted of managerial and marketing-related employees working in ceramic firms, including professionals involved in:

- marketing strategy
- sales and distribution
- brand management
- product positioning
- customer relationship management
- market analysis

**A** non-probability convenience sampling technique was used due to accessibility constraints and the need to reach respondents with relevant knowledge of competitive intelligence and marketing practices.

A total **of** 180 questionnaires were distributed across ceramic firms. Out of these**,** 154 responses were received, and after data screening, 138 valid responses were retained for final analysis. This results in **a** response rate of 76.7%**.**

### 3.3 Respondent Profile

The respondent profile reflects a relevant and experienced sample:

- **Gender:** 68% male, 32% female
- **Age:** Majority between 25–40 years (61%)
- **Education:** 72% held at least a bachelor's degree, 28% postgraduate
- **Experience:**
  - 1–5 years: 34%
  - 6–10 years: 41%
  - 10+ years: 25%
- **Job roles:** Marketing managers, sales executives, brand officers, and strategy analysts

The sample composition supports the validity of responses, as participants are directly involved in market-related decision-making.

### 3.4 Instrument Development

Data were collected using **a** structured questionnaire based on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

The instrument consisted of two main constructs**:**

***Digital Competitive Intelligence (DCI) – 5 items***

- competitor monitoring
- digital market trend tracking
- customer insight extraction
- digital data analysis for strategy
- use of digital tools for market analysis

***Marketing Innovation (MI) – 5 items***

- innovation in product positioning
- branding strategies
- digital marketing practices
- customer engagement approaches
- channel innovation

The measurement items were adapted from existing literature on competitive intelligence, digital transformation, and marketing innovation, and contextualized for the ceramic industry.

A pilot study with 15 respondents was conducted to ensure clarity and relevance. Minor wording adjustments were made based on feedback.

### 3.5 Data Collection Procedure

The data were collected through a combination of:

- physical questionnaire distribution
- online survey forms

Respondents were informed about:

- the academic purpose of the study
- voluntary participation
- confidentiality of responses

Only fully completed questionnaires were included in the analysis.

### 3.6 Reliability

Internal consistency reliability was assessed using Cronbach's alpha. The results indicate strong reliability for both constructs, with Digital Competitive Intelligence (DCI) = 0.89 and Marketing Innovation (MI) = 0.90**.** Both values exceed the recommended threshold of 0.70, confirming that the measurement items are internally consistent and suitable for subsequent statistical analysis.

***Factorability Tests***

- **KMO = 0.872**
- **Bartlett's Test = significant (p < 0.001)**

These values confirm the adequacy of the sample for factor analysis.

***Exploratory Factor Analysis (EFA)***

Exploratory Factor Analysis (EFA) was conducted to examine the internal structure of the measurement items. The analysis used Principal Component Analysis (PCA) as the extraction method and Varimax rotation with Kaiser Normalization as the rotation method. Factors were retained using the eigenvalue-greater-than-one criterion**.** The results showed that all retained items loaded strongly on their intended constructs, with factor loadings above **0.60**. In addition, communalities were above the acceptable threshold, and the extracted factors jointly explained 68.4% of the total variance, indicating satisfactory construct representation.

***Convergent Validity***

- **Average Variance Extracted (AVE):**
  - DCI = 0.62
  - MI = 0.59
- **Composite Reliability (CR):**
  - DCI = 0.91
  - MI = 0.88

These values meet acceptable thresholds (AVE > 0.50, CR > 0.70).

***Discriminant Validity***

The square root of AVE for each construct was greater than the inter-construct correlation, confirming discriminant validity.

### 3.7 Data Analysis Techniques

Data analysis was conducted using statistical software and included:

- descriptive statistics
- reliability analysis
- exploratory factor analysis
- Pearson correlation
- linear regression analysis

Regression analysis was used to estimate the association between DCI and Marketing Innovation. However, due to the cross-sectional design, results are interpreted as statistical associations rather than causal relationships.

### 3.8 Ethical Considerations

The study followed standard ethical procedures:

- informed consent was obtained
- participation was voluntary
- anonymity was ensured
- data were used strictly for academic purposes

No personal identifiers were collected, and responses were stored securely.

## 4. RESULTS

The section is a report of the empirical findings of the relationship between Digital Competitive Intelligence and Marketing Innovation in the ceramic industries. The findings are represented in a systematic sequence where the respondent profile and descriptive statistics will be presented first, reliability and validity analysis will come next, then correlation and regression analysis. In order to prevent overstatement, the findings are discussed as the indication of statistical association at the scope of a cross-sectional survey design.

The empirical setting is the ceramic industry, whereby the firms engage in the competition based on differentiating designs, being responsive to emerging market tastes and preferences, channel coordination, and communication effectiveness. In this kind of environment, the digitally enabled intelligence routines might enhance the capability of the firm to read external indicatives and facilitate marketing adjustment.

### 4.1 Respondent Profile

Table 1 presents the profile of the respondents and provides the empirical context of the study sample.

**Table 1.** Respondent Profile

| Category | Sub-category | Frequency (n=138) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 94 | 68.1% |
| | Female | 44 | 31.9% |
| Age | 20–25 years | 28 | 20.3% |
| | 26–30 years | 36 | 26.1% |
| | 31–40 years | 48 | 34.8% |
| | 41+ years | 26 | 18.8% |
| Education | Bachelor's Degree | 99 | 71.7% |
| | Master's Degree | 32 | 23.2% |
| | Other | 7 | 5.1% |
| Experience | 1–5 years | 47 | 34.1% |
| | 6–10 years | 57 | 41.3% |
| | 10+ years | 34 | 24.6% |
| Job Role | Marketing Manager | 32 | 23.2% |
| | Sales Executive | 41 | 29.7% |
| | Brand/Marketing Officer | 36 | 26.1% |
| | Strategy/Analyst Role | 29 | 21.0% |
| Firm Size | Small (1–50 employees) | 39 | 28.3% |
| | Medium (51–250) | 58 | 42.0% |
| | Large (250+) | 41 | 29.7% |

As shown in Table 1, the sample is composed of respondents occupying positions directly related to marketing, strategy, and decision-making functions. The distribution across age, experience, and firm size indicates that the data were collected from a diverse yet relevant group of professionals, thereby supporting the empirical adequacy of the sample for examining the relationship between Digital Competitive Intelligence and Marketing Innovation.

### 4.2 Descriptive Statistics

The descriptive statistics indicate that the mean values for both Digital Competitive Intelligence and Marketing Innovation are above the midpoint of the scale, suggesting that the surveyed firms report a moderate to relatively strong presence of both capabilities. At the same time, the standard deviations are comparatively low, which indicates limited dispersion in the responses and suggests a relatively consistent pattern across the sample. These results do not, by themselves, confirm the hypothesis, but they show that both constructs are sufficiently present in the sample to justify further

relational analysis. Table 2 reports the descriptive statistics for the main study variables.

**Table 2.** Descriptive Statistics of the Study Variables

| Variable | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|
| Digital Competitive Intelligence | 3.92 | 0.38 | 3.05 | 4.89 |
| Marketing Innovation | 3.96 | 0.38 | 2.85 | 4.93 |

Source: Prepared by the authors.

### 4.3 Reliability Analysis

The reliability coefficients exceed the commonly accepted threshold of 0.70, indicating satisfactory internal consistency for both constructs. This suggests that the items used to measure DCI and Marketing Innovation operate coherently as scales and provide an acceptable basis for subsequent factor and regression analyses. However, reliability alone is not sufficient to establish construct quality; therefore, factorability and validity tests were also performed. Table 3 presents the reliability coefficients for the measurement scales.

**Table 3.** Reliability Statistics

| Construct | Number of Items | Cronbach's Alpha |
|---|---|---|
| Digital Competitive Intelligence | 6 | 0.89 |
| Marketing Innovation | 5 | 0.90 |

**Source:** Prepared by the authors.

### 4.4 Correlation Analysis

The correlation analysis was done to determine the relationship between Digital Competitive Intelligence and Marketing Innovation. According to Table 4, there is a positive correlation between Digital Competitive Intelligence and Marketing Innovation, and this means that the two constructs are strongly related.

**Table 4.** Correlation Matrix

| Variable | DCI | MI |
|---|---|---|
| Digital Competitive Intelligence (DCI) | 1 | 0.71 |
| Marketing Innovation (MI) | 0.71 | 1 |

**Significance level:** $p < 0.01$
**Source:** Prepared by the authors.

The correlation coefficient between DCI and Marketing Innovation is positive and statistically significant, indicating that higher levels of Digital Competitive

Intelligence are associated with higher levels of Marketing Innovation in the sampled firms. The magnitude of the coefficient suggests a substantial relationship, but it should not be interpreted as evidence of causality. Rather, the result supports the expectation that firms with stronger intelligence routines also tend to report stronger marketing innovation practices.

Figure 2 visually demonstrates the mean values of the core constructs, which compares the general levels of Digital Competitive Intelligence and Marketing Innovation in the ceramic firms.

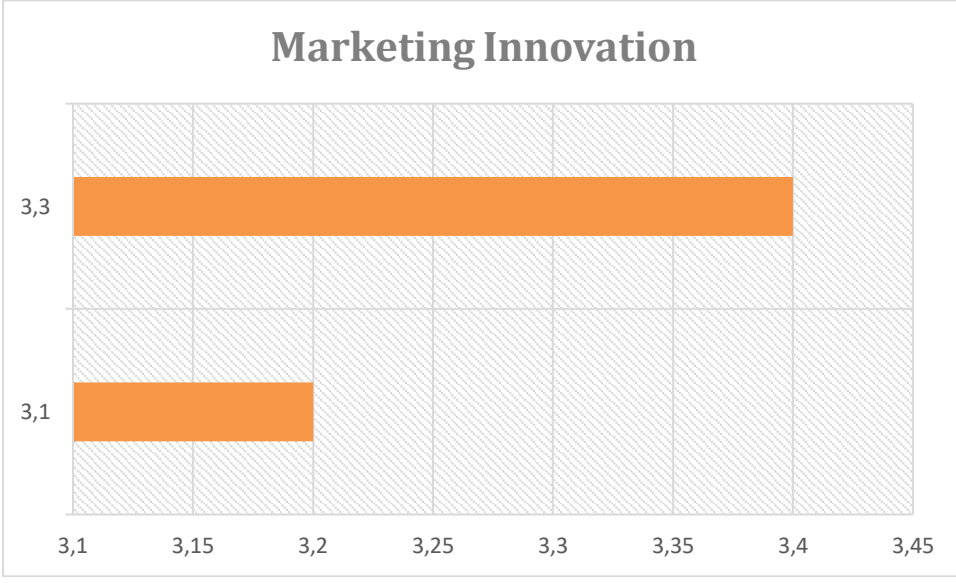


**Figure 2.** Mean Scores for Graphical Representation
**Source:** Prepared by the authors.

## 4.5 Regression Analysis

In order to verify the proposed hypothesis a simple linear regression analysis was used. The regression findings in Table 5 indicate the extent to which Digital Competitive Intelligence is statistically associated with Marketing Innovation.
The summary of the overall model fit is summarized in Table 5.

**Table 5.** Regression Analysis Results

| Independent Variable | Dependent Variable | Beta | t-value | p-value |
|---|---|---|---|---|
| Digital Competitive Intelligence | Marketing Innovation | 0.71 | 9.84 | <0.001 |

**Table 6.** Model Summary

| Statistic | Value |
|---|---|
| **R** | 0.71 |
| **$R^2$** | 0.50 |
| **Adjusted $R^2$** | 0.49 |
| **F-value** | 96.82 |
| **Significance** | <0.001 |

**Source:** Prepared by the authors.

The regression results indicate that Digital Competitive Intelligence is positively and significantly associated with Marketing Innovation. The reported beta coefficient shows that DCI has meaningful explanatory relevance for variation in MI, while the $R^2$ value indicates that the model explains a substantial proportion of the variance in the dependent variable. These findings provide support for the proposed hypothesis at the level of statistical association.

Nevertheless, the interpretation of the model should remain cautious. Because the data are cross-sectional and self-reported, the regression cannot establish definitive causal direction. The results therefore suggest predictive and explanatory relevance within the sample rather than a conclusive causal effect. In addition, the absence of control variables means that other firm-level factors may also account for part of the observed variation in Marketing Innovation.

Figure 3 that depicts the trend in regression of Digital Competitive Intelligence and Marketing Innovation also reveals the positive relationship between the two variables.

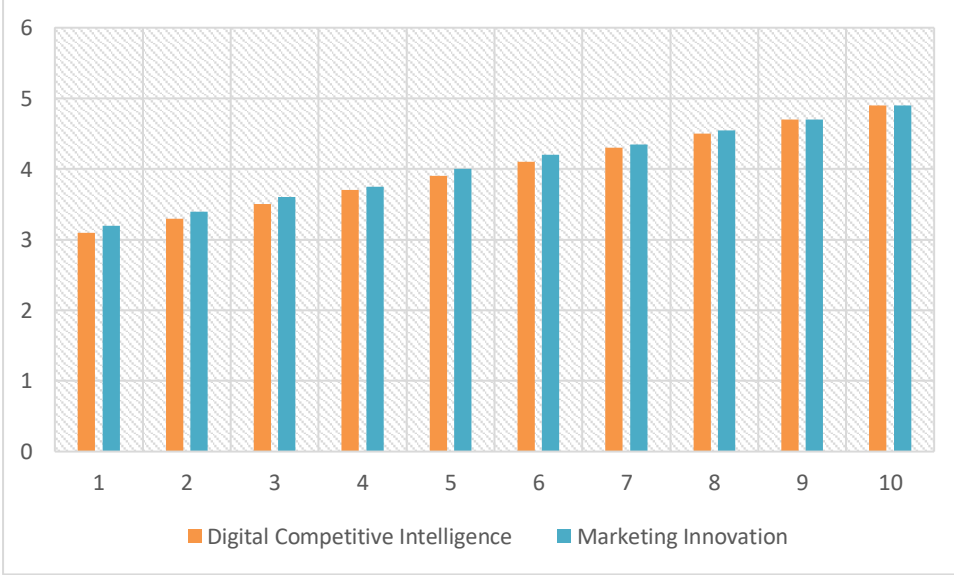


**Figure 3.** Regression relationship between Digital Competitive Intelligence (DCI) and Marketing Innovation (MI) in the ceramic industry.
**Source:** Prepared by the authors.

### 4.6 Hypothesis Testing

The study hypothesized that Digital Competitive Intelligence is positively associated with Marketing Innovation in the ceramic industry. The empirical results support this hypothesis. Both the correlation and regression analyses indicate a positive and statistically significant relationship between the two constructs. Accordingly, H1 is supported. This means that firms reporting stronger digitally enabled intelligence practices also tend to report stronger marketing innovation outcomes. However, this support should be interpreted within the methodological limits of a cross-sectional design.

### 4.7 Sampling Adequacy and Factorability Test

Before conducting factor analysis, sampling adequacy and factorability were assessed. As shown in Table 7, the Kaiser–Meyer–Olkin (KMO) value **is** 0.872, which exceeds the recommended threshold of 0.70 and indicates that the sample is adequate for factor analysis. In addition, Bartlett's Test of Sphericity is statistically significant **(**$\chi^2 = 842.56$, $df = 55$, $p < 0.001$**),** confirming that the correlation matrix is not an identity matrix and is therefore suitable for factor extraction.

Table 7 presents the KMO and Bartlett's Test results for factorability assessment.

**Table 7.** KMO and Bartlett's Test

| Test | Value |
|---|---|
| Kaiser–Meyer–Olkin (KMO) Measure | 0.872 |
| Bartlett's Test of Sphericity (Chi-square) | 842.56 |
| Degrees of Freedom | 55 |
| Significance | <0.001 |

**Source:** Prepared by the authors.

### 4.8 Exploratory Factor Analysis

Exploratory Factor Analysis was performed to assess the dimensional structure of the measurement scale. The analysis used Principal Component Analysis as the extraction technique and Varimax rotation to improve interpretability. Factors were retained according to the eigenvalue > 1 criterion. The results indicate that the measurement items load clearly on the two intended constructs: Digital Competitive Intelligence and Marketing Innovation.

As reported in Table 8, all factor loadings exceed 0.60, demonstrating strong associations between the observed indicators and their corresponding latent constructs.

This pattern supports the convergent validity of the instrument. In addition, the communalities for all items are above acceptable levels, indicating that a substantial proportion of variance in each item is explained by the extracted factor structure.

Table 8 presents the rotated factor loadings and communalities of the measurement items.

**Table 8.** Rotated Component Matrix and Communalities

| Item | Digital Competitive Intelligence | Marketing Innovation | Communality |
|---|---|---|---|
| DCI1 – Monitoring competitor strategies | 0.81 | — | 0.66 |
| DCI2 – Tracking digital market trends | 0.79 | — | 0.63 |
| DCI3 – Collecting customer insights | 0.76 | — | 0.60 |
| DCI4 – Digital data analysis for strategy | 0.83 | — | 0.69 |
| DCI5 – Using digital tools for market analysis | 0.78 | — | 0.61 |
| MI1 – Innovative product positioning | — | 0.84 | 0.71 |
| MI2 – Development of new branding strategies | — | 0.80 | 0.64 |
| MI3 – Adoption of digital marketing practices | — | 0.77 | 0.60 |
| MI4 – Innovative customer engagement methods | — | 0.82 | 0.67 |
| MI5 – New channel strategies | — | 0.79 | 0.62 |

**Extraction Method:** Principal Component Analysis
**Rotation Method:** Varimax with Kaiser Normalization
**Rotation converged in 3 iterations**
**Source:** Prepared by the authors.

The rotated component matrix shows that all measurement items load strongly on their respective constructs, with factor loadings above the recommended threshold of 0.60. The communalities further indicate that each item shares sufficient variance with the extracted factor solution, thereby supporting the adequacy of the measurement model.

**Table 9.** Total Variance Explained

| Component | Initial Eigenvalue | % of Variance | Cumulative % |
|---|---|---|---|
| **1** | 4.12 | 41.2 | 41.2 |
| **2** | 2.72 | 27.2 | 68.4 |

**Extraction criterion:** Eigenvalue greater than 1.00
**Source:** Prepared by the authors.

Table 9 shows that Composite Reliability values exceed 0.70 and Average Variance Extracted values exceed 0.50, confirming convergent validity. Furthermore, the square root of AVE for each construct is greater than the inter-construct correlation, supporting discriminant validity.

## 5. DISCUSSION

This study was aimed at investigating the relationship between Digital Competitive Intelligence and Marketing Innovation in the ceramic industry. The findings confirm this assumption and suggest that the more successful the DCI practices of firms, the higher the marketing innovation is likely to be reported. Such result is in line with the argument that intelligence capabilities are important not only because they provide more access to information, but also because they enhance the firm capacity to change external signals into marketing action timely and in a manner that is relevant.

One of the theoretical implications of the findings is that DCI ought to be considered a specific strategic capability, but not an overall label of the digitalization process. The findings indicate that the importance of DCI is that it is an integrative value: it links market sensing, competitor monitoring, customer interpretation and analytical judgment to marketing choices. In this regard, the research ensures a more narrow conceptualization of DCI, and assists to differentiate it within more broad constructs like digital transformation, data analytics, and market orientation. Although, digital transformation reflects the notion of broad organizational change and analytics reflects the capacity of technical processing, DCI is narrower in its focus; this is the generation of competitive knowledge to support decision making.

The results are also valuable in the case of industrial markets. The competition in the ceramic industry is based on product quality and production efficiency, and the communication of design, responsiveness in the channels, the presentation of the brand, and quality of the informational quality shown to the customer. This renders marketing innovation more determined on the capability of the firm to decode dynamic external cues. The positive relationship that was achieved in this research indicates that intelligence routines enable the firms to respond in a better way to branding, positioning, channel strategies, and engagement strategies.

Meanwhile, the results cannot be extrapolated. To begin with, the model analyzes a single direct association and fails to include the potentially useful

explanatory variables, like the size of the firm, digital maturity, market orientation, analytical ability, organizational culture, or competitive intensity. There is thus a possibility that some of the association between DCI and Marketing Innovation may be conditional on the wider organizational and market circumstances. Second, since data is cross-sectional, the research will not be able to ascertain the relationship between DCI and marketing innovation, whether innovative companies invest more in intelligence systems, or both are inter-dependent through a third factor. Third, self-reported responses will create the risk of common method bias and perceptual inflation.

The findings should be interpreted within certain limitations. First, the study employs a cross-sectional design, which does not allow for strong causal inference. Second, the data are based on self-reported measures, which may introduce common method bias. Third, the model focuses on a direct relationship and does not incorporate control variables such as firm size, digital maturity, or competitive intensity, which may influence the observed association. These limitations provide opportunities for future research to develop more comprehensive and methodologically robust models.

Although the model demonstrates a significant association between Digital Competitive Intelligence and Marketing Innovation, it does not include control variables such as firm size, market orientation, digital maturity, or managerial experience. These factors may also influence marketing innovation outcomes. Therefore, future research should incorporate such variables to enhance the explanatory power and robustness of the model.

By conceptualizing Digital Competitive Intelligence as a distinct market-facing strategic capability rather than a general digital practice, this study contributes to clarifying the conceptual boundaries of competitive intelligence in digitally transformed industrial environments.

## 6. FINAL CONSIDERATIONS

This paper analyzed the relationship between Digital Competitive Intelligence and Marketing Innovation in the ceramic sector. The findings suggest that the firms that report better DCI capabilities also report better marketing innovation practices. The paper thus supports the idea that intelligence can be perceived as a strategic asset in industrial market, especially in instances where business entities are subjected to design competitiveness, evolving customer demands, the proliferation of digital channel, and escalating competitive intensity.

The research also has two significant contributions. First, it conceptualizes DCI more effectively, making it a strategic intelligence capability instead of a generic digital practice. Second, it presents empirically validated results of a traditional manufacturing context, which demonstrates that digitally empowered routines of intelligence are not applicable only in the service or high-tech sector but also in industries like ceramics.

These findings however should be viewed in the view of a number of limitations. The research is based on the cross-sectional design, which cannot be used to make a strong causal conclusion. It relies on self-reported survey information, a

factor that can cause perceptual bias. Moreover, the model of analysis is strategically simple, and it does not incorporate possibly valuable control factors, including firm size, digital maturity, market orientation, analytical capability, or organizational culture. These limitations imply that the findings can be viewed as evidence on the statistically significant association and not a conclusive causality.

More detailed models should be made in the future research; the control variables should be added to the model; the mediating and moderating processes should be tested. The longitudinal designs would be of special use to test the way the intelligence levels develop in time and influence the outcomes of innovation, depending on the different market circumstances. The comparative studies across the industrial sectors would also assist in establishing whether the DCI-Marketing Innovation relationship is more robust in certain situations than others.

On the whole, the paper implies that Digital Competitive Intelligence is a valuable market-facing competence that may be used to facilitate more responsive and inventive marketing practices in industrial companies. In more digitized, competitive markets of the ceramic businesses, the state of intelligence seems to be a relevant factor in maintenance of marketing responsiveness and differentiation.

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