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Enhancing marketing information capability for sustainable development: A dynamic capability perspective in internet marketing systems

提升行銷資訊能力以促進永續發展：基於動態能力觀點的網路行銷系統研究

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Abstract: This study adopts a dynamic capability view to examine the role of marketing information capability in using internet marketing systems (IMS). Our model offers a more comprehensive method of measuring marketing information capability in IMS by re-examining the effects of market orientation and information technology capability. We also investigated the impact of marketing information capability on customer performance and assessed the moderating effect of competitive intensity on these relationships. Data from 125 consumer product manufacturing firms indicate that IT capability and market orientation are critical for enhancing marketing information capability, which in turn improves customer service and relationship performance. Our findings underscore the importance of high marketing information capability in IMS use for sustainable development. By leveraging advanced marketing information systems, firms can

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achieve superior customer service and foster long-term customer relationships, contributing to sustainable growth. This study highlights the role of enhanced marketing information capabilities in promoting social innovation and sustainable development, providing valuable insights for organizations aiming to thrive in competitive and dynamic markets.

Keywords: Marketing information capability, internet marketing systems, information technology capability, market orientation, sustainable development.

摘要：本研究採用動態能力觀點，探討行銷資訊能力在網路行銷系統（IMS）應用中的角色。本研究模式透過重新檢視市場導向與資訊技術能力的影響，提供更全面的衡量 IMS 中行銷資訊能力的方法。此外，我們也探討行銷資訊能力對顧客績效的影響，並評估競爭強度在這些關係中的調節作用。資料收集來自 125 家消費性產品製造企業。資料分析顯示，資訊技術能力與市場導向對於提升行銷資訊能力至關重要，而行銷資訊能力進一步改善顧客服務與關係績效。我們的研究結果強調，在 IMS 的應用中擁有高度行銷資訊能力對於永續發展的重要性。透過運用先進的行銷資訊系統，企業可以提供卓越的顧客服務，培養長期客戶關係，進而促進永續成長。本研究顯示行銷資訊能力的提升在推動社會創新與永續發展中的關鍵作用。本研究為企業在競爭激烈且動態變化的市場中，提供具有見解性的實務建議。

關鍵詞：行銷資訊能力、網路行銷系統、資訊技術能力、市場導向、永續發展

1. Introduction

Internet marketing has revolutionized how businesses connect with customers, enabling real-time engagement, personalized experiences, and broader market reach. Advances in information technology and the adoption of internet marketing have transformed traditional marketing, making it more efficient and

effective. Beyond commercial benefits, internet marketing also promotes social innovation and sustainable development. Effective use of internet marketing systems (IMS) enhances understanding of consumer behavior, allowing companies to develop profitable and socially responsible products and services. By leveraging data analytics and customer insights, businesses can create campaigns that promote eco-friendly products, sustainable consumption, and social and environmental awareness. Studies show that marketing information improves customer service and relationship performance, making it crucial for effective customer service management (Azadeh *et al.*, 2017). IMS has become essential in advancing firms' marketing information capabilities.

Despite its potential, many firms struggle to effectively use data analytics to forecast customer demands, develop marketing objectives, and outperform competitors. Enhancing marketing information in response to market changes can increase sales to existing customers and grow revenue (Chang *et al.*, 2010; Sleep *et al.*, 2023). This study addresses a gap in the marketing literature by examining the roles of IT capability and market orientation in enhancing marketing information capability in IMS use. Although internet marketing has been linked to market growth (Bianchi and Mathews, 2016; Mathews *et al.*, 2016), many IMS implementations fail as users struggle to obtain business benefits (Zhang *et al.*, 2018). The reasons for IMS adoption failure are not fully examined in the IS literature. Researchers have proposed using internet technology to achieve competitiveness (Haller *et al.*, 2023), improve e-service innovation (Chuang and Lin, 2015), and sustain customer relationships (Trainor *et al.*, 2014). Marketing information, a driver of customer service and relationship performance, is more effective with extensive IMS usage in a firm's marketing activities.

This study focuses on marketing information capability rather than IMS or specific systems. Business practitioners suggest that marketing information capability in IMS use, which includes processing and analyzing information resources, supporting sales and services, and forecasting customer demands, improves customer relationships. However, IMS utilization results are debatable, and little research has focused on marketing information capability to enhance

customer relationship performance.

The dynamic capability view (DCV) offers a broad framework for understanding how firms reconfigure resources in dynamic environments. However, cannot provide comprehensive insights into the interactions between IT capabilities and marketing activities. The e-marketing capability model (Trainor *et al.*, 2011) addresses this by considering the integration of IT resources into marketing operations to enhance customer engagement and improve performance outcomes. Therefore, this study adopted the e-marketing capability model to explore how marketing information capability, as determined by IT resources, strengthens firms' responsiveness to market demands. This study conceptualizes marketing information capability as a firm's dynamic capability, mediating between IT capability and market orientation in performance. IT capability is critical for IMS use in marketing activities and essential for understanding elements driving marketing information capability. Market orientation improves information processing and generates a competitive advantage, enhancing e-marketing adoption and customer relationship performance (Chuang, 2018; Trainor *et al.*, 2011). Thus, this study aims to develop a research model examining the antecedents and consequences of marketing information capability in IMS use. It focuses on how efficiently firms create valuable marketing information capabilities, advancing the roles of IT capability and market orientation, and examining their interactive effects in a competitive environment. Additionally, it explores the impact of marketing information capability on creating customer response capability and enhancing customer relationship performance.

2. Theoretical background

2.1 2.1 Resource-based views and DCV

The resource-based view (RBV) asserts that companies gain business value by utilizing resources that are valuable, rare, inimitable, and non-substitutable, which are unevenly distributed among firms (Barney, 1991). Although RBV highlights firm-specific resources and capabilities as sources of competitive

advantage, it faces challenges in rapidly evolving environments (Coates and McDermott, 2002). The DCV emphasizes a firm's ability to integrate, build, and reconfigure internal and external competencies to adapt to dynamic environments (Teece *et al.*, 1997). Although the DCV offers a broad framework for understanding how firms develop dynamic capabilities to respond to market changes, it does not fully capture how these capabilities are operationalized in marketing and service innovation activities. Therefore, this study adopted the DCV as the overarching framework but supplemented it with the e-marketing capability model and the e-service innovation model. This integrated approach allowed for a comprehensive examination of how firms leverage information systems to effectively achieve dynamic capabilities.

Several studies support the DCV, suggesting that marketing resources or capabilities need to be combined with other complementary capabilities to achieve a competitive advantage (Cavusgil *et al.*, 2007; Menguc and Auh, 2006). Menguc and Barker (2005) emphasize that combining selling skills with intraorganizational collaboration can enhance sales performance. Chuang and Lin (2015) show that merging service activities with IT resources can create new IT-based services, leading to value co-creation. Trainor *et al.* (2011) demonstrate that integrating IT resources with marketing can develop e-marketing capabilities, improving organizational performance. According to Bag *et al.* (2023), the DCV advocates for the integration of marketing capabilities with other capabilities to benefit firms.

Research also indicates that capabilities are developed through the continuous reconfiguration of existing resources (Munoz-Penas *et al.*, 2024). For example, R&D relates to the dynamic capability to design new products in response to market changes (Bag *et al.*, 2023). In information systems (IS), e-service innovation as a dynamic capability is crucial for customer service reconfiguration and resource optimization (Chuang and Lin, 2015). Researchers have applied the DCV to analyze IS alignment processes and enhance implementation success (Chen *et al.*, 2008). In marketing, the DCV defines marketing capability as the ability to understand and forecast customer demands better than competitors (Bag *et al.*, 2023).

Despite the focus on DCV, there is limited research on the antecedents, dimensions, or outcomes of marketing information capability in the use of integrated marketing systems. This study examines IT capability and market orientation as enablers of marketing information capability in IMS. IT capability stems from a "technological push" philosophy, where firms adapt to emerging technologies (Zhou *et al.*, 2005), while market orientation derives from a "customer pull" philosophy, focusing on sensing and responding to customer needs (Kaynak and Kara, 2004). The study explores how IMS usage enhances marketing information capability, facilitating rapid response to business changes and improving customer service and relationships.

2.2 Marketing information capability in IMS use

This study investigated how firms leverage IMS to enhance their marketing information capabilities and improve customer service and customer relationship performance. The decision of this study to include a wide range of tools under the framework of IMS was intentional; it reflects the reality of modern firms relying on various interconnected systems (e.g., customer relationship management [CRM] platforms, digital marketing tools, and data analytics systems) for their Internet marketing activities. These systems are not operated in isolation; rather they work together to effectively generate, process, and leverage marketing information. By examining IMS as an integrated entity, this study captured the holistic nature of modern Internet marketing practices, wherein multiple tools and systems interact to create value for firms. This approach allowed for exploration of how IT capability and market orientation contribute to a firm's ability to effectively utilize these systems in real-world marketing operations.

The Internet has emerged as an innovative tool for marketing, offering information and enabling online transactions that foster efficient communication and relations, generating new opportunities (Shuai and Wu, 2011; Mathews *et al.*, 2016). Firms use IMS for advertisements, product and service information, online sales, and customer interactions, creating a two-way communication model. Research shows that IMS facilitates market requirement access, rapid customer

response, and reduced transaction costs (Rohm *et al.*, 2004). IMS integrates internal business data with external market information, supporting decision-making and marketing actions through data analysis. By allowing customer feedback and providing firms with market insights, IMS helps manage market information and understand customer demands (Mathews *et al.*, 2016).

The marketing effectiveness of enterprise information systems hinges on marketing information capability, which includes sales, service, and data analysis deemed essential by customers (Bianchi and Mathews, 2016). IMS supports sales by identifying customer needs, customizing products, and tracking availability. Service support includes customer service delivery tracking, providing solutions, and facilitating customer interaction. Data analysts use IMS to analyze customer preferences and transaction data, employing data mining and prescriptive analytics to derive valuable insights (Fan *et al.*, 2015).

To enhance real performance, firms must effectively use IMS for sales, service, and analysis. IMS can integrate and analyze market information from various contact points, offering high-level marketing information capability. Studies highlight the significance of marketing capability in Internet marketing (Bianchi and Mathews, 2016; Mathews *et al.*, 2016), proposing that marketing information capability is a direct outcome of IMS utilization. Additionally, IMS plays a crucial role in promoting sustainable development. By leveraging IMS, firms can develop eco-friendly products, encourage sustainable consumption, and raise social and environmental awareness. Effective use of IMS can lead to reduced waste, optimized resource use, and overall environmental benefits, aligning marketing strategies with sustainability goals. Thus, incorporating sustainable practices into IMS not only enhances marketing performance but also contributes to long-term sustainable development.

2.3 IT capability

Technology orientation reflects a firm's preference for adopting new technology and can be viewed as a 'technological push' philosophy (Gangwani and Bhatia, 2024; Khan *et al.*, 2024; Trainor *et al.*, 2011; Zhou *et al.*, 2005). In this

study, IT capability is defined as the firm's competence to acquire, deploy, combine, and reconfigure IT resources to support marketing strategy and enhance work processes (Chen *et al.*, 2015). While Chen *et al.* (2015) showed that improved IT competence boosts new product development and innovation performance, a gap exists in explaining how IT resources combine with other resources to develop novel IT capabilities.

Chuang and Lin (2015) demonstrated that integrating a firm's technology, business, and human resources increases overall capability. Powell and Dent-Micallef (1997) found that IT resources alone don't create value; value emerges when IT is combined with complementary human and business resources.

Studies (Chuang and Lin, 2017) indicate that IT capability is crucial for successful IS adoption and usage, driving high firm performance. The concept of IT capability has been extensively explored in the literature, with various dimensions being proposed for each research context. For example, Chen *et al.* (2015) and Nam *et al.* (2018) characterize IT capability as a multidimensional construct typically encompassing dimensions such as IT infrastructure, IT management, IT knowledge, and dimensions such as IT flexibility or IT integration. The core dimensions of IT infrastructure, IT management, and IT knowledge have consistently been identified as essential to leveraging IS and driving business value, particularly in marketing contexts. In this study, we specifically focused on these three dimensions—IT infrastructure, IT management, and IT knowledge—because they are most directly related to the effective implementation and utilization of IMS for enhancing marketing information capability. The rationale for this focus is presented in the following:

IT infrastructure is the technological backbone required to support the operations of IMS. Having a robust infrastructure ensures that the systems and applications required for processing marketing information can function efficiently. A firm’s IT management reflects its ability to align IT resources with overarching business and marketing strategies. Effective management of IT projects, resources, and value maximization is critical to ensuring that technological investments effectively support marketing objectives. IT knowledge

emphasizes the firm's human knowledge, specifically their ability to acquire, assimilate, and leverage technological knowledge. This dimension is vital for fostering innovation within marketing processes and adapting IT capabilities to meet evolving customer needs. Although other dimensions of IT capability, such as IT flexibility and IT alignment, have been examined in the literature, the current study focused on IT infrastructure, IT management, and IT knowledge because they were determined to be the most relevant to the context of IMS. These three dimensions are foundational to a firm's ability to utilize IMS to enhance its marketing information capabilities, which is a key focus of this study. Research (Chuang and Lin, 2017) suggests that IT capability is a second-order latent construct comprising these three critical dimensions.

2.4 Markt orientation

The literature on market orientation originates from the marketing concept and is seen as a customer-centric philosophy. Kotler and Armstrong (2012) stated that the goal of market orientation is to achieve organizational objectives by identifying and satisfying target market needs better than competitors. It involves generating market intelligence related to current and future customer needs, disseminating it across departments, and responding to this intelligence organization-wide. This approach enhances long-term firm performance by delivering significant value to customers.

Gangwani and Bhatia (2024) described market orientation as a multidimensional construct comprising three key components: intelligence generation, dissemination, and responsiveness, all linked to firm performance. They argued that market orientation enables firms to swiftly adapt to environmental changes. Research by Jayachandran *et al.* (2004) supports the notion that business activities focused on generating and disseminating customer-related information enhance a firm's responsiveness.

Bhatt *et al.* (2010) defined information generation as monitoring customer preferences and demands and analyzing factors such as competition, regulation, and technology that might influence this information. Effective information

dissemination, according to Hult *et al.* (2005), involves communicating and transferring information to all departments and employees within a firm. This process drives a firm's competitive advantage and success through responsiveness.

Carbonell and Rodríguez Escudero (2010) found that information generation and dissemination contribute to value creation, although the impact of responsiveness on firm performance was less conclusive. Consequently, this study proposes that market orientation is a second-order latent construct composed of the three critical components: information generation, dissemination, and responsiveness.

3. Research model and hypotheses

3.1 Research model

Although some overlap is observed between the DCV, e-marketing capability, and e-service innovation models, each framework offers distinct but complementary insights. The DCV provides a broad perspective on how firms reconfigure resources to adapt to market changes. The e-marketing capability model specifically examines the integration of IT resources into marketing activities, particularly within digital contexts, emphasizing their role in enhancing customer engagement and organizational performance. The e-service innovation model emphasizes the role of IT in driving service innovation. Together, these models provide a comprehensive framework that can be used to elucidate how firms utilize IT to enhance their marketing information capabilities, which can in turn lead to improved customer service and relationship performance.

We reviewed the literature linking technological-push and customer-pull antecedents to Internet marketing. From the technological-push perspective, a firm's IT infrastructure, management, and knowledge should align with IMS to develop marketing information capability. Empirical studies (Chang *et al.*, 2010) have examined the relationships between these antecedents and marketing capability. Additionally, the customer-pull philosophy can enhance e-marketing capability and provide insights into market orientation. Trainor *et al.* (2011)

suggested that firms should consider market orientation crucial for enhancing marketing information capability in IMS use.

Our research model integrates insights from the literature on IS and marketing capability to support a dynamic capability view and performance constructs. We also drew on Melville *et al.*'s (2004) integrative model of IT business value to emphasize IS-enabled marketing capability. This dynamic capability view highlights the importance of a firm's ability to recombine and adopt resources or capabilities in response to changing environments. Consequently, intermediate capabilities and business processes should be examined, considering the moderating influence of the competitive environment.

The research model, as shown in Figure 1, illustrates the constructs of IT capability, market orientation, marketing information capability, customer service performance, and customer relationship performance. Specifically, it presents two philosophies—technological push and customer pull—and one dynamic capability perspective.

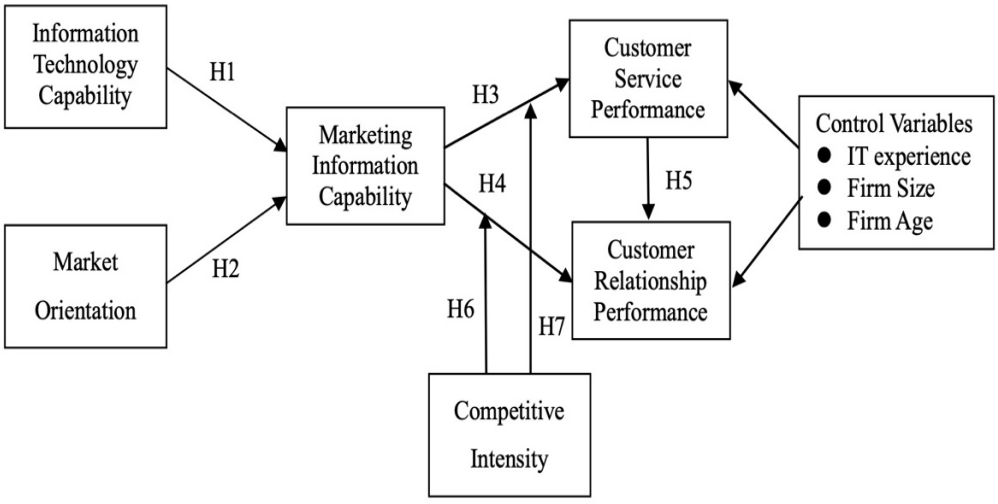

Figure 1
Model and hypothesized relationships

3.2 Hypothesis development

3.2.1 The antecedents of marketing information capability

Previously, researchers and practitioners viewed IMS primarily as tools for promoting a firm's products and services online. However, recent perspectives have expanded IMS to encompass a holistic approach that enhances marketing capabilities such as advertising, online sales, after-sales services, and marketing research (Mathews *et al.*, 2016). In this study, IMS are designed to help firms process and analyze marketing-related information from internal business data and external market information. Effective use of IMS requires IT capabilities, including IT infrastructure, management, and knowledge (Nam *et al.*, 2018), to integrate various data sources under changing business conditions. A lack of IT integration and information analysis hinders a firm's ability to predict and respond to market opportunities (Chen *et al.*, 2015).

Chuang and Lin (2017) emphasized the importance of IT-leveraging capability in e-service systems for offering information value, noting that sophisticated IT can enhance the integration of customer information from external sources. Firms need IT capabilities that support and are compatible with IMS to effectively handle sales, services, and data analysis from multiple sources. This integration is crucial for establishing marketing information capabilities within the firm, making sales and service information support a technology-based innovation.

H1: IT capability is positively related to marketing information capability.

Market orientation is a critical factor in successful e-business adoption (Gangwani and Bhatia, 2024). A market-oriented firm helps system designers establish effective IMS by processing market information, enabling firms to respond to changing customer demands (Hult *et al.*, 2005). Abundant market information allows firms to offer services that satisfy customer needs (Kaynak and Kara, 2004). Jayachandran *et al.* (2004) observed that effective market information dissemination promptly addresses customer needs, demonstrating the positive impact of market orientation on information processing.

Deficiencies in market orientation reduce market information generation, dissemination, and responsiveness, highlighting the importance of market orientation in optimizing information processing (Jayachandran *et al.*, 2004; Kaynak and Kara, 2004). Firms with a strong market orientation proactively understand and forecast customer preferences and demands. To achieve this, they must equip sales, service, and customer support personnel with thoroughly analyzed information. Effective information processing through IMS maximizes marketing information capability. Therefore, market information generation, dissemination, and responsiveness are essential for enhancing marketing information capability. A lack of market orientation hinders this process and impedes progress.

H2: Market orientation is positively related to marketing information capability.

3.2.2 Consequences of marketing information capability

Marketing studies have emphasized that customer service and customer relationship performance significantly influence firm performance. Customer service and support encompass how a product or service is delivered, bundled, explained, installed, renewed, and maintained (Cao *et al.*, 2024). This study defines customer service performance as the enhancement and provision of marketing-related information to customers through IMS.

A firm's ability to provide marketing information depends on its capability to create and utilize IMS outcomes. Effective use of IMS for marketing information enables firms to respond quickly and thoroughly to market changes and customer service issues. Quick and effective responses, facilitated by IMS, can improve customer perceptions of service performance (Jayachandran *et al.*, 2004; Setia *et al.*, 2013). For instance, IMS can help prevent customer churn and solve problems faster than competitors, thereby enhancing customer service performance (Chong *et al.*, 2018; Jones *et al.*, 2003).

H3: Marketing information capability is positively related to customer service performance.

The literature suggests that strong firm-customer relationships can reduce uncertainty and enhance these relationships. Customer satisfaction and loyalty can be achieved through developing e-marketing capabilities (Trainor *et al.*, 2011) and offering valuable information (Chuang and Lin, 2017). Providing better services and appropriate information are recognized as key factors for customer satisfaction, loyalty, and acquiring new customers. High-quality customer information, efficiently gathered and timely executed, leads to increased satisfaction (Chuang and Lin, 2013). These studies imply that marketing information capability positively influences customer relationship performance through enhanced satisfaction and loyalty.

The business management literature consistently highlights the role of IT in enhancing marketing capabilities (Chang *et al.*, 2010). The impact of technology on marketing capability relies on the firm's ability to provide valuable information. Effective use of marketing information capability by employees results in optimized sales, service, and analysis support, which in turn enhances customer relationships. For instance, sales support capabilities enable employees to offer customized products or services, while analysis support capabilities allow firms to forecast customer preferences and meet their needs.

H4: Marketing information capability is positively related to customer relationship performance.

The IS literature highlights the importance of a firm’s ability to serve and respond to customer needs, both of which influence customer relationship performance (Nam *et al.*, 2018). IT applications provide direct benefits to customer service performance, which in turn generates indirect benefits for customer relationship performance. Effective customer service, including prompt responses to customer issues, is critical for enhancing performance and gaining competitive advantages (Vickery *et al.*, 2003). Rust *et al.* (1995) suggested that high-quality customer service can lead to increased revenue and stronger business-to-business relationships, positioning improvements in customer relationship performance as a benefit of enhanced customer service performance.

H5: Customer service performance is positively related to customer

relationship performance.

3.2.3 Moderating influences of competitive intensity

The management literature suggests that environmental operating intensity moderates the relationship between IT capability and performance outcomes (Chen *et al.*, 2015). In less intense competitive environments, firms can rely on existing capabilities. However, in highly competitive environments, firms need new capabilities to respond swiftly to market demands and generate performance outcomes. Intense competition influences managers' decision-making, pushing firms to enhance sales revenue and expand abroad to compensate for limited profitability (Adomako *et al.*, 2017; Martin and Javalgi, 2016). Firms with robust sales, service, and information analysis capabilities are better equipped to predict and respond to market changes. Thus, we expect the impact of marketing information capability on performance outcomes to be stronger in highly competitive environments.

Given that marketing information capability is critical for connecting firms to customer service and customer relationship performance, we argue that its performance impact is higher in intensely competitive environments than in stable ones.

H6: Competitive intensity negatively moderates the relationship between marketing information capability and customer service performance.

H7: Competitive intensity negatively moderates the relationship between marketing information capability and customer relationship performance.

4. Motheds

4.1 Measurement of the variables

In this study, we adopted and reworded all multi-item scales from previous research to fit the IMS context (see Table 2). We measured the multidimensional construct of IT capability as a second-order construct with three formative first-order dimensions: IT infrastructure, management, and knowledge. The instruments were adapted from Lu and Ramamurthy (2011) and Nam *et al.* (2018).

IT capability was evaluated by assessing how well technologically related resources were integrated into enterprise information systems.

The market orientation scale, adapted from Bhatt *et al.* (2010) and Kaynak and Kara (2004), was modeled as a second-order construct with three formative first-order dimensions: information generation, dissemination, and responsiveness. For marketing information capability, also a second-order construct, we used measures adapted from Bianchi and Mathews (2016), Jayachandran *et al.* (2005), and Morgan (2012). This construct comprised three formative first-order dimensions: sales, service, and analysis support.

Customer service performance was assessed using five items adapted from Setia *et al.* (2013) and tailored to the IMS context. Customer relationship performance was measured with an adapted three-item scale from Chuang and Lin (2013). Finally, competitive intensity was measured using four items from a scale developed by Adomako *et al.* (2017).

4.2 Control variables

Our empirical research suggests that additional factors might influence performance, so this study explicitly controlled for three variables from previous literature: prior IT experience, firm size, and firm age. Prior IT experience: Experience with similar information technology (e.g., social media) helps in understanding customer demands and improving customer satisfaction (Nunan *et al.*, 2018). Firm size: Measured by the number of employees, larger firms might influence customer relationship performance due to having more resources for managing customer relationships and firm performance (Foltean *et al.*, 2019). Firm age: Likely to affect customer service and relationship performance as older firms might have a first-mover advantage and greater innovation capabilities, enhancing customer relationships (Messeni Petruzzelli *et al.*, 2018).

4.3 Sample selection and collection

To analyze the antecedents and consequences of marketing information capability using IMS, we selected one of the most widely used IMS to support sales, service, and marketing information analysis. Data was collected from

consumer product manufacturing firms listed in the "Top 5000 Largest Corporations in Taiwan." A structured questionnaire was developed to collect data on the firms' implementation and utilization of IMS. To ensure that respondents clearly understood the concept of IMS as it pertained to their organizations, the following steps were undertaken: (1) At the beginning of the questionnaire, we provided a clear and concise definition of IMS to ensure that all respondents had a common understanding of the term. (2) To ensure that only individuals with sufficient knowledge of IMS participated in the survey, a screening question was included: "Are you familiar with the IMS used in your company to support online marketing activities?" Only those who responded affirmatively were allowed to proceed with the survey. This methodological approach ensured that the respondents had sufficient familiarity with IMS to provide meaningful and accurate responses.

The questionnaire was prepared in three phases: (1)Translation from English to Chinese, followed by validation by two professors and two Ph.D. candidates in business management. (2)Review for clarity and readability by six marketing managers and three academic experts. (3)Pretesting with 20 managers from various industries, followed by interviews to refine the questionnaire based on their feedback.

Questionnaires and cover letters explaining the survey's purpose were sent via email and physical mail. Of the 486 questionnaires distributed, 47 responses were initially received. Follow-up phone calls resulted in an additional 78 responses, yielding 125 valid questionnaires and a final response rate of 25.7%. Respondents were from various industries, including electronics, automobiles, cosmetics, pharmaceuticals, and others. To address common method bias, Harman's one-factor test was employed. The factor analysis revealed six factors with eigenvalues greater than 1, accounting for 71% of the variance, with the first factor explaining only 18.1%. This indicated that common method bias was not a significant issue in our results.

This study focused on enterprises involved in the production of consumer products. The sample comprised 29 companies in the electronics industry (23.2%),

21 in the textile and apparel industry (16.8%), 35 in the food and health industry (28.0%), 26 in the home and furniture industry (20.8%), 1 in the bicycle industry (0.8%), 7 in the toy and stationery industry (5.6%), and 6 in the footwear industry (4.8%). We obtained 116 responses from the marketing managers of these enterprises, along with 6 responses from senior executives and 3 from individuals in other roles.

5. Analysis and results

We employed SmartPLS with partial least squares to estimate the model, and our data analysis included a measurement model using confirmatory factor analyses and a structural model to test our hypotheses. Table 1 presents the reliability and validity of the measurement model. Factor loadings ranged from 0.656 to 0.941, which are acceptable according to Hair *et al.* (1998). Composite reliability values for all first-order constructs ranged from 0.804 to 0.882, exceeding the recommended threshold of 0.70 (Segars, 1997). Average variance extracted (AVE) values were above 0.5, indicating adequate variance captured (Segars, 1997). Discriminant validity (Table 2) was confirmed as the square root of the AVE for each construct was larger than its correlations with other constructs (Fornell and Larcker, 1981).

We tested the proposed model using partial least squares structural equation modeling with a bootstrap resampling procedure. The results, shown in Figure 2 and Table 3, include the coefficients of causal relationships and R-square values, indicating the variance explained by antecedents. To test moderating effects, we analyzed the interaction between competitive intensity and marketing information capability on customer service and customer relationship performance. Significant hypothesized interaction effects are described in Model 2 (Table 3).

Model 1 tested the direct effect, while Figure 2 shows the paths and significance for Model 2. IT capability significantly influenced marketing information capability ($\beta = 0.384$, $p < 0.05$), as did market orientation ($\beta = 0.332$, $p < 0.05$), explaining 46.1% of the variance in marketing information capability, thus supporting H1 and H2. Marketing information capability significantly

Table 1

Constructs and measuring items

Constructs items	Factor Loadings	t-value
Information technology (IT) capability		
IT infrastructure; CR = 0.861, AVE = 0.674		
Indicate your agreement with each of the following statements with respect to IT infrastructure of your company.		
1. IT facilities operations and services are superior.	0.864	23.822
2. The network communication is sufficient with good connectivity, reliability, and availability.	0.835	22.978
3. The quality of IT applications can meet our company needs.	0.760	10.794
IT management; CR = 0.845, AVE = 0.646		
Indicate your agreement with each of the following statements with respect to IT management of your company.		
1. Our company has understanding on how IT contributes to the marketing advantages.	0.768	12.806
2. Our company integrates marketing strategic planning with IT planning.	0.839	23.149
3. Our company enables functional department and general management ability to understand the value of IT investment.	0.801	18.563
IT knowledge; CR = 0.828, AVE = 0.617		
Indicate your agreement with each of the following statements with respect to IT knowledge of your company.		
1. Our company constantly keep up with new IT innovations.	0.808	17.967
2. Our company has a climate that is supportive of trying out new ways of using IT.	0.821	18.262
3. Our company seek new ways to enhance the effectiveness of IT use.	0.723	8.400
Market orientation		
Information generation; CR = 0.854, AVE = 0.540		
1. Our employees interact directly with customers to learn how to service their needs better.	0.748	11.139
2. Our employees meet with customers to find out what products or services they will need in the future.	0.690	8.793
3. Our company is quick to detect changes in our customers products or services preferences.	0.816	19.504
4. The market intelligence on our competitors is generated independently by several departments of our company.	0.754	12.012
5. Our company is quick to detect fundamental shifts in our industry such as competition, technology, regulation.	0.656	6.951
Information dissemination; CR = 0.843, AVE = 0.642		
1. Our company has interdepartmental meeting to discuss market	0.796	12.013

trends and developments.		
2. Marketing personnel spend time discussing customers' future needs with other functional departments.	0.829	11.901
3. Marketing personnel in our company spend time discussing customers' future needs with other departments.	0.778	11.003
Information responsiveness; CR = 0.841, AVE = 0.639		
1. Our company reviews product/service development efforts to ensure that they are in line with what customers want.	0.801	8.770
2. Our company responds to our competitors' price changes.	0.819	12.382
3. Our company tends to consider changes in our customers' product/service needs.	0.777	7.848
Marketing Information Capability		
Sale support; CR = 0.814, AVE = 0.523		
Our company has the IMS to:		
1. Offer online sales.	0.678	11.960
2. Track customer order availability.	0.766	10.868
3. Provide customized products.	0.742	13.416
4. Advertise online.	0.703	10.106
Service support; CR = 0.833, AVE = 0.625		
Our company has the IMS to:		
1. Track customer service delivery.	0.712	11.471
2. Provide customer access to a knowledge base of solutions to FAQ.	0.821	18.683
3. Provide customer support personnel with access to data on customer interactions.	0.833	22.774
Analysis support; CR = 0.804, AVE = 0.578		
We use the IMS to:		
1. Forecast customer preferences and demands.	0.721	9.029
2. Analyze customer transaction data.	0.805	13.382
3. Assess product profitability.	0.752	9.900
Customer service performance*; CR = 0.884, AVE = 0.604*		
1. Our company provides customers with service information promptly after IMS adoption.	0.747	8.655
2. Our company is never too busy to respond to customers after IMS adoption.	0.702	7.522
3. Our company is empowered to solve customers' problems after IMS adoption.	0.829	16.658
4. Our company performs services accurately the first time after IMS adoption.	0.785	12.333
5. Our company understands customers' specific needs after IMS adoption.	0.817	16.369
Customer relationship performance*; CR = 0.854, AVE = 0..662*		
1. Our company has seen increased customer satisfaction since adopting the IMS.	0.724	7.226

2. Our company has observed increased customer loyalty since adopting the IMS.	0.841	15.171
3. Our company has experienced a higher customer acquisition rate since adopting the IMS.	0.868	24.180
Competitive intensity*; CR = 0.882, AVE = 0.656*		
1. Our local market experiences intense competition.	0.726	2.911
2. Our company faces relatively strong competitors.	0.684	2.624
3. Competition in our local market is extremely fierce.	0.941	3.417
4. Price competition is a defining characteristic of our local market.	0.862	3.382

Table 2

Discriminant validity

	II	IM	IK	IG	ID	IR	SS	SE	AS	CSP	CRP	CI
II	**0.821**											
IM	0.721	**0.803**										
IK	0.557	0.779	**0.785**									
IG	0.724	0.621	0.566	**0.735**								
ID	0.567	0.692	0.624	0.637	**0.801**							
IR	0.488	0.638	0.711	0.499	0.615	**0.799**						
SS	0.464	0.563	0.561	0.522	0.562	0.404	**0.723**					
SE	0.292	0.450	0.511	0.372	0.395	0.339	0.694	**0.791**				
AS	0.477	0.565	0.534	0.538	0.501	0.412	0.680	0.522	**0.760**			
CSP	0.190	0.325	0.376	0.297	0.315	0.377	0.350	0.327	0.359	**0.777**		
CRP	0.136	0.263	0.306	0.321	0.288	0.311	0.368	0.354	0.407	0.654	**0.814**	
CI	0.302	0.270	0.214	0.193	0.355	0.282	0.125	0.051	0.170	0.054	0.112	**0.810**

Notes: Diagonals represent the square root of average variance extracted, while the other matrix entries represent the correlations; II:IT infrastructure; IM: IT management; IK: IT knowledge; IG: Information generation; ID: Information dissemination; IR: Information responsiveness; SS: Sale support; SE: Service support; AS: Analysis support; CSP: Customer service performance; CRP: Customer relationship performance; CI: Competitive intensity.

impacted customer service performance ($\beta = 0.333$, $p < 0.001$) and customer relationship performance ($\beta = 0.190$, $p < 0.05$), supporting H3 and H4. Customer service performance positively affected customer relationship performance ($\beta = 0.570$, $p < 0.001$), supporting H5.

The interaction between marketing information capability and competitive intensity on customer service performance was significant and negative ($\beta = -0.121$, $p < 0.05$), supporting H6. As illustrated in Figure 2, firms operating in environments with a high competitive intensity encountered increased resource constraints, operational pressure, and rapidly evolving market conditions. These challenges reduced the effectiveness of marketing information capability in enhancing customer service performance, which led to a negative interaction effect. Conversely, in scenarios where the competitive intensity was low, firms experienced greater flexibility, which enabled them to fully leverage their marketing information capabilities, resulting in improved customer service performance. By visually illustrating these relationships, the slope figure helps clarify why the interaction between competitive intensity and marketing information capability on customer service performance is negatively significant. However, the interaction effect on customer relationship performance was not significant, so H7 was not supported. Control variables (IT experience, firm size, and firm age) had no significant effects on customer service and customer relationship performance.

6. Discussion

The results of this study highlight critical relationships among IT capability, market orientation, marketing information capability, customer service performance, and customer relationship performance in the context of IMS use.

IT capability directly influences marketing information capability by effectively managing and integrating IT infrastructure, management, and knowledge with IMS. This finding supports the idea that IT capability helps IMS integrate and analyze data, maximizing support for sales and service information. Consistent with Chuang and Lin (2013), firms invest in compatible IT and strive to create valuable information post-investment.

Market orientation positively affects marketing information capability by enhancing information generation, dissemination, and responsiveness. Firms that adapt quickly to changing customer preferences can better support sales and

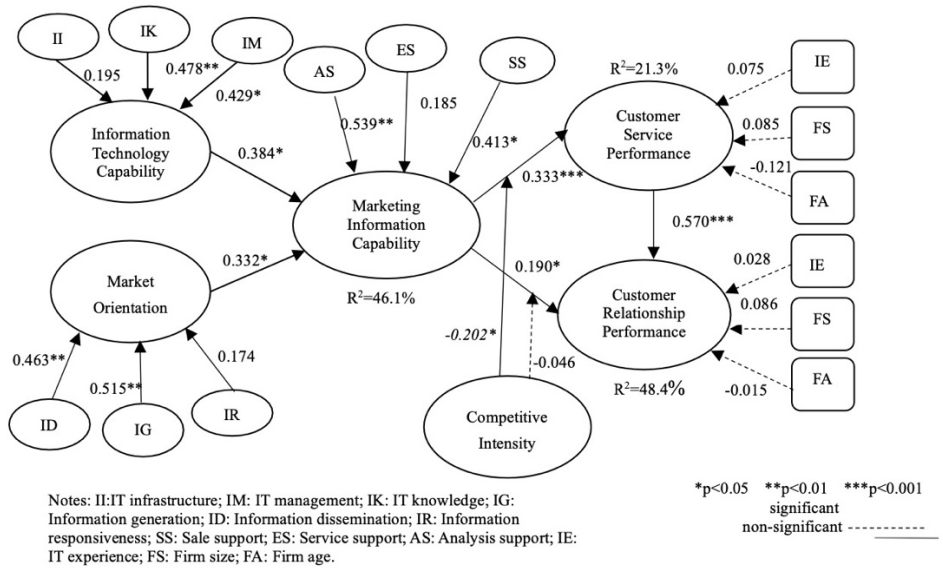

Figure 2

Path diagram for model 2

Table 3

Parameter estimates for all model runs

		Model 1 (direct effects)	Model 2 (interactive effects)
H1	ITC → MIC	0.384*	0.384*
H2	MO → MIC	0.332*	0.332*
H3	MIC → CSP	0.389***	0.333***
H4	MIC → CRP	0.197*	0.190*
H5	CSP → CRP	0.583***	0.570***
	IE → CSP	0.053	0.075
	IE → CRP	0.022	0.028
	FS → CSP	0.061	0.085
	FS → CRP	0.079	0.086
	FA → CSP	-0.098	-0.121
	FA → CRP	-0.006	-0.015
	CI → CSP		-0.152
	CI → CRP		-0.029
H7	MIC * CI → CSP		-0.202*
H8	MIC * CI → CRP		-0.046
R^2	MIC	0.461	0.461
	CSP	0.162	0.213
	CRP	0.482	0.484

Notes: * p < 0.05; ** p < 0.01; *** p < 0.001; ITC: Information technology capability; MO: Market orientation; MIC: Marketing information capability; CSP: Customer service performance; CRP: Customer relationship performance; CI: Competitive intensity; IE: prior IT experience; FS: Firm size; FA: Firm age

services information, aligning with studies by Jayachandran *et al.* (2004) and Trainor *et al.* (2011).

Marketing information capability has a weak but significant effect on customer service performance and a strong positive effect on customer relationship performance. This capability supports customer service, improves communication, and helps firms meet customers' latent needs and attract new customers. These results align with Jayachandran *et al.* (2004) and Setia *et al.* (2013), indicating advanced customer service performance through effective customer response capability.

In highly competitive environments, the moderating effect of competitive intensity on the relationship between marketing information capability and customer service performance is negative. This phenomenon can be explained by the following reasoning: (1) As competition intensifies, firms are compelled to allocate more resources to maintain their competitiveness, particularly in marketing and customer service. Although marketing information capabilities enhance a firm’s capacity to process information and respond to market needs, the increased demands for rapid responses and elevated customer expectations in such highly competitive environments can strain the firm’s resources. This strain can reduce the efficiency and effectiveness of customer service, even when firms possess strong marketing information capabilities. (2) In fiercely competitive markets, firms are often required to continually innovate and enhance their customer service to distinguish themselves from competitors. However, the returns on these improvements may diminish over time. Furthermore, even when they have advanced marketing information capabilities, firms may struggle to achieve further gains in customer service performance because their competitors may be investing in similar capabilities. This dynamic can create a scenario in which the marginal benefits of additional improvements in customer service performance decline, thereby contributing to the observed negative moderation. (3) When competition is intense, the pressure to rapidly adapt to market changes can compel firms to make rapid, reactive decisions that may not always align with the insights generated by their marketing information capabilities. This urgency to act can limit

a firm's ability to fully utilize the strategic value of information, leading to a weaker relationship between marketing information capability and customer service performance in such environments.

Although marketing information capability is essential to enhancing customer service performance, the increasing complexity and pressure inherent in highly competitive markets can attenuate the positive impact of this capability. Consequently, competitive intensity serves as a negative moderator in this relationship, diminishing the potential of marketing information to lead to superior customer service outcomes. While the effect on customer relationship performance was not significant, the findings suggest that using IMS to provide customized products enhances customer satisfaction and loyalty in intense environments. Our study confirms the importance of IT capability and market orientation in enhancing marketing information capability, which in turn improves customer service and relationship performance. Competitive intensity moderates these relationships, emphasizing the need for firms to adapt swiftly in dynamic environments to maintain customer satisfaction and loyalty.

7. Conclusions

7.1 Theoretical implications

This study offers several noteworthy contributions to the theoretical understanding of IMS, dynamic capability, and the integration of IT capability with market orientation in enhancing firm performance.

The term IMS encompasses a wide range of systems, the current research was the first study to integrate marketing information capability, IT capability, and market orientation to investigate how these factors collectively influence customer service and customer relationship performance. This study enhanced the understanding of how firms leverage IMS to not only collect and process information but also enhance their dynamic capabilities in highly competitive environments. The holistic approach undertaken in this study to assess the performance outcomes of IMS use has not been extensively explored in prior

research, which has primarily focused on specific tools or systems (e.g., CRM or social media platforms). Although IMS encompasses a broad spectrum of tools, this study specifically focused on the integrated use of these systems to enhance marketing information capability, which is a critical competence for firms operating in the modern digital landscape. By examining how firms leverage a combination of IT resources and market orientation to drive performance through IMS, the study provided a more comprehensive and practical perspective of IMS use in real-world business contexts.

This research expands the DCV by demonstrating how IT capability—encompassing infrastructure, management, and knowledge—and market orientation operate as dynamic capabilities that enable firms to reconfigure resources and adapt to rapidly changing environments. The findings indicate that these capabilities are essential to enhancing a firm's marketing information capability, which in turn improves customer service and customer relationship performance. This supports the theoretical proposition that firms with greater dynamic capabilities are better equipped to respond to external market demands and achieve superior performance.

The study identified competitive intensity as a notable moderator in the relationship between marketing information capability and performance outcomes, offering a novel perspective within the context of research on dynamic capabilities. The finding of a negative moderation effect in highly competitive environments indicates that the effectiveness of marketing information capability in improving customer service performance is diminished under intense competition because of operational pressures and resource constraints. This adds depth to the understanding of how dynamic capabilities operate in different market contexts, suggesting that firms must adapt their strategies in response to competitive conditions.

By investigating the interaction between IT capability and market orientation, this study effectively bridged the gap between research related to IT and that related to marketing. The results of the study indicate that successful integration of these capabilities within IMS yields improved performance outcomes,

confirming the importance of cross-functional alignment between IT and marketing strategies in the modern digital business environment. These findings enhance the understanding of how firms can create and leverage dynamic capabilities through the integration of IT resources with market-oriented practices.

This study also contributes to the broader field of IMS by offering a holistic perspective on how firms can utilize IMS to develop and enhance their marketing information capabilities. Whereas earlier studies have typically focused on specific tools or platforms (e.g., CRM or social media platforms), this study treated IMS as an integrated system that supports a range of online marketing activities. This approach provides a more comprehensive understanding of how IMS contribute to firm performance through the effective utilization of marketing information.

7.2 Managerial implications

The results of this study provide several actionable insights for managers and practitioners, particularly in firms leveraging IMS to enhance their marketing capabilities and improve performance outcomes.

The findings indicate that IT capabilities—including IT infrastructure, IT management, and IT knowledge—play a critical role in enhancing marketing information capability. To capitalize on this, firms should strategically invest in these dimensions to strengthen their IMS. Specifically, companies must ensure they establish a robust IT infrastructure that facilitates seamless marketing operations. Effective IT management is also essential for aligning IT strategies with overarching business objectives. Furthermore, fostering a culture that promotes continuous learning and innovation in IT use is crucial. By prioritizing these investments and practices, firms can enhance their capacity to process marketing data more efficiently and respond more effectively to customer needs.

The current study highlights the importance of marketing information capability as a fundamental driver of customer service performance. Firms can leverage this capability to enhance their responsiveness to customer needs, optimize service delivery, and foster stronger relationships with their customers.

By effectively using IMS, firms can gather valuable customer insights, forecast preferences, and deliver personalized services that align with evolving demands. This proactive approach can not only lead to enhanced customer satisfaction but also foster loyalty, thereby providing firms with a competitive advantage in CRM.

The findings of this study indicate that competitive intensity negatively moderates the relationship between marketing information capabilities and customer service performance. In highly competitive markets, firms may experience diminishing returns on their marketing information capabilities because of increased operational pressures and resource constraints. Managers should be aware of this and adapt their strategies accordingly. In such environments, streamlining operations, prioritizing the customer service initiatives that have the greatest impact, and focusing on maintaining agility to ensure rapid responses to market shifts may be necessary. Additionally, firms should explore avenues for differentiating themselves from competitors by enhancing customer experiences through the innovative use of IMS.

This research underscores the importance of aligning IT and marketing strategies. For firms to fully leverage their marketing information capabilities, IT and marketing departments must closely collaborate to ensure that marketing goals are supported by appropriate technological tools. This cross-functional integration will help firms to maximize the potential of their IMS, thereby optimizing their marketing efforts and enhancing customer interactions. Furthermore, such collaboration enables firms to gain deeper insights into customer behavior.

Managers should acknowledge that the effectiveness of IMS in enhancing customer service performance and customer relationship performance is influenced by the competitive environment they are in. In less competitive markets, firms can more effectively leverage their marketing information capabilities to drive performance improvements. Conversely, in more competitive markets, additional strategies may be necessary to sustain a competitive advantage. These strategies include investing in customer service technologies or focusing on niche markets where firms can offer differentiated value.

7.3 Limitations and future research directions

Our study has several limitations. First, the research was conducted in Taiwan, and conducting similar research in additional countries would extend the generalizability of our findings. Future research should verify cross-cultural differences in organizational mechanisms designed for handling marketing information in IMS. Second, a longitudinal study could provide further insights into the understanding of marketing information capability and how it might change in varying intensity environments. Third, the survey responses were all from top managers, and since participation was voluntary, there is a potential for selection bias. Although we used the Harman one-factor test to analyze the study's issues and found that the principal constructs were not subject to common method bias, indicating that our data did not suffer from a high degree of common method variance, this limitation should be considered in interpreting the results.

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