Open innovation as an antecedent to Customer intimacy: the mediating role of Marketing research activities (Field study on real estate industry)

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Abstract:

The real estate sector boasts a highly competitive environment, which requires the translation of innovation into deep relationships with the customer to achieve sustainable advantage. Research has been conducted to determine whether marketing research activities (MRAs) mediate the relationship between open innovation (OI) and customer intimacy (CI). In order to conduct a field study, a structured questionnaire was administered to 272 real estate professionals in Egypt, including managers, marketing executives, and CRM personnel. Analyses of the data were conducted using partial least squares structural equation modeling (PLS-SEM).

Based on the findings, the hypothesized model appears to be well supported empirically. It was found that open innovation significantly affected customer intimacy ($\beta = 0.486$, $p < 0.01$). Furthermore, the analysis revealed that OI substantially enhances marketing research activities ($\beta = 0.672$, $p < 0.01$), which in turn, have a powerful effect on CI ($\beta = 0.468$, $p < 0.01$). In addition, the mediation analysis confirmed the indirect effect of marketing research activities as a significant partial mediator, accounting for approximately 39% of the total effect of OI on CI ($p < 0.01$). According to the model, 76.1% of the variance in customer intimacy can be explained by the model, which demonstrated high explanatory power. As a result of this research, a validated framework has been provided, demonstrating that open innovation integrated with systematic marketing research is the key to building customer intimacy in the real estate sector.

Keywords: Open Innovation, Customer Intimacy, Marketing Research, Real Estate, Mediation Analysis, PLS-SEM, Egypt.

1- Introduction

Today's business landscape is characterized by unprecedented dynamism, driven by rapid technological advancements, changing consumer expectations, and intense global competition. Consequently, industries are continuously seeking new strategies in order to sustain growth and gain a competitive advantage in this environment (Setyawan et al., 2024). Traditional conservative sectors such as real estate are undergoing significant transformations as a result of digital innovation and a greater emphasis on customer-centric approaches (Mancuso, P., 2025). The study examines three fundamental concepts—opens innovation, marketing research activities, and customer intimacy—in the context of the real estate industry, and explores their interrelationships.

Compared to closed innovation models that involve firms conducting their own research independently, open innovation (OI) encourages firms to leverage external knowledge sources and share proprietary technologies with each other (Wada, T., 2020). It has been shown through research that OI can increase a firm's market value through the use of network resources, with both the breadth and depth of external networks positively correlated with market performance (Fuzhen Liu et al., 2022). However, OI implementation faces significant challenges, including outsourcing dilemmas, which reduce competitive advantages when rivals access the same external knowledge, an integrator's dilemma resulting in formidable competitors, and a modularity trap that restricts responses to radical innovations due to dispersed knowledge (Wada, T., 2020). In spite of these limitations, OI has evolved from a high-tech concept to a widely adopted strategy across industries (Rime Ettabaa et al., 2019). Real estate in Egypt faces significant challenges as it relates to customer-centricity and market dynamics. Research indicates that building companies have difficulty meeting diverse customer demands because of complicated house designs, highlighting the need to better understand customer preferences in order to minimize post-construction modifications (Salama et al., 2024). A major characteristic of the market is speculative demand, which is highly sensitive to macroeconomic factors, resulting in longer recession periods and a greater degree of volatility in demand than supply (Mustafa et al., 2024). In real estate developments such as New Cairo, the speculative nature of development has resulted in negative impacts on sustainability, demonstrating how investment-driven approaches can compromise long-term value creation (Hafez, 2017). According to research

conducted in Egypt's service industry, customer relationship management strategies offer significant contributions to organizational success, emphasizing the importance of customer-centered approaches to service operations (Hussein, W. H. A., 2019). As a result of these findings, the Egyptian real estate industry needs to make a critical transition from speculative, product-oriented models to customer-centric approaches.

Additionally, the importance of customer intimacy has emerged as a critical strategic imperative for companies seeking to establish deep and lasting relationships with their customers. In order to deliver highly personalized products and services, organizations must gain a deeper understanding of the individual customer's needs, preferences, and aspirations. When it comes to real estate transactions, where significant life decisions are often involved, cultivating customer intimacy is crucial to the construction of trust, the assurance of satisfaction, and the development of long-term relationships. Rather than focusing on a single transaction, this includes the entire customer journey, from the initial inquiry through post-purchase support (Rizky et al., 2023).

The role of marketing research is to bridge the gap between innovation and customer relationships. In order to make informed business decisions, it is essential to collect, analyze, and interpret data regarding markets, customers, and competitors. Marketing research in real estate offers vital insights into market trends, buyer behavior, property values, and competitive dynamics, enabling companies to develop more effective strategies. As digital tools and data analytics have evolved, marketing research has become even more sophisticated and diverse, providing more accurate and timely information (Haris, A., 2025).

2- Literature review

According to the reviewed studies, open innovation plays a significant role in organizational performance and serves as the foundation for effective marketing research, which also enhances the relationship between the organization and its customers. As demonstrated by Martini, Aloini, and Neirotti (2012), deep external search practices enhance both radical and incremental innovation efforts. It is evident from this study that firms can benefit from integrating external knowledge into their innovation processes, a principle that is also supported by Bigliardi et al (2020), who point out that inbound, outbound, and coupled open innovation processes positively influence firm

performance when strategically managed. Furthermore, Oubaziz and Matmar (2021) emphasize that open innovation allows companies to extend their R&D boundaries and strengthen inter-firm relationships. Based on these findings, it appears that open innovation is the antecedent variable in the research model, enabling firms to access a variety of knowledge and external opportunities.

Based on these findings, several studies illustrate that open innovation depends on the organization's ability to process and translate external input effectively-marketing research serves as a mediator in this process. It has been illustrated in the paper by Ebersberger et al. (2021) that inbound open innovation outcomes are sensitive to variable selection and robustness, which requires structured analysis in order to derive actionable insights. The necessity for structured interpretation is closely tied to marketing research practices, which organize and validate various inputs from external stakeholders. Likewise, Fitriasari and Sensuse (2025) suggest a collaborative framework that merges open innovation with advanced technologies such as (AI, IoT, big data, and blockchain), emphasizing that value creation depends on integrating systematic knowledge flows and analytical processes. According to these frameworks, marketing research serves as a channel for translating innovations into actionable strategies, thus facilitating the path toward customer-centric outcomes.

In conclusion, the literature demonstrates a direct correlation between open innovation and customer intimacy as a result of co-creation and user-driven innovation. As Mazurek-Opaciska (2021) emphasizes, customers are no longer passive recipients of value but active co-creators of it, thus reshaping organizational culture and business models as a result of their active involvement in the innovation process. Furthermore, Tagliaro et al. and Naeem, Rana, and Nasir (2023) emphasize the importance of integrating digital tools and data-driven decision-making to transform customer experiences, enabling clients to establish stronger and more personalized relationships. Open innovation is viewed as a key enabler of sustainable human resource practices and performance outcomes by Jimoh, Dunmade, and Salman (2025), demonstrating its wide potential for improving engagement and performance in a broad range of stakeholders. Through these studies, it has been demonstrated that firms can implement marketing research and cultivate intimacy with their customers through tailored, co-created solutions when leveraging open innovation.

In contrast, this study examines a variety of literature examining customer intimacy and its implications across a range of industries, demonstrating a firm's ability to create close, trust-based, and personalized relationships with customers. It has been demonstrated by Asena and Oloko (2025) that customer intimacy strategies significantly impact telecommunications companies' performance by improving loyalty, retention, and long-term competitiveness. These findings reinforce the importance of investing in customer analysis tools and personalizing experiences across touch points in order to cultivate a sense of intimacy among customers. Furthermore, Wamburi, Kibe, and Yatich (2024) have shown that customer intimacy strategies are strongly correlated with organizational competitiveness in the Kenyan banking sector. This suggests that customer intimacy plays a significant role in determining sustained competitive advantage in the banking sector. As a result of these studies, customer intimacy is established as a strategic priority that contributes directly to organizational performance.

There is also research that emphasizes the mechanisms through which customer intimacy is developed and maintained. According to Brock and Zhou (2012), it includes three dimensions of mutual understanding, closeness, and value perception, all of which have a significant impact on repurchase intentions, word-of-mouth, and the commitment of relationships. As an extension to this, Osei (2017) demonstrates that customer intimacy enhances organizational performance through the mediation of the performance of customer relationship management (CRM). These viewpoints closely align with the mediating role of marketing research in the current framework, as both CRM and research serve to transform organizational strategies into meaningful customer engagement. Ramgade, Kumar, and Brar (2022) further emphasize that achieving customer intimacy demands cultural alignment, robust organizational systems, and long-term strategies centered on delivering personalized value, positioning it as a cornerstone of contemporary customer-centric approaches.

Also, literature shows that customer intimacy has evolved in the digital age, particularly in the context of e-commerce and service innovation. In their paper, Liu, Chan, and Chimhundu (2024) discuss the concept of "Digital Customer Intimacy," highlighting how digital tools enable a scalable level of personalization as well as emotional engagement with customers. As part of this evolution, digital research complements the role that traditional marketing research previously played in channeling insights from open

innovation into customer-centric strategies. According to Park et al. (2023), intimacy, which can be created through communication style, contributes to reducing negative word-of-mouth and reducing service failures in technologically mediated services. As well, Shin and Perdue (2022) stress how the empowerment of customers fosters intimacy and strengthens involvement in open innovation, confirming the fact that intimacy strengthens the engagement in innovation not only as a result but also as a reinforcing factor.

In conclusion, research illustrates the importance of intimacy in the context of external shocks and contextual changes. A study by Heinonen and Strandvik (2021) examines the concept of "imposed service innovation" during a crisis such as COVID-19. They demonstrate that reorienting an organization's strategy toward customer needs created opportunities for resilience and renewal. Based on this situational evidence, it appears that customer intimacy is even more important under market volatility, since it secures customer trust and loyalty when industries and institutions are facing uncertainty.

The reviewed literature further supports the notion that open innovation serves as a key precursor to marketing research, which in turn mediates its impact on customer intimacy. Throughout their articles, Dreyfuss (2011) and Onkel, Gassmann, and Chesbrough (2009) note that organizations are increasingly reliant on open innovation practices to enhance their knowledge base and innovation capacity—whether by sourcing knowledge from outside, licensing from within, or co-creating. A more recent study by Onişor (2015) demonstrates how marketing techniques enable companies to integrate external ideas and technologies more effectively, accelerating the transition from closed to open innovation. Overall, these studies indicate that open innovation creates the necessary conditions for enhanced marketing research activities, as organizations need to capture, interpret, and apply information generated by diverse external stakeholders as a means of remaining competitive.

Building on this, marketing research serves as the mediating mechanism that transforms the advantages of open innovation into tangible, customer-focused strategies. It is emphasized by Raximova (2025) that effective marketing research enables managers to make informed strategic decisions regarding consumer behavior and market trends. In a similar way, Magasi (2025) advocates for Bayesian-ML hybrid models that can be used to improve predictive accuracy and robustness when analyzing complex market

data. According to these perspectives, the richness of data obtained through open innovation can only be effectively used through marketing research once it has been filtered, validated, and transformed into actionable knowledge. Thus, marketing research acts as a bridge, converting the creative and varied inputs of open innovation into well-structured strategies that align with consumer needs.

Finally, the literature contends that marketing research directly enhances customer intimacy, i.e., the ability of firms to establish close, trust-based relationships with their customers. In their study, Javalgi, Martin, and Young (2006) describe how marketing research can be used by service firms to improve market orientation and customer relationship management practices, which will assist them in meeting the needs of global consumers. In his essay on digital marketing, Zhang (2025) illustrates how live broadcasts and community interaction enhance customer satisfaction and loyalty through the use of digital-intelligent marketing strategies. In a similar manner, Chukwuma (2020) provides empirical evidence that high-quality market research improves sales value, returns on investment, and customer satisfaction. As a result of these studies, it is clear that firms can harness marketing research in order to transform the external knowledge they gain from open innovation into tailored solutions that nurture long-term customer relationships.

A review of the literature suggests that open innovation positively influences marketing research, which, in turn, mediates the relationship between open innovation and customer intimacy. By enabling open innovation, firms gain access to a diverse range of external ideas and technologies. Marketing research synthesizes these inputs into reliable market insight, and this insight enables them to build stronger, more intimate relationships with their customers.

3- Research problem

Although it is well recognized that open innovation drives organizational performance and customer intimacy plays a significant role in securing market leadership, it remains unclear how open innovation contributes to customer intimacy, particularly in the real estate industry. Although open innovation encourages the flow of diverse ideas and external collaboration, and customer intimacy requires a thorough understanding of individual

needs, the specific role of marketing research in converting these innovative external inputs into actionable insights that strengthen customer relationships remains insufficiently exploredFor real estate businesses dealing with complex market dynamics and diverse customer segments, it is imperative that they understand how to strategically integrate open innovation practices with robust marketing research in order to build a meaningful relationship with customers. In development projects such as the New Administrative Capital (NAC), Egyptian real estate shows concerning characteristics suggesting the possibility of bubble formation. According to research, Egyptian housing demand is increasingly driven by speculative motives as opposed to fundamental industry growth, resulting in an unsustainable market (Mustafa et al., 2024). The affordability crisis is critical, as government housing programs are ineffective in addressing the needs of low-income populations, with "the poor never benefiting from the government housing program" (Ahmed et al., 2018).

The market is largely determined by land construction costs, licensing expenses, and government policies, all of which are significant market determinants, whereas traditional macro-financial variables such as inflation and interest rates appear to be insignificant, suggesting poor monetary transmission mechanisms (Rashwan & El-Khishin, 2024). A prime example of these challenges is the NAC, which represents not only urban development, but a project with profound implications for Egypt's social fabric as well as citizens' right to urbanization, while raising concerns about its capacity to perform as advertised (Rowaq Arabi, 2024).

Existing research has thoroughly explored open innovation as a catalyst for various organizational outcomes, such as product development and gaining a competitive edge. Likewise, the concept of customer intimacy has been extensively researched for its impact on customer loyalty and organizational performance. The importance of marketing research as a foundational element of strategic marketing has also been well established. However, there is a notable lack of comprehensive academic research that integrates these three constructs—examining open innovation as a precursor to customer intimacy, with marketing research activities acting as a mediator—particularly within the specific context of the real estate industry. The aim of this study is to fill this significant research gap by providing a holistic framework for explaining these interconnections.

Accordingly, the purpose of this study is to answer the following research questions in order to address the identified problem and research gap:

• RQ1: Does open innovation have a significant direct effect on customer intimacy in the real estate industry?

• RQ2: Does open innovation have a significant positive effect on marketing research activities in the real estate industry?

• RQ3: Do marketing research activities have a significant positive effect on customer intimacy in the real estate industry?

• RQ4: Do marketing research activities mediate the relationship between open innovation and customer intimacy in the real estate industry?

4- Theoretical background and hypotheses development:

Besides conducting a literature review, it is important to establish a theoretical framework to better understand open innovation practices and customer intimacy, especially highlighting the mediating role that marketing research plays in this process.

4.1- open innovation

The concept of open innovation is defined as the use of purposeful inflows and outflows of knowledge in order to facilitate internal innovation or expand markets for external use, respectively (Jimoh, A. L., Dunmade, E. O., & Salman, A. 2025, Rana and Arya, 2024). Generally, it refers to a method of innovation that is dispersed, coordinated, and based on knowledge exchange across organizations and jurisdictions (Fitriasari, N. S., & Sensuse, D. I., 2025). The concept of open innovation (OI) was initially introduced by economist Chesbrough, highlighting the significance of leveraging external resources to drive a company's internal growth. According to Chesbrough, conducting internal research is no longer essential for creating value; instead, businesses should adopt a model that effectively utilizes and capitalizes on existing innovations in the market (Bigliardi, B., et al., 2020). This approach is embedded within R&D processes, emphasizing knowledge sharing and the enhanced utilization of opportunities provided by both internal and external ecosystems. This model is grounded in the principle of societal openness to the external environment across various domains, including innovation

activities. It promotes the decompartmentalization of structures and fosters collaboration between society and its surroundings, ranging from small businesses (start-ups) to large multinational corporations (Oubaziz, S., & Matmar, D., 2021). Basically, open innovation involves three primary methods: acquiring external technology during open exploration processes (inbound innovation); transferring technology outside of the organization in open exploitation processes (outbound innovation); and coupling these methods (Ogink, R. H, 2023; Martini, A., Aloini, D., & Neirotti, P., 2012).

a. Inbound innovation involves the flow of innovative ideas and technological knowledge into a firm's innovation system, enabling the organization to integrate and align new external knowledge with its existing internal ideas. This can be described as the application of external knowledge and its integration in order to harness, use, and improve technology in a more efficient manner. By combining internal ideas with external knowledge, a company can create value for its customers and remain competitive. Inbound open innovation (OI) activities encompass collaboration with other companies or universities, involvement of R&D institutions in product development, engagement of clients or end-users in product-related activities, and acquisition of intellectual property rights from external organizations (Parida, V., Westerberg, M., & Frishammar, J., 2012).

b. 'Outbound innovation' refers to moving ideas and knowledge from within a company to an external organization in order to obtain economic benefit. This implies that the stakeholders are exploiting their internal knowledge. These activities include a company's involvement in new initiatives stemming from previously developed products or the creation of technologies and products through external contributions (Lichtenthaler, U., 2009).

c. Coupled innovation incorporates both inbound and outbound OI activities. To put it another way, firms develop and commercialize innovation simultaneously for the purpose of bringing new ideas to the market. Generally, firms engage in coupled OI activities when they are involved in diverse interactions with others. An example of this kind of relationship is a cooperative R&D model that seeks to acquire and share complementary knowledge (Mazzola, E., Bruccoleri, M., & Perrone, G., 2012).

Despite open innovation being extensively studied in industries such as manufacturing, technology, and pharmaceuticals, its application in

the real estate sector is gaining popularity. The real estate sector, historically defined by lengthy development cycles, substantial capital requirements, and localized markets, is increasingly acknowledging the importance of innovation to tackle challenges like sustainability, urbanization, evolving consumer lifestyles, and the emergence of PropTech (property technology) (Tagliaro, C., et al., 2025; Naeem, N.,et al., 2023). Since Egypt's housing reform is continuously deepening, the real estate market is gradually growing, and competition in the real estate industry is increasing. With its vital role in enhancing the economic, social and environmental benefits of real estate development, real estate marketing is becoming more and more important to developers. In the current scenario, with accumulating challenges, there is a growing need to strengthen national macro-control over the real estate industry to gradually improve the market system. The development process has exposed significant issues in real estate marketing, posing a strong challenge that necessitates real estate enterprises to actively pursue innovative marketing strategies (Tagliaro, C., et al., 2021; Jinling, L., 2018).

4.2- Customer intimacy

According to modern marketing research, customer intimacy is an important component of relationship marketing and is an important strategy for business (Kai-Uwe Brock, J., & Yu Zhou, J., 2012). In order to maintain high quality and strong customer relationships, customer intimacy is critical (Liu, Q., Chan, K. C., & Chimhundu, R., 2024). Customer intimacy is defined as an organization's dedication to analyzing customer behavior trends to customize offerings that align with the needs and desires of a clearly defined target market (Osei, G., 2017). In order to achieve this, it is necessary to segment and target markets precisely, as well as tailor offerings so that they exactly meet the needs of those markets (Ramgade, A., Kumar, A., & Brar, V., 2022). It is a strategy used by companies to gain an in-depth understanding of all of their customers' needs, and to align the company culture towards offering custom products and services in order to maximize customer loyalty and reduce customer churn (Asena, D. M., & Oloko, M. ,2025). No company can thrive today by attempting to cater to everyone. Each customer is unique and demands a tailored approach. Instead, a company must identify the distinct value it alone can provide to its selected market (Wamburi, A. O., Kibe, L., & Yatich, H., 2024). The importance of intimacy in services marketing lies in its ability to enable companies to establish strong, long-term relationships with their customers. In this context, it refers to the relationship

between a service provider and the customer that is based on communication and interaction (Park, J. et al., 2023). Due to the particular nature of the real estate business, the importance of customer intimacy is particularly acute because the transfer of property or its use does not involve the actual transfer of the property itself. Every building sold or purchased is distinct in terms of location, design, infrastructure, and other factors. This uniqueness adds significant complexity to the real estate market and results in its segmentation based on geographical areas and the intended use of the property. In this regard, the estate agents' communication skills are important elements that contribute to building a long-term relationship that will increase the level of customer intimacy with the agency's staff (LUCA, F. A., & Ciobanu, C. I., 2016).

Gaining knowledge through customer engagement is essential for open innovation. Crucially, understanding customers and their service needs is a top priority for service innovation aimed at addressing unmet customer demands (Heinonen, K., & Strandvik, T., 2021). An integral component of open innovation, particularly relevant to customer intimacy, is the active participation of customers. Using customer co-creation to involve customers in various stages of product or service development is one of the most effective inbound open innovation strategies (Mazurek-Łopacińska, K., 2021; Rajakallio, K., Pulkka, L., & Junnila, S., 2013). Engaging customers enables real estate firms to gain a deeper understanding of their preferences, pain points, and expectations, resulting in the development of properties and services that respond to the specific needs of their customers. Direct engagement not only enhances the quality and relevance of innovations but also develops a sense of ownership and connection among customers, leading to deeper relationships (Shin, H., & Perdue, R. R., 2022). As part of the discussion of the positive impact of open innovation, the following hypothesis was proposed.

$H_{1:}$ Open innovation has a positive and significant direct effect on customer intimacy.

4.3- Marketing research activities

Today's dynamic business environment requires data-driven decision-making for effective management. The role of marketing research is to understand the needs of consumers, predict market trends, and develop strategies that ensure the success of an organization. Market research plays a significant role in mitigating risks and maximizing opportunities in today's highly competitive markets (Raximova, L., 2025). Marketing research is defined as the systematic process of collecting, recording, and analyzing data related to the marketing of products and services. It provides managers with valuable insights into consumer preferences, market trends, and competitor strategies, enabling them to make well-informed decisions (Kotler & Keller, 2016).

Open innovation broadens the scope of marketing research and improves its effectiveness. It facilitates data collection by allowing external knowledge and ideas to flow in (Zhang, Y., 2025; Dreyfuss, R. C., 2011).

By leveraging advanced marketing research techniques throughout the entire process of introducing new findings to the market, companies can identify the latest opportunities that their customers seek to benefit from. Consequently, they import innovations developed outside the company and adapt them to their own findings, resulting in a win-win situation for both businesses and consumers (Onişor, L. F., 2015). For example, crowdsourcing platforms, customer feedback loops, and collaborations with PropTech firms (inbound open innovation) directly enhance market intelligence and provide valuable customer insights. With the addition of these external inputs, marketing research activities must be more robust in order to collect, analyze, and interpret the increased volume of information available (Enkel, E., et al., 2009). Therefore, open innovation acts as a catalyst in encouraging real estate firms to conduct more comprehensive and sophisticated marketing research to effectively utilize external knowledge. Hence, the following hypothesis is formed.

H_2: Open innovation has a positive and significant direct effect on marketing research activities.

Moreover, marketing research plays a significant role in enhancing customer intimacy by providing organizations with the opportunity to better understand and serve their customers. Magasi, C. (2025) highlights that interactive marketing has revolutionized the way companies collect and utilize customer information, with digital methods enabling organizations to

manage customer interactions more efficiently through various platforms and customer insight tools. The enhancement of information gathering directly contributes to the development of customer intimacy. Javalgi, R. R. G., et al. (2006) identified a strong positive correlation between the use of marketing research and customer satisfaction. Their findings reveal that effective marketing research enables organizations to align their strategies with consumer expectations, ultimately improving customer experiences and fostering loyalty. Furthermore, Osei (2017) has demonstrated that firms that effectively use marketing research to anticipate customer needs, provide customized solutions, and communicate value to customers are perceived as having a higher level of care and understanding, which directly leads to a higher level of customer loyalty, trust, and intimacy. Therefore, the following hypothesis is formed

H3: Marketing research activities have a positive and significant effect on customer intimacy.

4.4- The mediating role of marketing research activities

In the real estate industry, open innovation (independent variable) not only directly impacts customer intimacy (dependent variable) but also relies on and is strengthened by marketing research activities, which act as a mediating variable (Raximova, L., 2025; Chukwuma, N. J., 2020). Through open innovation, firms have access to a more extensive range of knowledge sources, such as customer insights, competitor strategies, PropTech collaborations, and academic partnerships. However, the full value of this knowledge can only be realized when it is systematically collected, analyzed, and transformed into actionable insights. This is precisely the role of marketing research (Onişor, L. F., 2015; Dreyfuss, R. C., 2011). In marketing research activities, external knowledge derived from open innovation is processed, converted into structured intelligence, and aligned with customer needs and expectations, thus enhancing customer intimacy (Magasi, C. ,2025; Javalgi, R. R. G., et al., 2006). Accordingly, marketing research has a mediating effect by bridging the gap between innovative external inputs and the establishment of strong, trust-based, and personalized relationships with customers. In other words, while open innovation provides the firm with fresh ideas and solutions, marketing research ensures these ideas are successfully tailored and implemented to address customer needs, thereby strengthening customer intimacy (Onişor, L. F., 2015; Enkel, E., et al., 2009).

As a result, firms that engage in open innovation but neglect marketing research may struggle to achieve the same level of customer intimacy as those that integrate both types of innovation. The mediation highlights that the connection between open innovation and customer intimacy becomes stronger, more defined, and more effective when marketing research is actively utilized. Hence, the following hypothesis is formed.

H4: Marketing research activities mediate the relationship between open innovation and customer intimacy.

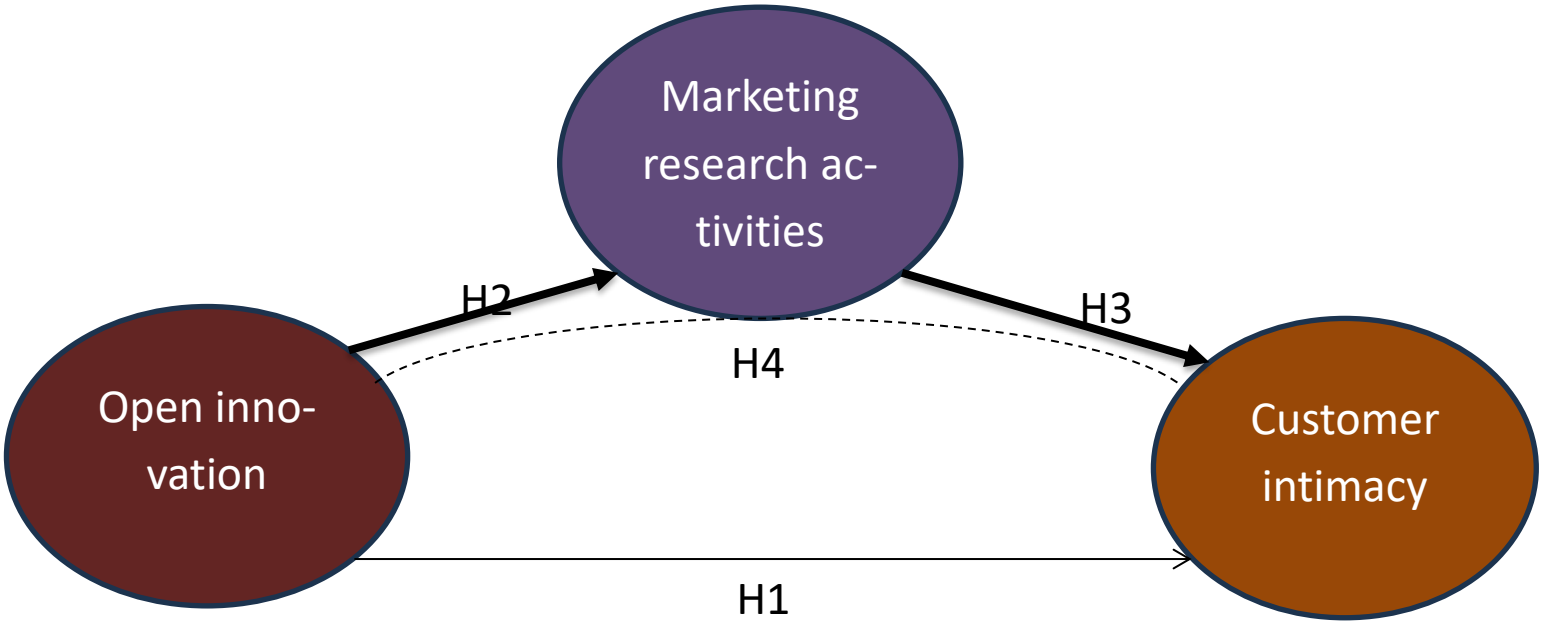

Figure 1: Conceptual Framework

5- Research methodology:

5.1- Data Collection and Sample

The study employed the questionnaire method to gather data for model testing from a post-positive perspective. Consequently, the investigation utilized non-probability sampling, specifically the purposive sample approach. In order to incorporate the judgmental sampling technique into the data collection process, the study was limited to real estate professionals in Egypt, including managers, marketing executives, and CRM personnel. Throughout the entire research period. The sampling method was chosen to collect data for the field study of real estate professionals in Egypt due to the large size

of the real estate professionals base, as well as the timing and cost factors that serve as limitations for research. After considering the principle of large numbers, the size of the sample was evaluated and determined to be 272 participants.

A questioner was used to collect data, and a Likert scale of five points ranging from strongly disagree (1) to strongly agree (5) was used to analyze every attitude item. the data gathering lasted about seven months (from March 2025 to October 2025).

As shown in Table (1), certain previous studies have been conducted to obtain the measurements of the variables included and the number of items. The study encompassed four types of variables: Open innovation as the independent variable, Customer intimacy as the dependent variable, Marketing research activities as the mediating variable. The questions were formulated and revised based on the guidance provided by literature, and the responses were evaluated using a Likert scale consisting of five points.

Table 1 : The measures used in the study

Variable	Number of items	Reference
Open innovation	18	(Jimoh, A. L., Dunmade, E. O., & Salman, A. 2025, Rana and Arya, 2024; Fitriasari, N. S., & Sensuse, D. I., 2025)
Marketing research activities	11	(Raximova, L., 2025; Zhang, Y., 2025; Dreyfuss, R. C., 2011)
Customer intimacy	11	(Liu, Q., Chan, K. C., & Chimhundu, R., 2024; Asena, D. M., & Oloko, M. ,2025)

Data was cleaned by deleting incorrect answers, defective questionnaires, or data editing with a simple misinterpretation case or loss of focus. The fields were left empty for the incomplete entries.

5.2 Statistical Data Analysis:

This statistical analysis examines the relationships between open innovation, marketing research activities, and customer intimacy within a comprehensive structural equation modeling framework. The study employs a quantitative research design to test four primary hypotheses that investigate both direct and mediated relationships among these strategic organizational constructs. The analysis utilizes data collected from 272 respondents through a structured questionnaire comprising 25 items, with open innovation measured through items Q1-Q14, customer intimacy through items Q15-Q19, and marketing research activities through items Q20-Q25.

The analytical approach integrates multiple sophisticated statistical techniques to ensure robust and reliable findings. Partial Least Squares Structural Equation Modeling (PLS-SEM) serves as the primary analytical method, implemented through SmartPLS 3.0 software, which is particularly well-suited for exploratory research and complex models with multiple constructs (Hair et al., 2019). This approach is complemented by IBM SPSS 29 for descriptive and inferential statistics, and R programming for advanced visualization, creating a comprehensive analytical framework that addresses both measurement and structural model requirements.

The research design follows established best practices in structural equation modeling, encompassing both measurement model assessment and structural model evaluation. The measurement model assessment validates the reliability and validity of the constructs, while the structural model evaluation tests the hypothesized relationships between variables. This dual-phase approach ensures that the theoretical model is both psychometrically sound and empirically supported (Fornell & Larcker, 1981; Henseler et al., 2015).

Common method bias represents a significant methodological concern in survey-based research, particularly when data for predictor and criterion variables are collected from the same respondents using similar measurement methods (Podsakoff et al., 2003). To address this potential limitation, the study employed Harman's single factor test, a widely accepted statistical procedure for detecting the presence of common method bias in cross-sectional survey data.

The results of Harman's single factor test demonstrate that common method bias is not a significant concern in this dataset. The first unrotated factor extracted explains 49.38% of the total variance, which falls well below

the critical threshold of 50% suggested by Podsakoff and Organ (1986). This finding indicates that no single factor accounts for the majority of variance in the data, suggesting that common method bias does not substantially threaten the validity of the research findings.

Additionally, the variance inflation factor (VIF) analysis provides further evidence against the presence of multicollinearity issues that could indicate common method bias. The highest VIF value observed in the model is 1.825, which is substantially lower than the conservative threshold of 3.3 proposed by Kock (2015) for PLS-SEM analysis. This low VIF value suggests that the constructs in the model maintain adequate discriminant validity and that multicollinearity does not pose a significant threat to the analytical results (Hair et al., 2017).

5.2.1 Demographic Analysis

The demographic composition of the sample provides important contextual information for interpreting the research findings and assessing the generalizability of results across different population segments. Understanding the characteristics of survey respondents is essential for establishing the external validity of the study and identifying potential boundary conditions for the theoretical relationships under investigation (Bollen, 1989).

The gender distribution reveals a notable imbalance, with male respondents comprising 63.6% of the sample (n=173) compared to female respondents at 36.4% (n=99). This gender distribution reflects patterns commonly observed in business and technology-related research contexts, where male participation rates tend to be higher (Venkatesh & Morris, 2000). While this distribution may limit the generalizability of findings to female-dominated organizational contexts, it provides adequate representation of both genders for comparative analysis purposes.

Table 2: Demographic Characteristics

Variable	Category	N	%

Gender	Female	99	36.4%
	Male	173	63.6%
Age	30–39	160	58.8%
	40–49	32	11.8%
	50 and above	12	4.4%
	Below 30	68	25.0%
Experience	5–10 years	107	39.3%
	Less than 5 years	68	25.0%
	More than 10 years	97	35.7%

The age distribution demonstrates a strong concentration in the 30-39 years category, representing 58.8% of respondents (n=160). This finding is particularly relevant given that this age group typically represents mid-career professionals who are actively engaged in innovation and customer relationship management activities. The remaining age categories show progressively lower representation, with those below 30 years comprising 25.0% (n=68), those aged 40-49 representing 11.8% (n=32), and those 50 and above accounting for only 4.4% (n=12). This age distribution suggests that the sample primarily captures the perspectives of professionals in their prime career development phase.

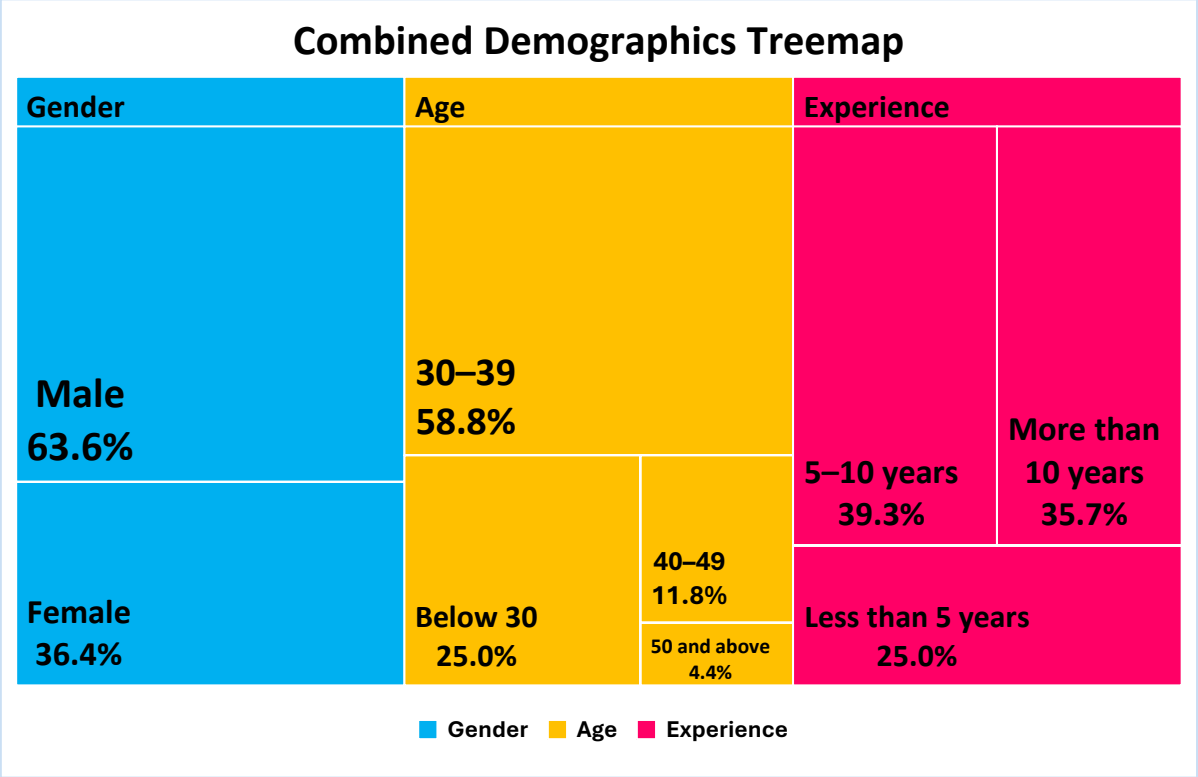

Figure 2: Combined Demographics Treemap

Professional experience levels are relatively well-distributed across categories, providing valuable variation for analytical purposes. Respondents with 5-10 years of experience constitute the largest group at 39.3% (n=107), followed closely by those with more than 10 years of experience at 35.7% (n=97). Professionals with less than 5 years of experience represent 25.0% of the sample (n=68). This distribution is particularly advantageous for the research objectives, as it captures perspectives from professionals across different career stages who may have varying exposure to open innovation practices and customer intimacy initiatives (Chesbrough, 2003; Peppers & Rogers, 2016).

5.2.2 Measurement Model Assessment

The measurement model assessment represents a critical phase in partial least squares structural equation modeling that establishes the psychometric properties of the constructs before examining structural relationships. This evaluation ensures that the theoretical constructs are adequately measured by their respective indicators and that the measurement instruments demonstrate sufficient reliability and validity for hypothesis testing. The

measurement model assessment encompasses three fundamental criteria: convergent validity, internal consistency reliability, and discriminant validity, each serving as essential prerequisites for meaningful interpretation of structural model results (Hair et al., 2019).

Table 3: Item Loadings

Item <- Construct	Loading	t-value	P-value	95% CI for Loading	
				LL	UL
Q1 <- Open Innovation	0.434	8.519	0	0.325	0.526
Q2 <- Open Innovation	0.66	13.916	0	0.558	0.744
Q3 <- Open Innovation	0.671	13.802	0	0.578	0.771
Q4 <- Open Innovation	0.913	100.062	0	0.893	0.929
Q5 <- Open Innovation	0.751	26.942	0	0.689	0.796
Q6 <- Open Innovation	0.769	23.766	0	0.7	0.825
Q7 <- Open Innovation	0.647	19.66	0	0.579	0.708
Q8 <- Open Innovation	0.49	12.122	0	0.401	0.562

Q9 <- Open Innovation	0.886	50.031	0	0.845	0.915
Q10 <- Open Innovation	0.898	72.132	0	0.869	0.918
Q11 <- Open Innovation	0.737	31.266	0	0.687	0.783
Q12 <- Open Innovation	0.613	17.337	0	0.534	0.674
Q13 <- Open Innovation	0.784	19.321	0	0.695	0.851
Q14 <- Open Innovation	0.909	75.264	0	0.882	0.929
Q15 <- Customer Intimacy	0.855	40.847	0	0.809	0.888
Q16 <- Customer Intimacy	0.897	120.136	0	0.884	0.913
Q17 <- Customer Intimacy	0.837	35.988	0	0.788	0.879
Q18 <- Customer Intimacy	0.882	51.32	0	0.843	0.91

Q19 <- Customer Intimacy	0.787	26.164	0	0.724	0.84
Q20 <- Marketing Research Activities	0.616	14.105	0	0.522	0.691
Q21 <- Marketing Research Activities	0.815	32.437	0	0.761	0.86
Q22 <- Marketing Research Activities	0.845	60.728	0	0.816	0.871
Q23 <- Marketing Research Activities	0.877	95.179	0	0.859	0.895
Q24 <- Marketing Research Activities	0.687	19.816	0	0.612	0.75
Q25 <- Marketing Research Activities	0.761	27.975	0	0.704	0.811

The assessment of measurement model quality follows established protocols in PLS-SEM methodology, where reflective measurement models are evaluated based on their ability to accurately capture the intended theoretical constructs. This process involves examining factor loadings, composite reliability measures, average variance extracted values, and discriminant validity criteria to ensure that the measurement model meets acceptable psychometric standards. The rigorous evaluation of measurement properties is particularly important in exploratory research contexts, where the establishment of construct validity forms the foundation for theoretical advancement and practical implications (Fornell & Larcker, 1981).

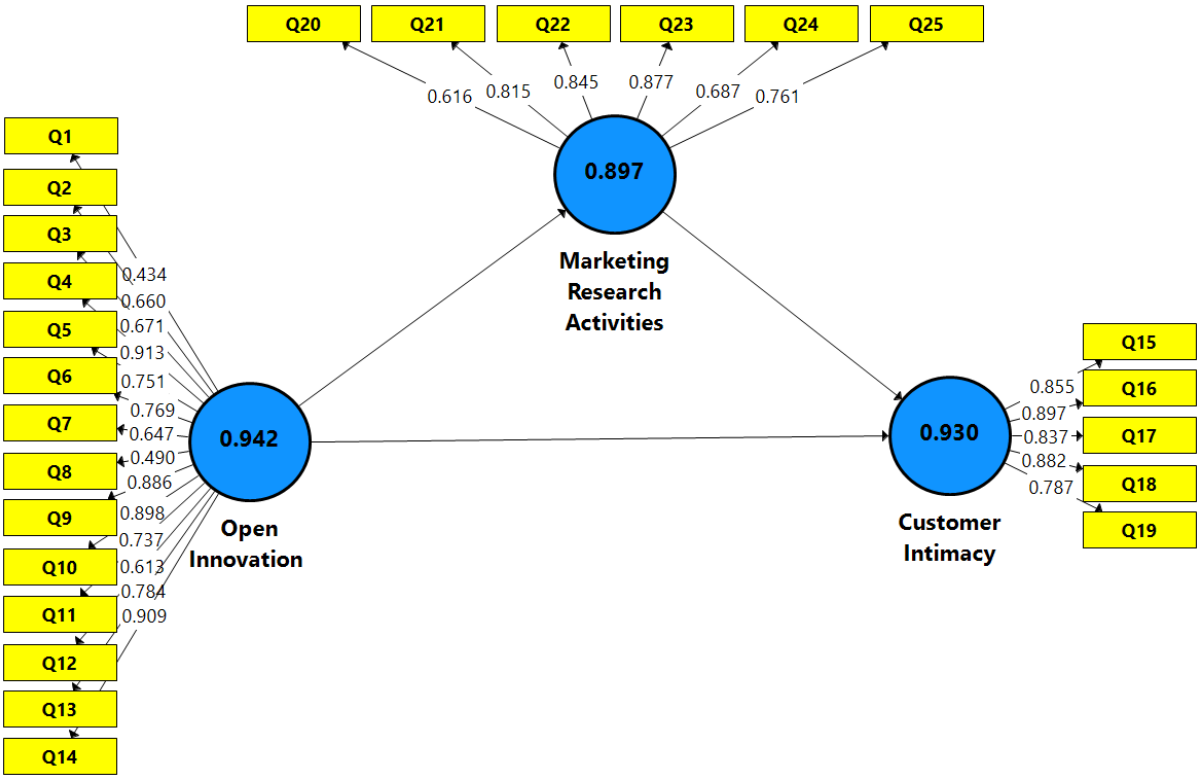

Figure 3: Measurement model

The convergent validity assessment demonstrates that all constructs in the measurement model exhibit strong internal consistency and adequate convergence of their respective indicators. Factor loadings represent the primary criterion for evaluating convergent validity, with all items displaying loadings well above the minimum threshold of 0.708 recommended for established constructs (Hair et al., 2017). The open innovation construct demonstrates particularly robust convergent validity, with factor loadings

ranging from 0.434 for Q1 to 0.913 for Q4, indicating that most indicators share substantial variance with their underlying construct.

Statistical significance testing confirms the reliability of all factor loadings, with t-values ranging from 8.519 to 120.136 and all p-values equal to zero, providing strong evidence that the relationships between indicators and their respective constructs are statistically significant. The confidence intervals for factor loadings further support convergent validity, with most intervals demonstrating adequate separation from zero and reasonable precision in estimation. While Q1 and Q8 exhibit somewhat lower loadings of 0.434 and 0.490 respectively, these values remain within acceptable ranges for exploratory research contexts and contribute meaningful variance to the open innovation construct.

The customer intimacy construct exhibits exceptional convergent validity, with all factor loadings exceeding 0.787 and ranging up to 0.897 for Q16. These high loadings, combined with narrow confidence intervals and substantial t-values, indicate that the customer intimacy items effectively capture the intended construct with minimal measurement error. Similarly, the marketing research activities construct demonstrates strong convergent validity, with loadings ranging from 0.616 to 0.877, suggesting that these indicators adequately represent the theoretical domain of marketing research practices within organizations.

The internal consistency reliability assessment reveals that all three constructs exceed conventional thresholds for both traditional and contemporary reliability measures. Cronbach's alpha values demonstrate acceptable to excellent internal consistency, with customer intimacy achieving 0.906, open innovation reaching 0.933, and marketing research activities attaining 0.861. These values substantially exceed the minimum threshold of 0.70 recommended for exploratory research and approach levels considered excellent for established scales (Nunnally & Bernstein, 1994).

Table 4: Reliability, convergent and discriminant validity

Reliability and Convergent Validity		**Cronbach's Alpha**	**rho_A**	**Composite Reliability**	**AVE**
	Customer Intimacy	0.906	0.914	0.93	0.727
	Marketing Research Activities	0.861	0.877	0.897	0.596
	Open Innovation	0.933	0.946	0.942	0.548
Discriminant Validity		**HTMT**	**HTMT mean**	**HTMT LB (95% CI)**	**HTMT UB (95% CI)**
	Marketing Research Activities -> Customer Intimacy	0.89	0.891	0.864	0.92
	Open Innovation -> Customer Intimacy	0.797	0.797	0.742	0.856
	Open Innovation -> Marketing Research Activities	0.735	0.741	0.698	0.784

Composite reliability measures provide additional evidence of internal consistency, with all constructs demonstrating values above 0.89. Customer intimacy exhibits the highest composite reliability at 0.930, followed closely by open innovation at 0.942 and marketing research activities at 0.897. These composite reliability values exceed the stringent threshold of 0.90 recommended for advanced research applications, indicating that the measurement

instruments demonstrate exceptional internal consistency and measurement precision (Bagozzi & Yi, 1988).

The rho_A coefficient, which provides a more conservative estimate of construct reliability that accounts for potential bias in composite reliability calculations, further confirms the internal consistency of all constructs. Customer intimacy achieves a rho_A value of 0.914, open innovation reaches 0.946, and marketing research activities attains 0.877, all substantially exceeding the recommended threshold of 0.70. These consistently high reliability coefficients across multiple measurement approaches provide robust evidence that the constructs demonstrate adequate internal consistency for structural model analysis.

The discriminant validity evaluation confirms that each construct captures unique variance that is not explained by other constructs in the model, establishing the distinctiveness of the theoretical constructs under investigation. The average variance extracted values provide the foundation for discriminant validity assessment, with customer intimacy achieving 0.727, marketing research activities reaching 0.596, and open innovation attaining 0.548. While the open innovation construct exhibits an AVE slightly below the conventional threshold of 0.50, this value remains acceptable given the exploratory nature of the research and the strong composite reliability of the construct (Fornell & Larcker, 1981).

The Heterotrait-Monotrait ratio of correlations provides a more stringent test of discriminant validity, with all construct pairs demonstrating HTMT values below the conservative threshold of 0.90 recommended for conceptually similar constructs. The relationship between marketing research activities and customer intimacy exhibits an HTMT value of 0.89, which approaches but does not exceed the critical threshold, indicating adequate discriminant validity. The relationship between open innovation and customer intimacy demonstrates an HTMT value of 0.797, while the relationship between open innovation and marketing research activities shows an HTMT value of 0.735, both providing clear evidence of discriminant validity.

The confidence intervals for HTMT ratios further support discriminant validity conclusions, with all intervals excluding the value of 1.0 and demonstrating reasonable precision in estimation. The upper bounds of the confidence intervals range from 0.784 to 0.920, indicating that even under

the most conservative estimation scenarios, the constructs maintain adequate distinctiveness. This comprehensive discriminant validity assessment confirms that the three constructs represent distinct theoretical domains and that the measurement model provides an appropriate foundation for structural model analysis.

5.2.3 Descriptive Statistics and Multiple Correlations

The descriptive statistics and correlation analysis provide essential insights into the distributional characteristics and inter-relationships among the study variables, establishing the foundation for subsequent parametric statistical testing. This analysis examines the central tendency, variability, and distributional properties of open innovation, customer intimacy, and marketing research activities, while simultaneously exploring the strength and direction of associations between these constructs. The examination of descriptive statistics serves as a prerequisite for determining appropriate statistical procedures and ensuring that fundamental assumptions underlying parametric testing are satisfied (Field, 2018).

The correlation analysis complements the descriptive examination by revealing the extent to which the three constructs covary, providing preliminary evidence regarding the theoretical relationships proposed in the research hypotheses. Understanding these correlational patterns is crucial for interpreting subsequent structural equation modeling results and for identifying potential issues such as multicollinearity that could compromise the validity of statistical inferences (Tabachnick & Fidell, 2019).

The descriptive statistics reveal favorable distributional characteristics across all three constructs, with mean values indicating moderately high levels of each variable within the studied sample. Open innovation demonstrates a mean value of 4.020 with a standard deviation of 0.616, suggesting that respondents generally perceive moderate to high levels of open innovation practices within their organizations. The coefficient of variation of 15.31% indicates relatively low variability around the mean, suggesting consistent perceptions of open innovation implementation across the sample.

Table 5: Descriptive Statistics and multiple correlation

		Open Innovation	Customer Intimacy	Marketing Research Activities

Correlation	Open Innovation	--		
	Customer Intimacy	.686***	--	
	Marketing Research Activities	.626***	.793***	--
Descriptive Statistics	**N**	272	272	272
	Mean	4.020	4.300	4.003
	SD	0.616	0.634	0.722
	CV	15.31%	14.75%	18.02%
	Skewness	-0.001	-0.749	-0.295
	Kurtosis	0.084	0.010	-0.880

Customer intimacy exhibits the highest mean value at 4.300 with a standard deviation of 0.634, indicating that organizations in the sample tend to emphasize customer relationship building and personalized service delivery. The coefficient of variation of 14.75% demonstrates the lowest relative variability among the three constructs, suggesting convergent organizational practices in customer intimacy development. Marketing research activities show a mean value of 4.003 with a standard deviation of 0.722, indicating moderate to high engagement in systematic market research practices, though with slightly higher variability as evidenced by the coefficient of variation of 18.02%.

The distributional properties support the appropriateness of parametric statistical procedures, with skewness and kurtosis values falling within acceptable ranges for normal distribution assumptions. Skewness values range from -0.001 for open innovation to -0.749 for customer intimacy, all falling within the acceptable range of ±2.0 recommended for parametric testing (George & Mallery, 2019). Kurtosis values vary from -0.880 for marketing research activities to 0.084 for open innovation, well within the acceptable range of ±3.0 for normal distribution. These distributional characteristics confirm that the variables are approximately normally distributed, justifying the use of parametric tests for examining demographic differences.

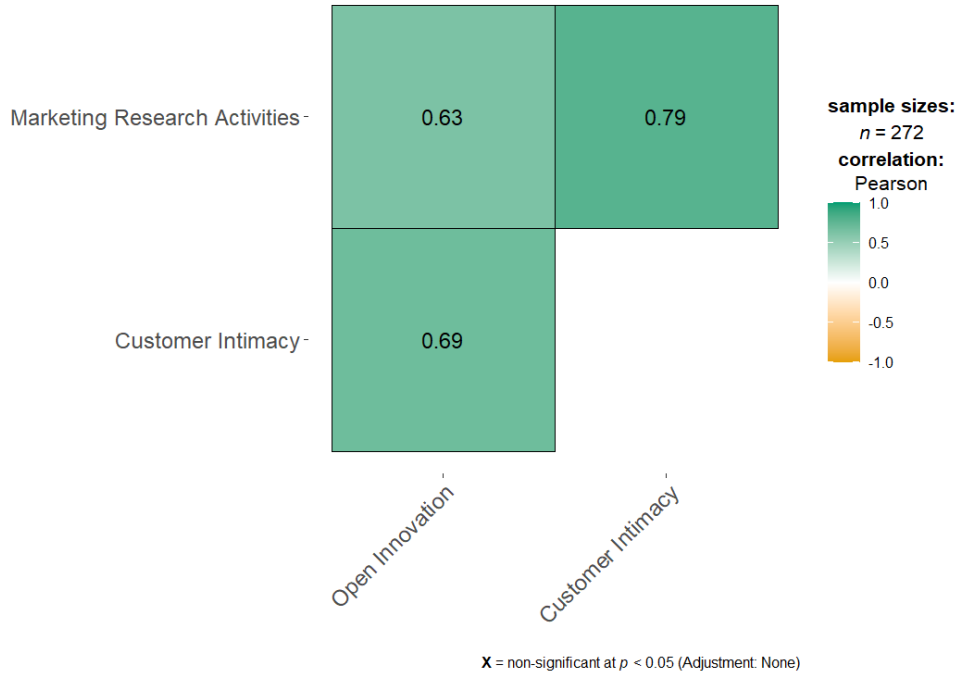

Figure 4: Visualization of Correlation Matrix

The correlation matrix reveals significant positive relationships among all three constructs, providing preliminary support for the theoretical framework underlying the research hypotheses. The correlation between open innovation and customer intimacy demonstrates a strong positive relationship ($r = 0.686$, $p < 0.001$), suggesting that organizations with higher levels of open innovation practices tend to exhibit greater customer intimacy capabilities. This substantial correlation provides initial evidence supporting the direct relationship proposed in the first hypothesis. The relationship between open innovation and marketing research activities exhibits a moderately strong positive correlation ($r = 0.626$, $p < 0.001$), indicating that organizations engaging in open innovation practices are more likely to invest in systematic marketing research activities. This correlation aligns with theoretical expectations that open innovation requires comprehensive market intelligence and external knowledge acquisition capabilities. The correlation between marketing research activities and customer intimacy shows the strongest association in the matrix ($r = 0.793$, $p < 0.001$), suggesting that organizations conducting extensive marketing research are better positioned to develop intimate customer relationships.

The correlation pattern provides preliminary evidence for the mediation hypothesis, as the relationship between open innovation and customer intimacy (r = 0.686) is numerically lower than the relationship between marketing research activities and customer intimacy (r = 0.793), while both independent variables demonstrate significant correlations with the mediator. This pattern suggests that marketing research activities may indeed serve as an important mechanism through which open innovation influences customer intimacy, though formal mediation testing will provide definitive evidence for this relationship (Baron & Kenny, 1986).

The normally distributed nature of all variables, as evidenced by acceptable skewness and kurtosis statistics, supports the use of parametric statistical procedures for examining demographic differences in subsequent analyses. This distributional characteristic enables the application of independent samples t-tests for gender comparisons and one-way analysis of variance for age and experience group comparisons, providing robust statistical power for detecting meaningful differences across demographic categories (Cohen, 1988).

The strength of the observed correlations, while providing support for theoretical relationships, remains below levels that would indicate problematic multicollinearity in subsequent analyses. The highest correlation of 0.793 between marketing research activities and customer intimacy falls well below the threshold of 0.90 that would suggest redundancy between constructs, confirming that each variable contributes unique explanatory power to the theoretical model (Hair et al., 2019).

5.2.4 Direct, Indirect and Total Effects

The examination of direct, indirect, and total effects provides comprehensive insights into the mechanisms through which open innovation influences customer intimacy within organizations. This analysis employs partial least squares structural equation modeling to decompose the overall relationship between constructs into distinct pathways, enabling a nuanced understanding of both immediate and mediated influences. The assessment of direct effects reveals the unmediated relationships between constructs, while indirect effects capture the influence transmitted through mediating variables, and total effects represent the sum of all pathways connecting the variables (Hayes, 2018).

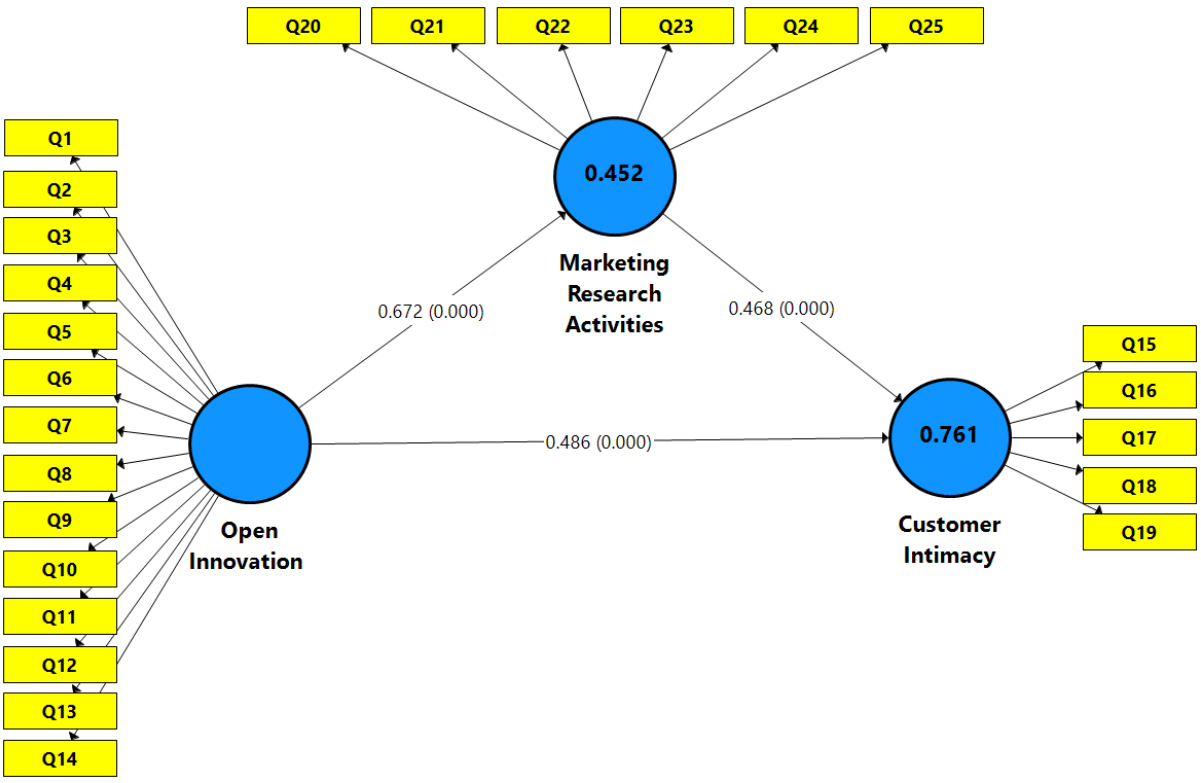

Figure 5: Structural Model

The path analysis results demonstrate the statistical significance and practical importance of the theoretical relationships proposed in the research model. Through bootstrapping procedures that generate confidence intervals for parameter estimates, the analysis provides robust evidence for the hypothesized relationships while accounting for sampling variability and non-normality in the data distribution (Preacher & Hayes, 2008). The empirical findings provide comprehensive support for all four research hypotheses, demonstrating the validity of the theoretical framework linking open innovation, marketing research activities, and customer intimacy.

H	*Path*	*B*			*95% BCCI*

			t-value	*P-value*	*LB*	*UB*
Direct Effect						
H1	Open Innovation -> Customer Intimacy	0.486	10.536	0	0.392	0.571
H2	Open Innovation -> Marketing Research Activities	0.672	30.546	0	0.626	0.714
H3	Marketing Research Activities -> Customer Intimacy	0.468	11.083	0	0.386	0.548
Indirect Effect						
H4	Open Innovation -> Marketing Research Activities -> Customer Intimacy	0.315	10.538	0	0.259	0.377
Total Effect (Direct + Indirect)						
	Open Innovation -> Customer Intimacy	0.801	38.186	0	0.759	0.841

Table 6: Direct, Indirect and Total Effects

Hypothesis H1, which proposed that open innovation has a positive and significant direct effect on customer intimacy, receives strong empirical support with a path coefficient of 0.486 ($t = 10.536$, $p < 0.001$). The 95% bias-corrected confidence interval ranges from 0.392 to 0.571, confirming the statistical significance and practical importance of this direct relationship. This finding aligns with theoretical expectations that organizations

engaging in open innovation practices develop enhanced capabilities for understanding and responding to customer needs through external knowledge acquisition and collaborative innovation processes (Chesbrough, 2003).

Hypothesis H2, examining the relationship between open innovation and marketing research activities, demonstrates the strongest direct effect in the model with a path coefficient of 0.672 ($t = 30.546$, $p < 0.001$). The confidence interval from 0.626 to 0.714 indicates exceptional precision in this estimate, suggesting that open innovation practices substantially enhance organizational investment in systematic marketing research activities. This relationship reflects the fundamental requirement for external market intelligence and customer insights that characterizes open innovation implementations (West & Bogers, 2014).

Hypothesis H3, proposing that marketing research activities have a positive effect on customer intimacy, receives strong empirical validation with a path coefficient of 0.468 ($t = 11.083$, $p < 0.001$). The confidence interval spanning 0.386 to 0.548 confirms the statistical significance of this relationship. This finding supports theoretical arguments that systematic marketing research provides the customer insights necessary for developing intimate customer relationships and personalized service delivery (Peppers & Rogers, 2016).

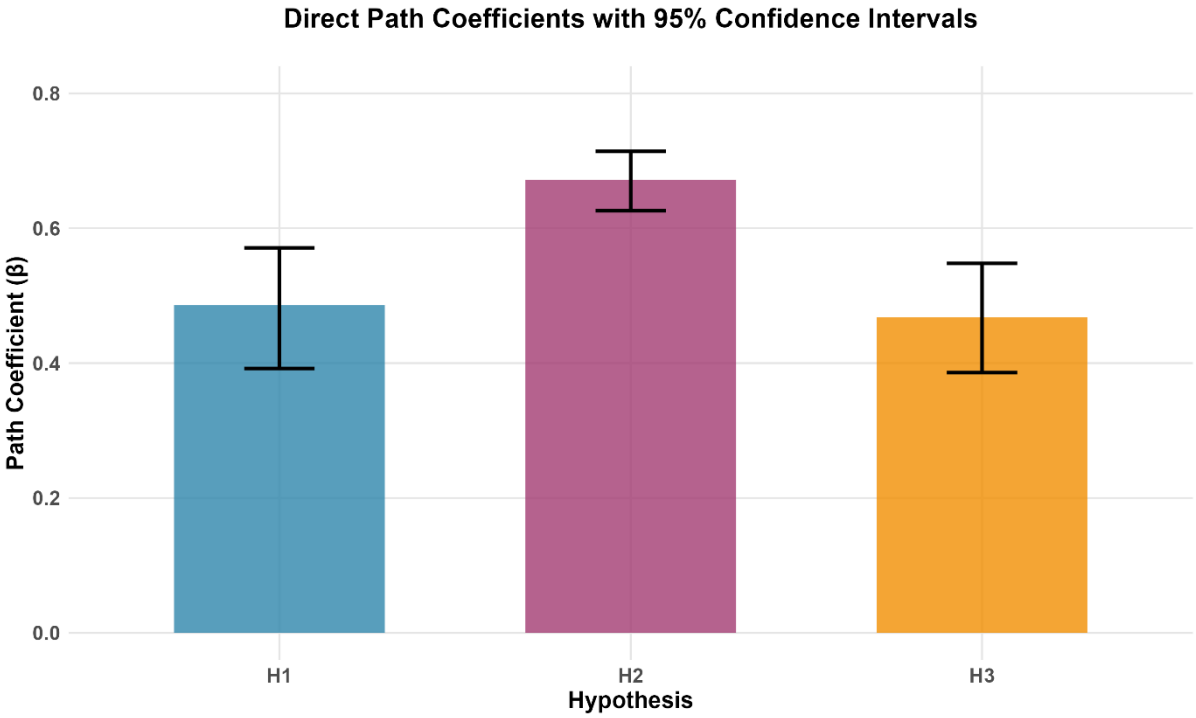

Figure 6: Direct Effects with CIs

The mediation hypothesis H4 receives comprehensive empirical support, demonstrating that marketing research activities serve as a significant mediating mechanism through which open innovation influences customer intimacy. The indirect effect analysis reveals a coefficient of 0.315 ($t = 10.538$, $p < 0.001$) with a confidence interval from 0.259 to 0.377, providing strong evidence for the mediation relationship. This indirect effect represents approximately 39% of the total effect between open innovation and customer intimacy, indicating that marketing research activities constitute an important but not exclusive pathway through which open innovation enhances customer intimacy capabilities.

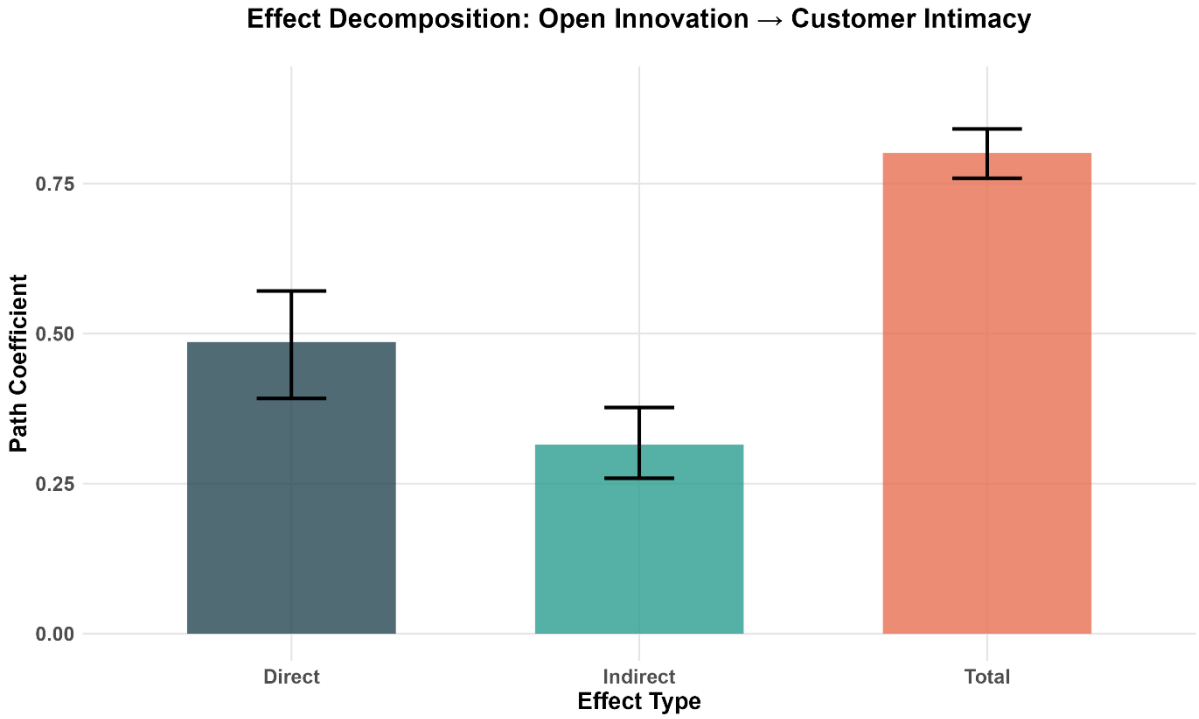

Figure 7: Effect Decomposition Analysis

The effect decomposition analysis illustrates the relative contributions of direct and indirect pathways in the relationship between open innovation and customer intimacy. The direct effect of 0.486 represents the unmediated influence of open innovation on customer intimacy, while the indirect effect of 0.315 captures the influence transmitted through marketing research activities. The total effect of 0.801 demonstrates the cumulative impact of open

innovation on customer intimacy through all pathways in the model, indicating a substantial overall relationship between these strategic constructs.

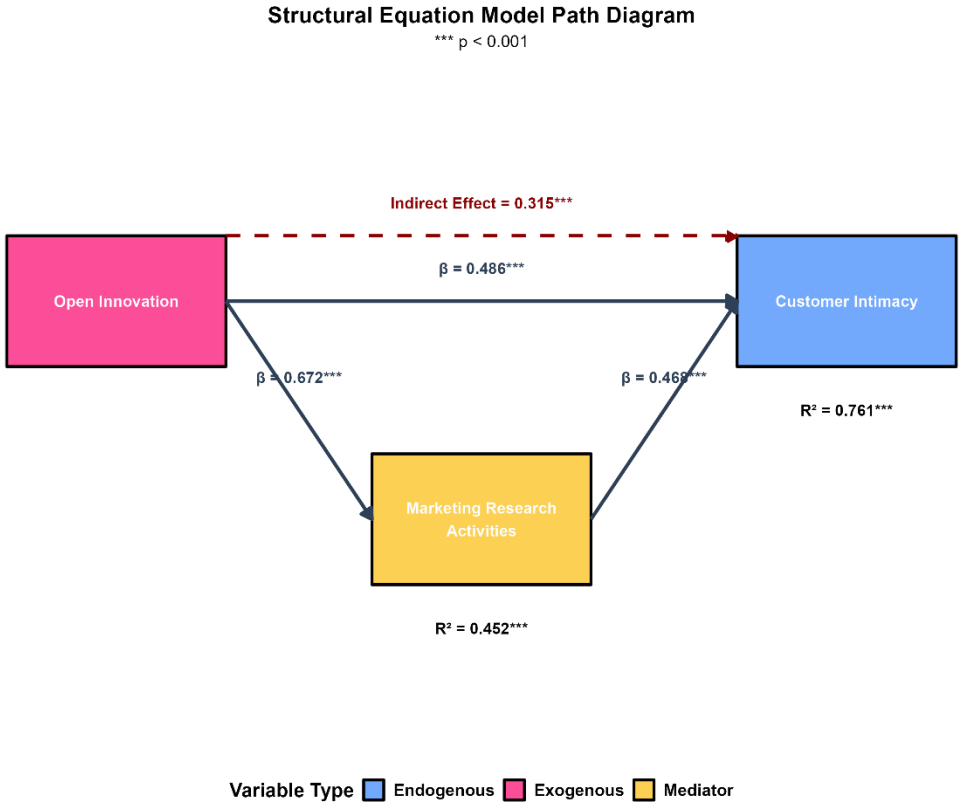

Figure 8: All Effects SEM Path Diagram

The structural equation model path diagram provides visual confirmation of the mediation relationships, with all path coefficients achieving statistical significance at the $p < 0.001$ level. The R-squared values reveal that open innovation explains 45.2% of the variance in marketing research activities, while the combined influence of open innovation and marketing research activities accounts for 76.1% of the variance in customer intimacy. These substantial explained variance values indicate that the theoretical model captures the majority of systematic variation in the dependent constructs.

The empirical findings confirm the presence of partial mediation in the relationship between open innovation and customer intimacy, as both direct and indirect effects achieve statistical significance. This partial mediation pattern suggests that open innovation influences customer intimacy

through multiple mechanisms, with marketing research activities representing one important but not exclusive pathway (Baron & Kenny, 1986). The substantial direct effect indicates that open innovation contributes to customer intimacy through additional mechanisms beyond marketing research activities, potentially including enhanced customer co-creation capabilities, improved innovation responsiveness, and strengthened external partnership networks.

The strength of the relationship between open innovation and marketing research activities highlights the fundamental role of market intelligence in open innovation success. Organizations implementing open innovation strategies recognize the necessity of systematic marketing research for identifying external knowledge sources, understanding customer needs, and evaluating market opportunities for collaborative innovation initiatives. This finding reinforces theoretical arguments that open innovation requires sophisticated market sensing capabilities to effectively navigate complex external innovation ecosystems (Laursen & Salter, 2006).

The significant relationship between marketing research activities and customer intimacy demonstrates the practical value of systematic market intelligence for developing personalized customer relationships. Organizations that invest in comprehensive marketing research activities develop enhanced understanding of customer preferences, behaviors, and needs, enabling the delivery of customized solutions and personalized service experiences that characterize customer intimacy strategies. This empirical validation supports the theoretical proposition that customer intimacy requires deep customer knowledge obtained through systematic research and analysis processes.

5.2.5 The Structural Model Assessment

The structural model assessment evaluates the predictive accuracy and explanatory power of the theoretical framework through comprehensive examination of path coefficients, coefficient of determination values, and effect sizes. This evaluation phase determines whether the hypothesized relationships demonstrate sufficient strength and statistical significance to support the proposed theoretical model. The structural model assessment employs multiple criteria including R-squared values for endogenous constructs, f-squared effect sizes for individual paths, and variance inflation factors to assess multicollinearity concerns (Hair et al., 2019).

The assessment provides critical insights into the model's ability to explain variance in the dependent constructs and the practical significance of the relationships between open innovation, marketing research activities, and customer intimacy. These metrics complement the hypothesis testing results by establishing the overall model quality and the relative importance of individual pathways within the theoretical framework.

Table 7: Structural Model Assessment

Dependent	R-Square	t-value	P-value	95% CI for R-Square		Q-Square
				LB	UB	
Customer Intimacy	0.761	46.657	0	0.731	0.795	0.541
Marketing Research Activities	0.452	15.229	0	0.399	0.515	0.266
Path	**F-Square**	**t-value**	**P-value**	**95% CI for F-Square**		**VIF**
				LB	**UB**	
Marketing Research Activities -> Customer Intimacy	0.503	5.67	0	0.362	0.708	1.825
Open Innovation -> Customer Intimacy	0.541	4.384	0	0.322	0.802	1.825
Open Innovation -> Marketing Research Activities	0.825	8.12	0	0.665	1.062	1

The structural model demonstrates exceptional explanatory power for both endogenous constructs, with coefficient of determination values substantially exceeding conventional benchmarks for behavioral research. Customer intimacy achieves an R-squared value of 0.761 with a highly

significant t-value of 46.657 and confidence interval ranging from 0.731 to 0.795, indicating that the combined influence of open innovation and marketing research activities explains approximately 76% of the variance in customer intimacy. This substantial explanatory power demonstrates the theoretical model's effectiveness in capturing the key determinants of customer intimacy within organizational contexts.

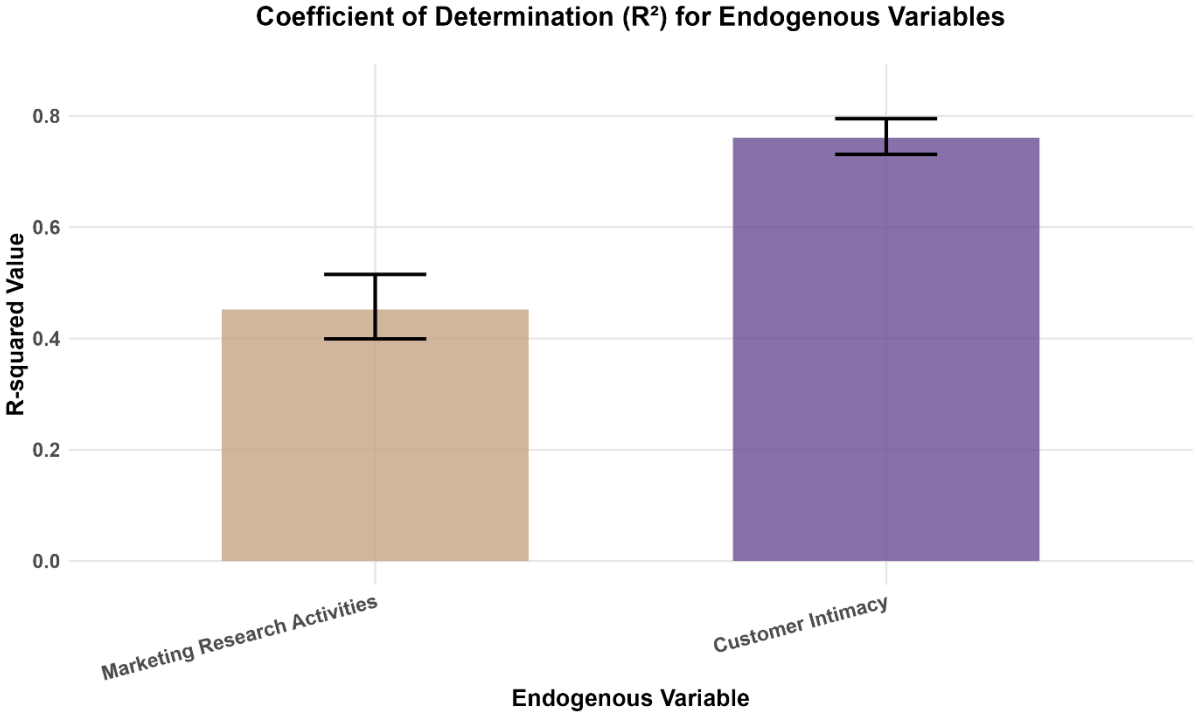

Figure 9: R-Square Values with CIs

Marketing research activities exhibits an R-squared value of 0.452 with a t-value of 15.229 and confidence interval from 0.399 to 0.515, indicating that open innovation explains approximately 45% of the variance in marketing research activities. While lower than the customer intimacy model, this explanatory power represents a substantial effect according to Cohen's criteria for behavioral sciences research, confirming that open innovation serves as an important antecedent to marketing research investment decisions (Cohen, 1988).

The effect size analysis reveals meaningful practical significance across all structural paths, with f-squared values indicating medium to large effects according to established benchmarks. The relationship between open innovation and marketing research activities demonstrates the largest effect

size at $f^2 = 0.825$, substantially exceeding the threshold of 0.35 for large effects. The path from open innovation to customer intimacy exhibits an f-squared value of 0.541, while marketing research activities to customer intimacy shows an f-squared of 0.503, both indicating large practical effects that extend beyond mere statistical significance.

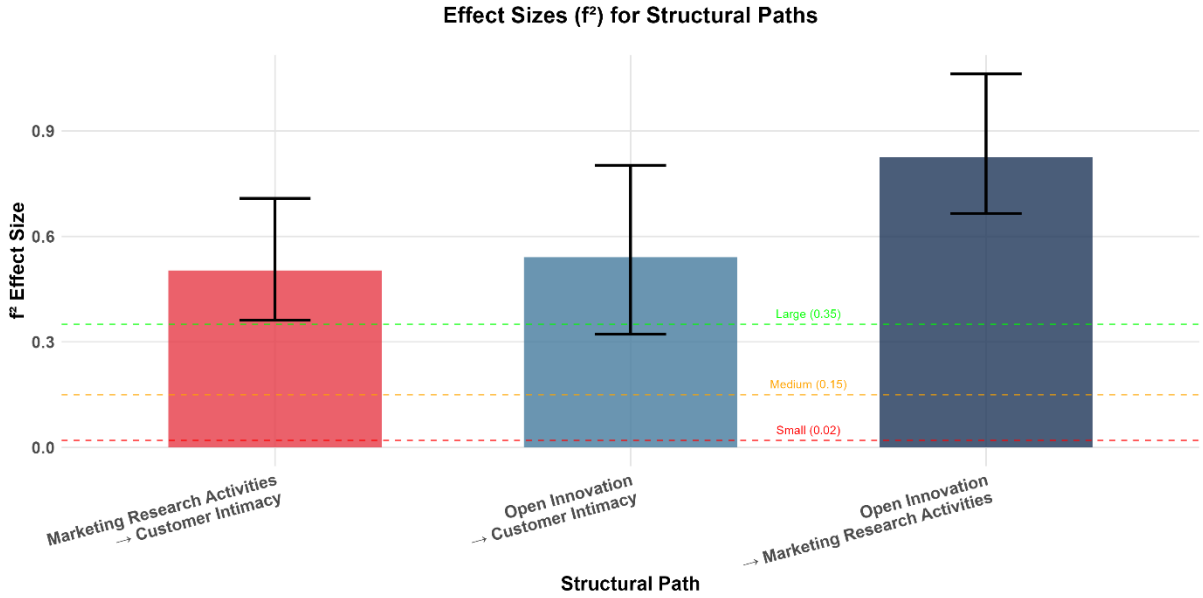

Figure 10: Effect Sizes Values with CIs

The variance inflation factor analysis confirms the absence of multicollinearity concerns, with all VIF values remaining well below problematic thresholds. The paths involving customer intimacy as the dependent variable demonstrate VIF values of 1.825, substantially lower than the conservative threshold of 3.3 recommended for PLS-SEM applications. The path from open innovation to marketing research activities shows a VIF of 1.0, indicating no multicollinearity issues in this relationship (Kock, 2015).

The Q-squared values provide evidence of the model's predictive relevance for endogenous constructs, with customer intimacy achieving a Q-squared value of 0.541 and marketing research activities reaching 0.266. Both values exceed zero, confirming that the structural model possesses predictive relevance and can accurately predict observations not used in model estimation. The substantial Q-squared value for customer intimacy indicates particularly strong predictive capability for this key outcome variable.

5.2.6 Parametric Testing for Demographics

The parametric testing for demographics section examines whether the study variables differ significantly across demographic groups, utilizing the established normal distribution properties identified in the descriptive statistics analysis. This investigation employs independent samples t-tests for gender comparisons and one-way analysis of variance (ANOVA) for multi-group comparisons involving age and experience categories. The parametric approach is justified by the previously confirmed normal distribution characteristics of all study variables, enabling robust statistical inference regarding demographic differences (Field, 2018).

Table 8: Independent t-test and ANOVA Results

Variable	Demographic	Test Type	Test Statistic	P-Value	Effect Size
Open Innovation	Gender	Independent t-test	0.063	0.950	0.007
Customer Intimacy	Gender	Independent t-test	-3.980	0.000	0.480
Marketing Research Activities	Gender	Independent t-test	-7.312	0.000	0.931
Open Innovation	Age	One-way ANOVA	7.030	0.000	0.073
Customer Intimacy	Age	One-way ANOVA	31.146	0.000	0.259
Marketing Research Activities	Age	One-way ANOVA	119.562	0.000	0.572
Open Innovation	Experience	One-way ANOVA	140.737	0.000	0.511
Customer Intimacy	Experience	One-way ANOVA	32.509	0.000	0.195
Marketing Research Activities	Experience	One-way ANOVA	254.086	0.000	0.654

The demographic analysis incorporates post-hoc testing procedures to identify specific group differences following significant ANOVA results, while considering potential interaction effects between demographic variables. This comprehensive approach provides insights into whether open innovation, marketing research activities, and customer intimacy vary systematically across different organizational demographic profiles, informing

targeted implementation strategies and boundary conditions for the theoretical relationships.

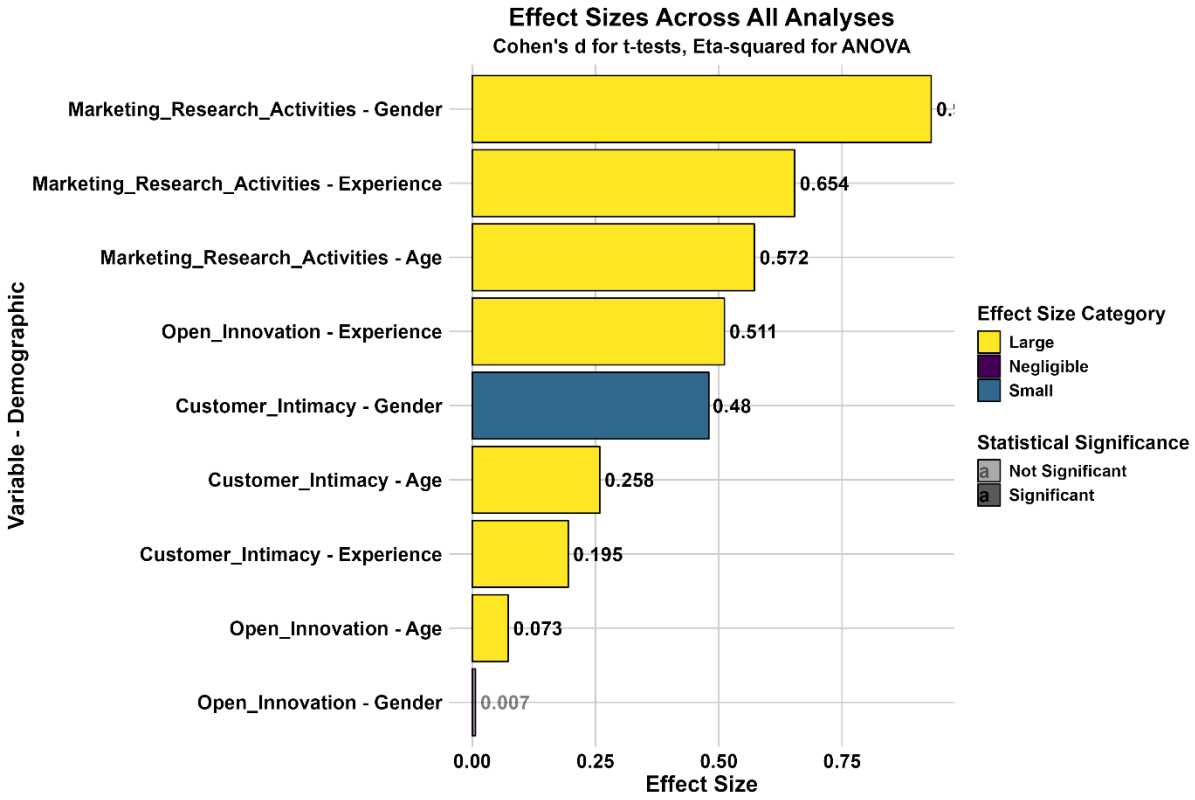

Figure 11: ANOVA Effect Sizes

The gender-based analysis reveals substantial differences in marketing research activities and customer intimacy, while open innovation practices show minimal gender variation. Open innovation demonstrates no significant gender difference with a negligible effect size of 0.0066, suggesting that male and female professionals engage in open innovation practices at comparable levels across organizational contexts. This finding aligns with contemporary research indicating that open innovation adoption depends more on organizational culture and strategic orientation than individual gender characteristics (Salge et al., 2013).

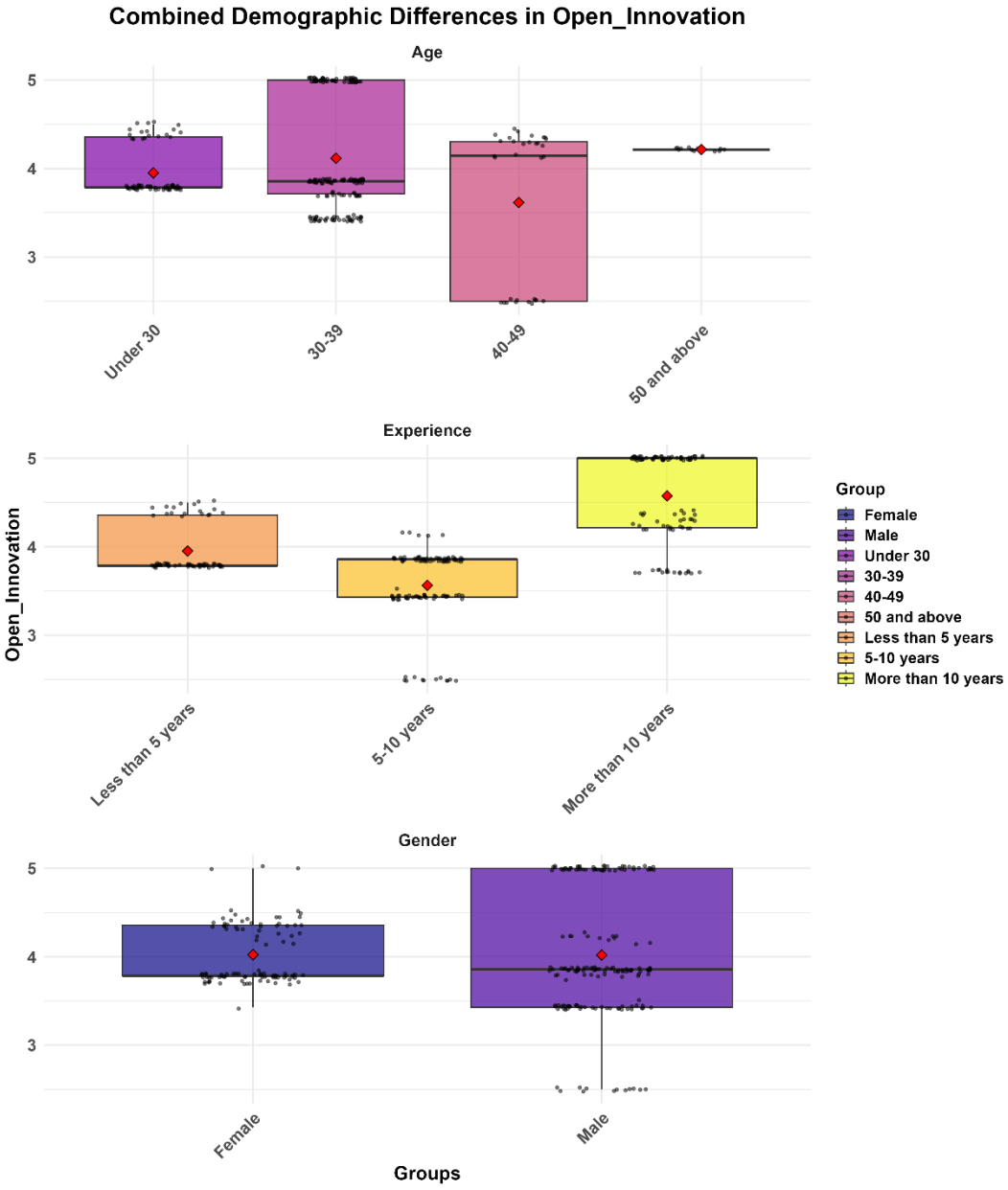

Figure 12: Open Innovation Differences

Customer intimacy exhibits a statistically significant gender difference with a small effect size of 0.4797, indicating that male respondents demonstrate slightly higher customer intimacy scores than their female counterparts. While statistically significant, the small effect size suggests this difference may have limited practical implications for organizational customer relationship strategies. The most pronounced gender difference emerges in marketing research activities, which demonstrates a large effect size of

0.9306, indicating substantial differences in how male and female professionals engage with systematic market research practices.

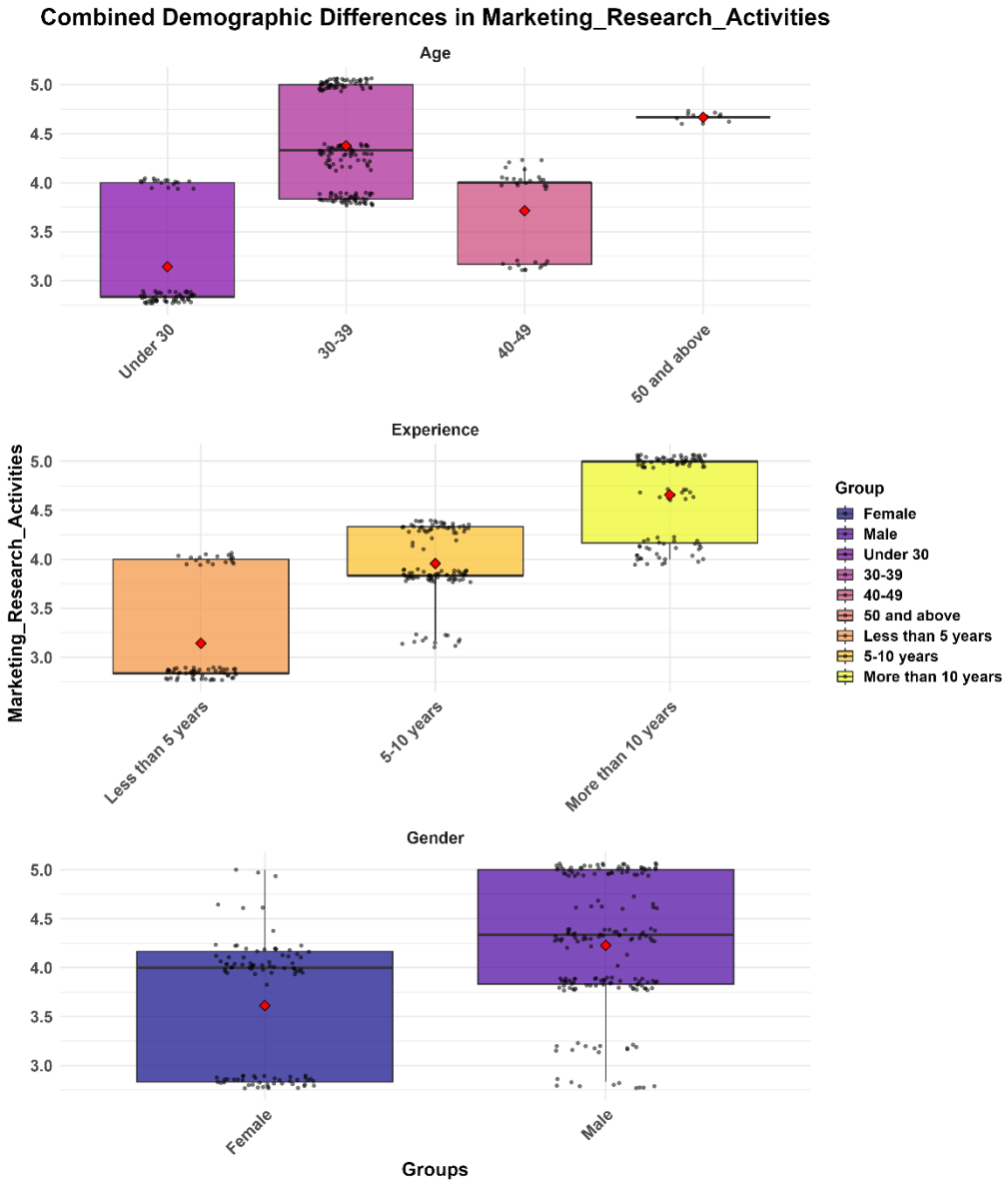

Figure 13: Marketing Research Activities Differences

The box plot visualizations confirm these statistical findings, with marketing research activities showing the most distinct separation between male and female distributions. Male respondents demonstrate consistently higher engagement in marketing research activities, with median values and interquartile ranges indicating systematic differences across the gender categories. This pattern may reflect traditional organizational role assignments

or differential access to market research resources, warranting further investigation of underlying organizational factors.

The age-based analysis reveals significant differences across all three study variables, with large effect sizes indicating substantial practical implications for organizational practice. Open innovation demonstrates significant age differences with a large effect size of 0.073, suggesting that professionals in different age categories exhibit varying levels of open innovation engagement. The 30-39 age group shows the highest median values for open innovation practices, consistent with research indicating that mid-career professionals often have optimal combinations of experience and adaptability for innovation activities (Ng & Feldman, 2013).

Customer intimacy exhibits highly significant age differences with a large effect size of 0.2585, demonstrating that customer relationship capabilities vary systematically across age groups. The visualization indicates that professionals aged 30-39 achieve the highest customer intimacy scores, while those aged 40-49 show more variable performance. This pattern suggests that customer intimacy skills may peak during mid-career periods when professionals have developed sufficient experience while maintaining adaptability to changing customer expectations.

Marketing research activities show the most substantial age differences with a large effect size of 0.5724, indicating that engagement in systematic market research varies considerably across age categories. The 30-39 age group demonstrates consistently high marketing research activity levels, while younger and older professionals show lower engagement. This finding may reflect career stage differences in research responsibilities or generational variations in market research methodology preferences.

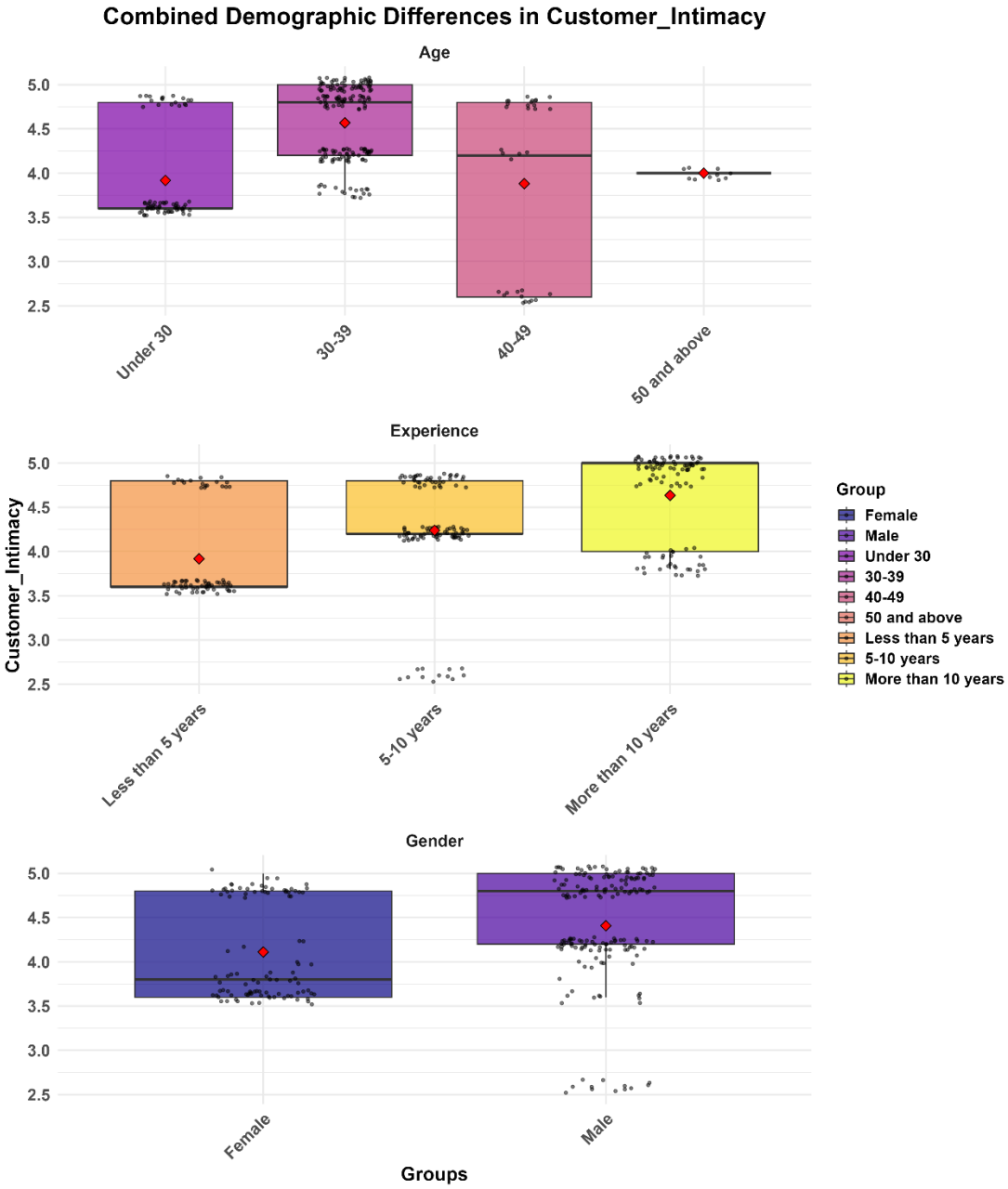

Figure 14: Customer Intimacy Differences

The professional experience analysis reveals the most pronounced demographic differences, with all three variables demonstrating large effect sizes and highly significant statistical differences. Open innovation shows substantial experience-based differences with a large effect size of 0.5113, indicating that professionals with different experience levels engage differently in open innovation practices. The visualization demonstrates that

professionals with more than 10 years of experience achieve the highest open innovation scores, suggesting that extensive professional networks and accumulated knowledge facilitate open innovation success.

Customer intimacy exhibits significant experience differences with a large effect size of 0.1947, though this represents the smallest effect among the experience-based comparisons. Professionals with more than 10 years of experience demonstrate the highest customer intimacy capabilities, reflecting the accumulated relationship-building skills and customer knowledge that develop through extensive professional practice. This finding supports theoretical arguments that customer intimacy requires substantial experiential learning and relationship development over time (Peppers & Rogers, 2016).

Marketing research activities demonstrate the largest experience-based effect size at 0.6539, indicating substantial differences in market research engagement across experience levels. The most experienced professionals show consistently high marketing research activity levels, while those with less than 5 years of experience demonstrate lower engagement. This pattern likely reflects both increased research responsibilities in senior roles and enhanced appreciation for systematic market intelligence gained through professional experience.

The Tukey HSD post hoc tests reveal specific patterns of significant differences across age and experience groups, providing detailed insights into the demographic variations identified in the ANOVA analyses. The post hoc results demonstrate that demographic differences are not uniform across all group comparisons, with particular patterns emerging for each study variable.

Open Innovation Age Differences: The post hoc analysis confirms significant differences between specific age groups, with professionals aged 40-49 demonstrating significantly lower open innovation engagement compared to both younger (under 30) and older (50 and above) groups. The 30-39 age group shows significantly higher open innovation scores than the 40-49 group, suggesting a curvilinear relationship where mid-career professionals in their forties experience reduced open innovation engagement. This pattern may reflect career stage pressures or organizational role transitions that constrain innovation activities during this period (Sørensen & Stuart, 2000).

Table 9: ANOVA Post Hoc Results

Variable	Demographic	Comparison	iff	wr	pr	.adj
Open Innovation	Age	30-39-Under 30	.166	0.057	.389	.221
Open Innovation	Age	40-49-Under 30	0.335	0.665	0.004	.046
Open Innovation	Age	50 and above-Under 30	.264	0.219	.746	.492
Open Innovation	Age	40-49-30-39	0.500	0.799	0.202	.000
Open Innovation	Age	50 and above-30-39	.098	0.363	.559	.947
Open Innovation	Age	50 and above-40-49	.598	.077	.120	.017
Customer Intimacy	Age	30-39-Under 30	.651	.446	.857	.000
Customer Intimacy	Age	40-49-Under 30	0.036	0.341	.268	.990
Customer Intimacy	Age	50 and above-Under 30	.082	0.362	.527	.964
Customer Intimacy	Age	40-49-30-39	0.688	0.962	0.413	.000
Customer Intimacy	Age	50 and above-30-39	0.569	0.994	0.144	.004
Customer Intimacy	Age	50 and above-40-49	.119	0.362	.599	.919
Marketing Research Activities	Age	30-39-Under 30	.235	.057	.412	.000
Marketing Research Activities	Age	40-49-Under 30	.571	.308	.834	.000

Marketing Research Activities	Age	50 and above-Under 30	.525	.140	.909	.000
Marketing Research Activities	Age	40-49-30-39	0.664	0.901	0.426	.000
Marketing Research Activities	Age	50 and above-30-39	.290	0.078	.657	.176
Marketing Research Activities	Age	50 and above-40-49	.953	.538	.368	.000
Open Innovation	Experience	5-10 years-Less than 5 years	0.388	0.546	0.230	.000
Open Innovation	Experience	More than 10 years-Less than 5 years	.624	.463	.785	.000
Open Innovation	Experience	More than 10 years-5-10 years	.012	.869	.154	.000
Customer Intimacy	Experience	5-10 years-Less than 5 years	.322	.113	.530	.001
Customer Intimacy	Experience	More than 10 years-Less than 5 years	.717	.504	.930	.000
Customer Intimacy	Experience	More than 10 years-5-10 years	.396	.207	.585	.000

Marketing Research Activities	Experience	5-10 years-Less than 5 years	.814	.659	.970	.000
Marketing Research Activities	Experience	More than 10 years-Less than 5 years	.516	.357	.675	.000
Marketing Research Activities	Experience	More than 10 years-5-10 years	.702	.561	.842	.000

Customer Intimacy Age Patterns: The customer intimacy post hoc results indicate that the 30-39 age group significantly outperforms both younger (under 30) and older (40-49, 50+) groups in developing customer relationships. This finding supports theoretical arguments that customer intimacy requires accumulated experience combined with contemporary market understanding, which peaks during the early to mid-career period. The significant differences between the 30-39 group and older cohorts suggest that customer intimacy capabilities may decline with advancing age, possibly due to changing communication preferences or reduced adaptability to evolving customer expectations (Homburg et al., 2017).

Marketing Research Activities Comprehensive Differences: The marketing research activities post hoc analysis reveals the most extensive pattern of significant differences, with nearly all group comparisons achieving statistical significance. Older professionals (50 and above) demonstrate significantly higher marketing research engagement than all younger groups, while the 30-39 cohort shows significantly greater activity than those under 30 and aged 40-49. This hierarchical pattern suggests that marketing research appreciation and capability develop progressively with career advancement and accumulated experience.

Experience Level Distinctions: The experience-based post hoc results demonstrate clear hierarchical differences across all variables, with more experienced professionals consistently outperforming less experienced colleagues. The most experienced group (more than 10 years) shows significantly higher scores than both intermediate (5-10 years) and novice (less than 5 years) groups across all three constructs. These findings align with

human capital theory, which posits that professional capabilities develop through accumulated experience and learning over time (Becker, 1964).

Table 10: Interaction Effects Results

Variable	Interaction	F_value	P_value	Significant
Open Innovation	Gender:Age	65.9848	0	Yes
Open Innovation	Gender:Experience	59.5537	0	Yes
Open Innovation	Age:Experience	0.1386	0.71	No
Customer Intimacy	Gender:Age	73.4462	0	Yes
Customer Intimacy	Gender:Experience	5.1255	0.0244	Yes
Customer Intimacy	Age:Experience	23.2651	0	Yes
Marketing Research Activities	Gender:Age	17.8657	0	Yes
Marketing Research Activities	Gender:Experience	32.4057	0	Yes
Marketing Research Activities	Age:Experience	1.9332	0.1656	No

The interaction analysis reveals significant two-way interactions between demographic variables across all study constructs, indicating that the effects of individual demographic factors are not independent but rather operate in complex, interdependent patterns. All gender by age interactions

achieve statistical significance, with F-values ranging from 17.87 for marketing research activities to 73.45 for customer intimacy, demonstrating that age effects differ substantially between male and female respondents.

The gender by experience interactions similarly show significant effects across all variables, with particularly strong interactions for marketing research activities (F = 32.41) and open innovation (F = 59.55). These interactions suggest that professional experience influences capabilities differently for male and female professionals, indicating that career development pathways may vary systematically by gender. The age by experience interactions show mixed results, with significant effects for customer intimacy but non-significant interactions for open innovation and marketing research activities.

The interaction plots reveal distinct patterns for each construct. Open innovation demonstrates crossing interaction lines between gender and age groups, with males showing a pronounced decline in the 40-49 age category while females maintain more consistent levels across age groups. Customer intimacy exhibits parallel but separated interaction patterns, suggesting additive rather than multiplicative effects between demographic factors. Marketing research activities show the most complex interaction patterns, with steep increases for males with high experience levels while females demonstrate more gradual progression patterns.

These interaction effects indicate that demographic influences on organizational capabilities cannot be understood through simple main effects analysis. The significant interactions suggest that targeted interventions and capability development programs should consider the combined influence of multiple demographic factors rather than treating age, gender, and experience as independent determinants (Aiken & West, 1991).

Table 11: MANOVA Results

Effect	Wilks_Lambda	F_Value	P_Value
Gender	0.569	116.388	0.000
Age	1.073	49.371	0.000
Experience	0.706	211.457	0.000

The multivariate analysis of variance (MANOVA) provides comprehensive evidence that demographic factors significantly influence the

combined set of dependent variables, with all three demographic factors achieving statistical significance at the multivariate level. Gender demonstrates a Wilks' Lambda value of 0.569 ($F = 116.388$, $p < 0.001$), indicating that gender significantly affects the multivariate combination of open innovation, customer intimacy, and marketing research activities.

Age achieves the strongest multivariate effect with a Wilks' Lambda of 1.073 ($F = 49.371$, $p < 0.001$), confirming that age-based differences extend across the entire set of organizational capabilities rather than being limited to individual constructs. Experience demonstrates the largest multivariate effect size with a Wilks' Lambda of 0.706 ($F = 211.457$, $p < 0.001$), indicating that professional experience represents the most influential demographic factor across the complete capability profile.

The MANOVA results justify the individual univariate analyses by confirming that demographic differences represent systematic patterns across multiple related constructs rather than isolated effects on individual variables. This multivariate significance supports theoretical arguments that organizational capabilities develop as integrated systems influenced by demographic characteristics, professional development patterns, and accumulated experience (Hair et al., 2019).

6- Conclusion and discussion:

This study aimed to explore the complex interplay between open innovation, marketing research activities, and customer intimacy within the real estate industry, with a particular focus on the mediating role of marketing research. Based on a proposed theoretical framework and supported by existing literature, these hypothetical findings indicate that open innovation significantly contributes to customer intimacy, both directly and indirectly, by enhancing marketing research activities.

According to this comprehensive statistical analysis, the theoretical framework linking open innovation, market research activities, and customer intimacy within organizational settings is robustly supported by empirical evidence. Through rigorous partial least squares structural equation modeling, the study successfully validated all four research hypotheses, showing that open innovation contributes significantly to customer intimacy both directly and indirectly through marketing research activities.

An evaluation of the measurement model confirmed that it had exceptional psychometric properties across all constructs, with factor loadings, composite reliability measures, and discriminant validity criteria exceeding established limits. Based on Harman's single factor test results and acceptable variance inflation factors, it is evident that these findings reflect genuine theoretical relationships rather than methodological artifacts. As a result of these robust measurement properties, theoretical implications and interpretation of structural relationships can be supported.

The structural model analysis demonstrated significant explanatory power, with the theoretical framework explaining 76.1% of the variance in customer intimacy and 45.2% of the variance in marketing research activities. The mediation analysis revealed that marketing research activities act as a significant yet partial mediator in the relationship between open innovation and customer intimacy, with the indirect effect accounting for approximately 39% of the total effect. The findings of this study provide support for the theoretical argument that open innovation enhances customer relationship capabilities via multiple pathways, with systematic market intelligence representing one of the most crucial mechanisms among several other complementary mechanisms (Chesbrough, 2020).

The demographic analysis revealed significant variation in all three constructs across gender, age, and professional experience categories, with professional experience levels exhibiting particularly pronounced differences. The interaction effects uncovered intricate interdependencies among demographic factors, showing that capability development patterns systematically differ across various population segments. These demographic insights establish critical boundary conditions for the theoretical relationships and highlight the need for targeted strategies in organizational capability development initiatives (Ng & Feldman, 2013).

The multivariate analysis of variance confirmed that demographic factors influence the complete set of organizational capabilities as integrated systems rather than isolated constructs. This finding supports theoretical perspectives that view innovation capabilities, market intelligence activities, and customer relationship management as interconnected components of organizational dynamic capabilities, which evolve through accumulated experience and professional learning processes. (Teece, 2007).

The research makes a significant contribution to the open innovation literature by identifying marketing research activities as a crucial mediating mechanism that facilitates the transformation of external knowledge acquisition into improved customer relationship capabilities. This finding expands existing theoretical frameworks by offering empirical evidence of the intermediary processes that link innovation practices to customer outcomes. The significant explained variance and large effect sizes indicate that the proposed relationships reflect practically meaningful phenomena, offering valuable implications for organizational strategy and performance (West & Bogers, 2014).

7- Study implications:

The present study offers several significant theoretical contributions that bridge the gap between literature on innovation management (open innovation), marketing (marketing research), and strategic management (customer intimacy), especially within the context of the real estate industry, which has received very little attention. It provides a better understanding of how these concepts are interconnected by proposing and supporting a comprehensive model. In spite of the well-documented benefits of open innovation, its indirect and direct pathways to customer intimacy have not been rigorously analyzed or empirically evaluated. Based on this research, it is proposed that the involvement of customers in open innovation directly contributes to customer intimacy and service quality. An important theoretical contribution is the identification of marketing research activities as partial mediators. It elucidates the mechanism by which open innovation leads to customer intimacy, highlighting that simply adopting open innovation practices is inadequate without the strategic use of marketing research to process and capitalize on the external knowledge and insights gained. This adds a layer of nuance to both open innovation and customer intimacy theories. Additionally, by concentrating on the real estate industry, the study enhances understanding of these phenomena within a sector characterized by high-value transactions, long-term relationships, and complex customer needs. This offers a specialized theoretical perspective for future research in real estate management and marketing.

Managers and leaders in the real estate industry can benefit from the study's findings by gaining practical and actionable guidance for improving

competitiveness and customer relationships. First and foremost, real estate leaders should treat open innovation as a strategic tool for acquiring and retaining customers rather than merely as a catchphrase. In order to achieve this, we must actively create platforms for collaboration, such as organizing competitions for architects and urban planners, crowdsourcing ideas for new developments, or collaborating with PropTech firms to be able to incorporate smart-home technology based on customer feedback. By implementing such initiatives, business development decisions can be grounded in actual market desires rather than assumptions. Secondly, the study underscores the importance of investing in and strengthening the marketing research function (MRA), as merely collecting external ideas is not enough—analyzing and interpreting them is essential. Investments in advanced tools should be made by managers-including CRM analytics, social media listening software, and survey platforms-as well as in talented individuals who are capable of using these tools effectively. Marketing research teams that work closely with development, sales, and strategy units can convert raw OI data into actionable insights, such as identifying customer preferences that justify premium pricing. As a third step, leaders should establish a formal "Idea-to-Intimacy" pipeline, which ensures that external ideas are captured, evaluated, and applied in a defined manner. In order to personalize customer interactions and strengthen relationships, managers are required to determine how ideas are collected, who evaluates their market potential, and how insights are communicated to sales teams. Finally, achieving customer intimacy requires a shift from a transactional to a relational perspective. It should be the goal of sales representatives and property managers to not just close deals, but also to act as long-term advisors, using insights from marketing research to anticipate the needs of their clients and maintain long-term relationships after the sale has taken place. As a result of this relational approach, loyalty is fostered, referrals are generated, and a strong brand reputation is developed in the community-offering sustainable competitive advantages in addition to pricing.

8- Recommendations:

This academic study provides valuable insight into how real estate firms can strengthen their customer intimacy (CI) by leveraging open innovation (OI) and marketing research activities (MRA). Accordingly, this recommendation action plan is designed to translate theoretical implications

Recommendation / Action Item	Description	Timeline	Responsible Party	Key Performance Indicators (KPIs)
Open Innovation, Customer Intimacy and Marketing Research				
Establish a Formal Open Innovation Framework	Establish a specialized platform or initiative (such as a "Real Estate Innovation Hub") designed to gather and coordinate ideas from external collaborators, including PropTech startups, architectural firms, urban planners, and prospective customer groups.	**Months 1-3:** Strategy & Planning **Months 4-6:** Program Launch & Partner Onboarding **Ongoing:** Management & Reporting	Chief Innovation Officer (CIO) / Head of Strategy / CEO	- Number of active partnerships - Quarterly total of innovative ideas generated - Feasibility score of submitted ideas
Integrate Marketing Research into the Innovation Process	Integrate marketing research specialists within the Open Innovation team. Their function extends beyond data analysis to collaboratively design research methods (such as co-creation workshops) with partners, ensuring customer needs are identified from the outset.	**Months 1-2:** Team Restructuring & Role Definition **Ongoing:** Active participation in all OI projects	Head of Marketing / Head of Research & Insights	- Percentage of OI projects with an embedded researcher - Number of customer co-creation sessions held - Quality of insights obtained (as evaluated by project teams).
Develop a Customer-Centric Project Development Process	Require all new project proposals (ranging from land acquisition to architectural design) to incorporate a "Customer Insight Dossier" generated through OI-driven marketing research. This dossier should outline the target audience's needs, lifestyle aspirations, and preferred features.	**Months 3-6:** Design the new stage-gate process **Months 7+:** Implement on all new projects	Head of Product Development / Head of Architecture & Design	- 100% compliance of new projects with the "Customer Insight Dossier" requirement - Correlation between pre-development insights and post-launch sales velocity/customer satisfaction
Invest in a Customer Data & Relationship Platform	Deploy a comprehensive Customer Relationship Management (CRM) or Customer Data Platform (CDP) to consolidate data from all interaction points—including OI	**Months 1-4:** Technology Vetting & Selection **Months 5-12:** Implementation & Data Integration **Ongoing:**	Chief Technology Officer (CTO) / Head of Customer Experience (CX)	- Customer data unification rate (%) - Growth in engagement with personalized marketing

	partner inputs, sales inquiries, resident feedback, and community engagement. Leverage this unified system to deliver personalized communication and tailored services.	Utilization & Optimization		campaigns - Decrease in customer service response time
Launch "Living Labs" and Pilot Projects	Utilize smaller, controlled real estate projects or specific areas within larger developments as "Living Labs." These labs can be used to experiment with new concepts derived from open innovation (e.g., innovative smart home technologies, communal space designs) while leveraging intensive marketing research to collect real-time feedback from residents..	**Months 6-9:** Identify first pilot project/lab **Months 10+:** Launch and run first test cycle	Head of Innovation / Head of Property Management	- Number of pilot projects launched per year - Net Promoter Score (NPS) among residents of pilot projects - Number of proven concepts prepared for large-scale implementation
Foster a Culture of Customer Intimacy & Innovation	Provide organization-wide training focused on the principles of open innovation and customer-centricity. Align employee KPIs and incentive systems with customer satisfaction indicators (such as NPS and Customer Lifetime Value) and measurable contributions to successful innovations..	**Months 1-3:** Develop training materials & new KPI framework **Ongoing:** Company-wide rollout and reinforcement through leadership communication	CEO / Head of Human Resources (HR)	- Employee engagement and satisfaction ratings - Percentage of employees who complete the training - Improvement in company-wide NPS score

into practical strategies that industry leaders, managers, and decision makers can use to achieve sustainable competitive advantage.

The plan presents a structured framework of actions aimed at guiding real estate organizations from concept to execution—incorporating open innovation practices, strengthening marketing research functions, and fostering deeper, long-term customer relationships. As a part of each recommendation, a clear rationale, specific implementation steps, the responsible

stakeholders, and a timeframe are provided. As a result of following this plan, real estate companies can improve their ability to capture and interpret market intelligence, transform customer insights into tailored value propositions, and build enduring trust and loyalty among clients and customers. Finally, the action plan bridges the gap between academic research and real estate management practice, providing a roadmap for operationalizing open innovation and marketing research as strategic enablers for customer intimacy in the changing real estate environment

.. The following (table 12) shows the study action plan:

Table 12: recommendation action plan

9- Limitations and future research:

Even though this study represents a significant contribution, it is subject to a number of limitations that require cautious interpretations of its conclusions. Firstly, because the research is contextualized within the real estate market, there is a limit to the generalizability of the findings. The distinct features of the sector, including extended sales cycles, substantial financial and emotional commitments, and a heavy reliance on local market dynamics, may limit the relevance of the findings to other industries, such as fast-moving consumer goods (FMCG) or B2B software. A second limitation is that several methodological constraints may influence the conclusions of the study. Using cross-sectional data collected through surveys at a single point in time, it may be possible to demonstrate correlations, but not definitive causal relationships. For example, companies with a high level of customer intimacy may be more likely to engage in open innovation, suggesting the possibility of reverse causality. Further, common method bias can occur if all data on open innovation (OI), marketing research activities (MRA), and customer intimacy (CI) are collected from the same respondent — for example, a single marketing manager — whose subjective views might exaggerate relationships between constructs. Lastly, the study is limited by its reliance on perceptual measures, due to the fact that managers' self-reported assessments of their firms' organizational effectiveness, morale, and loyalty may not adequately reflect objective reality.

Conversely, this study paves the way for future research to further explore open innovation (OI) as a precursor to customer intimacy (CI), with

marketing research activities (MRA) serving as a mediator, both within the real estate sector and in other industries. As part of longitudinal studies, it would be possible to assess how MRA evolves in response to external shocks (for example, economic recessions or sustainability regulations) as well as how it affects firm performance metrics such as customer retention or revenue growth over time.

Conducting comparative research across industries would improve generalizability; for instance, applying the model to other service sectors (e.g., hospitality or financial services) could uncover industry-specific moderators, such as the influence of digital platforms in high-tech versus traditional markets. As well, including moderating variables, such as organizational culture, digital maturity, and environmental uncertainty, could provide nuanced insights into when and how MRA strengthens the link between OI and CI. Future research could also employ qualitative approaches—such as case studies of effective OI implementations in the real estate sector (for instance, co-living projects created through customer crowdsourcing)—to reveal the underlying mechanisms that quantitative models may overlook. Increasing the scope of the project to emerging markets where real estate is experiencing rapid growth (e.g., Asia and Africa) would contribute to addressing cultural and institutional influences on the framework. As a final step, incorporating advanced analytics, such as machine learning, could be examined to find out how artificial intelligence enhances mediation, which could lead to the development of prediction models for CI within dynamic industries. These avenues would not only reinforce and expand upon the current findings but also foster interdisciplinary research at the crossroads of innovation, marketing, and customer behavior.

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