# Innovation and Agility in Emerging Market E-commerce: The Case of Vietnam

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*Abstract:* - This research seeks to explore the connections among external innovation sources, the integration of digital technologies, customer engagement, internal innovation sources, and their influence on perceived organizational agility and market dynamics within emerging market e-commerce. The research method employed in this paper is systematic and includes the use of well-developed structured questionnaires distributed among e-commerce vendors and the logistics workforce. As a result, PLS-SEM was used to analyze the investigated factors and examine the relationships between the variables and the ability of governmental policies to influence them. Field evidence indicates that external sources of innovation and the application of digital technologies significantly enhance the firm's ability to respond to the market. At the same time, internal resources are beneficial but with some complexities. Absorptive policies are a crucial enabling system that sustains or hinders the diffusion of innovative ideas. The study highlights the importance of collaborative work between organizations, the integration of technologies, innovations into processes enhancing work, and supportive governmental policies. The findings reveal several managerial, social, and theoretical implications that contribute to the increased flexibility and growth capability of e-commerce firms in emergent markets.

*Key-Words:* - Digital age, innovation, technology, e-commerce, intellectual property, emerging markets.

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## 1 Introduction

Technological advancement through digital means has significantly impacted world business through unprecedented developments that present equal risks and opportunities for business ventures. Businesses ensure that they use advanced methods to sustain their position in the continuously growing electronic commerce market, [1]. Ownership becomes meaningful as emerging economies join the digital economy. The current research focuses on emerging market e-commerce. It discusses how enterprises in emerging markets may strategically address intellectual property issues with the help of technology innovation under the open innovation framework for constructing competitive advantages, [2].

The role of technology and innovation continues to become extremely important to e-commerce planning. Existing reports indicate that emerging market enterprises are adopting digital technology in today's dynamic environment, [3]. They have stated that they would like this change to improve the efficiency of logistics, payment, and customer engagement. Copyrights, patents, and trademarks are now helpful in gaining global attention through e-commerce, which requires technology, [4]. There is a need for open innovation that harnesses external and internal ideas to enable business formation for business organizations to operate within the ambit of the free market subject to the law, [5]. Since these markets need and can change over time and bring up the issue of intellectual property rights, e-commerce firms must constantly align their technology and

processes to these alterations, making this process necessary, [6].

Open innovation emphasizes collaborating with external partners, including consumers, suppliers, and rivals, to increase innovative capabilities. This technique is essential for staying competitive in e-commerce, where technology changes quickly, [7]. Thus, open innovation has multiple benefits, but owing to the complexity of intellectual property in developing nations, it remains relatively unexplored. The relation of open innovation and market factors in developing countries requires investigation, especially in the growing sector of e-commerce, [8].

Dynamic capabilities theory builds on open innovation theory by highlighting an organization's ability to integrate, develop, and rearrange internal and external talents to adapt to changing surroundings, [9]. Emerging enterprises must adapt to shifting market conditions, making this idea crucial. The literature on perceived e-commerce market dynamics and technological innovation in e-commerce is still lacking. Innovation is driven by market conditions, including customer behavior, competition, and regulatory changes, [10]. However, little is known about how e-commerce companies' perceptions of these dynamics impact their technical innovation efforts. This gap must be addressed to understand how developing companies might use market shifts to promote technology, [7].

This study upgrades theoretical frameworks by integrating open innovation and dynamic capabilities theories. Perceived e-commerce market dynamics and organizational agility are key mediators, [11]. Understanding e-commerce market dynamics shows how organizations perceive and respond to e-commerce changes, while perceived organizational agility measures their ability to adapt quickly. Mediating factors link open innovation methods to technological innovation in e-commerce [12]. This research examines how firms may use new technologies to improve platform performance, customer experiences, and intellectual property.

Furthermore, the administration intervention element serves as this study's moderating factor. State politics influence the formulation of laws that govern firms, such as intellectual properties, data privacy laws, and trade laws that significantly shape firms' knowledge of market conditions and flexibility, [13]. This means that government laws can either increase or decrease e-commerce industry dynamics and affect the development of technologies in this segment. Markets could influence technology more where a favorable legal environment fosters technology development and sets clear legal boundaries, [14]. However, new regulations, especially those that are dear or those that the business establishment could not predict, could lead to complications of changes in business conditions.

To fill gaps to the following extent concerning open innovation, dynamic capabilities, and technological innovation of the emerging e-commerce markets. This research discusses the contingency of the perceived e-commerce market environment, organizational nimbleness, and governmental influence. It also covers how organizations can attend to and invent intellectual property dilemmas in a complex landscape. This research identifies how developing market organizations may leverage open innovation and dynamic capacities to push technology for technology despite intellectual property concerns.

# 2 Literature Review and Development Hypothesis

## 2.1 Theory Background

This research examines how open innovation and dynamic capabilities promote e-commerce technical innovation in emerging nations, [15]. Research using the open innovation theory framework [16], which emphasizes internal and external sources of innovation like partnerships and customers, and dynamic capabilities theory, which emphasizes the organization's ability to integrate assets in dynamic environments to create new resource configurations, [17]. An approach used in the study considers how external sources of innovation, digital technology integration, customers, co-production of technology, and internal sources of innovation assist in technological progression, [18]. Furthermore, the e-commerce sector's flexibility and organizations' flexibility as two variables moderating firms' ability to respond to changes are also analyzed, [11]. In addition, it examines factors on how such mediators are supported by government policies that make it possible to temper technological innovation, [14]. This proposed theoretical framework is intended to understand better the context in which innovations occur in emergent market firms in the changing e-commerce environment.

## 2.2 Development Hypothesis

### 2.2.1 Sources of Innovation, the Characteristics of the Electronic Commerce Market and Organizational Change in Response to Technology Innovation in E-Commerce

External sources of innovation are concerned with the search for information, partners, and connections with parties in the outside environment, including the users, suppliers, and competitors in developing innovation, [19]. Regarding e-commerce, tapping external resources for innovation unlocks new technologies, ideas, and solutions that a firm may not develop independently, [20]. When firms rely on external sources for innovations, it is easier for them to adapt to changes in a market, in this case, e-commerce, as viewed in Chesbrough's open innovation theory. Suppose firms can draw on these external inputs. In that case, they will be able to respond more effectively to changes in customers' tastes, trends in technology, and competitive forces in the e-commerce environment, which should translate into more strategic and effective operations in this arena, [21].

Moreover, external sources of innovation also influence organizational agility, which is the capacity to alter processes and assets to meet environmental alterations, [22]. Related studies recently discovered that businesses that apply external knowledge to working models have enhanced adaptability and can thus adjust rapidly to the progress of new technologies and industry trends, [23]. The above flexibility enables firms to effectively adapt to changing market environments, which is critical for firms operating in the e-commerce segment.

Lastly, perceived e-commerce market dynamics and technical organizational agility influence the interaction between external sources of technological innovation and e-commerce technological innovation, [11], [24]. Here, external information and partnerships help organizations observe market changes and rearrange structure and process to be more systematic about e-commerce technical change.

H1a. External sources of innovation positively influence perceived e-commerce market dynamics.

H1.b. External sources of innovation positively impact perceived organizational agility.

### 2.2.2 Interaction of Perceived E-Commerce Market Dynamics and Integration of Digital Technologies: A Mediation Model of Perceived Organizational Agility to Technological Innovation in E-Commerce

Digital technology integration, as a concern in this study, refers to the use and successful implementation of complex digital technologies in a firm's operations and business models involving aspects such as artificial intelligence, big data, and cloud computing, [25]. In the e-commerce field, this integration makes it easier for businesses to overcome several challenges to create value and better satisfy customers while striving to sustain their market standings and respond to new developments, [26]. Digital technologies significantly form the company's perception of the e-commerce market due to the efficiency of tools that link businesses to their consumers, market trends, and competitive forces, [27]. Organizations embrace these technologies in a better position to have a feel of the market trends and, hence, are in a better position to innovate.

Moreover, all of the introduced digital technologies are aimed at supporting the improvement of organizational agility and the ability of the firm to respond to the changes in the market environment promptly, [22]. Involving information technologies in a firm's context makes decisions more efficient, reduces time, and increases the flexibility of the firm, [28]. Thus, operation commerce enterprises require this flexibility in today's rapidly developing technology and market. Business life is full of challenges. Therefore, organizations must be adaptive to cope with challenges, consider the change, and manage for change, [29].

Therefore, the application of advanced technologies by end users helps to increase the imperative of and perceived e-commerce market dynamics as well as the flexibility of organizational processes to promote e-commerce technological developments, [7]. Firms can swiftly adapt to changes, and digital tools significantly improve competitiveness and attain a high-profit status in the e-commerce market.

H2a. Integration of digital technologies positively influences perceived e-commerce market dynamics

H2b. Integration of digital technologies positively impacts perceived organizational agility

#### 2.2.3 The Relationship between Customer Engagement and Co-Creation with Perceived E-Commerce Market Dynamics and Perceived Organizational Agility to Technological Innovation in E-Commerce

Customer engagement and co-creation are terms used to describe how customers participate in the innovation process through which firms partner with customers to generate, design, or modify products and services, [30]. This allows these companies to have first-hand knowledge of customer needs and wants, thus making the innovation process more customer-focused, [31]. From an e-commerce point of view, customer involvement & co-production deeply affect how a firm decides the dynamics of the e-commerce context, [32]. With the participation of the customers, businesses will be able to make more accurate assessments of the trends, customer changes, and competition, [33]. This feedback mechanism lessens the lag between market anticipation and developing new products and services relevant to the changing market demand. It thus enhances the innovation of the firm, [34].

Furthermore, customer engagement and co-creation also enhance organizational agility, the speed at which the firm reconfigures its processes, structures, and strategy in the face of change in the external environment, [35]. In addition to gaining important information, when businesses work with customers, they also enhance their ability to modify how they do business in reaction to the information received from consumers, [36]. Such ability is essential in a field like e-commerce, where the dynamics are so fluid that the ability to change direction in response to evolving technologies or consumer needs can easily make a difference to the competitive stamina of a company, [37].

Last but not least, customer engagement and co-creation in e-commerce are equally determinants of technology explorations within e-commerce, increasing both perceptions of e-commerce market dynamics and internal organizational agility.

H3a. Customer engagement and co-creation positively influence perceived e-commerce market dynamics

H3b. Customer engagement and co-creation positively impact perceived organizational agility

#### 2.2.4 The Relationship between Internal Sources of Innovation with Perceived E-Commerce Market Dynamics and Perceived Organizational Agility to Technological Innovation in E-Commerce

Internal sources of innovation are the indigenous resources, competencies, or capabilities of the organization that foster innovation within the organization, [9]. This includes R&D, employee creativity, and the company's patent file. These internal resources are very important in the process of creating innovations independently and are inclined to bring some inventions, [3].

Within the e-commerce industry, internal perception of innovation is among the competitive dynamics, one of the most essential components for corporate performance, [38]. Internal innovation capabilities are critical to industries' future development as they study market actors, the expectations of their participants, and competition. They also help the organization manage and leverage these changes to its advantage and expand with them, [39].

In addition, internal innovations are also instrumental in enhancing organizational dynamic capabilities, or in other words, the ability to respond to environmental turbulence promptly, [40]. Capitalizing on internal innovation enhances a firm's independence and adaptability. Although it may be valuable in helping the company to better address the matters of technology and the concerns of the customers, with the various processes and techniques used being refined, this may not prove a convenient solution, [41]. This flexibility is essential within e-commerce as it is a sector that needs evolution and solitary change perpetually, [24].

Lastly, the motivation for innovation coming from inside the company constitutes the primary concern of internal sources that affect the e-commerce-oriented market environment and behavioral adaptability of the company in question, [42]. Through utilizing internal intellectual capital, functional specialized experience, and research and development initiatives, the organization addresses the trends of the e-commerce market environment, modifies its strategies, and creates new technologies to meet competitive performance expectations.

H4a. Internal sources of innovation positively or negatively influence perceived e-commerce market dynamics.

H4b. Internal sources of innovation positively or negatively impact perceived organizational agility.

### 2.2.5 Role of Perceived E-commerce Market Dynamics and Perceived Organizational Agility Motivate Technological Innovation in E-Commerce

Perceived e-commerce market dynamics is defined as the company's ability to anticipate and comprehend the improvements made on e-commerce platforms, including the change in the behavior of the customers, technology, and other competitors' pressure, [13]. In contrast, organizational agility is the perceived ability of the organization to adjust its internal processes, structures, and strategies promptly and effectively in the face of changing market conditions, [14]. These two concepts are fundamental when driving a technological incentive in the e-commerce sector as they impose the need to do business in a continuously transforming environment, [43].

First, perceived e-commerce market dynamics enable innovation because businesses can help plan for possible changes and avoid inertia, [44]. Firms that acknowledge the intense competition in e-commerce, especially in growing economies, are more open to adopting newer technologies to change customer needs and beat their rivals, [45]. By appreciating such changes in the market, companies can realize certain voids and possibilities, which in turn encourages them to invent new devices and technologies capable of improving productivity, customer interaction, and the general efficiency of the processes. For example, corporations can adopt FinTech solutions like blockchain payment solutions to optimize the security of transactions, whereas Intelligent systems applied can anticipate customers' needs, hence developing personalized services and optimizing stock flow, [46]. These technologies also enable firms to cope with changing environments and retain their competitive advantage, [47].

To illustrate the above perception congruence, perceived organizational agility also propels technological innovation for managers, [15]. When managers see their management structures as agile and able to adjust to market forces, they are likely to innovate, [48]. Organizational agility allows companies to quickly react to external threats and change how things used to be done, be it a change in the target customers and the way they do business or a technology change, [49]. That ability to adjust to external factors is why companies are likely to develop new technologies that will improve e-commerce workings and enhance customer relations and service delivery, [23].

In conclusion, both the e-commerce market dynamics, as perceived by the consumers, and the organizational agility, as perceived by the management, encourage technological advancement in e-commerce, [50]. Suppose an organization recognizes inevitable changes in the market while at the same time remaining flexible enough structurally. In that case, it can integrate potentially disruptive technologies in some segments of its operations that cater to the digital marketplace.

H5. Perceived e-commerce market dynamics drive firms to innovate technologically in e-commerce.

H6. Perceived organizational agility is a predictor of technological innovation in e-commerce

### 2.2.6 The Moderating Role of Government on the Relationship between Perceived E-Commerce Market Dynamics, Perceived Organizational Agility, and Innovation in E-Commerce

The technical innovation of a company is influenced by the government's regulations and economic policies. Market and intellectual property framework, digital enablers, and governmental stimulus for or against company adaptability and creativity, [51]. Intermediary stages are the key element in the relationship, and government policies, laws, and actions either strengthen or decrease the connection to technical advancement in e-commerce, [52]. This research defines e-commerce innovation as deploying and improving technology, systems, and business strategies that enable e-operations. In this case, government policies can play a key role in how business entities view market trends, organizational flexibility, and innovation processes, [25].

Recent studies have reported on the relationship between perceived e-commerce market dynamics and technological innovation, stating that perceived e-commerce market dynamics influence technological innovation and may be positively or negatively impacted by government regulations, [53]. For example, in markets where governments intervene by offering incentives like tax credits for research and development or grants for innovation and/or infrastructural support for digital technologies, firms

are likely to introduce innovations to perceived changes in the market, [3]. They remove obstacles to using new technologies and give firms the assurance to venture into innovations. On the other hand, overbearing rules, like high-powered patents or barriers to access the innovation market, reduce the degree of innovation as they cause risks and costs that firms must bear, [54].

Similarly, the mediating effect is used to explain the relationship between the perceived organizational agility and technological innovation in e-commerce in the presence of the moderating role exerted by the government, [12]. The results also found that if firms think of themselves as agile, they are more likely to innovate if they see government policies agreeable regarding business operations, [14]. Frameworks for regulation, enhancing technology adoption, and legal certainty provide avenues to improve organizational flexibility to support change and innovation. Moreover, the governments that enable the necessary digital infrastructure and promote FinTech fundamentally enable innovations based on artificial intelligence, [55]. For example, providing the four business models in the form of tax incentives for adopting artificial intelligence technologies or FinTech will enhance the growth of e-commerce technological solutions, [56]. On the other hand, stringent or unpredictable regulations may create barriers, limiting the flexibility businesses need to adapt and innovate effectively, [57].

In general, depending on the country and the level of centralization of the economy, the government has a key and regulative impact on the dynamics of the e-commerce market as viewed by the individuals in the organization, the organization's responsiveness, and innovative initiatives in the e-commerce business processes and activities. Favorable government actions boost market dynamics and organizational agility, advancing technology. However, policy constraints or inconsistencies could impede these relationships, reducing innovations within the e-commerce industry.

H7a. The government moderates the relationship between perceived e-commerce market dynamics and technological innovation in e-commerce.

H7b. The government moderates the relationship between perceived organizational agility and technological innovation in e-commerce.

Figure 1 (Appendix) illustrates the proposed research model for this study, drawing on the literature review and the development of hypotheses.

# 3 Methodology

## 3.1 Design Measurement

This research is a structured questionnaire designed to capture demographic data and key concepts underpinning the study of technological innovation in e-commerce. The first part focuses on collecting demographic information, such as gender, age, and the respondent's role in the e-commerce ecosystem (e.g., retail sellers, business owners, logistics providers).

In the second section, an attempt is made to assess some perceptions using a Likert scale, in which a rating of one shows a highly negative response and a rating of five is highly positive (1 stands for strongly disagree and 5 for strongly agree). First, external sources of innovation, which concern strategies pursued with an intent to bolster relationships with partners from the external environment for the enhancement of innovation, is founded on a backdrop of evidence noting that firms depend on sources in the development of innovation in e-commerce, [4], [11], [19], [20], [22], [24].

Similarly, the integration of digital technologies evaluates the strategic implementation of complex digital solutions, including artificial intelligence and big data, which are fundamental to enhancing the operations of e-commerce [25], [26], [28]. In addition, customer involvement and co-production offer the measure of customers' involvement in the innovation process, which is a key driver to innovation due to immediate market feedback, [30], [31], [33]. Also, the second type of sources internal that presents the innovation as the firm’s resources internal environment, including R&D and employee creativity, helps the firm to keep the innovative momentum and adjust to external conditions independently, [3], [9], [40], [42].

Next, perceived e-commerce market dynamics relate to the firm's awareness of changes in customer buyer behavior and emerging technologies, an important area for the firm to compete sustainably [13], [44]. Similarly, perceived organizational flexibility focuses on the flexibility of the organization's business process concerning the forces

of the operation environment on the internal business processes, [14], [15].

In addition, the moderating role of government takes into account to what extent Tanzanian formal institutions enable innovation by discussing regulations and policies that are either conducive or non–conducive to innovation as elicited by incentives and infrastructure supported by the government, [51], [54]. Finally, technological innovation in e-commerce assesses how firms adopt and improve technologies to enhance their operations and competitiveness, [3], [53].

### 3.2 Sample Size and Collection Data

The content of the structured questionnaire is designed on a Google form; this content link is only sent to those who agree to participate in the response. This research sampling focuses on sellers on e-commerce platforms, and the research team approaches the sample through purchases to support business owners' selling according to the B2C model. Delivery drivers were given tips for the sample group. Furthermore, this research was supported by 10 final-year students majoring in e-commerce, who were recruited and trained in data collection statements and basic interviewing skills before approaching the sample. Each person assisted in data collection through internships and approached employees working at e-commerce platforms.

Each study sample size estimation approach has pros and cons. Cochran's formula, variable count rule of thumb, power analysis, and the ten times rule are common methods, [58]. The ten times rule has been selected for this research because of its easy application, versatility, and suitability of PLS-SEM models.

Cochran's formula ensures a representative sample for investigations with vast or limitless populations. This approach presupposes another valuable event rate and normal distribution, which are unsuitable for this examination. However, PLS-SEM is used to investigate predictive and complex relationships without customarily distributed data, so the ten-time rule is appropriate.

The minimal sample size for this study is 320 samples, based on the ten times rule, as the model has eight variables, each assessed by four items. This sample size allows for convergent and discriminant validity in CFA and robust prediction capabilities in PLS-SEM by providing enough data to analyze variable correlations accurately. However, the design of this study is 500 samples; the actual number of samples obtained is 364 samples used in this report.

### 3.3 Data Analysis

The study employed several analytical tools to enhance the validity and reliability of the data collected. First, we applied frequencies to describe the basic demographic data of participants and their rank in the sphere of e-commerce, relying on the criteria of age and gender. This served us well by helping establish some basic parameters of the respondents and providing a foundation for the study's proceedings.

In the next section, the internal reliability of the measurement scales was established using Cronbach's alpha coefficient. According to the coefficient alpha, values above point 0.7 are considered reliable. Next, CFA was done to additionally test the convergent and discriminant validity of the constructs and ensure that the measurement model was well-fit for the data.

Therefore, the PLS-SEM was used to analyze the paths between the variables and the suggested model. However, when interactions in the structural models are many, PLS-SEM is ideal, with data not necessarily having to be normally distributed. Therefore, it set the bootstrapping application with 5000 samples because SmartPLS was applied with the default settings, which enhanced the reliability of the results. This procedure helped assess the incremental value of the path coefficients. This supported the hypothesized parameters' validity and offered a complete view of the relationships proposed in the e-commerce framework.

## 4 Results

### 4.1 Characteristics of the Study Sample According to Demographics

Demographic study reveals innovation in rising e-commerce marketplaces. Table 1 (Appendix) presents the results of the percentage frequency analysis of the categories. Participants aged 30–39 (47.25%) are the leading innovators, combining expertise and adaptation to new technology. However, the 18–29 age group (25.28%) may be early adopters, accelerating technological development and innovation.

Moreover, when referring to the roles in the e-commerce setting, retail sellers occupy the leading

position with a 54.95% share; that indicates that they are among the key players in the effective use of technology by increasing customer value and competitiveness. The reported carriers are at 25.82% to advance the part of the supply chain, including artificial intelligence and automation, [59]. Competence developed with directions from the owners (10.99%) and the rest (8.24%) affect organizational innovation.

This information helps towards the objective of the study which seeks to determine the role of innovation sources on organisational agility. It depicts how the age groups and the actors that are part of the ecosystem affect the e-commerce landscape in Vietnam.

### 4.2 Testing the Reliability of the Conceptual Measurement Structure

To ensure that the required levels of the reliability of necessary indicators are reached, the analysis results provided in Table 2 (Appendix) contain Cronbach alpha, external loadings, and variance inflation factor in the survey data set, as [60] suggests. Meanwhile, the internal consistency in the measurement structure must be defined following. Cronbach's alpha coefficient was used in estimating the internal consistency of the developed scale. For purposes of screening for internal consistency of the scale, a value greater than 0.7 was desirable or ideal, [61]. In the current study, the internal reliability of all the constructs was at acceptable criteria, where Cronbach's alpha coefficients ranged between 0.835 and 0.900, which is greater than 0.70. Moreover, outer loading values were used to assess the loading of every indicator to the relevant latent constructs about the generally acceptable cutoff line of 0.708 for indicator reliability, [62]. The outer loadings in this study ranged from 0.751 to 0.917, and thus, the present study showed satisfactory reliability, but further improvement can increase the measured reliability. Multicollinearity among the independent variables was tested using the variance inflation factor, which gave a range of 1.521 to 2.937. These values are considerably lower than the threshold of 5, which implies that multicollinearity is not a concern, [63]. These findings indicate that the scales applied in this study are valid and authentic and can be applied in other research investigations within the framework of this research.

### 4.3 Test the Degree of Convergence and Discrimination

The study will attest to the reliability of the constructs' measures presented in Table 3 (Appendix) using the estimates of composite reliability (CR) and average variance extracted (AVE) to test the convergent validity. The convergent and the discriminant validity that fall under the construct validity were analyzed in detail. The CR values varied between 0.890 and 0.925, all exceeding the threshold of 0.70 suggested by [62], indicating a high level of internal consistency across all constructs. The AVE values of the constructs are ranged from 0.670 to 0.767. All these numbers indicate the constructs' ability to define over 50% variance in measures. The AVE was further utilized to test the convergent validity whereby the figures were all greater than 0.50, which, according to [64], is sufficient to give this model good validity.

### 4.4 Hypothesis Testing

Table 4 (Appendix) shows that the reported indices used to assess the relationship of measurement concepts include path coefficients, T statistics, and P values.

According to the findings, the following aspects may be identified as external innovation drivers: digitalization, consumer connection, and co-creation, perceived organizational agility, and perceived e-commerce market dynamics as internal innovation drivers. Hypotheses on relationships between internal innovation sources, digital technology, external innovation sources, and dynamic capabilities were tested, and all significant coefficients were obtained. This study shows that firms exploit their consumers, suppliers, and competitors as organizational resources to exploit the unfamiliar e-commerce environment unsteadily and profit from the organizational dynamism, [65]. Additionally, the findings show that the effectiveness of AI, big data, and other digital systems in enhancing business work and capacity to detect changes in the market is confirmed, [25]. In the same regard, internal resources such as research and development and the present pool of a company's manpower greatly affect both aspects of organizational nimbleness and knowledge of the market situation, [3]. This emphasizes that the internal resources of the enterprise are the foundation for building innovation capabilities, helping enterprises better adapt and respond promptly to changes in the market.

In addition, the relationship between internal sources of innovation perceived organizational agility, and perceived e-commerce market dynamics is negative. This suggests that internal resources such as R&D, employee creativity, or patent portfolio are not effectively utilized or optimized, [66]. The company may have difficulty using internal resources to change or adapt quickly to environmental fluctuations. Additionally, e-commerce market dynamics are negatively impacted when a business cannot quickly adapt to changes in customer behavior, technology, and competitive pressures, [67]. This can also lead to a disconnect between the business units in terms of leveraging internal innovation resources, [68]. This may result in the rundown application of concept innovativeness and does not offer enough flexibility, a requirement of e-commerce environments.

At the same time, the link between customer involvement and co-creation, innovation sourced internally on perceived organizational flexibility, and perceived e-commerce environment are insignificant, [69]. This may indicate that the level of customer engagement in the innovation and creativity process of the enterprise is still low or that there is no effective participation. From a management perspective, the enterprise does not possess the means or structures to transform innovation occurring within the organization into a tangible change of processes or structures, [70]. Additionally, the amount of feedback or interaction during the process of co-creation does not suffice to enhance the enterprise's flexibility or effectiveness in the context of the commercial environment, [71].

On the other hand, the results identified the mediating role of perceived organizational agility and perceived e-commerce market dynamics in the evolution of change to promote technological innovation. This can help them move their processes, structures, and strategies to align with environmental changes, [35]. Perceived e-commerce market dynamics mediate by helping firms understand and anticipate changes in customer behavior, technology, and competition. The existence of these two mediating factors acts as a bridge, helping to turn resources into specific innovation actions [20]. This means that firms can leverage resources for technological innovation only when they have good flexibility and market awareness.

Finally, the moderating role of government on the relationship between perceived organizational agility, perceived e-commerce market dynamics, and technological innovation in e-commerce is statistically significant. However, the magnitude of the influence on the relationship between perceived e-commerce market dynamics and technological innovation in e-commerce is higher. This suggests that policies and actions of government are more responsive to the feel and control of market events, [57]. The government intervenes to regulate technology and bring the confrontation of the perception of change in the e-commerce market directly, [14].

The study model specifies a set of indirect correlations that is more detailed, as indicated in Table 5 (Appendix), while Table 4 (Appendix) includes the direct evaluation.

Figure 2 (Appendix) depicts direct and indirect effect analysis. The research investigation arrived at these results.

# 5 Discussion

This research aimed to assess the effects of external sources of innovation, information technology, consumer participation, co-production, and internal sources of innovation on perceived organizational flexibility and e-commerce market conditions in developing market e-commerce. Next, the moderating role of the government in these relationships was studied.

External innovation sources, digital technology integration, and internal innovation sources significantly influence perceived e-commerce market dynamics and organizational agility. E-commerce businesses enhance their agility and responsiveness via the use of digital technology. Customer input had no substantial impact on perceived market dynamics, [72]. Market demands and organizational flexibility also played a part in pushing technological innovation in response to governmental regulations.

By sourcing innovation from local and global suppliers and technology providers, firms demonstrate how they can adapt to changing market requirements, which is confirmed by earlier research findings that revealed the significant correlations between the external sources of innovation and perceived market dynamics. Amongst the current growing technologies, AI and big data have improved market sensing and organizational adaptation, providing insights into how the application of information technology causes firms to manage

customer pressures and competition more successfully, [25]. However, internal sources of innovation negatively affect perceived market factors, suggesting that marketers may not be able to fully capitalize on internal assets to generate innovation owing to either a bureaucratic system or inadequate R&D, [73].

The weak link between the degree of customer involvement and perceived market fluctuations suggests that emerging market firms may not make the best use of consumers' feedback even as they try to involve consumers in creation processes. The lack of effective approaches to translating customers' feedback into tangible improvement impacts little on market flexibility, [36].

The government mainly regulated perceived dynamics within the e-commerce industry. Government incentives for innovation and digital transformation enhanced firms' agility and creativity, [74]. Nonetheless, stringent regulations, particularly around intellectual property, impeded innovation by imposing obstacles on e-commerce businesses.

The results support prior research about the importance of outside innovation to organization flexibility, [19]. Such studies have suggested that digital technology is much more effective in raising market consciousness and sensitivity, [26]. The concept that internal sources are important for the development of technology is counterbalanced by the fact that these sources have a negative impact, [9]. This may be due to a lack of resources or a lack of innovative environment setting resulting in emerging economies. The moderate overall impact of consumer interaction supports the previous findings that customer co-creation activities have positive effects and improvement of organizational performance relates to the efficient management and inclusion of such practices into business processes, [30].

However, this research is constrained by the demographics of the sample. Most respondents were e-commerce sellers and delivery personnel, perhaps limiting the relevance of the results to business owners and technology providers. Due to the limited access of sellers and delivery personnel to strategic decision-making in e-commerce companies, specific demographics may influence the perceived value of different sources of innovation, [75]. While methodologically valid and generalizable, the sample is not likely to include a complete range of ideas within the e-commerce environment, thus distorting the reported associations.

Relevant trends around external innovation, incorporations of digital technologies, and government regulation in e-commerce. Another important finding that was made based on the estimation of the effects of the factors of market adaptation and organization flexibility is that while internal resources and the customer connection had a lower positive value on the market adaptation and organization flexibility than cooperation and technology innovation, it indicates that emerging market firms failed to innovate. More subjects are required for a better understanding of the interaction patterns, [14]. This result highlights that there is a need for government policies and external cooperation to foster technological development in developing nations, [7].

# 6 Conclusion

The following research contributes to the advancements in knowledge of external sources of innovation for the emerging e-commerce market, integration of digital technology, customers, internal resources, and government moderation. This research established that external innovation and the integration of digital technology enhance organizational flexibility and market sensitivity. However, it also highlighted the limitations of the internal innovation resources, including the consumers, that require further scrutiny for their impact on innovation.

Consequently, the study establishes that government policy support as well as the participation of actors outside B2C are vital in e-commerce construction. Two of them propose that governmental stimulation or control might affect the degree of the freedom or emergence of novelties regarding e-commerce organizations. This brings about the question of whether there is propriety for having a fair environment in that end to encourage creative minds yet such intellectual property is protected.

Thus, the study demonstrates how developing market e-commerce ventures can leverage external knowledge resources, digital technology, and government support to improve competition and manage change. This paper combines previous research to give a holistic approach to influencing technical innovation in this emerging economy's rapidly evolving e-commerce landscape.

# 7 Implications (Practical, Social, Research)

The results obtained have the following managerial implications for developing market e-commerce businesses. Suppliers, technology counterparts, and competitors are important innovation partners, [76]. Firms need to actively acquire such externality to gain outside knowledge and develop innovative solutions that enhance system flexibility, [77]. For instance, e-commerce firms can partner with logistics companies to interface AI systems into order fulfillment, replenishment, and delivery systems, making it faster and minimizing complications and inconvenience to the consumer. In the same way, there are possibilities for platforms to employ customer engagement tools for creating relevant marketing initiatives or variable pricing schemes that should be more relevant to the current markets, [78]. Large companies that wish to enhance their daily operations and organization's operational flexibility must implement information technology, including AI and big data. Managers should invest in time-real market analysis and decision-making technologies.

In addition, the enterprises must adjust to shifting policy landscapes due to government regulation. E-commerce enterprises may foster growth by engaging with legislators and lobbying to support innovation policies. Firms should also comply with intellectual property laws to prevent legal issues that might stifle innovation.

The following research demonstrates that e-commerce can innovate and engender positive social change. The application of digital technology also increases the prospects of the economic development of SMEs and entrepreneurs, also increasing stakeholder involvement. For developing countries, supporting innovation helps them diversify and stabilize a country's economy, improve consumer services, and create more job offerings. The moderating role of government policy means that the key aspect of having a policy is to provide the proper framework for innovation and fair benefits distribution. This result helps SMEs solve problems, and government technology and resources might help them start. Furthermore, according to the study findings, more study on internal innovation that can be deemed to enhance should be done, and searching for internal innovation sources might change the current structure fit or resource configuration of the emerging market organizations. Also, more studies should be conducted on internal innovation having established their effectiveness from the current study. Identifying sources of internal innovation may also lead to positive changes in emerging markets. In the future, internal capabilities will be integrated into internal R&D processes, innovation will be strengthened, and internal capabilities will be connected with external sources of information.

Customer co-creation does not impact the market, which implies that the problems of consumer co-creation in the market require further investigation. The paper mainly emphasizes that electronic feedback technology may involve consumers in the development of innovation and evaluate its influences on business flexibility and viability.

Lastly, as government regulation constrains the innovative development of e-commerce, future works should contrast the effects of specific policies. Cross-sectional research across various developing economies may establish how various regulatory frameworks influence the innovation of e-commerce enterprises.

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# APPENDIX

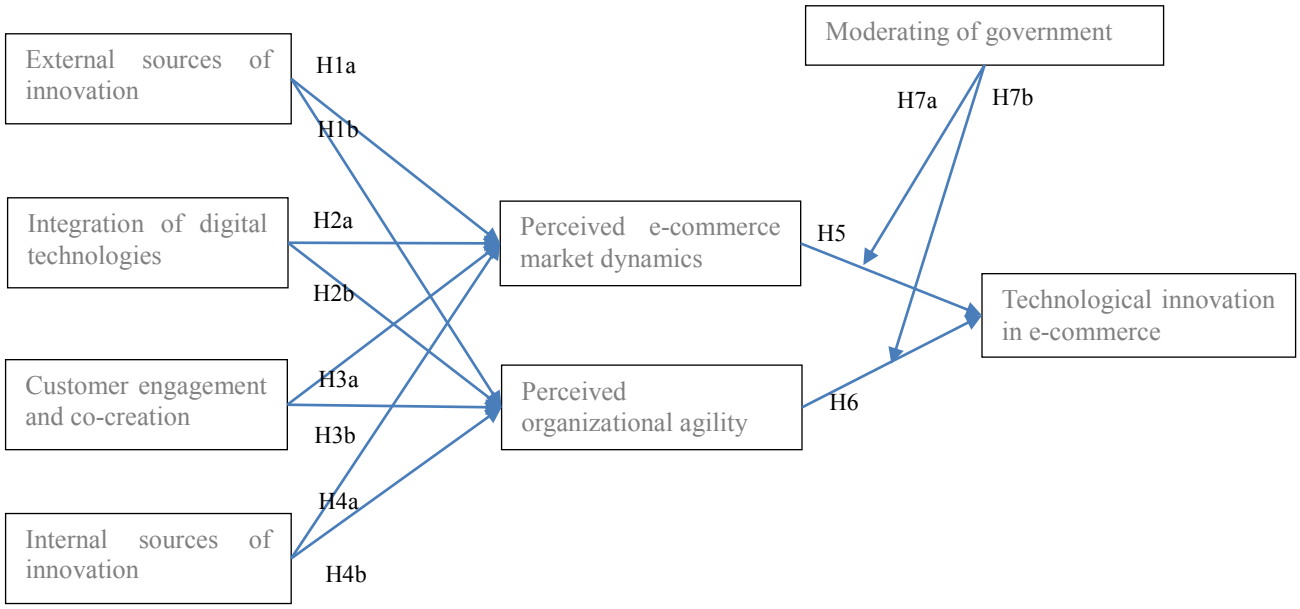


Fig. 1: Analytical model for assessing perceived technological advancement of electronic commerce
*Source: Author's synthesized, 2024*

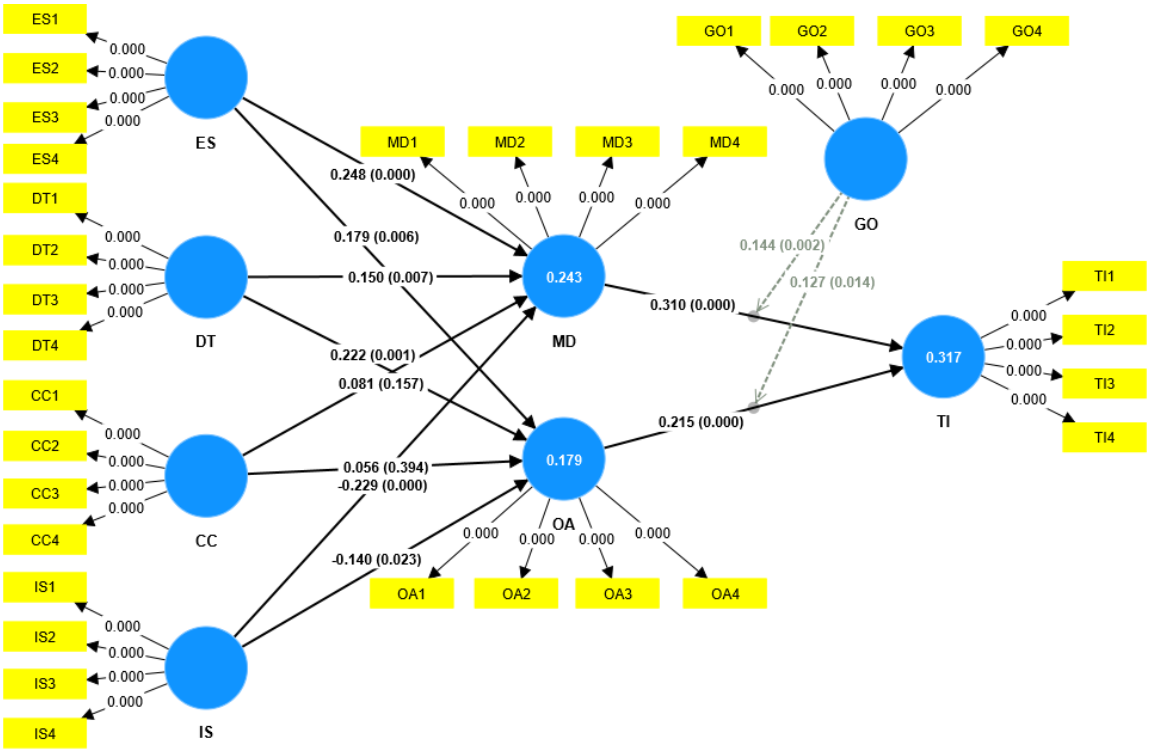


Fig. 2: Visualization of analysis results in perceived market dynamics and organizational agility of technology innovation in e-commerce
*Source: author's analysis, 2024*
*Note: External sources of innovation (ES), integration of digital technologies (DT), customer engagement and co-creation (CC), internal sources of innovation (IS), perceived e-commerce market dynamics (MD), perceived organizational agility (OA), moderating role of government (GO), technological innovation in e-commerce (TI).*

Table 1. Demographic data of the participants enrolled in the study

| Characteristics | Categories | Frequency | Percent (%) |
|---|---|---|---|
| Gender | | | |
| | Female | 165 | 45.33 |
| | Male | 199 | 54.67 |
| Age | | | |
| | 18 - 29 | 92 | 25.28 |
| | 30 - 39 | 172 | 47.25 |
| | 40 - 49 | 81 | 22.25 |
| | Up 50 | 19 | 5.22 |
| Roles in the E-commerce Ecosystem | | | 54.95 |
| | Retail sellers | 200 | 25.82 |
| | Logistics providers | 94 | 10.99 |
| | Owners | 40 | 8.24 |
| | Others | 30 | 25.28 |

*Source: author's analysis, 2024*
*Note: Composite reliability (rho_c), Average variance extracted (AVE)*

Table 2. Results of testing the reliability of the measurement structure

| Items | Questionnaire | Cronbach's Alpha | Outer loading | VIF |
|---|---|---|---|---|
| **ES** | **External sources of innovation** | **0.883** | | |
| ES1 | Your business collaborates with external partners (e.g., suppliers, users, competitors) to generate innovation [19]. | | 0.863 | 2.391 |
| ES2 | Your business taps into external resources for new technologies and solutions [20]. | | 0.894 | 2.669 |
| ES3 | External knowledge helps your business quickly adapt to changes in the market [4], [22]. | | 0.894 | 2.748 |
| ES4 | Your business uses external partnerships to observe market changes and adjust processes [11], [24]. | | 0.786 | 1.832 |
| **DT** | **Integration of digital technologies** | **0.892** | | |
| **DT1** | Your business adopts advanced digital technologies (e.g., AI, big data, cloud computing) to improve operations [25]. | | 0.865 | 2.389 |
| **DT2** | Your business uses digital tools to understand better and respond to market trends and customer needs [26]. | | 0.866 | 2.449 |
| **DT3** | Your business uses IT in the way to support appropriate flexibility and speed of decision-making [28]. | | 0.866 | 2.306 |
| **DT4** | Your business is digitalized to enable the entity to respond to changes in the market environment in a short span [29]. | | 0.877 | 2.495 |
| **CC** | **Customer engagement and co-creation** | **0.865** | | |
| **CC1** | Your business collaborates with customers to develop or improve products and services [30]. | | 0.854 | 2.151 |
| **CC2** | To fully understand the specifics of your customers' needs, your business involves the customers in the innovation process [31]. | | 0.836 | 2.110 |
| **CC3** | Customer feedback assists the business organization know the prevailing market trends and competition for production [33]. | | 0.813 | 1.805 |
| **CC4** | Customer engagement is used by your business to adapt and optimize processes in line with the market [36]. | | 0.869 | 2.226 |
| **IS** | **Innovational internal sources** | **0.835** | | |
| **IS1** | Your business firm depends on internal investment made in innovation research and development [9]. | | 0.831 | 1.791 |
| **IS2** | Your business leverages employee creativity to generate new ideas and inventions [3]. | | 0.832 | 1.980 |
| **IS3** | Your business proactively responds to market and technological changes through internal innovation [40]. | | 0.859 | 2.245 |

| Items | Questionnaire | Cronbach's Alpha | Outer loading | VIF |
|---|---|---|---|---|
| **IS4** | Your business adapts its processes based on internal capabilities to meet evolving customer needs and market trends [42]. | | 0.749 | 1.521 |
| **MD** | **Perceived e-commerce market factors** | **0.867** | | |
| **MD1** | Your business expects a shift in customer behavior across online selling platforms [13]. | | 0.843 | 2.088 |
| **MD2** | Your business comprehends technological improvements in the e-commerce market [44]. | | 0.841 | 2.031 |
| **MD3** | Your business recognizes competitive pressures in the e-commerce environment [45]. | | 0.834 | 1.953 |
| **MD4** | Your business identifies opportunities for innovation based on market changes [44]. | | 0.864 | 2.236 |
| **OA** | **Perceived organizational agility** | **0.882** | | |
| **OA1** | Your business adjusts its internal processes in response to market changes [14]. | | 0.852 | 2.237 |
| **OA2** | Your business modifies its strategies promptly to meet external market conditions [15]. | | 0.867 | 2.186 |
| **OA3** | Your business adapts to technological advancements quickly and efficiently [49]. | | 0.867 | 2.361 |
| **OA4** | Your business can reconfigure its structure to respond to changing customer demands [23]. | | 0.852 | 2.206 |
| **GO** | **The moderating role of government** | **0.901** | | |
| **GO1** | Your business is influenced by government policies that support innovation through incentives like tax credits and grants [51]. | | 0.888 | 2.547 |
| **GO2** | Your business faces obstacles to innovation due to stringent or unpredictable government regulations [54]. | | 0.864 | 2.637 |
| **GO3** | Government rules help your company implement digital technologies [52]. | | 0.902 | 2.483 |
| **GO4** | Your business's innovation processes rely on the intellectual property laws and market regulations developed by the government [25]. | | 0.849 | 2.563 |
| **TI** | **Technological innovation in e-commerce** | **0.888** | | |
| **TI1** | Your business adopts new technologies to enhance e-commerce operations [3]. | | 0.849 | 2.169 |
| **TI2** | Your business improves existing digital systems to meet changing market demands [53]. | | 0.865 | 2.416 |
| **TI3** | Your business develops new business strategies to remain competitive in the e-commerce market [52]. | | 0.843 | 2.100 |
| **TI4** | Your business deploys technology to improve customer interactions and service delivery [12]. | | 0.901 | 2.937 |

*Source: author's analysis, 2024*
*Note: Variance Inflation Factor (VIF)*

Table 3. Correlation matrix according to Fornell-Larcker criterion

| | CR | AVE | ES | CC | DT | IS | MD | OA | GO | TI |
|---|---|---|---|---|---|---|---|---|---|---|
| ES | 0.919 | 0.740 | 0.860 | | | | | | | |
| CC | 0.908 | 0.711 | 0.352 | 0.843 | | | | | | |
| DT | 0.925 | 0.755 | 0.363 | 0.321 | 0.869 | | | | | |
| IS | 0.890 | 0.670 | -0.218 | -0.212 | -0.265 | 0.819 | | | | |
| MD | 0.909 | 0.715 | 0.381 | 0.265 | 0.326 | -0.340 | 0.846 | | | |
| OA | 0.919 | 0.739 | 0.310 | 0.220 | 0.342 | -0.250 | 0.273 | 0.860 | | |
| GO | 0.929 | 0.767 | -0.191 | -0.103 | -0.201 | 0.112 | -0.218 | -0.114 | 0.876 | |
| TI | 0.922 | 0.748 | 0.400 | 0.334 | 0.345 | -0.233 | 0.450 | 0.366 | -0.260 | 0.865 |

*Source: author's analysis, 2024*
*Note: Composite reliability (CR), average variance extracted (AVE), external sources of innovation (ES), integration of digital technologies (DT), customer engagement and co-creation (CC), internal sources of innovation (IS), perceived e-commerce market dynamics (MD), perceived organizational agility (OA), moderating role of government (GO), technological innovation in e-commerce (TI).*

Table 4. Results of direct relationship analysis

| Hypothesis | Direct relationship | Path coefficient | Standard deviation | T-statistics | P values |
|---|---|---|---|---|---|
| H1a | ES -> MD | 0.248 | 0.058 | 4.289 | 0.000 |
| H1b | ES -> OA | 0.179 | 0.064 | 2.775 | 0.006 |
| H2a | DT -> MD | 0.150 | 0.056 | 2.690 | 0.007 |
| H2b | DT -> OA | 0.222 | 0.066 | 3.384 | 0.001 |
| H3a | CC -> MD | 0.081 | 0.057 | 1.416 | 0.157 |
| H3b | CC -> OA | 0.056 | 0.066 | 0.852 | 0.394 |
| H4a | IS -> MD | -0.229 | 0.060 | 3.836 | 0.000 |
| H4b | IS -> OA | -0.140 | 0.062 | 2.272 | 0.023 |
| H5 | MD -> TI | 0.310 | 0.057 | 5.461 | 0.000 |
| H6 | OA -> TI | 0.215 | 0.057 | 3.784 | 0.000 |
| H7a | GO x MD → TI | 0.127 | 0.052 | 2.461 | 0.014 |
| H7b | GO x OA → TI | 0.144 | 0.046 | 3.134 | 0.002 |

*Source: author's analysis, 2024*

*Note: External sources of innovation (ES), integration of digital technologies (DT), customer engagement and co-creation (CC), internal sources of innovation (IS), perceived e-commerce market dynamics (MD), perceived organizational agility (OA), moderating role of government (GO), technological innovation in e-commerce (TI).*

Table 5. Results of Indirect Relationship Analysis

| Indirect relationship | Path coefficient | Standard deviation | T-statistics | P-values |
|---|---|---|---|---|
| ES -> MD -> TI | 0.077 | 0.024 | 3.184 | 0.001 |
| ES -> OA -> TI | 0.038 | 0.017 | 2.209 | 0.027 |
| DT -> MD -> TI | 0.046 | 0.020 | 2.371 | 0.018 |
| DT -> OA -> TI | 0.048 | 0.021 | 2.276 | 0.023 |
| CC -> MD -> TI | 0.025 | 0.019 | 1.319 | 0.187 |
| CC -> OA -> TI | 0.012 | 0.016 | 0.763 | 0.445 |
| IS -> MD -> TI | -0.071 | 0.023 | 3.159 | 0.002 |
| IS -> OA -> TI | -0.030 | 0.014 | 2.080 | 0.038 |
| GO x MD -> TI | 0.127 | 0.052 | 2.461 | 0.014 |
| GO x OA -> TI | 0.144 | 0.046 | 3.134 | 0.002 |

*Source: author's analysis, 2024*

*Note: External sources of innovation (ES), integration of digital technologies (DT), customer engagement and co-creation (CC), internal sources of innovation (IS), perceived e-commerce market dynamics (MD), perceived organizational agility (OA), moderating role of government (GO), technological innovation in e-commerce (TI).*