

Impact of Information Technology, Innovation, Customer Service, and Environmental Compliance on Organizational Performance in Vietnam

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Abstract

This paper aims to analyze how information technology are related to organizational performance, firm innovation, and customer relationship management. It also examines how firm innovation, customer relationship management, and environmental compliance influence on organizational performance. In addition, this study adopts a quantitative approach, with questionnaires distributed to 110 respondents collected from both large enterprises and small and medium-sized enterprises (SMEs) in Vietnam applying convenience sampling approaches. The structural analysis will be carried out utilizing PLS-SEM modeling. The result shows that information technology has a positive effect on organizational performance as well as firm innovation and customer relationship management. Additionally, firm innovation and environmental compliance enhance organizational performance. While previous studies have delved into the impact of information technology on organizational performance, as well as the impact of firm innovation and customer relationship management on performance, this study makes an original contribution by examining these relationships concurrently in a Vietnamese context. It, furthermore, offers valuable insights for Vietnamese businesses striving to improve their performance through the use of information technology, innovation, customer management, and environmental practices.

Keywords

Business Innovation; Customer Relationship; Environment; Organizational Efficiency; Technology

1. Introduction

IT is now essential to a business's success. According to Farhanghi et al. (2013), it is now a crucial driver of survival and development rather than a supporting role. Businesses are spending extensively on contemporary IT systems as a result of this. These expenditures give businesses a competitive edge and aid in navigating the market's complexity (Crichton & Edgar 1995). CRM and IT combine to strengthen a company's customer interactions. IT provides the architecture and resources needed for a robust CRM system. According to He et al. (2005), a CRM system may help businesses maximize profits through ongoing customer contact and the creation of marketing strategies based on customer data analysis.

Innovation is critical for organizations to survive in the present competitive landscape, as it forces them to constantly pursue efficiency and adaptability (Hmoud et al. 2023; Khmour et al. 2021). It is necessary for long-term success in every endeavor. Understanding the relationship between innovation and performance helps businesses attract top talent, improve employee engagement, and create a collaborative learning environment. Ultimately, when IT procedures align with innovation goals, businesses are able to maintain a competitive edge. Long-term organizational performance and creativity were enhanced by environmental compliance (Zhao et al. 2018). Companies that prioritize environmental compliance will benefit in two key ways as consumer demand for high-end, eco-friendly products grows. First off, compliance usually necessitates technological innovation as businesses develop new practices and products with a lower environmental impact. Furthermore, a business can enhance its standing by prioritizing environmental responsibility, as this will draw in environmentally conscious customers and foster sustained prosperity.

1.1. Objectives

The purpose of this study is to look at how IT affects organizational performance, innovation, and CRM in both major Vietnamese firms and SMEs. It also provides an inquiry into the relationship between innovation and organizational performance. Furthermore, the study investigates the impact of CRM on organizational performance. Finally, it looks at the relationship between environmental compliance and organizational performance.

2. Literature Review

2.1. Customer relationship management (CRM)

CRM encompasses a comprehensive strategy for managing all interactions with customers. This strategy prioritizes the development of long-lasting relationships and the continual improvement of the customer experience (Chen & Wu, 2016; Duong Vu Xuan Quynh & Nguyen Hoang Huy, 2018). By fostering stronger customer connections and enhancing retention, CRM contributes to increased organizational efficiency and a deeper understanding of specific customer needs (Das & Hassan 2022).

2.2. Environmental compliance (EC)

As global awareness of environmental issues grows, EC plays an increasingly important role. Businesses are now responsible for ensuring compliance with environmental legislation (Al-Sartawi Editor 2022). EC requires careful adherence to the legal frameworks, laws, and standards established by governmental agencies and organizations to protect the environment. Furthermore, gaining ISO 14000 certification is a well-known way for firms to demonstrate their commitment to regulatory compliance (Truong et al. 2023a).

2.3. Firm innovation (FI)

The contemporary business landscape is in constant instability, necessitating a focus on innovation as the foundation of competitive advantage and long-term viability (Al Daboub et al. 2024). FI is more than just a survival strategy; it has evolved into a critical instrument for improving organizational performance (Ahuja & Katila 2001; Sierra-Morán et al. 2024). As a result, FI has climbed to the top of managerial priorities (Sierra-Morán et al. 2024). In this context, FI is described as the strategic development of new products and services in a short period (Truong et al. 2023a).

2.4. Information technology (IT)

The resource-based view (RBV) asserts that organizational resources have a major impact on company performance (Barney 1991). Particularly, given technology's ubiquitous integration into organizational activities, it is acknowledged as a significant resource influencing performance (Bahrami et al. 2012). Prior research has shown that technology investments enable operational reconfigurations, which promote adaptability and flexibility (Bharadwaj

et al. 2013; Ghobakhloo, 2018; Hilman Abdullah et al. 2017; Muthuveloo 2013). This enables businesses to quickly develop creative projects in response to changing conditions and uncertainty.

2.5. Organizational Performance (OP)

OP is a multidimensional concept that encompasses a wide range of outcomes that contribute to an organization's overall financial health. These outcomes include financial performance, operational effectiveness, employee satisfaction, client retention, and firm efficacy (Pillai & Srivastava 2024). To prosper in today's dynamic and uncertain market environment, firms must be proficient at navigating change (Allegretti et al. 2021). As a result, monitoring OP becomes critical for influencing strategic decisions and guaranteeing the organization's responsiveness to changing market demands. Within this study setting, efficiently leveraging IT, promoting innovation, creating strong customer relationships, and maintaining a focus on EC are regarded as critical drivers of successful OP.

2.6. Relationship of CRM with EC

Customers and the environment play critical roles in business performance development (Calza et al. 2023). CRM systems can help to improve environmental compliance by enabling communication and data management. Melnyk et al. (2020) claimed that customer-related environmental data might be utilized to demonstrate regulatory compliance and improve overall environmental performance. CRM can also be used to target and promote environmental actions to customers, thereby increasing brand loyalty and attracting environmentally concerned buyers (Berrone & Gomez-Mejia 2009). Therefore, we suggest the first hypothesis as follows:

H1. CRM has a positive effect on EC

2.7. Relationship of CRM with OP

CRM and OP are clearly related. Several studies highlight the importance of customer engagement in enhancing organizational effectiveness (Garrido-Moreno & Padilla-Meléndez 2011; Khan & Qianli 2017). Customer satisfaction rises as a result of the company's market performance (Soltani et al., 2018). Additionally, the authors also implemented that CRM can improve customer satisfaction and loyalty. OP will improve as a result of higher customer happiness and loyalty (Chung et al. 2012). Therefore, the second hypothesis of this study is as follows:

H2. CRM has a positive effect on OP

2.8. Relationship of EC with FI

Previous research suggested that environmental restrictions could encourage enterprises to innovate, which could enhance their performance (van Leeuwen & MohnenM2017). Eiadat et al. (2008) contended that well-designed rules and flexible environmental controls stimulate inefficient enterprises to increase their capacity by investing in innovation. For example, one study found that green innovation and flexible environmental laws result in a large reduction in hazardous emissions in the United States (Carrión-Flores & Innes 2010). Therefore, we could hypothesize that:

H3. EC has a positive effect on FI

2.9. Relationship of EC with OP

Stringent environmental regulations can act as a catalyst for firms to invest in advanced equipment and technologies, ultimately leading to increased operational efficiency (Zhao et al. 2018). According to Tan et al. (2017), financial performance and environmental sustainability in the travel and lodging industries are positively correlated in a number of different sectors. Moreover, Yang and Yao (2012) discovered that Chinese businesses strongly supported financial performance, innovation, and EC. Their study also discovered that businesses with ISO 14000 certification had greater market shares and sales per employee. Based on this interpretation, we establish the following hypothesis:

H4. EC has a positive effect on OP.

2.10. Relationship of IT with CRM

CRM has been demonstrated to concurrently enhance client loyalty and satisfaction while optimizing organizational benefits (Chatterjee et al. 2021). This necessitates the effective utilization of comprehensive customer databases for

thorough analysis. IT plays a critical role in this context, facilitating the efficient collection, storage, and retrieval of customer data, as evidenced by research from Rust and Verhoef (2005) and Lederer et al. (2001). Furthermore, Yang and Rhee (2009) emphasize the importance of leveraging IT resources to cultivate stronger customer relationships, particularly within virtual shopping environments. As such, it is hypothesized that:

H5. IT has a positive effect on CRM.

2.11. Relationship of IT with FI

IT acts as the foundation for FI. It provides the tools and framework that enable creative activities. Previous studies have demonstrated that IT has an important role in innovation (Stock et al.2002; Wang et al. 2013). Usai et al. (2021) contribute further by illuminating the intricate relationship between specific technologies, innovation, and their subsequent influence on the employment landscape. Joshi et al. (2015) stated that firms strategically investing in novel technologies establish a robust foundation for FI. In light of this, we propose:

H6. IT has a positive effect on FI.

2.12. Relationship of IT with OP

In today's dynamic business environment, successful IT implementation is a critical factor in boosting OP (Zhou et al., 2014). Previous studies have found some correlations between IT and OP. For example, Liu et al. (2020) showed that IT skills yield significant performance improvements. Farhanghi et al. (2013) investigated the influence of environmental dynamism on the relationship between IT investment and OP, uncovering a demonstrably positive effect. They further asserted the performance-enhancing capabilities of IT implementation. Thus, the following hypothesis is proposed:

H7. IT has a positive effect on OP.

2.13. Relationship of FI with OP

According to the RBV, companies can potentially gain a competitive edge over rivals through the development of a robust innovation strategy (Bommer & Jalajas 2004).

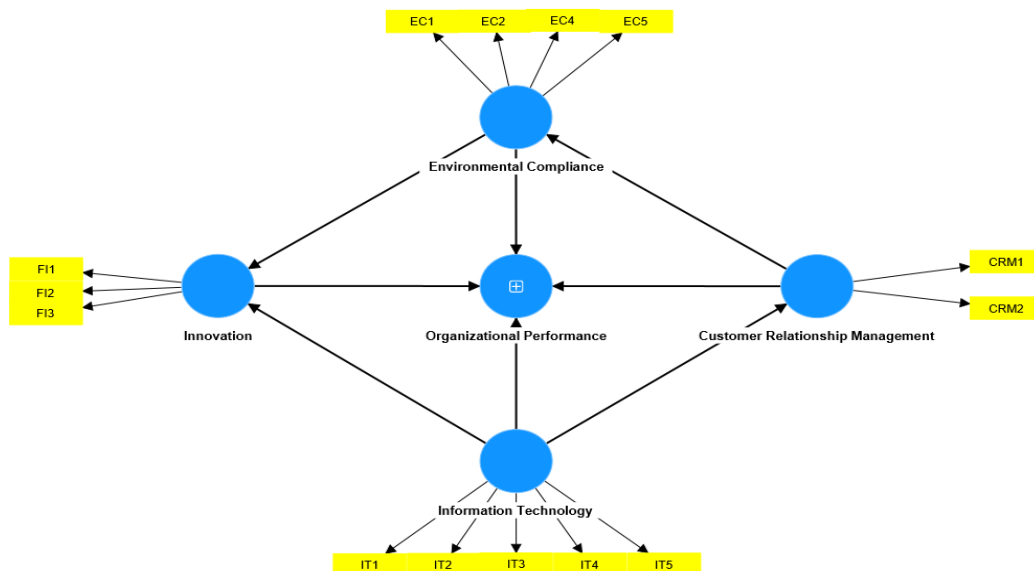


Figure 1. Research framework with hypothesis development
(Source: Created by the author)

Moreover, it results in improved OP and a competitive advantage (Tripathi & Kalia 2022). As stated by Racela and Thourunroje (2020), innovative businesses possess superior process capabilities, ultimately leading to a greater likelihood of achieving exceptional overall performance. Therefore, the following hypothesis is suggested:

H8. FI has a positive effect on OP.

3. Methods

3.1. Sampling and data collection

A convenient sampling technique is used to collect the primary data. The board of directors, managers, and project managers from different Vietnamese industries are the study's participants. The study took place between April and May of 2024, for about two months. 110 of the 500 forms that were distributed were deemed valid for further examination. Based on data collection, Table 1 presents more details regarding the characteristics of the sample.

3.2. Measurement

We used a closed-ended questionnaire to survey a large number of respondents as it is an effective technique. Evaluation of all constructs were conducted using a five-point Likert scale ranging from 1 - strongly disagree to 5 - strongly agree. Our measurement scale was developed by adapting items from previous studies. The items for OP, FI, and EC were adapted from Truong et al. (2023b). Five CRM items were adapted from Das & Hassan (2022). Finally, five IT items were adapted from Chan Ie Lyn & Muthuveloo (2019) with small modifications.

3.3. Analytical methodology

The study model was assessed using PLS-SEM for a number of reasons. Firstly, the primary objective of PLS-SEM, being a variance-based technique, is to account for all of the variability in the data. This is accomplished by a series of ordinary least squares regressions, which are well recognized by academics and are less prone to breaches of normality assumptions than covariance-based SEM (Hair et al., 2020). Second, PLS-SEM is ideal for such a model because our conceptual framework consists of numerous interdependent components. Compared to covariance-based SEM, PLS-SEM focuses on optimizing the model's capacity to forecast the dependent variables. This focus on prediction is in line with our research objectives, which highly prioritize identifying the primary drivers of the dependent variables. Finally, PLS-SEM can handle complex models with multiple construct interactions. This is beneficial to our research because it allows us to examine the complex connections between the many components of our model. When the dependent variable affects the causal variable, endogenous issues occur. These issues can be solved with the use of PLS-SEM.

4. Results and Discussion

4.1. Demographic characteristics

In this study, managers accounted for 52% of respondents, with 48% working in the manufacturing business. In terms of corporate characteristics, 70% of respondents represented organizations that had been in business for more than 20 years, while 45% represented major businesses with more than 500 people. Table 1 displays the demographic information for each responder as well as their companies.

4.2. Measurement model

Table 2 shows the factor analysis, including reliability and validity statistics. According to Dash and Paul (2021), each construct has an adequate factor loading of at least 0.6; Table 2 shows that the lowest loading was 0.764 and the highest was 0.934. Furthermore, all VIF values are within the permitted range of 1 to 10. When VIF values exceed 10, multicollinearity is presumed to be the source of the mistake in regression coefficient computations, rendering multicollinearity problematic (Salmerón Gómez et al. 2016; Shrestha 2020).

Cronbach's alpha (α) and composite reliability (CR) were both used to assess reliability. Also, Gentle et al. (2010) assessed internal consistency using Cronbach's α and CR. The Cronbach's α and CR values for all constructs exceeded the essential value of 0.70 (Nunnally & Bernstein 1995; Ventre & Kolbe 2020), indicating a trustworthy and internally consistent measuring approach (see Table 2). Convergent and discriminant validity are used to evaluate the validity; convergent validity is evaluated using the average variance extracted (AVE); Hair et al. (2014) state that the threshold for convergent validity is greater than 0.50. The results in Table 2 demonstrate that the measurement model produced adequate convergent validity. Both the heterotrait-monotrait ratio (HTMT) (see Table 3) and the Fornell-Larcker criterion (see Table 4) were used to assess the discriminant validity.

Table 1. Demographic characteristics

Characteristics (N=110)	Number	Percentage (%)	
Type of industry	Services - Trading	17	15%
	Manufacturing	53	48%
	Consulting-Design-Construction	14	13%
	Healthcare-Education	13	12%
	Others	13	12%
Position	Board of directors	16	15%
	Manager	57	52%
	Project manager	37	33%
Firm size	50-200	15	14%
	201-300	13	12%
	301-400	14	13%
	401-500	19	17%
	More than 500	49	45%
Years of firm operations	Less than 10	17	15%
	11-20	16	15%
	More than 20	77	70%

(Source: Created by the author)

The square root of each construct's AVE is compared to the correlations between constructs using the Fornell-Larcker criterion. For each construct, the square root of AVE must be greater than whatever association it may have with other constructs (Larcker 1981). The HTMT ratio, on the other hand, is concerned with the relationship between the square root of the product of the AVEs of two conceptions and their correlation. Furthermore, according to (Henseler et al. 2015), a value less than 0.9 denotes strong discriminant validity.

Table 2. Factor analysis with reliability and validity statistics

Constructs	Code	Loading	VIF	Alpha	CR	AVE
Customer relationship management	CRM1	0.934	1.746	0.791	0.903	0.824
	CRM2	0.880	1.746			
Environmental compliance	EC1	0.846	2.434	0.882	0.918	0.738
	EC2	0.813	2.187			
	EC4	0.883	3.220			
	EC5	0.893	3.360			
Firm innovation	FI1	0.874	1.771	0.871	0.919	0.792
	FI2	0.905	3.389			
	FI3	0.891	3.178			
Information technology	IT1	0.879	4.012	0.919	0.939	0.756
	IT2	0.922	4.423			
	IT3	0.790	2.440			
	IT4	0.867	4.464			
	IT5	0.884	5.000			
Organizational performance	OP1	0.854	2.559	0.885	0.916	0.686
	OP2	0.848	2.574			
	OP3	0.764	1.956			
	OP4	0.816	2.297			
	OP5	0.855	2.525			

(Source: Created by the author)

Table 3. Heterotrait-monotrait ratio (HTMT)

	CRM	EC	FI	IT	OP
CRM					
EC	0.614				
IT	0.418	0.631			
FI	0.343	0.619	0.688		
OP	0.554	0.786	0.857	0.804	

(Source: Created by the author)

Table 4. Fornell-Larcker criterion

	CRM	EC	FI	IT	OP
CRM	0.908				
EC	0.516	0.859			
IT	0.370	0.576	0.870		
FI	0.303	0.557	0.633	0.890	
OP	0.471	0.700	0.778	0.719	0.828

(Source: Created by the author)

4.4. Structural model

The structural model obtained from the PLS analysis is displayed in Tables 6 and 8. They show how the variance of endogenous variables (R^2) (see Table 5) and the standardized path coefficient (β) (see Table 7) explain the structural model's output. The significance levels of the estimates were evaluated using a bootstrap technique with 5,000 samples, and the model's validity was confirmed by examining the R^2 values (Hair et al. 2019). Hair et al. (2014) used path coefficients (β) with a specified range of -1 to +1 to represent potential connections between constructs. According to the author, coefficients near to +1 suggest significant positive associations, whereas coefficients close to -1 indicate strong negative relationships. Table 7 shows that all relationships in this research have β values that above 0, indicating minor to considerable positive influences.

Table 6 displays the structural model's f^2 values. According to Meinhardt et al. (2021), Birenbaum and Rosenau (2006), large, medium, and small impacts are defined as any f^2 value more than 0.35, 0.15, and 0.02. Table 7 and Figure 2 illustrate the results of the hypothesis testing. The results showed that CRM and EC were correlated, supporting H1 (p -value = 0.000). With a p -value of 0.066, CRM and OP were not significant enough to demonstrate that CRM enhances OP, so H2 was not supported. Additionally, EC significantly strengthened FI, supporting H3 (p -value = 0.028). Furthermore, EC strongly improved OP, hence supporting H4 (p -value = 0.006). Moreover, IT showed a positive relationship with CRM, IT, and OP, supporting H5, H6, H7 (all p -values < 0.05). Finally, FI and OP were shown to have a positive relationship, which supports H8 (p -value = 0.013).

Table 5. R-square

	R-square	R-square adjusted
CRM	0.137	0.129
EC	0.266	0.259
FI	0.456	0.446
OP	0.751	0.742

(Source: Created by the author)

Table 6. Effect size f^2

	f^2	
CRM → EC	0.362	Large
CRM → OP	0.031	Medium
EC → FI	0.101	Large
EC → OP	0.127	Large
IT → CRM	0.159	Large
IT → FI	0.258	Large
IT → OP	0.360	Large
FI → OP	0.181	Large

(Source: Created by the author)

Table 7. Hypothesis testing results

	β	T-statistics	P-values	Result
CRM → EC	0.516	4.506	0.000	Supported
CRM → OP	0.102	1.841	0.066	Not supported
EC → FI	0.288	2.192	0.028	Supported
EC → OP	0.247	2.756	0.006	Supported
IT → CRM	0.370	3.404	0.001	Supported
IT → FI	0.467	3.903	0.000	Supported
IT → OP	0.415	4.345	0.000	Supported
FI → OP	0.288	2.491	0.013	Supported

(Source: Created by the author)

We also identified indirect effects in Table 8. The results indicated that CRM served as partial mediators of the relation between IT and OP.

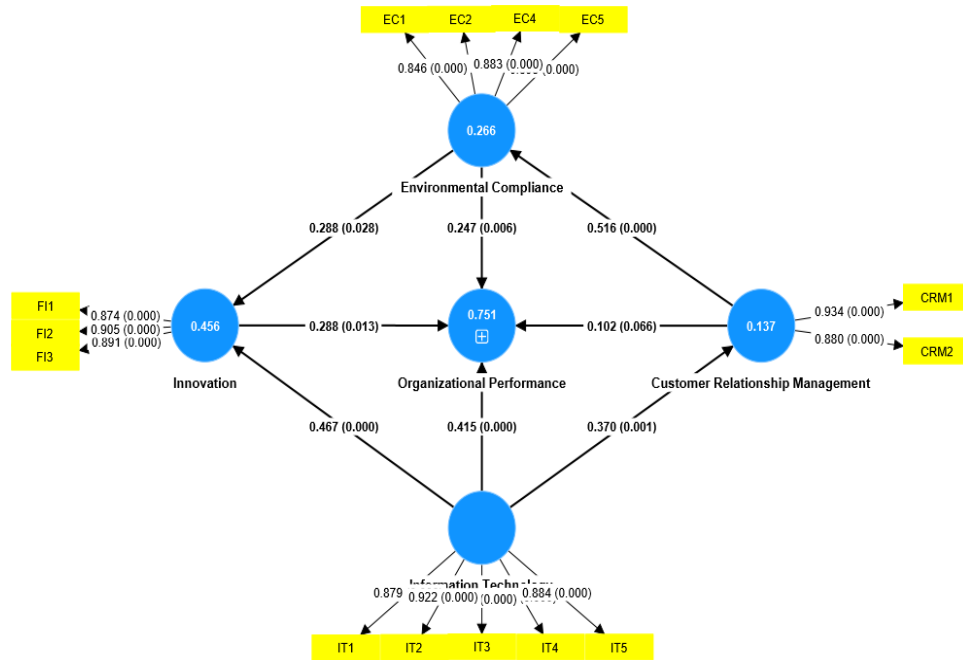


Figure 2. Structural equation model with all items and variables
(Source: Created by the author)

Table 8. Mediation effect analysis

	Specific indirect effects	Remarks
IT → CRM → EC → FI	0.055	Not supported
IT → CRM → OP	0.038	Supported
IT → CRM → EC	0.191	Not supported
EC → FI → OP	0.083	Not supported
CRM → EC → FI	0.148	Not supported
IT → CRM → EC → OP	0.047	Supported
IT → CRM → EC → FI → OP	0.016	Supported
CRM → EC → OP	0.128	Not supported
CRM → EC → FI → OP	0.043	Supported
IT → FI → OP	0.135	Not supported

(Source: Created by the author)

5. Conclusion

This study explored the interactions between EC, CRM, FI, IT, and OP. The findings showed that FI significantly improved the OP. Furthermore, IT directly boosts FI, CRM, and OP while indirectly increasing OP through CRM's mediating effect. Finally, EC and OP had close relationships. Furthermore, this study has been constructed by developing a conceptual framework that combines current ideas with an actual survey.

5.1. Theoretical contributions

The paper presents two theoretical contributions. First, this study shows how EC improves OP. Previous studies have shown that OP can be improved by using IT, maximizing FI potential, and complying to environmental standards. This study, however, is the first to show how CRM, FI, IT, and EC combine to influence OP. Second, by emphasizing the critical role that IT plays in improving organizational outcomes, the findings contribute to the theory and show how IT is indirectly related to OP. This study stressed the importance of firms investing in adequate IT methods and implementation in order in accordance with CRM and increase productivity.

5.2. Practical implications

This study has significant practical implications for research into organizational effectiveness since it improves understanding of how CRM, EC, FI, IT, and OP interact.

First, CRM is essential for increasing OP. However, the relationship is not strong enough. Despite this finding, there was more evidence that CRM could serve as a mediator to improve the connection between IT and OP.

Second, it is now a strategic requirement for firms to pursue EC. Leaders can get a competitive edge by implementing sustainability. A company's reputation and market position are also enhanced by its commitment to environmental sustainability. By prioritizing environmentally friendly operations, manufacturers can achieve their own economic goals while also contributing to a more sustainable future.

Third, innovation is the driving factor behind firm growth and profitability. To maximize this influence, top executives must foster a working atmosphere of innovation and calculated risk-taking. This can be accomplished by forming cross-functional teams from diverse backgrounds. Businesses may reach their full potential and achieve their goals by encouraging innovation and developing a collaborative culture.

Fourth, IT has a much broader impact on businesses than just computer use. The network of linked devices and systems has an impact on all parts of daily operations. Practically speaking, IT facilitates collaboration and communication among teams and departments. Tools such as collaborative workspaces, instant messaging services, and video conferencing platforms can assist with this.

In conclusion, IT investments, FI encouragement, CRM promotion, EC prioritizing, and OP assessment and monitoring can all contribute significantly to Vietnamese firms' competitiveness. Purchasing IT infrastructure establishes the foundation for effective automation, networking, and data processing. This enables collaboration and data-driven analysis, which not only speeds up operations but also promotes innovation. When connected with IT systems, a CRM system strengthens client connections by centralizing data, tailoring marketing campaigns, and offering excellent support. Setting EC as a high priority benefits the environment, which is supported by IT-driven solutions.

5.3. Limitations

We aware that our research may have three limitations. First, the study of cross-sectional data raises concerns regarding CRM, EC, FI, and IT long-term ability to boost OP. The same theoretical approach might be extended to longitudinal studies to investigate any changes in outcomes. Second, CRM had no significant effect on OP, which could be related to the sample size or technique. As a result, more research is needed to identify exactly how CRM benefits OP. Finally, because this study was only conducted in Vietnam, the results may not be applicable to other cultural contexts. As a result, the research should cover both industrialized and developing countries.

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