THE INFLUENCE OF INNOVATION STRATEGY AND INFORMATION TECHNOLOGY ON COMPETITIVE ADVANTAGE WITH EMPLOYEE CREATIVITY AS A MODERATING VARIABLE

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ABSTRAK

Studi ini menyelidiki dampak strategi inovasi dan teknologi informasi terhadap keunggulan kompetitif, dengan fokus pada kreativitas karyawan sebagai variabel moderasi. Tujuan utama adalah untuk memahami bagaimana kreativitas karyawan mempengaruhi efektivitas strategi inovasi dan investasi teknologi dalam meningkatkan keunggulan kompetitif. Desain penelitian kuantitatif digunakan, dengan pendekatan survei dan data yang dikumpulkan dari 200 responden melalui Google Forms, dengan 178 tanggapan yang valid dianalisis. Model Persamaan Struktural (SEM) menggunakan Smart PLS digunakan untuk menguji hubungan yang dihipotesiskan. Temuan menunjukkan bahwa baik strategi inovasi maupun teknologi informasi berdampak positif terhadap keunggulan kompetitif. Secara khusus, kreativitas karyawan memoderasi hubungan ini, secara signifikan meningkatkan efektivitas baik strategi inovasi maupun investasi teknologi dalam mencapai keunggulan kompetitif. Hasil ini menyoroti peran penting kreativitas karyawan dalam meningkatkan manfaat yang diperoleh dari inovasi dan teknologi. Studi ini berkontribusi pada literatur dengan menunjukkan interaksi antara strategi inovasi, teknologi informasi, dan kreativitas karyawan dalam mendorong keunggulan kompetitif. Ini menekankan pentingnya mengembangkan tenaga kerja yang kreatif untuk memaksimalkan hasil dari investasi inovasi dan teknologi. Temuan ini menawarkan implikasi praktis bagi organisasi yang ingin memanfaatkan kemampuan strategis dan teknologi mereka secara efektif dan memberikan dasar untuk penelitian di masa depan di bidang ini.

keywords:

Innovation Strategy, Information Technology, Competitive Advantage, Employee Creativity

This study investigates the impact of innovation strategy and information technology on competitive advantage, with a focus on employee creativity as a moderating variable. The primary objective is to understand how employee creativity influences the effectiveness of innovation strategies and technological investments in enhancing competitive advantage. A quantitative research design was employed, utilizing a survey approach with data collected from 200 respondents via Google Forms, with 178 valid responses analyzed. Structural Equation Modeling (SEM) using Smart PLS was used to test the hypothesized relationships. The findings reveal that both innovation strategy and information technology positively impact competitive advantage. Notably, employee creativity moderates these relationships, significantly enhancing the effectiveness of both innovation strategies and technological investments in achieving competitive advantage. These results highlight the crucial role of employee creativity in amplifying the benefits derived from innovation and technology. This study contributes to the literature by demonstrating the interplay between innovation strategy, information

technology, and employee creativity in fostering competitive advantage. It emphasizes the importance of cultivating a creative workforce to maximize the returns on innovation and technology investments. The findings offer practical implications for organizations seeking to leverage their strategic and technological capabilities effectively and provide a foundation for future research in this area.

INTRODUCTION

In the ever-evolving business landscape, innovation has become a crucial element for the sustainability and success of companies(Porath, 2023). Innovation is not only related to the creation of new products or services but also encompasses the processes and strategies that allow companies to adapt to market changes, competition, and customer needs. In the digital era, where changes occur rapidly and information technology is advancing at a fast pace, an effective innovation strategy can be a key differentiator in determining whether a company can survive or even excel in the global competitive market (Warner & Wager, 2019).

A well-designed innovation strategy enables companies to identify new opportunities, optimize resources, and create added value that is not easily replicated by competitors. However, innovation is neither a linear nor simple process (Iruthayasamy, 2021). It requires a holistic approach that involves all parts of the organization, from top management to frontline employees. Successful innovation also needs support from information technology, which allows the innovation process to run faster, more efficiently, and more effectively (Zhan et al., 2017).

Information technology has become the backbone of operations for many modern companies (Han et al., 2017). The use of this technology not only helps in automating processes and reducing operational costs but also paves the way for deep digital transformation. Companies that can strategically leverage information technology can optimize their operations, improve service quality, and respond to market changes more quickly (Huang & Rust, 2017). Therefore, information technology plays a critical role in supporting innovation strategies and driving companies toward sustainable competitive advantage (Kim et al., 2020; Mady et al., 2022).

However, information technology and innovation alone are not sufficient (Dong & Netten, 2017). The human factor, particularly employee creativity, plays a central role in driving the innovation process and maximizing the benefits of existing technology (Ogbeibu et al., 2020). Employee creativity is the ability to generate new, original, and useful ideas that can be applied in a business context to create innovative solutions. Creative employees can see opportunities that others may miss, develop new approaches to problem-solving, and leverage information technology in innovative ways to enhance productivity and efficiency (Colbert et al., 2016).

In this context, employee creativity functions as a moderating variable that can strengthen or weaken the relationship between innovation strategies and information technology with competitive advantage. When employees are empowered to innovate, they can be more effective in implementing strategies designed by management and more adaptive to technological changes (He et al., 2023; Mashudi et al., 2024; Rubel et al., 2023). Conversely, a lack of creativity can be a barrier to the innovation process and the utilization of information technology, ultimately hindering the company's efforts to achieve a competitive advantage (Azeem et al., 2021; Nasifoglu Elidemir et al., 2020).

The relationship between information technology (IT) and competitive advantage is complex and evolving. While IT can be a source of competitive advantage, it can also lead to hyper turbulent environments that erode such advantages (Nan & Tanriverdi, 2017). IT's impact on competitive advantage is influenced by its integration into business strategies and value chains (Daneshvar & Ramesh, 2010). Information strategies, when designed and implemented comprehensively, can enable competitive advantage by improving decision-making quality and reliability (Baporikar, 2014). However, as IT matures and standardizes, its power to provide competitive advantage diminishes, while its potential to neutralize existing advantages increases (Andrevski & Ferrier, 2019). This "corrosion" of IT advantage makes sustainable competitive advantage more challenging to achieve. Successful companies must now focus on combining sustainable advantages based on distinctive positioning with leverageable advantages that provide stepping stones to future opportunities (Ziakas, 2019).

This study aims to explore the relationship between innovation strategies, information technology, and competitive advantage, as well as how employee creativity can moderate this relationship. Through a quantitative approach, this research will analyze data from various companies differing in size, industry, and level of information technology adoption. This analysis will provide deeper insights into how companies can

develop more effective innovation strategies and optimize the use of information technology by considering the central role of employee creativity.

The findings of this research are expected to make significant contributions to management theory and business practice. On the one hand, this study will add to the literature on the role of innovation strategies and information technology in creating competitive advantage. On the other hand, it will also provide practical guidance for companies in developing and implementing more holistic strategies that focus not only on technology and innovation but also on empowering human resources as the key to achieving sustainable competitive advantage.

METODE PENELITIAN

1. Research Design

This study employs a quantitative research design with a survey approach to examine the relationships between innovation strategy, information technology, employee creativity, and competitive advantage. The design aims to test a conceptual model linking the key variables and assess the impact of employee creativity as a moderating variable. This methodology allows for systematic data collection and in-depth analysis to identify patterns, relationships, and effects among the variables under investigation.

2. Population and Sample

The population for this research consists of companies operating across various industry sectors that have implemented innovation strategies and information technology in Cilegon City, Banten Province. The sample size for the study is 200 individuals, comprising managers and employees from these companies. Data collection will be conducted using an online questionnaire distributed via Google Forms. From the initial 200 respondents who completed the questionnaire, 178 responses will be deemed suitable for further analysis, after excluding incomplete or invalid submissions. The sample size and response rate will be sufficient to provide robust insights and ensure statistical reliability.

3. Measurement of Variables and Research Instruments

The variables in the study will be measured using a specifically designed questionnaire to assess each variable:

a. Innovation Strategy: Measured by indicators such as new product development, innovation processes, and adaptation to market changes adopted from Varadarajan (2018)
b. Information Technology: Assessed through the evaluation of IT usage and integration in company operations, including information management systems and data analysis tools adopted from Dong & Netten (2017).
c. Employee Creativity: Evaluated using a scale that assesses employees' ability to generate new, innovative, and useful ideas adopted from Kremer et al. (2019)
d. Competitive Advantage: Measured through performance indicators such as market position, customer satisfaction, and relative profitability compared to competitors adopted from (Mady et al., 2022).

The research instrument, consisting of a questionnaire, will be tested for validity and reliability before data collection. Validity will be tested through item analysis and expert evaluation, while reliability will be assessed using Cronbach's Alpha method.

4. Data Analysis

The collected data will be analyzed using Structural Equation Modeling (SEM) with the Smart PLS software. SEM will be used to test the hypothesized relationships and assess the direct effects of innovation strategy and information technology on competitive advantage. Descriptive analysis will include summary statistics such as means, standard deviations, and frequency distributions to understand the characteristics of the data. Additionally, moderation analysis will be conducted to evaluate the role of employee creativity in moderating the relationships between the main variables. Smart PLS will facilitate the examination of both the measurement and structural models, allowing for comprehensive analysis of direct and moderation effects. This approach ensures accuracy and precision in understanding how the variables interact and impact competitive advantage.

RESULTS AND DISCUSSION

1. Validity and Reliability

Confirmatory Factor Analysis (CFA) was utilized to assess the validity and reliability of the constructs in this study. Validity was evaluated through outer loadings, where ideally each indicator should have a loading of 0.70 or higher, and Average Variance Extracted (AVE), with a threshold of 0.50 or above to ensure that constructs explain a significant portion of the variance in their indicators. Reliability was assessed using Cronbach's Alpha and rho_A, both with acceptable values above 0.70, as well as Composite Reliability (CR),

where values of 0.70 or higher are preferred. The results confirm that the constructs of Innovation Strategy, Information Technology, Competitive Advantage, and Employee Creativity are measured with both validity and reliability, thereby supporting the robustness of the study's findings (see Table 1).

Table 1. Confirmatory Factor Analysis

Construct	Indicators	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
Innovation Strategy	The company regularly introduces new products or services	0.902	0.963	0.968	0.97	0.843
	The company adapts its strategies based on market trends	0.931				
	The company invests significantly in research and development	0.933				
	The company continuously improves its operational processes	0.929				
	The company forms strategic partnerships to drive innovation	0.875				
	The company incorporates customer feedback into its innovation strategy	0.936				
Information Technology	The company integrates advanced IT systems across its operations	0.837	0.955	0.966	0.963	0.815
	The company effectively manages and utilizes data for decision-making	0.908				
	The company regularly upgrades its technology infrastructure	0.924				
	The company provides ongoing training for employees on new IT tools	0.915				
	The company implements robust cybersecurity measures to protect data	0.931				
	The company has a dedicated IT support team for troubleshooting and maintenance	0.898				
Competitive Advantage	The company maintains a leading position in the market	0.877	0.948	0.950	0.959	0.795
	The company has high levels of customer loyalty and retention	0.926				
	The company operates with superior cost efficiency compared to competitors	0.918				
	The company has strong brand recognition and reputation	0.883				
	The company is recognized as a leader in innovation within its industry	0.884				
	The company experiences consistent revenue growth relative to competitors	0.860				
Employee Creativity	Employees regularly generate innovative ideas for the company	0.870	0.924	0.940	0.940	0.725
	Employees demonstrate strong problem-solving skills in their work	0.878				
	Employees propose creative solutions to business challenges	0.917				

	Employees are encouraged and supported in implementing their ideas	0.861				
	Employees actively collaborate on creative projects and initiatives	0.725				
	The company recognizes and rewards creative contributions from employees	0.846				

Table 1 presented summarizes the results of the Confirmatory Factor Analysis (CFA) for the constructs of Innovation Strategy, Information Technology, Competitive Advantage, and Employee Creativity. Each construct's measurement model is evaluated based on its outer loadings, reliability metrics including Cronbach's Alpha, rho_A, Composite Reliability (CR), and Average Variance Extracted (AVE). These indicators provide insights into the validity and reliability of the measurement instruments used in the study.

The CFA results for Innovation Strategy show strong outer loadings across all items, ranging from 0.875 to 0.936. These high loadings indicate that the items are well-correlated with the underlying construct. The Cronbach's Alpha of 0.963 and rho_A of 0.968 reflect excellent internal consistency, while the Composite Reliability (CR) of 0.970 confirms the reliability of the construct. The Average Variance Extracted (AVE) of 0.843 is above the recommended threshold of 0.50, indicating that the construct explains a substantial amount of variance in its indicators. These results suggest that the Innovation Strategy construct is measured with high reliability and validity.

In addition, for Information Technology, the outer loadings of the items range from 0.837 to 0.931, demonstrating strong correlations with the construct. The Cronbach's Alpha of 0.955 and rho_A of 0.966 are indicative of high internal consistency. The Composite Reliability (CR) of 0.963 and Average Variance Extracted (AVE) of 0.815 further support the reliability and convergent validity of the Information Technology construct. The high CR and AVE values suggest that the measurement model for Information Technology is robust and effectively captures the underlying dimensions of the construct.

Moreover, the Competitive Advantage construct shows outer loadings between 0.860 and 0.926, reflecting good item reliability. The Cronbach's Alpha of 0.948 and rho_A of 0.950 demonstrate strong internal consistency. The Composite Reliability (CR) of 0.959 and Average Variance Extracted (AVE) of 0.795 indicate that the construct has high reliability and good convergent validity. These metrics confirm that the Competitive Advantage construct is well-defined and reliably measured, capturing a significant amount of variance in its indicators.

Finally, for Employee Creativity, the outer loadings range from 0.725 to 0.917. While most loadings are strong, the item "Employees actively collaborate on creative projects and initiatives" has a lower loading of 0.725, which might suggest a weaker relationship with the construct. The Cronbach's Alpha of 0.924 and rho_A of 0.940 indicate high internal consistency, and the Composite Reliability (CR) of 0.940 further supports the reliability of the construct. The Average Variance Extracted (AVE) of 0.725, though slightly lower than the other constructs, still meets the acceptable threshold. Overall, Employee Creativity is measured reliably, but attention may be needed to strengthen items with lower loadings.

In summary, the CFA results indicate that all constructs—Innovation Strategy, Information Technology, Competitive Advantage, and Employee Creativity—are measured with high reliability and validity. The strong loadings, consistency, and convergent validity metrics across most constructs suggest that the measurement models are robust and effectively capture the underlying theoretical dimensions. However, some items in the Employee Creativity construct may require further refinement to enhance their contribution to the construct's overall validity.

2. Hypothesis Result

The hypothesis testing results offer crucial insights into the relationships between the constructs of Innovation Strategy, Information Technology, Competitive Advantage, and the moderating role of Employee Creativity. Each hypothesis was tested to evaluate the significance of these relationships, with the results confirming the expected positive impacts. The findings demonstrate how both innovation strategy and information technology contribute to enhancing a firm's competitive advantage, while employee creativity plays a significant role in moderating and amplifying these effects. The following section provides a detailed analysis of these results, highlighting the implications for organizational strategy and competitive positioning (see Table 2 and Figure 2).

Table 2. Hypothesis Testing Result

Hypothesis	Construct*)	Original Sample	STDEV	T Statistics	P Values	Result

H1	IS -> CA	0.184	0.086	3.970	0.000	Supported
H2	IT -> CA	0.136	0.059	2.293	0.012	Supported
H3	IS*EC -> CA	0.142	0.052	2.958	0.000	Supported
H4	IT*EC -> CA	0.173	0.068	3.690	0.000	Supported
*) IS=Innovation Strategy; IT=Information Technology; CA=Competitive Advantage; EC=Employee Creativity						

The results of the hypothesis testing, as presented in Table 2, provide valuable insights into the relationships between Innovation Strategy (IS), Information Technology (IT), Competitive Advantage (CA), and the moderating role of Employee Creativity (EC). Each hypothesis was tested to determine the significance of these relationships, with the results showing strong support across all proposed hypotheses.

Hypothesis 1 (H1), which posited that Innovation Strategy positively impacts Competitive Advantage, is supported with an original sample value of 0.184 and a T-statistic of 3.970. The P-value of 0.000 further confirms the significance of this relationship. This result suggests that companies with a strong innovation strategy are likely to experience enhanced competitive advantage, affirming the critical role that innovation plays in maintaining and improving market position.

Hypothesis 2 (H2), examining the impact of Information Technology on Competitive Advantage, is also supported, with an original sample value of 0.136, a T-statistic of 2.293, and a P-value of 0.012. Although the effect size is slightly lower than that of innovation strategy, the significance of the relationship indicates that investments in information technology contribute to a firm's competitive advantage. This underscores the importance of integrating advanced IT systems and practices as part of a comprehensive strategy to outperform competitors.

Hypothesis 3 (H3) explores the moderating effect of Employee Creativity on the relationship between Innovation Strategy and Competitive Advantage. The hypothesis is supported with an original sample value of 0.142, a T-statistic of 2.958, and a P-value of 0.000. These results highlight that employee creativity significantly enhances the positive impact of innovation strategy on competitive advantage. This finding emphasizes the importance of fostering a creative work environment to maximize the effectiveness of innovation initiatives.

Hypothesis 4 (H4) tests the moderating role of Employee Creativity on the relationship between Information Technology and Competitive Advantage. With an original sample value of 0.173, a T-statistic of 3.690, and a P-value of 0.000, this hypothesis is also supported. The results suggest that employee creativity amplifies the benefits derived from information technology investments, making it a crucial factor in leveraging IT for competitive gains. This further illustrates the need for organizations to cultivate creativity among employees to fully capitalize on their technological assets.

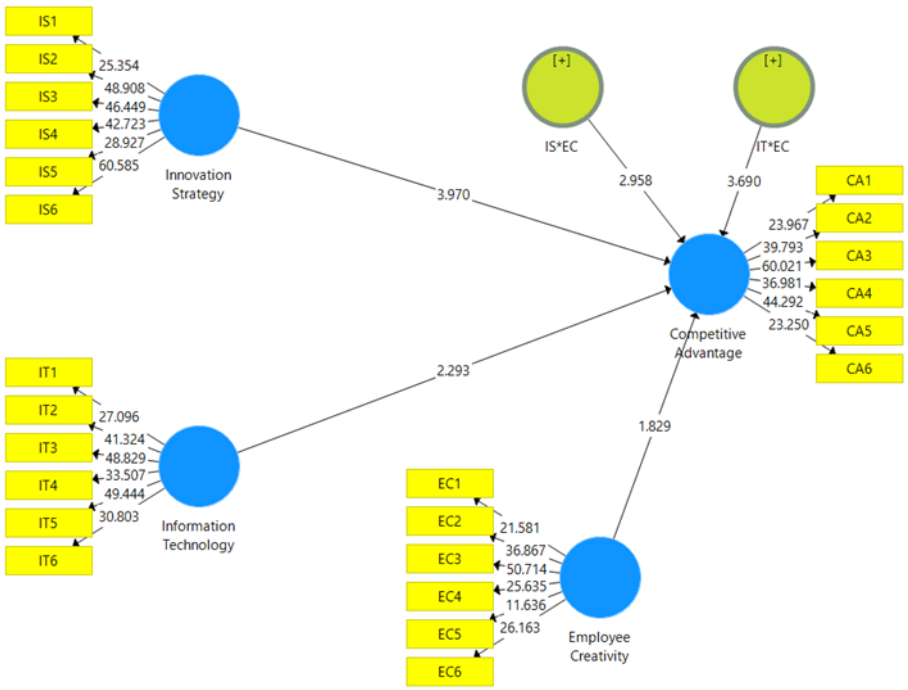

Figure 2. Bootstrapping Result

3. Discussion

Hypothesis 1 posits that innovation strategy has a positive impact on competitive advantage. This hypothesis is grounded in the notion that a well-formulated innovation strategy can significantly enhance a company's competitive positioning in the market. Previous research supports this relationship by demonstrating that companies with robust innovation strategies are better equipped to differentiate themselves from competitors, meet evolving customer needs, and adapt to market changes effectively.

For instance, studies have shown that organizations that prioritize innovation are more likely to introduce groundbreaking products and services, streamline processes, and explore new business models, all of which contribute to achieving a competitive advantage (Abdelkafi & Pero, 2018). These strategic innovations allow firms to stand out in crowded markets, attract and retain customers, and improve overall performance. Furthermore, research has highlighted that innovation strategies often lead to superior operational efficiencies and cost reductions, which further bolster a company's competitive edge (Agyapong et al., 2016). The positive impact of innovation strategy on competitive advantage is thus well-documented in the literature. Companies that invest in and execute strategic innovation are not only able to respond proactively to market demands but also create barriers to entry for competitors. By continuously innovating, these companies maintain a dynamic and adaptive approach that sustains their competitive advantage over time.

Hypothesis 2 asserts that information technology (IT) has a positive impact on competitive advantage. This hypothesis is supported by substantial evidence in the existing literature, which demonstrates that effective utilization of IT can significantly enhance a company's competitive positioning. Previous research indicates that IT provides critical tools and resources that enable organizations to optimize their operations, enhance data management, and improve decision-making processes. By leveraging IT, companies can achieve greater efficiency through streamlined operations, faster processing times, and improved accuracy in handling information. For example, the adoption of advanced information systems such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) can lead to more efficient management of resources and better customer insights, both of which contribute to a competitive advantage.

Additionally, IT facilitates the development and implementation of innovative business models and strategies. Companies that effectively integrate IT into their business processes can access real-time data, conduct detailed analyses, and adapt quickly to market changes. This technological capability allows organizations to respond more swiftly to customer needs, launch new products and services, and maintain a leading edge over competitors. The positive impact of IT on competitive advantage is well-documented, with studies highlighting how technology-driven efficiencies and innovations can create substantial competitive benefits (Bajada & Trayler, 2015; Huang & Rust, 2017). Firms that strategically utilize IT resources are often able to outperform their rivals, maintain superior market positions, and achieve long-term success.

Hypothesis 3 proposes that employee creativity moderates the relationship between innovation strategy and competitive advantage. This hypothesis suggests that the impact of an innovation strategy on competitive advantage is influenced by the level of creativity exhibited by employees. Previous research has shown that while a robust innovation strategy can significantly enhance a company's competitive position, the effectiveness of this strategy can be substantially influenced by the creativity of the workforce (Nasifoglu Elidemir et al., 2020). Creative employees contribute novel ideas and solutions that can further enhance the implementation and outcomes of innovation strategies. For instance, organizations with high levels of employee creativity are often better equipped to develop and execute innovative processes and products that resonate more effectively with the market. This, in turn, can amplify the benefits of an innovation strategy, leading to a more pronounced competitive advantage. In summary, while an innovation strategy lays the groundwork for competitive advantage, employee creativity acts as a catalyst that can strengthen or moderate this relationship, making it more impactful and effective.

Hypothesis 4 asserts that employee creativity moderates the relationship between information technology and competitive advantage. This hypothesis posits that the effect of information technology on competitive advantage is influenced by the level of creativity demonstrated by employees. Research indicates that while information technology provides the tools and systems necessary for enhancing organizational efficiency and innovation, the effectiveness of these IT resources can be significantly influenced by employee creativity. Creative employees are more likely to leverage IT tools in innovative ways, generate novel solutions, and utilize technology to its fullest potential. For example, employees who think creatively can develop unique applications of IT systems that optimize business processes, enhance customer interactions, and uncover new opportunities for growth. Therefore, employee creativity can play a crucial role in moderating the impact of information technology on competitive advantage, ensuring that IT investments translate into substantial and sustainable competitive benefits.

CONCLUSION

This study has provided valuable insights into the dynamic interplay between innovation strategy,

information technology, employee creativity, and competitive advantage. The results indicate that while innovation strategy and information technology individually contribute to a company's competitive edge, their impact is significantly enhanced by the creativity of employees. This suggests that a well-crafted innovation strategy and robust technological infrastructure alone are not sufficient to guarantee a competitive advantage; instead, the creative contributions of employees play a crucial role in optimizing these elements. Organizations that effectively integrate employee creativity into their strategic and technological initiatives are better positioned to achieve and sustain a competitive advantage.

The implications of these findings are substantial for organizational practice. Companies are encouraged to invest not only in developing and implementing innovative strategies and advanced technologies but also in fostering an environment that nurtures and supports employee creativity. By cultivating a culture that encourages creative thinking and problem-solving, organizations can enhance the effectiveness of their innovation strategies and technological investments. This approach enables businesses to leverage their creative workforce to generate novel solutions, adapt to market changes, and maintain a leading edge over competitors.

However, the study is not without its limitations. The cross-sectional nature of the research provides a static view of the relationships between the variables, and does not account for changes over time. Additionally, the sample size, while adequate for the study, may limit the generalizability of the findings to other industries or geographic regions. The reliance on self-reported data also introduces potential biases, as respondents' perceptions and assessments may not fully capture the complexities of the relationships being studied.

Future research should address these limitations by employing longitudinal designs to observe how the relationships among innovation strategy, information technology, employee creativity, and competitive advantage evolve over time. Expanding the sample size and incorporating diverse industries and geographic regions could improve the generalizability of the findings. Additionally, combining quantitative data with qualitative insights through interviews or case studies could provide a deeper understanding of how creativity interacts with innovation and technology to drive competitive advantage. Organizations should prioritize creating an environment that fosters creativity to maximize the potential benefits of their strategic and technological investments.

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