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Article

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Entrepreneurship orientation and management ties in the relationship between technological opportunism and innovation performance

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ABSTRACT

During economic crises, innovation performance becomes a critical driver of competitiveness. Technological opportunism is recognized within dynamic markets as a key driver for innovation development. However, gaps persist in understanding how technological flexibility, pursuit of entrepreneurial opportunities, and resource optimization influence innovation performance. In order to fill these gaps, this study looks at the relationship between technical opportunism and innovation performance while taking managerial ties and entrepreneurial orientation into account as moderating factors. The study, which collected 93 questionnaires from managers, team leaders, branch leaders, and directors of Indonesian banks, finds a favourable and statistically significant correlation between technological opportunism and innovation performance. It was discovered that managerial ties and entrepreneurial inclination moderated this link. The findings contribute to bridging knowledge gaps in entrepreneurship, technology, and innovation, particularly within the banking industry.

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1. Introduction

In today's rapidly evolving business environment, characterized by significant technological advancements and economic uncertainties, firms' ability to innovate has become a critical determinant of their survival and success. The banking industry, in particular, faces unprecedented challenges due to the rise of digital technologies, increasing competition from fintech companies, and the ongoing impacts of the COVID-19 pandemic. These factors necessitate a strategic focus on leveraging technological opportunism, entrepreneurial orientation, and strong management ties to sustain innovation and competitiveness.

In the ever-changing landscape of the modern business world, entrepreneurial activity is an essential driving force for innovation, growth and competitiveness (Bruton et al., 2023). When top managers exhibit an entrepreneurial top management style in their strategic choices and management philosophy, the company is classified as an entrepreneurial enterprise—one of the ways to enhance its competitive advantage (Paek & Lee, 2018). Therefore, maintaining company performance during economic crises calls for adaptability in business practices, seizing business opportunities, optimizing resources, and developing innovative processes (Hasgall & Ahituv, 2018; Kuratko & Morris, 2018; La Nafie et al., 2014). Cooper (2019) found that the commercial success of new products can be influenced by a company's strong R&D orientation and utilization of cutting-edge technology in new product products.

In fast-moving markets, firms' specific technological capabilities provide a relatively secure foundation for long-term strategies to achieve a competitive advantage (Feng et al., 2020). Entrepreneur-oriented companies are more dynamic, flexible, and opportunistic in seizing opportunities to improve company performance. A high degree of entrepreneurial orientation becomes important when considering the

level and agility of the technological turbulence that companies face today and the continued impact of digital technology on individuals and companies across industries.

The digital transformation sweeping across industries has profoundly impacted the banking sector. Traditional banks are under pressure to adopt new technologies to enhance operational efficiency, improve customer experiences, and develop innovative financial products. The rise of fintech firms offering agile and customer-centric solutions pose a significant threat to established banks. Recognizing and responding to technological changes—termed technological opportunism—is vital for banks to maintain their competitive edge (J. Cho et al., 2024).

Currently, technology is crucial for the success of companies because technology opportunism is the capacity to recognize and react to technology changes, which implies a rise in the value of competition (J. Cho et al., 2024). Determining the return on information technology investment is also essential (IT) as well as growing IT capacities (Melville et al., 2004) constitute significant additions to the field of information systems research and the resource-based view (RBV) because capabilities positively oriented technological opportunism that enables companies to compete better (Cao et al., 2019; Maklan et al., 2015).

Previous investigations uncover that with technological advancement, technological opportunism empowers companies to strategically manage and take advantage of chances to oversee technology advancements through creative organizational practices and strategic management (Faraj & Leonardi, 2022). Enterprise-level advances in technical innovation have resulted in changed business strategies (Danvila-del-Valle et al., 2019) and have been connected to handling and product innovation (Geldes et al., 2017), in addition to innovative performance (Valdez-Juárez & Castillo-Vergara, 2021). In this regard, the significance is that since the two are so essential to a company's performance, it is acknowledged that entrepreneurship and innovation complement each other. Technical innovation must satisfy market demands, and entrepreneurship is necessary for a business to succeed. While it is acknowledged that opportunistic technology companies are perfectly positioned to look into and take advantage of possible opportunities (Urban & Maphumulo, 2022), there is frequently a need for arrangement between dynamic qualities, like an entrepreneurial mindset, within businesses to strategically use recently developed (Gomez et al., 2018). Because of earlier research, the moderating impact of entrepreneurial orientation must be considered. Kusa et al. (2021) examined the presumptions underlying the link between performance and entrepreneurial attitude. In conclusion, the interplay between technological opportunism, entrepreneurial orientation, and management ties is pivotal for enhancing innovation performance in firms. This study aims to address gaps in the literature by examining how these factors influence innovation performance in the banking industry, focusing on Indonesian banks.

In addition to technological and entrepreneurial capabilities, robust management ties are essential for accessing critical resources, information, and networks to enhance innovation performance. Business and political connections provide the social capital to navigate complex regulatory environments, secure strategic partnerships, and leverage external expertise (Chen et al., 2018). In the Indonesian context, where regulatory and market conditions can be particularly challenging, strong management ties are indispensable for fostering an environment conducive to innovation.

Managerial ties have long been considered a source of social capital, represented by the connections and networks of interactions among businesses that produce economic action (T. Lee, 2019). The finding suggests that directors give social capital connected to the organization to attain commerce objectives. Administrative ties are isolated into two sorts: commerce ties, which include connections with the best directors in other companies, such as buyers, providers, and competitors, which are called level connections; and political ties, which incorporate associations with government authorities, which are called vertical associations (J. J. Wang et al., 2020). Administrative ties offer business visionaries important assets, mastery, data, and benefits such as elite openings and authenticity (W. Zhang et al., 2020). Administrative ties moreover upgrade arrange part trade and collaboration by bringing down exchange costs and lessening advantage (Fox et al., 2020). As a result, administrative ties play a vital part in improving the survival and development of modern wanderers (Landry et al., 2018). Business visionaries can improve product development, seize opportunities, and gain a competitive edge with the assistance of administrative ties, but this support can take many different forms (H. Cho et al., 2019).

Luo et al. (2012) looked at the application of managerial relationships within the company, with conflicting results regarding the connection between managerial ties and company performance (Abugre,

2020). Numerous studies demonstrate that management ties improve a firm's ability to perform because they support the development of robust networks, intricate societal linkages, and acquiring rare and valuable resources from networks within the organization or the external environment (Chen et al., 2018). However, due to unethical behaviour and a lack of accountability, some studies discovered that management ties negatively impact corporate performance (Z. Li, 2022).

Lepore et al. (2019) claimed that different ownership structures affect a company's performance regarding managerial connections. According to the research, corporations are more prone to rely on management ties when forming exchange agreements with more significant environmental uncertainty (Yung & Root, 2019). Thus, this study establishes management bonds that underpin the relationship between technological opportunism and innovation performance and regulates the kinds of research objects in banking companies that exhibit a high degree of technological opportunism, particularly in the provision of financial services.

The Indonesian banking sector is uniquely positioned at the crossroads of rapid technological change and economic growth. As one of Southeast Asia's largest economies, Indonesia's banking industry is critical in facilitating financial inclusion and economic development. However, it also faces distinct challenges, including regulatory hurdles, a diverse customer base, and the need for technological upgrades. This study intends to give practical insights to assist Indonesian banks in improving their innovation performance and overall competitiveness by examining the relationship between technological opportunism, entrepreneurial attitude, and managerial relationships.

Furthermore, this study seeks to fill gaps in the literature by investigating the impact of these factors on innovation performance within the Indonesian banking sector. This research is in line with Urban and Maphumulo (2022), which calls for a more thorough empirical comprehension of technological opportunism and empirical evidence that entrepreneurial attitude is a crucial strategic component for businesses; nevertheless, certain studies also yield inconsistent performance outcomes. Few prior studies have examined the moderating effect of entrepreneurial orientation on technological opportunism on company performance, which explains the influence of entrepreneurial orientation in the relationship between technological opportunism and company performance.

By analyzing the moderating effects and interrelationships of each dimension of entrepreneurial orientation, this study makes theoretical and practical contributions, expanding the scope of entrepreneurial orientation experimentally from the realms of entrepreneurship, technology, and innovation. In addition, this study focuses on the banking sector to understand how managerial relationships moderate the impact of innovation performance because testing in different industrial sectors allows for a more dynamic context consistency (Ali et al., 2017).

Furthermore, this study explores the cultural aspects of technology access and use among banking managers in urban and rural areas in Indonesia. The analysis will help determine if there are disparities in technology use based on geographical location. Understanding these differences can assist banks in developing more targeted strategies for technological innovation based on the specific conditions of each region.

This study enhances the understanding of entrepreneurial orientation (EO) by integrating it with technological opportunism (TO), place of origin, and management ties (MT). Previous research has established EO as a critical driver of firm performance (Basco et al., 2020). However, including TO as a mediating variable provides a nuanced view of how EO influences innovation performance. This study extends the EO literature by illustrating that firms with a solid entrepreneurial orientation are better equipped to exploit technological opportunities, boosting their innovation performance (Urban, 2019). In addition, technological opportunism has been recognized as a crucial factor for firms to maintain competitive advantage in rapidly changing environments (Saemundsson & Holmén, 2011). This research contributes to the strategic management literature by demonstrating the mediating role of TO in the EO-innovation performance relationship. The findings suggest that firms proactive in identifying and exploiting technological opportunities can enhance their innovation capabilities, thereby achieving superior performance outcomes.

The inclusion of management ties as a moderating variable underscores the importance of relational networks in innovation processes. Management ties, characterized by solid relational ties among managers, facilitate knowledge sharing and coordinated efforts essential for innovation (Khan et al., 2023). This

study contributes to the social capital literature by emphasizing management ties' role in enhancing EO and TO's positive effects on innovation performance.

This study provides managers and policymakers with a clearer grasp of the intricate linkages between technological opportunism and other factors, which has significant implications for practice and policy, entrepreneurial orientation, management bonding, and innovation performance. These findings can help organizational leaders identify and take advantage of opportunities to oversee technology advancements that will improve business performance. Technology-based banking solutions and value-added services that increase client loyalty require the banking industry to innovate and become entrepreneurial, and technological opportunism is essential to this.

2. Literature and hypothesis development

2.1. *The relationship between technological opportunism and performance*

The approach of dynamic capabilities highlights firm advantage that establishes originality (unequalled) capabilities to reconfigure essential firm assets in response to technological and market changes (Muneeb et al., 2023). Theoretically rooted in dynamic capabilities theory, technological opportunism allows businesses to use various aspects of their strategy and the technical know-how and infrastructure required to cater to distinct market niches (Urban & Maphumulo, 2022). Technological opportunism is one of the dynamic characteristics that organizations can leverage to fulfil the demands of many markets and leverage multiple areas of innovation (J. Cho et al., 2024). Technical opportunistic organizations possess technical sensing competence—the ability to comprehend and gather knowledge about new technological developments—and the technological response capability, or the ability to recognize and differentiate between new technologies. These businesses constantly search for information regarding new technical advancements that they perceive as having the potential to be growth sources (Snihur & Wiklund, 2019), be proactive in responding to cutting-edge technologies (Akpan et al., 2021), and are also capable of reshaping corporate plans to take advantage of openings or lower the danger that these new technologies present. Through this monitoring and responding process, businesses may integrate new technology into creative new products and lead the market ahead of their rivals, creating a long-lasting competitive edge (F. Li, 2020) and prevalent company accomplishment (Berawi et al., 2020). In this regard, the detecting and reaction measurements of technological opportunism recommend that companies make asset assignments and investment capabilities in physical resources, specialized competencies, and technology development so that these capabilities are inserted successfully all throughout the organization.

The dynamic capabilities approach emphasizes the firm's advantage, forming the original (unmatched) ability to reconfigure essential firm assets in response to technological and market changes (J. M. Lee et al., 2021). The study results displayed by Tian et al. (2021) agree with the discoveries distinguished by Elidemir et al. (2020), where supplementary capabilities, which contribute to protecting mechanical capabilities from rival imitation, explain how creative advantage affects the core competitive advantage.

Furthermore, technologically opportunistic firms can manage technology advancements, seek out competitive advantages, and comprehend the fundamental impact of technological change on operational and strategic choices (Fabrizio et al., 2022). In this case, technology-savvy businesses' adaptability and agility allow for integrating acknowledged novel advancements into product and benefit development cycles (Faraj & Leonardi, 2022). It frequently creates the possibility of increased margins when combined with higher costs, and eventually, the degree of technological opportunism will improve business performance (Opazo-Basáez et al., 2022).

In order to build and maintain a company's long-term capabilities and performance, particularly inventive performance, technological opportunism is essential (Y. Zhang et al., 2019). According to earlier research findings, corporate functions benefit from developing technology-based sensing and response capabilities. Sensing and response capabilities are complementary in supporting and improving innovation performance (Valdez-Juárez et al., 2024). In addition, innovation performance in a growing market with rapid fluctuations (Genc et al., 2019) encourages companies to be opportunistic towards technology

along with capabilities needed to improve their performance (Urban, 2019). Based on these findings, technological opportunism can affect innovation performance.

H1: Technological opportunism enhances the performance of innovation

2.2. Entrepreneurial orientation

Traditional businesses' organizational structures are altered by digital technology, opening up new avenues for entrepreneurship (Garcez et al., 2022). Most of the research discusses entrepreneurial orientation; its three main facets are initiative, risk-taking, and proactivity (Wales, 2016). Being proactive is the ability to anticipate needs and make necessary adjustments while being innovative, which shows the ability to create value by developing new goods or processes. Risk-taking is associated with a company's ability to take calculated risks and experiment (Guo & Jiang, 2020). Several studies (Rüsch et al., 2019; X. Wang et al., 2020) show that the adoption of an entrepreneurial orientation provides the ability for companies to assess strategic decision-making via an entrepreneurial perspective, utilizing many established connections to diverse performance metrics.

All three dimensions of entrepreneurial orientation are essential to comprehending the entrepreneurial process, and they can occur in different combinations depending on the kind of entrepreneurial opportunity the firm is pursuing. Entrepreneurial orientation has been linked to improved firm performance to this extent (McGee & Peterson, 2019). One prerequisite for the success of an organization is an entrepreneurial mindset. Tantawy et al. (2021) showed that any company with a solid entrepreneurial attitude tends to be creative and supportive of inventive efforts in creating new goods and services, particularly in new opportunities and technology advancements.

Burnette et al. (2020) demonstrates a favourable correlation between strategic learning skills and an entrepreneurial mindset, primarily reflective of the technological responsiveness and sensory capacities businesses require to obtain a competitive edge. Rosique-Blasco et al. (2018) show how introducing entrepreneurship is associated with active abilities and global implementation. Liu and Wang (2022) also appear that entrepreneurial introduction emphatically moderates the connection between small business performance and market orientation in China's transition economy. Subsequent findings illustrate the relationship between company performance and entrepreneurial orientation, outlining the peculiarities of possible elements in economic change. Research suggests that entrepreneurial orientation positively moderates the relationship between market orientation and the performance of small firms in China's transition economy.

Conversely, other studies indicate that information creation capabilities influence the relationship between entrepreneurial orientation and firm performance (Santoro et al., 2021). The conclusions of Liu and Wang (2022) explain entrepreneurial orientation as a mediator in measuring company performance, which outlines the uniqueness of contingency variables in economic transitions. Businesses prioritizing entrepreneurship are more likely to embrace new technologies to gain first-mover advantage. Entrepreneurship drives value creation and economic wealth (Ofori-Sasu et al., 2023). Recognizing the fast improvement of technology demands the company's capacity to find fresh changes brought on by imbalances. Companies must effectively create and use risk-taking strategies in the context of emerging markets in an entrepreneurial orientation to meet customer demands.

Putniņš and Sauka (2020) demonstrate that taking risks substantially influences a company's performance, but (Lwamba et al., 2014) discover that their entrepreneurial approach positively impacts Kenyan producers' financial performance. In addition, as the environment grows more dynamic and complicated, businesses need to plan and adopt proactive aspects of an entrepreneurial mindset to function in a confusing and unorganized setting (Sánchez-García et al., 2022). It makes it evident that chances abound and that performance should be better for businesses with more excellent entrepreneurial orientation to seize these new opportunities with zeal in a dynamic environment where demand levels vary quickly. McCarthy et al. (2018) highlight entrepreneurial orientation in an unsupportive environment such as an economic crisis; innovation in the dimension of entrepreneurial orientation becomes significant.

The above research's findings can be inferred that in many situations, a company must be excellent in the entrepreneurial orientation dimension to achieve capabilities and use technological opportunism

to generate more excellent value or enhance innovation performance. It demonstrates how entrepreneurial orientation affects the connection between technological opportunism and the company's innovation performance. Consequently, this line of inquiry extends to the point wherein technological opportunism capacities are frequently considered complementary to entrepreneurial orientation and generate the skills needed to enhance innovation performance within firms.

H2: The relationship between technological opportunism and innovation performance is strengthened by entrepreneurial orientation.

2.3. Management ties

There are two categories of managerial ties: business ties, or connections with top managers in other businesses, such as suppliers, buyers, and rivals, and political ties, or connections with public officials; these are referred to as vertical ties. It has long been understood that managerial relationships are a source of social capital, reflected in the networks and connections between businesses that spur economic activity (Zhu, 2020). The research suggests that to accomplish organizational objectives, managers should offer social capital linked to their network. Over the past few decades, web-based apps, technologies, and social media have become standard in all businesses. Businesses can use the Internet to reach clients anywhere (Lo & Campos, 2018). Many online apps and webs, including social networking sites, blogs, forums, microblogs, photo and video sharing, product and service evaluations, evaluative communities, and social games, are examples of technological opportunism. The existence of technological opportunism, such as social media, provides experiences and engages quickly with external entities (Lo & Campos, 2018). Therefore, managerial ties have received much attention from previous researchers (Huynh et al., 2021; T. Lee, 2019; W. Zhang et al., 2020). Social network theory states that management connections give entrepreneurs the necessary resources, know-how, information, and advantages like first dibs and credibility (W. Zhang et al., 2020). Because managerial ties reduce transaction costs, they also promote network interchange and collaboration (Sheng et al., 2011). Therefore, relationships with managers are crucial for improving the survival of those affected by the utilization of technology (Y. Zhang et al., 2019).

Executive interactions with external entities within the company's work environment are called managerial bonds. There are two categories of managerial ties: business ties, or connections with top managers in other businesses, such as suppliers, buyers, and rivals, and political ties, or connections with government officials; these are referred to as vertical ties. Relations between managers have historically been considered a source of social capital, which is communicated within the joins and systems of connections between firms that generate economic action (T. Lee, 2019). It implies that managers give social capital in addition to their plans to achieve economic goals. The use of web-based technologies, applications, and social media have become standard practice in all companies within the last few decades. Companies use the Internet to reach their clients anytime and anywhere (Lo & Campos, 2018). Various online applications and networks, such as social networking sites, blogs, events, microblogs, photo and video sharing, item and benefit surveys, evaluation communities, and social games, can be used for technological opportunism. The presence of technological opportunism, such as social media, gives experiences and engages rapidly with external entities (Appel et al., 2020). Subsequently, managerial ties have received much attention from previous researchers (Huynh et al., 2021; T. Lee, 2019; W. Zhang et al., 2020). Social network theory states that management links provide valuable resources, knowledge, and advantages to business people, including legitimacy and access to extraordinary opportunities (W. Zhang et al., 2020). Because managerial ties reduce transaction costs, they also promote network interchange and collaboration (Sheng et al., 2011).

Conversely, social media is a communication tool that helps businesses accomplish various organizational objectives, such as public relations, marketing, branding, customer service, human resources, and problem-solving. Moreover, social media influences consumer loyalty, brand awareness, company brand positioning, and purchase decisions (Nisar & Whitehead, 2016). Businesses have found that social media is a helpful tool for connecting with a large number of potential customers, sharing company information, and adding value to organizations regarding the utility of social media (Shawky et al., 2020).

Companies' acceptance of technology can build excellent networks between businesses, clients, and vendors (Siamagka et al., 2015).

However, regarding strategic orientation, the effect of technology adoption on enhancing business performance is rarely considered when considering management engagement. However, in several previous studies, previous researchers found that the MSME industry that prioritizes technological opportunism has no statistically substantial impact on the success of businesses (Karami & Tang, 2019; Nguyen et al., 2022). In the meantime, additional research on Vietnamese SMEs shows that technology adoption positively impacts company execution (Luu & Ngo, 2019). Lee and Chu (2017) give proof of constructive interaction between management bonding and implications for technological opportunism on company performance in a family business sample test. Nevertheless, this association loses significance when examining a sample of non-family businesses. As a result, the research on technological opportunism's effects on performance needs to be more conclusive.

Companies can boost product innovation, seize opportunities, and achieve competitive advantages through managerial ties advantage (Gao et al., 2017). Nevertheless, the empirical findings that are now available differ throughout market situations, making it difficult to determine if business and political links improve or worsen firm performance (Luo et al., 2012). The effect of technology adoption on business performance varies depending on the type or ownership structure (Luo et al., 2012). Management relationships can potentially threaten the effectiveness of management bonding actions because building and maintaining managerial relationships require significant investment, which can burden businesses with limited finances, especially in the post-crisis economic transition period. Meanwhile, several companies in economic transition invest a lot in management connections, hoping to perform better (Nguyen et al., 2022). More investigation into how technology adoption might raise social capital from management links is necessary, given the possible risk of the effect on innovation performance influenced by management ties. Therefore, this study uses one type of company, a banking company, because of its competitive character in adopting technology. Furthermore, companies with high technological opportunities will improve their performance through management ties. No matter how well the technology is adopted or developed, good social relations with external parties are needed to be a beneficial technology investment.

H3: Management ties increase the influence between Innovation performance and technological opportunism.

2.4. Place of origin

Research examining the impact of rural and urban leadership on innovation performance reveals the unique challenges and opportunities encountered by companies in these diverse settings. Rural leaders often contend with resource limitations, while urban leaders benefit from robust infrastructures and advanced technology access. Social, organizational, and community-based factors are found to be influential in driving innovation in rural areas, whereas urban leaders thrive on dynamic networks and enriching environments (Yin et al., 2022). Despite urban firms generally having greater resources, rural firms have demonstrated superiority in specific sectors (Fernandes et al., 2015; Phillipson et al., 2019). This underscores the significant disparities in innovation performance between urban and rural leaders.

H4: Place of origin increase the influence between Innovation performance and technological opportunism.

This study comprises of one independent variable, two moderating variables, and one dependent variable. Prior studies, such as Wang et al. (2020), have employed two moderating variables (Figure 1).

3. Methodology

A questionnaire survey was used to target respondents and gather primary data. The study's exclusive industry environment is its primary focus, banking companies because controlling the type of company and the banking industry is necessary. A questionnaire survey was conducted to gather primary data and reach the intended respondents. The particular industry setting that this study is focused on is

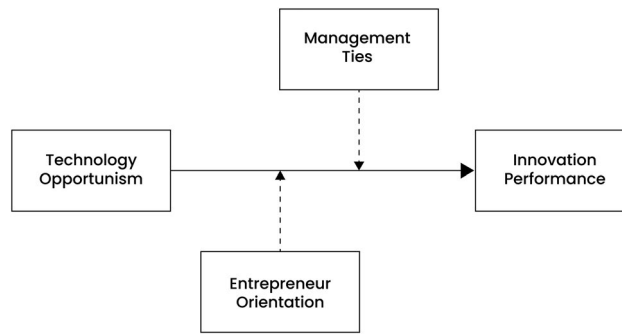


Figure 1. Research framework.
Source: Authors (2024).

business growth in Indonesia. An essential factor in a country's economic development is its investment banks. They frequently handle vast amounts of data at different operational levels worldwide as a necessary component of their banking business (Ravi & Vedapradha, 2023). In addition, the banking industry is fast in technological adaptation due to its technologically volatile environment and the need for companies in this sector to innovate and be entrepreneurially oriented in order to remain competitive (KPMG, 2018).

This research is concentrated on a particular industry setting, the banking industry in Indonesia, which is the purpose of this study sample. Indonesia's banking industry comprises state-owned institutions, regional-owned banks, and private banks. Kuratko and Morris (2018) suggest that all managers at every level can influence the entrepreneurial orientation of an organization. The respondents of this study are directors, branch leaders, managers, and team leaders in the banking industry because they are assumed to have an excellent position to comprehend the intricacies of entrepreneurial orientation, managerial relationships, technology opportunism, and innovation performance.

An email with a hyperlink is distributed as an online questionnaire. A *t*-test was used to look for non-response bias, which was carried out from the sample responses that answered earlier than those who answered later. In addition to eliminating general bias effects, the direction of the questions is to ensure that respondents are cautious and that their responses are inconsistent. The questionnaire also includes both positive and negative questions (Rodrigo et al., 2019).

This research has received protocol approval from the Research Ethics Commission of the Faculty of Vocational Studies, Airlangga University, ensuring that it is carried out according to established ethical standards. Furthermore, this research has obtained consent from respondents to complete the questionnaire survey, with the guarantee that confidentiality will be maintained, as stated in the introductory statement. Informed consent was obtained from all participants before their involvement in the study, as evidenced by their written agreement on the survey questionnaire.

3.1. Measuring instruments

The measurement scale for each variable uses using a Likert scale of five. The questionnaire's initial section instrument is an introduction to the research to explain the identity of the researcher, the research target respondents, the research objectives, security guarantees for completing the questionnaire, and the amount of time needed to complete it. The subsequent section deals with demographic questions, which include the respondent's identity, managerial level position, and working period. The third part measures research variables. Measurement of technological opportunism, operationalized by the ability to respond to technological changes and technology adoption/investment (Urban & Maphumulo, 2022). In measuring entrepreneurial orientation, operationalized by innovation, proactivity, and risk-taking by Vogelsang (2015). Management ties are operationalized by political and commercial links from Chung et al. (2016) and (Nguyen et al., 2022). Furthermore, measuring innovation performance is operationalized by the efficacy and efficiency of innovation (Ryu & Won, 2022). Control variables were incorporated into the research because (Urban & Wood, 2017) indicated that context variables unique to each business were required because they impact entrepreneurial orientation.

Table 1. Reliability statistics.

Variable	Cronbach's alpha	No. of items
Technological opportunism	0.641	8
Entrepreneurial orientation	0.885	7
Management ties	0.387	9
Innovation performance	0.758	6

Table 2. Independent samples test.

		Levene's test for equality of variances		t-Test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error difference	95% Confidence Interval of the difference	
Tot_ALL	Equal variances assumed	3.332	.071	-.225	91	.823	-.24930	1.11019	-2.45456	1.95596
	Equal variances are not assumed.			-.212	57.161	.833	-.24930	1.17851	-2.60909	2.11049

4. Results

4.1. Data analysis

In the initial testing stage, a pre-test was carried out on research measurement instruments to test the feasibility of the questionnaire before being tested on the original respondents in this study. The pre-test was completed by filling out a questionnaire to 20 respondents who work as lecturers in the Banking and Finance study program because their characteristics match those of the original respondents in this study. The pre-test results showed that all the questions asked had a significance value <0.05 , so the research instrument could be continued with trials on original respondents.

The results of the classical assumption tests in this study include reliability tests, normality tests, and independent *t*-tests. The reliability test was conducted using Cronbach's Alpha to measure the internal consistency of the research variables. The results show that technological opportunism has a Cronbach's Alpha value of 0.641, indicating moderate reliability, while entrepreneurial orientation has a value of 0.885, indicating outstanding reliability. However, management ties have a low Cronbach's Alpha value of 0.387, indicating low reliability, whereas innovation performance shows fairly good reliability at 0.758 (Table 1).

Next, the independent *t*-test examined significant differences between the two sample groups. The results indicate no significant differences between the two groups, with a *t*-value of -0.225 and a significance (2-tailed) of 0.823. It is supported by Levene's Test results, which show that the variance between the groups is not significantly different ($F=3.332$, Sig. = 0.071) (Table 2). Additionally, method bias testing is frequently employed when risk is reduced by a series of procedural measures (Kay, 2022). Procedure-wise, both positive and negative remarks were provided in a standard scale format to test the consistency of respondents' answers in the risk of bias in the general method, which showed that out of 97 respondents, 4 respondents were biased in the test, so that the final sample of this study was 93 respondents.

The normality test using the One-Sample Kolmogorov-Smirnov Test shows that the data for all variables (technological opportunism, entrepreneurial orientation, management ties, and innovation performance) are not normally distributed, with the significance values of each variable being below 0.05 (Table 3).

Table 4 displays four demographic data kinds, including age, gender, job title, and years of banking industry experience. The proportion of female participants (50.54%) is more significant than that of males (49.46%). The majority of responders fell within this age group of 46–50 years, 59.14%, with the proportion of the majority being managers (44.09%) and branch heads (29.03%) in the banking industry. In terms of length of work period, it is dominated by 15–20 years. 61 respondents were from the city, which accounts for 64.89% of the total, while the remaining 32 came from the rural area.

Table 3. One-Sample Kolmogorov-Smirnov test.

		Tot_OT	Tot_EO	Tot_MT	Tot_IP
N		93	93	93	93
Normal parameters ^a	Mean	30.1505	35.3118	23.6667	32.1505
	Std. Deviation	2.71848	2.09024	2.05539	1.80546
Most extreme differences	Absolute	.288	.242	.414	.383
	Positive	.288	.242	.264	.383
	Negative	-.193	-.231	-.414	-.219
Test statistic		.288	.242	.414	.383
Asymp. Sig. (2-tailed)		.000 ^b	.000 ^b	.000 ^b	.000 ^b

^aCalculated from data.^bLilliefors significance correction.**Table 4.** Respondents' demographic information.

Characteristics (n = 93)		Percentage (%)
Age	31–35	7.53%
	36–40	17.20%
	41–45	5.38%
	46–50	59.14%
	51–55	10.75%
Sex	Male	49.46%
	Female	50.54%
Origin	Urban	64.89%
	Rural	35.11%
Position	Team leader	21.51%
	Branch head	29.03%
	Manager	44.09%
Working period	Director	5.38%
	5–10	10.75%
	10–15	10.75%
	15–20	60.22%
	> 20	18.28%

Table 5. Testing the research hypothesis.

Variable	Cronbach's alpha	β	R	R Square	F	Sig
TO	0.641					
EO	0.885					
MT	0.387					
IP	0.758					
TO \rightarrow IP		0.156	0.235	0.055	5.296	0.024**
TO x EO \rightarrow IP		0.035	0.636	0.405	20.179	0.000***
TO x MT \rightarrow IP		0.003	0.410	0.168	6.002	0.001***

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

4.2. Hypothesis test

The research hypothesis was tested using linear regression and moderated regression analysis. The test results are displayed in Table 5, where the coefficient is statistically significant $p < 0.05$. All hypotheses put forward in this study were declared accepted; Hypothesis 1 was tested using linear regression, which tested the effect of technological opportunism on innovation performance that was shown to be statistically significant ($\beta = 0.156$, $p = 0.024 < 0.05$) where higher technological opportunism also increased innovation performance by F value of 5.296. In order to evaluate the hypothesis, moderated regression analysis was used. As suggested by Urban and Maphumulo (2022), the connection between technological opportunism's influence on innovation performance and entrepreneurial attitude showed a significant F value of 20.179 ($p = 0.000 < 0.01$), thus supporting hypothesis 2. For hypothesis 3, management ties can also increase technical opportunism's impact on innovation performance, with a significant value of 0.001 ($p < 0.01$).

The data in Table 6 unequivocally demonstrates that the average innovation level among urban and rural company leaders is identical, at 121.28. This conclusion is supported by the Levene Test results, which yielded an F value of 1.294 and $Sig = 0.258$, indicating that the variance in innovation levels between urban and rural leaders can be considered the same. Furthermore, the t -test (t -test for Equality

Table 6. Group statistics.

	Location	N	Mean	Std. Deviation	Std. Error Mean
Innovation	City	61	121.28	6.064	.776
	Rural	32	121.28	3.494	.618

Table 7. Difference test.

		Levene's test for equality of variances		t-Test for equality of means						95% Confidence Interval of the difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error difference		Lower	Upper
Innovation	Equal variances assumed	1.294	.258	-.002	91	.998	-.003	1.163		-2.313	2.308
	Equal variances are not assumed.			-.003	90.116	.998	-.003	.992		-1.974	1.968

of Means) reveals no significant difference in the average innovation between urban and rural communities ($t = -.002$, Sig. = .998). With a very high p-value (Sig. (2-tailed) = .998), it is evident that the difference between the two groups is minimal or possibly non-existent (Table 7).

4.3. Discussion and implications

Our study aims to give a more thorough empirical understanding of the connections between innovation performance, managerial relationships, entrepreneurship, place of origin and technological opportunism because, according to Urban and Maphumulo (2022), for decades, testing of the hypothesis of a relationship involving moderating influences was critical to the progress of an entrepreneurial perspective and technology research. The research results affirm every hypothesis put forward in this research. The success of innovations is strongly correlated with higher degrees of technological opportunism (H1). This study supports earlier theory and research that found that an organization's ability to leverage technology is a critical component that fosters more excellent innovative performance (Saemundsson & Holmén, 2011). Schmidt et al. (2021) revealed that technology adoption is a form of dynamic ability to deal with rapidly changing environmental factors. As technology changes, companies will opportunistically adopt technology successfully and efficiently to create novel resource combinations to address technological demands and provide original methods (Jin et al., 2022). Therefore, the company will gain a positional advantage over competing companies that are less technically savvy when it comes to investigating business opportunities brought about by technology and creating apps based on the technology that has been accepted.

The research findings support Xiaobao et al. (2022) view of resources and offer a strong justification for entrepreneurial orientation as a tactical view of owning, combining and productively utilizing resources and competitive capabilities towards capitalizing on new opportunities. This view will have implications for the company's performance by generating new opportunities that have implications for the company's innovation performance. Another significant addition is our article's attention on the moderating effect of entrepreneurial introduction (EO) on the relationship between technological opportunism and innovation performance. This EO measurement positively impacts the relationship between technological opportunism and innovation performance, as this focus has highlighted (H3). When analyzing the research results on the relationship between technological opportunism and innovation performance, it is essential to comprehend the moderating role of EO proactive, EO innovation, and EO risk-taking. Alegre et al. (2009) illustrated that entrepreneurial activity is associated with knowledge acquisition through innovation, taking calculated risks, and quickly developing new (proactive) behaviours to influence technology uptake and learning y.

Based on the results of the data processing presented in [Tables 6](#) and [7](#), it is known that place of origin does not provide a significant difference in the level of innovation of companies in villages and cities. In other words, rejecting H4. This result is in line with the findings of Philipson et al. who found that small companies in rural England have similar turnover levels to companies in urban areas. However, rural companies are more likely to report greater profits and are more successful in terms of exporting goods and services, although there are some greater obstacles in rural areas. Corporate culture in banking often has a greater influence than in the local context. Managers across different locations follow guidelines and visions set by the central authority, prioritizing innovation and technology development, which make the origin factor less relevant. Additionally, the banking sector generally has access to uniform technology infrastructure in urban and rural areas, especially at the management level. Technologies such as internet banking, mobile applications, and other digital tools are already fairly evenly distributed in banking, reducing regional disparities and making the impact of origin less significant.

Technology and product innovation resulting from entrepreneurial orientation at a higher level can limit market orientation capabilities and returns from overly focused innovative initiatives (Seo, [2019](#)). Robust commitments to innovation may lead to improved acceptance and advancement of technology. However, organizations that excessively prioritize innovation and technology frequently neglect to implement effective management practices to meet market demands. Therefore, to profit from fruitful innovation outputs, particularly in the banking sector, entrepreneurial orientation is a crucial aspect that needs to be managed successfully. In Indonesia, The banking industry must think more strategically and technologically advanced while attempting to maintain its competitiveness in the face of the danger posed by emerging competitors like FinTech, internet lending, and digital entrepreneurs. The arrival of digital banking and FinTech companies, coupled with intense competition among banks, has changed banking business processes, and competition in digital transformation can threaten the stability of traditional banks over the long run (KPMG, [2018](#)).

Compared to several previous studies (Buli, [2017](#); Luu & Ngo, [2019](#); Presutti & Odorici, [2019](#)), this paper builds entrepreneurial orientation as a moderating factor and builds After corporate and political links are subcontracted, management ties serve as an additional moderating construct. As a result, this work presents a novel theoretical framework combining institutional theory and social network theory.

The effect of technological opportunism on innovation performance enhanced by management ties is statistically significant (H3). The findings confirm the role of two mediators: entrepreneurial orientation and management ties. Digital transformation is ultimately driven by technological strategy with a business vision and leadership focused on using emerging technologies to adopt new business models based on innovation (Valdez-Juárez et al., [2024](#)). It means that the underlying mechanism by which technological opportunism can enhance innovation performance is the advantage of acquiring valuable resources from both horizontal and vertical managerial ties. Social network theory states that managerial links offer essential resources, expertise, information, and advantages, such as first access to opportunities and credibility for firms. (Abawa & Obse, [2024](#)) highlight the importance of creating a positive organizational culture that fosters job satisfaction to improve overall performance. Organizations prioritizing creating a culture that aligns with employee values, fostering a supportive and inclusive work environment, and encouraging job satisfaction are most likely to gain from enhanced performance. Relationships between managers and employees help businesses develop new products, seize opportunities, and obtain a competitive edge. The suggested framework gives managers an effective method and approach to determine the likely costs, advantages, and competencies needed for innovation, whether in management theory or reality (Yeboah, [2023](#)). Therefore, the banking industry adopts technologies such as social media to promote its products better and engage its consumers instead of simply trying to increase sales, which ultimately contributes to increased innovation performance.

Competition in the business world can also arise from strict regulations where, in such conditions, companies must respond innovatively and proactively. Therefore, good relations with stakeholders need to be a concern to facilitate the policy steps taken by the company.

The literature on innovation and technology management benefits significantly from this study. This research shows that technological opportunism is not just an opportunistic behaviour but can

also be a strategic resource for driving innovation. In addition, this research shows the importance of managerial connections and an entrepreneurial mindset in moderating the link between corporate innovation performance. These findings provide implications for company managers who need to consider technological opportunism as a strategy to encourage innovation. For policymakers, it is necessary to create a conducive environment for innovation by supporting the development of entrepreneurial orientation and management ties. For future research, more investigation is required in order to understand how technological opportunism can be utilized optimally to encourage innovation.

5. Research limitations

This study has many restrictions that may present chances for future studies to be improved. This study's limitations stem from the survey's design, which includes respondent perceptions that might not accurately reflect their behaviour and the underlying causes. However, the notion that managerial perceptions influence strategy formation thus influences the company's performance. Even if strict criteria were followed for selecting critical informants as the responding organization's unit of analysis, a second constraint concerns data that may be intrinsically insufficient or untrustworthy. Third, the relatively small sample size (93) can reduce the external validity of the study's conclusions, even if it remains within the permissible range. In today's technological developments, the character of the types of companies that are more dependent on technology can be considered, such as the number of start-up companies emerging whose business operations rely on technology.

Authors' contribution

Yanuar Nugroho: Concept development, literature review, methodology, interpretation of data and discussion. Noorlailie Soewarno: Conceptualization, discussion, analysis, and conclusion.

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Data availability statement

The data supporting this study's findings are available on request from the corresponding author, Noorlailie Soewarno: noorlailie-s@feb.unair.ac.id. However, the data are not publicly available because they contain information that could compromise the privacy of research participants.

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