

The Relationship Between Innovation Strategy and Performance with the Moderating Role of Environmental Dynamism

Patryk Dziurski

Institute of Management, SGH Warsaw School of Economics, Poland
<http://orcid.org/0000-0003-2132-8657>

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Abstract

Purpose: This study aims to investigate the relationship between innovation strategy and performance with a moderating role of environmental dynamism in Poland. Innovation strategy and performance are popular topics of many studies, but the relationship between them is complex, as previous research reports mixed results. On the one hand, exploration, exploitation and ambidexterity innovation strategies have positive effects on performance, but on the other hand some research indicates a negative relationship. These mixed results are often explained by the dynamism of environment.

Design/methodology/approach: The paper presents the results of a quantitative research that uses CAWI techniques (Computer-Assisted Web Interview). Data were acquired from 259 respondents working in large and innovative firms in Poland. The paper presents the results of the hierarchical multiple regression on the relationship between innovation strategy and performance with a moderating role of environmental dynamism.

Findings: Research results show the positive relationship between exploration, exploitation as well as combined innovation ambidexterity strategies and organisational outcomes, while the relationship between balanced innovation ambidexterity strategy and performance is not statistically significant. Moreover, the research shows that environmental dynamism is a significant factor strengthening the positive relation between innovation strategy and performance, but only in the case of exploration and balanced innovation ambidexterity strategies. It also points out that the environmental dynamism strengthens the negative link between exploitation innovation strategy and performance.

Practical implication: Research results show that both exploration and exploitation innovation strategies improve organisational performance. Moreover, the simultaneous pursuit of exploration and exploitation innovation activities allows to achieve better organisational performance. Managers should also take into consideration the environmental dynamism, as it impacts the relationship between innovation strategy

Correspondence address: Institute of Management, SGH Warsaw School of Economics, 31/33Madalińskiego, 02-544 Warsaw, Poland; e-mail address: pdziur@sgh.waw.pl.

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and performance. Firms operating in stable environments should execute an exploitation innovation strategy, while firms in dynamic environments should choose an exploration innovation strategy or balanced innovation ambidexterity strategy to achieve better performance. The combined innovation ambidexterity strategy seems to be an appropriate strategy in stable as well as dynamic environments.

Originality/value: The paper provides new insights on the link between exploration, exploitation and ambidexterity innovation strategies and organisational outcomes. It does not focus just on exploration or exploitation innovation strategies, but also on the jointed outcomes of both strategies on performance and its interplay with the environmental dynamism.

Keywords: exploration innovation strategy, exploitation innovation strategy, ambidexterity innovation strategy, environmental dynamism

JEL: O30, O31, O32, Q55

Związek pomiędzy strategią innowacji a wynikami przedsiębiorstwa z moderującą rolą dynamiki otoczenia

Streszczenie

Cel: celem artykułu jest zbadanie zależności pomiędzy strategią innowacyjności a wynikami przedsiębiorstw z moderującą rolą dynamiki otoczenia w Polsce. Strategia innowacji i wyniki przedsiębiorstwa to popularne tematy wielu badań, ale związek między nimi jest złożony, ponieważ poprzednie wyniki badań nie są jednoznaczne. Z jednej strony eksploracyjne, eksploatacyjne oraz oburęczne strategie innowacji mają pozytywny wpływ na wyniki przedsiębiorstw, z drugiej zaś – niektóre badania wskazują na negatywną zależność. Niejednoznaczne wyniki poprzednich badań można wyjaśnić różnym poziomem dynamiki zmian otoczenia przedsiębiorstw.

Projekt/metodologia/podejście: w artykule przedstawiono wyniki badania ilościowego wykorzystującego technikę CAWI (*Computer-Assisted Web Interview*). Dane uzyskano od 259 respondentów pracujących w dużych i innowacyjnych firmach w Polsce. W artykule przedstawiono wyniki hierarchicznej regresji wielokrotnej na temat relacji pomiędzy strategią innowacyjności a wynikami przedsiębiorstw z moderującą rolą dynamiki otoczenia.

Wnioski: wyniki badań pokazują pozytywny związek pomiędzy eksploracyjną, eksploatacyjną, a także łączy strategią innowacji oburęcznych a wynikami przedsiębiorstw, podczas gdy związek pomiędzy zbalansowaną strategią innowacji oburęcznych a wynikami nie jest istotny statystycznie. Co więcej, badania pokazują, że dynamizm otoczenia jest ważnym czynnikiem wzmacniającym pozytywny związek pomiędzy strategią innowacji a wynikami, ale tylko w przypadku eksploracyjnej oraz zbalansowanej strategii innowacji oburęcznych. Badania wskazują również, że dynamika środowiskowa wzmacnia negatywny związek pomiędzy eksploatacyjną strategią innowacji a wynikami.

Zastosowanie praktyczne: wyniki badań pokazują, że zarówno eksploracyjna, jak i eksploatacyjna strategia innowacji poprawiają wyniki przedsiębiorstwa. Ponadto równoczesne prowadzenie eksploracyjnych i eksploatacyjnych działań innowacyjnych pozwala osiągnąć lepsze wyniki przedsiębiorstwa. Menedżerowie powinni również wziąć pod uwagę dynamikę otoczenia, ponieważ wpływa ona na związek między strategią innowacji a wynikami przedsiębiorstwa. Firmy działające w stabilnym otoczeniu powinny realizować strategię innowacji eksploatacyjnych, podczas gdy firmy w dynamicznym otoczeniu powinny wybrać strategię innowacji eksploracyjnych lub zbalansowaną strategię innowacji oburęcznych, aby osiągnąć lepszą wydajność. Łączna strategia innowacji wydaje się odpowiednią strategią zarówno w stabilnym, jak i dynamicznym otoczeniu.

Oryginalność/wartość: artykuł dostarcza nowych spostrzeżeń na temat relacji między eksploracyjnymi, eksploatacyjnymi oraz oburęcznymi strategiami innowacji a wynikami przedsiębiorstw w Polsce. Badania nie skupiają się wyłącznie na eksploatacyjnych oraz eksploatacyjnych strategiach innowacji, ale także na efektach stosowaniach obu strategii innowacji łącznie i ich współzależności z dynamiką środowiskową.

Słowa kluczowe: eksploracyjna strategia innowacji, eksploatacyjna strategia innowacji, oburęczna strategia innowacji, dynamika otoczenie.

1. Introduction

Innovation strategy is understood as ‘the sum of strategic choices a firm makes regarding its innovation activity’ (Strecker, 2009, p. 18), and it very often refers to exploration, exploitation and ambidextrous innovations (Jia, 2017; Khan & Candi, 2021; Zakrzewska-Bielawska, 2021; Fatemi et al., 2022). Innovation strategy has been a growing theme of many studies worldwide that focus either on its antecedents or effects or both. However, the research stream on effects of exploration, exploitation and ambidexterity innovation strategies has been studied less frequently than the one on antecedents. It is intriguing as the research results on the relation between exploration, exploitation and ambidexterity innovation strategies and organisational outcomes are ambiguous (Ceptureanu et al., 2022). Too much focus on exploitation innovation strategy increases the risk for a firm to become obsolete, but too much emphasis on exploration innovation strategy might result in bankruptcy before the firm has a chance to benefit from innovation (Lin et al., 2013). Thus, the jointed implementation of exploration and exploitation innovation strategy in an ambidextrous fashion might benefit a firm the most. However, early as well as more recent studies show mixed evidence on the organisational outcomes of ambidexterity innovation strategy (He & Wong, 2004; Hughes, 2018). Some studies found the positive effects on performance from simultaneous implementation of exploitation and exploration innovation strategies, while some indicate that it does not guarantee success (Khan & Candi, 2021). The relationship between innovation strategy and organisational outcomes is hence more mysterious than results of earlier research show, and one factor that can explain previous mixed research results is an environmental dynamism (Jansen et al., 2006; Lin & Ho, 2016; Mammassis & Kostopoulos, 2019; Rojas-Córdova et al., 2023). It shows the rationale to further investigate the link between exploration, exploitation and ambidexterity innovation strategies and organizational outcomes. Additionally, this research answers the call in the literature to focus not just on exploration or exploitation innovation strategies singly, but also on the jointed outcomes of both strategies on performance (Luger et al., 2018) and its interplay with the environmental dynamism (Posch & Garaus, 2020). Previous studies show that simultaneous exploration and exploitation innovation strategy results in better performance, and this relationship is the dynamic environment (Tamayo-Torres et al., 2017). This study therefore aims to investigate the relationship between innovation

strategy and performance with a moderating role of environmental dynamism in Poland. The author intends to clarify whether and how different innovation strategies impact company performance in dynamic and stable environments. The intentional focus of the research on firms in Poland is justified, as the exploration, exploitation and ambidexterity innovation strategy is context-dependent (Mueller et al., 2013). The aim of the paper is attained with the use of the literature review and quantitative research on the sample of 259 large and innovation firms in Poland. The theoretical research allows to formulate hypotheses that are supported or rejected in the empirical research.

2. Literature Review and Hypothesis

The innovation literature refers to two main types of an innovation strategy: exploration and exploitation (Jia, 2017; Khan & Candi, 2021; Fatemi et al., 2022) following the distinction made by March (1991) into the exploration and exploitation in organisational learning. Exploration innovation strategy is reflected by radical innovation targeted to satisfy the needs and wants of new clients or market segments. It requires novel knowledge to offer new-to-the-world products, develop new distribution channels and create new markets. Exploitation innovation strategy is portrayed by incremental innovation developed to satisfy the needs of existing customers and markets. It uses and reinforces existing knowledge to improve established offerings and distribution channels as well as expand existing products lines for short-term benefit (Jansen et al., 2006; Khan & Candi, 2021).

The literature shows that innovation leads to the better organisational performance (Tidd & Bessant, 2021). First, exploration innovation strategy is necessary for the survival and long-term growth, as it allows firms to adopt to dynamic environmental conditions (Cho et al., 2020) and therefore gain a sustainable competitive edge (Jia, 2017; Constant et al., 2020). It positively impacts on organisational outcomes, including financial (Hou et al., 2019; Ceptureanu et al., 2023; Makona et al., 2023), environmental, and social performance (Lee et al., 2023). Moreover, exploration innovation strategy significantly restrains organisational obsolescence (Chen & Yu, 2022). Given the above, we propose the following hypothesis:

H1. Exploration innovation strategy has a significant positive impact on performance.

Second, exploitation innovation strategy helps companies to maintain market position and increase market share as well as short-term revenue, because returns from exploitation innovation occur sooner and are more certain (He & Wong, 2004). Moreover, previous research yields the positive relation between exploitation innovation strategy and organisational outcomes, including financial

(Hou et al., 2019; Ceptureanu et al., 2023; Makona et al., 2023), environmental, and social performance (Lee et al., 2023). It also restrains organizational obsolescence (Chen & Yu, 2022). Considering above argumentations, we can formulate the following hypothesis:

H2. Exploitation innovation strategy has a significant positive impact on performance.

Despite the distinctiveness of both innovation strategies, it is highlighted that managers should pursue both strategies simultaneously, reducing the risk of being mediocre at both innovation activities. Therefore, innovation ambidexterity strategy is the commonly used term to describe an ability of a firm to be jointly involved in exploratory activities for new-to-the-world innovations and at the same time be involved in exploitative activities for incremental innovations (He & Wong, 2004). The execution of innovation ambidexterity strategy allows firms to attain results that are not achievable if they focus only on one of these innovation strategies at the expense of another (Lin et al., 2013). Therefore, innovation ambidexterity allows firms not only to survive (Moss et al., 2014; van Lieshout et al., 2021) but also to achieve an advantage over their competitors (Onufrey & Bergek, 2021), grow the business (Zhang et al., 2021) and attain superior performance (Jansen et al., 2006; Lin et al., 2013; Cho et al., 2020; Akbari et al., 2022; Shafique et al., 2022; Fragoso et al., 2023). However, some studies also report that pursuing exploration and exploitation innovation strategies simultaneously might not guarantee better organisational outcomes (Buccieri et al., 2020), and they even point out the negative relationship with performance at the firm level (Menguc & Auh, 2008).

Authors often identify two different forms of an innovation ambidexterity strategy: balanced (BIA) and combined innovation ambidexterity (CIA) (Cao et al., 2009; Choi et al., 2022). BIA represents an incompatibility perspective showing the trade-off between exploration and exploitation innovation strategies. It indicates that managers ought to strive to achieve an appropriate equilibrium between both innovation strategies to gain better organisational outcomes (He & Wong, 2004; Cao et al., 2009). Concentrating too much on exploration might result in the 'failure trap', when firm fails before achieving benefits from breakthroughs ideas (Levinthal & March, 1993). Additionally, it can result in the diminishing returns to learning as exploration increases costs of knowledge management and negatively impacts the productivity of searching new knowledge (Katila & Ahuja, 2002). However, excessive exploitation might increase the risk of the 'success trap' (Levinthal & March, 1993) as it fosters inertia and evolutionary learning. Additionally, it negatively impacts a company's ability to seize emerging opportunities (Cao et al., 2009). Previous research results show no relationship between BIA and a firm's obsolescence (Chen & Yu, 2022), but do show a positive link between BIA and organisational outcomes (He & Wong, 2004; Cao et al., 2009; Chang & Hughes, 2012). Thus, we propose the following hypothesis:

H3. BIA strategy has a significant positive impact on performance.

CIA exemplifies the complementary perspective that underlines simultaneous reinforcement of exploration and exploitation innovation strategies for superior organisational outcomes (He & Wong, 2004; Simsek et al., 2009). It highlights that exploration innovation strategy can promote exploitation innovation strategy, as the new knowledge internalised for radical innovation can be utilised also within the existing domains of a firm (Cao et al., 2009). Previous studies provide mixed research results. Some report no link (Solís-Molina et al., 2018; Lu et al., 2023) or a negative link between BIA and organisational outcomes (Atuahene-Gima & Murray, 2007), but some studies show a positive relation (He & Wong, 2004; Cao et al., 2009; Ceptureanu et al., 2022). Given the above, we propose the following hypothesis:

H4. CIA strategy has a significant positive impact on performance.

Previous studies point out that the environmental dynamism is the crucial moderating factor in the relation between innovation strategy and organisational outcomes (Jansen et al., 2006; Lin & Ho, 2016; Rojas-Córdova et al., 2023), whereas exploration and exploitation innovation strategies are seen as effective ways to adopt to dynamic or stable environments (Gupta et al., 2006). Environmental dynamism means turbulence in markets conditions, high-velocity changes in technology, and irregular behaviour of customers (Jansen et al., 2006) leading to a rapid obsolescence of products and strategies. It favours risk-taking behaviour, as the environmental dynamism brings new opportunities and encourages development of innovative offers (Chang et al., 2011). In these market conditions, firms focus on exploration innovation strategy (Jansen et al., 2006; Tamayo-Torres et al., 2017; Kassotaki, 2022) allowing them to gain novel technological and marketing knowledge for breakthrough innovation (Yang & Li, 2011). Consequently, it enables firms to compete effectively (Mathews et al., 2019) and acquire technological leadership positions (Yang & Li, 2011) for superior organisational performance. Previous studies support this claim showing that environmental dynamism strengthens the positive relationship between innovation strategy and organisational outcomes (Jansen et al., 2006; Lee et al., 2013; Tamayo-Torres et al., 2017; Bernal et al., 2019). We therefore propose the following hypothesis:

H5. Environmental dynamism significantly strengthens the positive relationship between exploration innovation strategy and performance.

To reduce the risk of failure or success traps of a too-high focus on either exploration or exploitation innovation strategy, firms often execute the innovation ambidexterity strategy in dynamic environments (Chang et al., 2011; Andrade et al., 2021) for long-term survival (Rojas-Córdova et al., 2023). The engagement in both radical and incremental innovation allows firms to stay

competitive in dynamic environments (Khan & Candi, 2021). Soto-Acosta et al. (2018) show that firms operating in dynamic environments engage often in innovation ambidexterity strategy, and that this relationship is strengthened by the environmental dynamism (Mavroudi et al., 2020). Given the above, we propose the following two hypotheses:

H6. Environmental dynamism significantly strengthens the positive relationship between BIA and performance.

H7. Environmental dynamism significantly strengthens the positive relationship between CIA and performance.

Stable markets are in contrary to dynamic environments, and they are characterised by lack of major disruptions (Jansen et al., 2006) allowing firms to concentrate on improving existing competences for more attractive prices and increased efficiency (Mudambi & Swift, 2011). Firms in stable markets might benefit from innovations over the long term and achieve acceptable returns on investments. Thus, they often choose to execute the exploitation innovation strategy (Uotila, 2007; Junni et al., 2013; Halevi et al., 2015) meaning that the positive relationship between exploitation innovation strategy and performance is strengthened in stable, but not in dynamic environments (Jansen et al., 2006; Yang & Li, 2011). Firms that focus on exploration innovation strategy in dynamic environments may find themselves in a disadvantage position due to higher costs and inefficiency (Xia & Dimov, 2019; Rojas-Córdova et al., 2023). It means that firms pursuing exploration innovation strategy in stable environments are more likely to reduce their organisational performance than companies with exploitation innovation strategy. We therefore propose the following hypotheses:

H8. Environmental dynamism significantly weakens the positive relationship between exploitation innovation strategy and performance.

3. Method

3.1. Data and Sample

The study uses data from an on-line survey among large and innovative firms in Poland to empirically test hypotheses. This is therefore a quantitative research that uses CAWI techniques (Computer-Assisted Web Interview). The independent research agency collected data from November 7 to 16, 2023. The questionnaire targets respondents who have knowledge about the innovation activity and performance of large entities in Poland (more than 250 employees) that report at least one product or process innovation within the 3-year period (innovation firms (OECD/Eurostat, 2018)). This study targets large-size firms, as they often possess a natural advantage in reconciling exploration and exploitation innovation activities by executing the ambidexterity innovation strategy (Lee et al., 2013; Khan & Candi, 2021) and they usually face

significant environmental uncertainty. The questionnaire was made available to 9,240 respondents who met the selection criteria and were signed to the database of an independent research agency. 1,106 respondents opened the questionnaire, while 755 surveys were rejected due to too little time to answer or inconsistency of answers, and 92 surveys were not included because the respondents did not finish the questionnaire. Therefore, the final sample numbers 259 surveys. Firms in the sample represents manufacturing (41.3%) and service firms (58.7%), mostly with employment equal to or exceeding 500 employees (76.4%); 23,6% of the firms employ between 250 and 500 staff. The distribution of firm age shows that more than 55.6% of the entities have been on the market for more than 26 years, while 44.4% of the firms are younger companies with fewer than 26 years on the market.

3.2. Measures

The study uses previously developed measures from the innovation literature to ensure comparability with previous research. As all measures identified are written in English, the translation into Polish was needed. The translation quality of the English-written questionnaire into Polish was confirmed through a backward translation design (Reynolds et al., 1993). We used the seven-point Likert scales for all variables.

Performance is a dependent variable, and we used the established measurement scale in the innovation literature by concentrating on a set of different indicators that allow to measure company performance from a broader perspective, and moreover overcome limitations linked to one-dimensional indicators of performance. Thus, we used three-item scale developed and tested by Lin et al. (2013). The scale requires the respondent to describe company performance relative to rival firms. Each respondent was asked to state if the firm's revenues, operating profits and productive growth were lower or higher compared to a major competitor (Lin et al., 2013).

In this study, innovation strategy means making choices (Sheth & Sinfield, 2022) regarding exploration, exploitation and ambidextrous innovation (Khan & Candi, 2021; Fatemi et al., 2022), and it is an independent variable. However, it applies two different perspectives. The first one focuses on exploration or exploitation innovation strategies singly, and both strategies were evaluated on the scale adopted from Jansen et al. (2006). We used a seven-item scale for exploration innovation to 'capture[d] the extent to which units depart from existing knowledge and pursue innovations for emerging customers or markets' (Jansen, 2006, p. 1666), and a seven-item scale for exploitation innovation that captures 'the extent to which units build on existing knowledge and meet the needs of [the] existing customer' (Jansen, 2006, p. 1666). It allows us to use exploration and exploitation innovation strategies as two separate independent variables. The second perspective allows to comprise two main types of innovation strategy – exploration and exploitation – into one construct. On the one hand, this study focuses on BIA, but on the other hand also on

CIA to check which approach to innovation ambidexterity strategy promotes better organisational performance. To operationalise BIA and CIA, we used the following formulas (Cao et al., 2009; Choi et al., 2022):

$$BIA = 7 - \text{exploratory innovation} - \text{exploitative innovation}$$
$$CIA = \text{exploratory innovation} * \text{exploitative innovation}$$

The greater the value of BIA, the more balanced is the execution of exploration and exploitation innovation strategies in a firm, while the greater the value of CIA, the greater is the focus on exploration and exploitation innovation strategies by a company.

The study applies one moderator – environmental dynamism. We used the five-item measure created and tested by Yang and Li (2011) that defines the environmental dynamism as ‘the perceived speed and magnitude of change and uncertainty and the variety of new product introductions in the industry’ (Yang & Li, 2011, p. 1453). Each respondent was asked to assess the rapidness and unpredictability of competitive conditions, preferences and needs of clients as well as technological changes (Yang & Li, 2011). It is a subjective measure of the perceived environmental dynamism based on respondents’ answers (Kim & Rhee, 2009).

To consider different variables that may have an impact on organisational performance, innovation strategy and environmental dynamism, we included three control variables. The first one is the size of an organization measured with the number of staff (Wang et al., 2020). We coded it as 0 when the size is less than 500, otherwise we coded it as 1 (when the company has 500 or more employees). Second, we used the age of a company that was assessed based on the number of years since its founding (Tsai & Yang, 2013). We created a new variable to evaluate it – firms aged equal or less than 26 years were assigned with the code 0, while firms older than 26 years with code 1. Finally, we included the control variable on company type (Vanhaverbeke et al. 2015) – manufacturing firms were given the code 0, while service companies were given code 1.

3.3. Reliability and Validity

Constructs used in the analyses have a good reliability (Table 1). The Cronbach’s alpha ranges from 0.727 to 0.893 exceeding the recommended value of 0.7 (Cronbach & Meehl, 1955). The CR of all constructs in the study also meets the recommended value of 0.6 (Fornell & Larcker, 1981).

Constructs in the study also passed the validity test (Table 1 and Table 2). AVEs are higher than the threshold of 0.5 (Fornell & Larcker, 1981). We also used the exploratory factor analysis (EFA). Before conducting EFA, we ran the Kaiser-Meyer-Olkin (KMO) test together with the Bartlett’s spherical test. Results of the KMO test exceed the recommended value of 0.6, and the p-values of

Bartlett's spherical test are statistically significant for all constructs (Kaiser, 1970). We also used the anti-image matrices to check the measures of sampling adequacy (MSA). The MSA for one factor of the environmental dynamism is below the recommended value of 0.5 (Kaiser, 1970), therefore it was not included in further analyses. Remaining MSAs are greater than 0.5. Hence, data is suitable to EFA. We used the principal component extraction with the varimax rotation. Factor loadings range from 0.667 to 0.920 being beyond the benchmark value of 0.5 (Costello & Osborne, 2005). EFA analyses replicate models of original constructs, except the construct of environmental dynamism in which the four-factor model is confirmed.

Table 1
Reliability and validity

Construct	Mean	SD	Factor loadings	Cronbach's alpha	CR	AVE
Exploratory innovation	5.5141	1.0912	0.704-0.849	0.876	0.906	0.597
Exploitative innovation	5.7546	0.9684	0.667-0.847	0.886	0.912	0.599
Performance	5.2613	1.1673	0.889-0.920	0.893	0.933	0.823
Environmental dynamism	5.2674	1.1725	0.808-0.844	0.727	0.856	0.684

Table 2
KMO and Bartlett's spherical test

		Exploratory innovation	Exploitative innovation	Performance	Environmental dynamism
KMO		0.876	0.905	0.743	0.787
Bartlett's spherical test	Approx. chi-square	825.882	868.208	456.214	423.239
	df	21	21	3	6
	Significancy	<0.001	<0.001	<0.001	<0.001

3.4. Common Method Bias

We used the personal survey with a single respondent per firm who provided information about a firm's innovation activity and performance in a single timeframe, therefore the common method bias (CMB) risk occurs. The design of the questionnaire aims to make sure that collected data are of a good quality. Anonymity and confidentiality of respondents were ensured to encourage participants of the study to answer questions truthfully (Podsakoff et al., 2003). We also divided questions referring to independent, dependent and moderating variables into separate parts of the questionnaire to make sure that participants in the study answer all questions carefully (Kortmann, 2014). Additionally, we included in the questionnaire additional questions not linked with the theme of the study to ensure survey participants' high focus (Podsakoff et al., 2003).

We also employed post-hoc analyses to make sure that the risk of CMB is under control. We used the Harman's one-factor test (Harman, 1967). The results show that the first principal component with the largest eigenvalue accounts for 42.2% of the total variance. It is lower than the threshold of 50.0% (Kortmann, 2014). We also investigated the potential multicollinearity using the variance inflation factors (VIFs) that range from 1.237 and 3.491, meeting the requirement for VIF to be less than 10 (Kock, 2015). Therefore, the CMB is in control.

4. Results

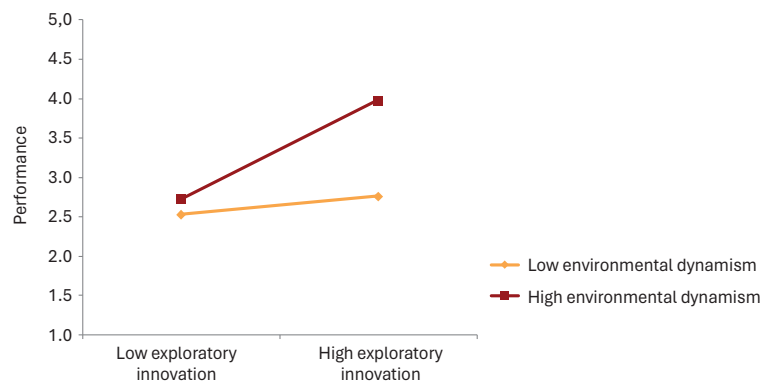
We used the hierarchical multiple regression to test proposed hypotheses (Table 3). The baseline model 1 includes only control variables. Models 2 and 3 add exploration and exploitation innovation strategy showing their impact on organisational performance, while models 6 and 7 introduce the moderating variable. Models 4 and 5 examine the impact of BIA and CIA on organisational performance, while models 8 and 9 assess the moderating effect of environment dynamism on the relationship studied. The Durbin-Watson statistic shows that the autocorrelation is not an issue in all models. Additionally, changes of R^2 are statistically significant and improved compared with the baseline model. It shows that the organisational performance can be assessed better by adding new independent variables.

First, we conducted analyses to test hypotheses claiming the positive impact of innovation strategy on organisational outcomes. Exploration and exploitation innovation strategies have the significant positive effect on performance (respectively, $\beta = 0.472$, $p < 0.001$ and $\beta = 0.433$, $p < 0.001$) (models 2 and 3). Therefore, H1 and H2 are confirmed. Model 4 shows that the BIA has no significant impact on performance ($\beta = 0.024$, $p > 0.001$), while Model 5 indicates the significant positive effect of CIA on organisational outcomes ($\beta = 1.225$, $p < 0.001$). Hence, H3 is rejected, while H4 is supported. Analysing changes of R^2 comprehensively in models 2–5, innovation strategy implemented by innovative

large firms in Poland can significantly explain the performance of the firms studied. However, it is worth noting that the explanatory power of CIA is the strongest among other independent variables.

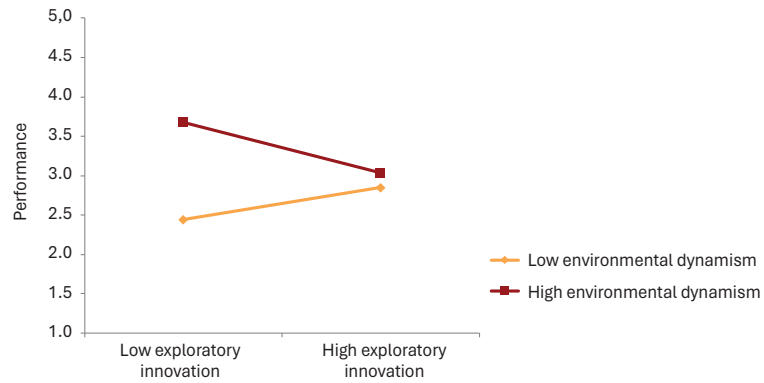
Second, we tested the impact of innovation strategy on organisational outcomes including the environmental dynamism as a moderating variable. Models 6–9 show the significant positive impact of environmental dynamism on organisational outcomes. Model 7 includes the interaction terms showing that the environmental dynamism strengthens the positive relation between exploration innovation strategy and performance ($\beta = 0.309$, $p < 0.001$), thus H5 is supported (see Figure 1). Model 7 indicates that the relation between exploitation innovation strategy and organisational outcomes is negative (it is not statistically significant), whereas the environmental dynamism strengthens the negative relationship ($\beta = -0.263$, $p < 0.05$). Hence, H8 is rejected (see Figure 2). Model 9 shows that the effect of BIA on organisational outcomes is not significant, but positive, while the environmental dynamism strengthens this positive relationship ($\beta = 0.203$, $p < 0.05$). It means that H6 is confirmed (see Figure 3). Model 9 also indicates that the environmental dynamism is not a moderating factor in the relation between CIA and organisational outcomes ($\beta = -0.001$, $p > 0.001$). Therefore, H7 is rejected. Comprehensive analysis of changes of R^2 shows that models can significantly explain the link between innovation strategy and organisational outcomes under different environmental conditions of firms studied.

Figure 1
Effects of exploration innovation strategy on performance at high and low values of environmental dynamism



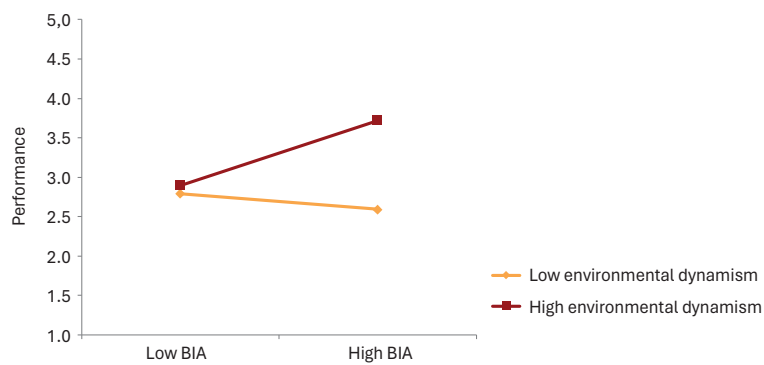
Low environmental dynamism = stable environments
High environmental dynamism = dynamic environments

Figure 2
Effects of exploitation innovation strategy on performance at high and low values of environmental dynamism



Low environmental dynamism = stable environments
High environmental dynamism = dynamic environments

Figure 3
Effects of BIA on performance at high and low values of environmental dynamism



Low environmental dynamism = stable environments
High environmental dynamism = dynamic environments

Table 3
Results of the hierarchical multiple regression

Variables	Dependent variable: performance								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	5.101***	5.141***	5.175***	5.155***	5.206***	5.182***	5.124***	5.200***	5.146***
Firm age	0.076	0.068	0.057	0.065	0.046	0.062	0.060	0.054	0.056
Firm size	0.034	0.010	0.013	0.008	-0.010	0.006	0.014	0.001	0.002
Firm type	-0.007	0.008	-0.011	0.003	0.011	-0.010	-0.012	-0.008	-0.008
				<i>Independent variables</i>					
E(i)Inn		0.472***		0.326**	-0.412*	0.183*	0.346***		
E(i)Inn			0.433***	0.167	-0.351**	0.139	-0.049		
BIA				0.024				-0.039	0.069
CIA					1.225***			0.353***	0.304***
				<i>Moderating variables</i>					
ED						0.302***	0.357***	0.275***	0.311***
				<i>Interaction terms</i>					
E(i)Inn * ED							0.309***		
E(i)Inn * ED							-0.263**		0.203**
BIA * ED									-0.001
CIA * ED									
				<i>Model fit statistics</i>					
R ²	0.008	0.229	0.194	0.236	0.281	0.297	0.333	0.310	0.338
F	0.646	18.878***	15.271***	12.977***	16.403***	17.708***	15.627	18.860***	15.965***
Durbin-Watson	1.826	1.802	1.809	1.788	1.822	1.785	1.832	1.801	1.845

N = 259 (all models)

*** p < 0.001; ** p < 0.05; * p < 0.01; E(i)Inn – exploratory innovation strategy; E(i)Inn – exploitation innovation strategy; ED – environmental dynamism

5. Discussion

Research on exploration, exploitation and ambidextrous innovation strategies has been flourishing, but our knowledge on the effects of these strategies is still unclear (Khan & Candi, 2021). Previous studies show that exploration, exploitation and ambidextrous innovation strategies might have positive, negative or even neutral impact on performance (He & Wong, 2004; Hughes, 2018), and this relationship might be impacted by the environmental dynamism (Jansen et al., 2006; Lin & Ho, 2016; Mammassis & Kostopoulos, 2019; Rojas-Córdova et al., 2023). Therefore, our intent was to investigate the link between innovation strategy and organisational outcomes in dynamic and stable environments. We underscore the positive relation between exploration as well as exploitation innovation strategy and performance contributing to the previous studies (Hou et al., 2019; Ceptureanu et al., 2023; Makona et al., 2023). Moreover, this study supports the claim about the positive link between CIA and organisational outcomes but does not confirm the link between BIA and performance. Therefore, it contributes to the research on the positive link between CIA and organisational outcomes (He & Wong, 2004; Cao et al., 2009; Ceptureanu et al., 2022) but also adds new a perspective to the research on BIA and performance. This study also contributes to the innovation literature, as it is conducted in the context of a less technologically developed economy that is classified as an emerging innovator (European Commission, 2022). It is especially important, as the country's idiosyncrasies have an impact on firms' innovation strategies, which suggests that firms in less-innovative countries may not replicate innovation behaviours of firms from countries that exhibit a high degree of innovativeness. It supports the claim of Mueller et al. (2013) that the specificity of the country has a strong impact on the performance implication of exploration, exploitation and ambidextrous innovation strategies.

BIA reflects the incompatibility between exploration and exploitation innovation strategies and indicates that managers should achieve equilibrium between these two innovation strategies to effectively distribute resources to achieve superior performance (Cao et al., 2009). However, the research results show that BIA is not beneficial for the firms studied to attain better performance, meaning that they are not capable of effectively avoiding the incompatibility of exploration and exploitation, and in effect do not take advantage of the rising returns of these two types of innovation strategy. It supports the claim from the literature that achieving a balance between exploration and exploitation innovation strategy is not beneficial for firms (Gupta et al., 2006).

CIA is beneficial in terms of performance among firms studied. This perspective on innovation strategy reflects the idea that exploration and exploitation innovation strategies might be complementary, and do not necessarily compete for scarce resources (Cao et al., 2009). It shows that the deep technological understanding developed during the exploitative innovation activities of a firm facilitates its ability to search for and absorb external resources

as well as reutilise knowledge that is a firm already possesses (Wei et al., 2014). Also, exploration innovation strategy can stimulate exploitation innovation, as newly gained external resources could be effectively utilised when merged with resources already owned by a firm (Cao et al., 2009). Thus, managers should implement high levels of exploration and exploitation innovation strategies to achieve better organisational performance (Cao et al., 2009; Simsek, 2009) by utilising the synergistic benefits from both innovation strategies (Pertusa-Ortega & Molina-Azorín, 2018). By combining the appropriate set of practices to simultaneously attain high levels of exploration and exploitation innovation strategies, companies might gain a sustainable competitive advantage, while companies that are not able to achieve it might be at risk of a competitive disadvantage. This research hence shows that high levels of both exploration and exploitation innovation strategies give advantage to companies in the form of better performance. It confirms results of the study of Lin et al. (2013) on medium-sized and large strategic business units in Taiwan. They also show that implementing high levels of both types of innovation strategy jointly impacts on the performance of a firm significantly. It also supports the study of Tamayo-Torres et al. (2017) on Spanish manufacturing firms that report the positive impact of simultaneous exploration and exploitation innovation strategy on manufacturing performance.

Choi et al. (2022) report that the firm size is positively linked with the growth effect of CIA, but is negatively related to that of BIA. It means that larger firms are more suitable for CIA, but not for BIA, while smaller companies are more likely to implement BIA, but not CIA. Therefore, this research supplements the study of Choi et al. (2022) showing that larger firms are also benefiting from CIA in terms of performance, but are not benefiting from BIA. Moreover, the study contributes to the discussion on the innovation and size of a firm indicating that larger companies take advantages from the simultaneous implementation of both innovating strategies due to resource availability (Cao et al., 2009; O'Reilly & Tushman, 2011; Knott & Vieregger, 2016) as well as higher organisational capabilities (Lee et al., 2013). Andrade et al. (2021) point out that small and medium-sized firms cannot pursue exploration and exploitation innovation strategy simultaneously, as these innovation activities should be 'mobilised, coordinated and developed considering a continuum of alternation between both' (2130). Therefore, this study showing that the greater organisational scale is vital for combined ambidexterity innovation strategy. It means that it contributes to the research stream in the innovation literature highlighting the importance of contextual variables (the size of a firm) when assessing the relationship between innovation strategy and performance (Lin & Chang, 2015; Khan & Candi, 2021).

This study confirms that environmental dynamism is an important factor moderating the relation between innovation strategy and organisational outcomes (Jansen et al., 2006; Yang & Li, 2011), but not for all types of innovation strategy. It shows that due to the intrinsic nature of exploration, exploitation and ambidexterity innovation strategy, environmental dynamism has different impacts on the

relationship between innovation strategy and performance (Andrade et al., 2021). First, environmental dynamism strengthens the positive link between exploration innovation strategy as well as BIA and performance (Jansen et al., 2006; Yang & Li, 2011; Lee et al., 2013; Tamayo-Torres et al., 2017; Bernal et al., 2019; Mavroudi et al., 2020). It shows that the relationship studied is in line with theoretical assumptions that underscore the strengthening impact of the environmental dynamism on the relationship between exploration innovation strategy as well as BIA and company performance (Jansen et al., 2006; Lee et al., 2013; Tamayo-Torres et al., 2017; Bernal et al., 2019; Mavroudi et al., 2020). Firms that operate in dynamic markets face many innovation challenges, inducing them to implement an exploration or ambidexterity innovation strategy (Wamba et al., 2020; Andrade et al., 2021). Therefore, it allows firms in dynamic markets to reduce the risk of competences obsolescence by offering radically new products and creating new markets, and firms pursuing BIA also implementing flexible and more efficient production processes as well as improved products. It supports and develops the claim of Yang and Li (2011) that negative impacts of exploration and ambidexterity innovation strategy on company performance might diminish when a firm operates in a dynamic market. The rapid technology obsolescence occurring often in dynamic markets forces firms to devote resources on experimentation and innovation activates to survive and grow the business (Yang & Li, 2011). These innovation strategies in turn improve company performance (Jansen et al., 2006; Tamayo-Torres et al., 2017). It shows that running a business in dynamic markets allows the bright sides to outweigh the dark sides of exploration and ambidexterity innovation strategy.

Second, our study shows that the environmental dynamism is not a moderating factor in the relation between CIA and organisational outcomes. It points out that the environmental dynamism is unable to moderate the link between CIA and company performance (Yang & Li, 2011). One possible explanation of this research finding is the non-linear moderating effect of the environmental dynamics on the relationship studied (Wamba et al., 2020). It might mean that effects of environmental dynamism on the relationship between CIA and organisational outcomes are relatively weak in stable and dynamic markets, while the impact might be stronger on the intermediate level of environmental dynamism. Markets that are halfway between stable and dynamic environments might allow firms to implement simultaneously high level of exploration and exploitation innovation strategies utilising existing innovation competences for more certain and closer-in-time short-term benefits, but also not giving up possibilities to explore and gain new resources for more uncertain and postponed benefits of innovation activities in the future.

Third, we also found that the link between exploitation innovation strategy and organisational outcomes in a dynamic environment is negative. This means that the focus on exploitation innovation strategy in dynamic environments results in poorer company performance, although it promotes better organisational outcomes in stable markets (Jansen et al., 2006; Yang & Li, 2011). Exploitation

innovation strategy that is targeted to reinforce existing knowledge (Jansen et al., 2006; Khan & Candi, 2021) is hence more suitable in stable than in dynamic markets (Jansen et al., 2006). In dynamic markets, the focus on incremental innovation might have detrimental effects on company performance as the market demands more radical innovation. Competences obsolescence is rapid in such environmental conditions, thus reinforcing existing knowledge makes firms fall behind competitors and erodes organisational outcomes (Lichtenthaler, 2009; Yang & Li, 2011). It shows that exploitation innovation strategy is not favoured in dynamic environments and not only might this strategy prevent firms from performing well, but it could lead to the company becoming obsolete. Pursuing the exploitation innovation strategy in stable markets shows that the fit between innovation activities and market conditions results in better organisational performance (Jansen et al., 2006; Yang & Li, 2011).

Research results support the literature that showing that environmental dynamism affects the relationship between innovation strategy and company performance, but it also points out that environmental dynamism plays a different role when different types of innovation strategy are considered. Therefore, the study contributes to the innovation and strategic management literature indicating that the relationship between innovation strategy and performance is dependent on company environment. It is in line with the fit-as-moderation view in the management literature highlighting the determinism of environment-strategy-performance relationship (Katila & Ahuja, 2002; Yang & Li, 2011). Additionally, it indicates that some innovation strategies are more beneficial in terms of improved performance than others in stable and dynamic environments highlighting that external factors limit the number and type of feasible innovation strategies (Hollenstein, 2019; Phung et al., 2021).

The study offers implications for management on the nature and consequences of innovation strategies. Our study points out that to improve organisational performance, managers should pursue an exploration or exploitation innovation strategy. Both innovation strategies have a positive impact on organisational performance. CIA that is characterised by a high focus on exploration and exploitation innovation activities is beneficial in terms of performance, while BIA that shows high/low focus on exploration and low/high concentration on exploitation in innovation has no impact on performance. Therefore, managers of larger business should simultaneously pursue exploration and exploitation innovation activities to achieve better organisational performance. Moreover, the link between innovation strategy and company performance is impacted by environmental dynamism. Firms operating in stable environments should the execute exploitation innovation strategy, while firms operating in dynamic environments should chose the exploration innovation strategy or BIA to achieve better performance. CIA seems to be an appropriate strategy in stable as well as dynamic environments. Implementing the inappropriate innovation strategy in the given environmental setting might not only prevent firms from performing better, might also cause them to fall behind the competition, risking the firms survival.

6. Conclusion

The topic of exploration and exploitation as well as ambidexterity innovation strategies (Jia, 2017; Khan & Candi, 2021; Zakrzewska-Bielawska, 2021; Fatemi et al., 2022) and organisational performance is common, however, previous studies show mixed research results (He & Wong, 2004; Hughes, 2018), suggesting that the relationship studied is not fully understood. This study aims to investigate the relationship between innovation strategy and performance with a moderating role of environmental dynamism in Poland. Understanding the role of innovation strategy for improved organisational performance is important, as innovation seems to be a competitive necessity and a top priority for firms worldwide (Bessant, 2017). Thus, having knowledge as to which innovation strategy is beneficial in terms of company performance in stable and dynamic environments is crucial not only for researchers, but also for managers. Our study indicates which innovation strategies bring improved performance in stable and dynamic environments.

The study achieves its aim, but it has unavoidable limitations. First, we focused on firms in Poland and gathered data only for one period. Therefore, conducting the research in different institutional environments and extending the sample size over a longer period will enable to check if research results from this study are confirmed. Second, we asked for the subjective opinions of employees regarding their perceptions of innovation strategy, performance and environmental dynamism. Therefore, the future research that would consider more objective data would allow for better recognition of the problem studied. Third, we used a general measure of the environmental dynamism that may impact the results of the study. The literature points to different dimensions of environmental dynamism (i.e., velocity, complexity, ambiguity, and unpredictability) (Davis et al., 2009) that might have a different impact on the relationship between innovation strategy and performance (Kim & Rhee, 2009). Therefore, future studies should apply a multidimensional construct of environmental dynamism to deepen the research results of this study. Fourth, data and statistical limitations need to be acknowledged.

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