Mykolo Romerio universitetas

ISSN 1822-8038 (online)
INTELEKTINĖ EKONOMIKA
INTELLECTUAL ECONOMICS
2023, No. 17(1), p. 30–56

THE SUSTAINABLE COMPETITIVE ADVANTAGE OF SMES TOWARDS INTELLECTUAL CAPITAL: THE ROLE OF TECHNOLOGY ADOPTION AND STRATEGIC FLEXIBILITY

Ni Putu Santi SURYANTINI[1]
Doctoral Program of Management Science, Universitas Brawijaya, Indonesia
santisuryantini@student.ub.ac.id

MOELJADI
Faculty of Economic and Business, Universitas Brawijaya, Indonesia
moeljadi@ub.ac.id

Siti AISJAH
Faculty of Economic and Business, Universitas Brawijaya, Indonesia
aisjah@ub.ac.id

Kusuma RATNAWATI
Faculty of Economic and Business, Universitas Brawijaya, Indonesia
kusuma@ub.ac.id

DOI: 10.13165/IE-23-17-1-02

Abstract

Purpose: *This study examines sustainable competitive advantage in the SME sector, which consists of three determinant factors: business performance, open innovation, and intellectual capital. It also extends the accepted procedure to include the effects of technology adoption and strategic flexibility.*

Design/methodology/approach: *The target sample consisted of 210 export SMEs in Bali, Indonesia. This study employs a self-administered questionnaire distributed to managers and key employees, with 630 surveys successfully collected and PLS-SEM used to analyze the data.*

Findings: *This study corroborates the notion that intellectual capital is crucial in building sustainable competitive advantage. Further, these results also highlight the roles of technology adoption and strategic flexibility as strategic factors that reinforce intellectual*

1 *Corresponding author: santisuryantini@student.ub.ac.id*

capital and indirectly affect sustainable competitive advantage. The results of this study present an insightful understanding to theorists and managers regarding how the sustainable competitive advantage of SMEs faces global competition.

Originality/value: *This paper is the first study to integrate technology adoption and strategic flexibility to enhance a sustainable competitive advantage-based performance model in the SME sector.*

Research limitations/implications: *The primary limitation involves the data collected from SMEs in Indonesia. Given the difference in SME managers' attitudes and behaviors, the findings of this study are most likely not able to be generalized.*

Practical implications: *SME managers are required to offer employees opportunities to transmit their knowledge into great ideas. Consequently, managers are to innovate constantly, using relationships to obtain knowledge, creating unique knowledge for the organization, and meeting market expectations.*

Keywords: *intellectual capital; business performance; open innovation; strategic flexibility; sustainable competitive advantage*

JEL Codes: *D23, D83, M12, O31, O34*

1. Introduction

A comprehensive annual report from the Global Competitiveness Index (WEF, 2019) points out that organizations escalate their productivity and competitiveness by actively seeking internal reinforcement while anticipating competition. Business performance and competitive advantage are flourishing, and have become a fascinating topic in various sectors – especially small and medium-sized enterprises (SMEs; Arsawan, Koval, Rajiani et al., 2022; Miroshnychenko et al., 2021). The development of business performance offers considerable benefits to SMEs, such as positive impacts on economic growth, contributions to gross domestic product, and the endorsement of sustainability (Gorondutse et al., 2020; Leckel et al., 2020; Surya et al., 2021). Consequently, given these advantages and to meet the needs of the market, the vast majority of business entities, especially SMEs, develop knowledge-based business performance; however, this leads to intensifying competition if SMEs offer very similar products and services (Bhamra et al., 2018; Falahat et al., 2020; Zaridis et al., 2021). Therefore, in this immensely competitive and challenging environment, SME managers must offer unique products and high-quality services that promote performance and expand sustainable competitive advantage (Ardito et al., 2021; Arsawan, Koval, Rajiani et al., 2022; Mady et al., 2022).

Given the ever-changing and turbulent market, the performance-based SME sector is subject to dynamic customer demands (Allal-Chérif et al., 2023; Parwita et al., 2021). Accordingly, ensuring that SMEs promote innovation, foster business performance, and offer excellent performance value is a crucial strategy for establishing sustainable competitive advantage as the key to a successful business (Kahupi et al., 2021; Khan et al., 2019; Yang et al., 2021; Zhang et al., 2023). However, notwithstanding numerous studies

devoted to examining business performance (Davcik et al., 2021; Olamide & Ogbechie, 2021), there is a scarcity of studies on SMEs' sustainable competitive advantage (Arsawan, Koval, Rajiani et al., 2022). This occurs because SMEs are often considered to have modest resources (Arsawan, Koval, Suhartanto et al., 2022), and frequently lack access to adequate financial resources (Özbuğday et al., 2020).

The existing literature has identified the determinants of sustainable competitive advantage, often including open innovation, business performance, and intellectual capital (Arsawan, Koval, Rajiani et al., 2022; Khan et al., 2019; Todericiu & Stăniţ, 2015). Furthermore, an open innovation orientation is a fundamental factor influencing sustainable competitive advantage (Alassaf et al., 2020; Allal-Chérif et al., 2023). The impact of open innovation on how the manager evaluates business performance has been explored extensively (Grimsdottir & Edvardsson, 2018; Hameed et al., 2021). Nevertheless, the impacts of technology adoption and strategic flexibility on intellectual capital are rarely explored despite the practical significance of managing business performance. Notably, studies on how technology adoption and strategic flexibility affect the establishment of sustainable competitive advantage in SMEs' business performance attract very little attention (Allal-Chérif et al., 2023). Committed to filling this gap, the present study attempts to: (1) examine business performance toward sustainable competitive advantage along with its determinants, including open innovation and intellectual capital; and (2) evaluate the roles of technology adoption and strategic flexibility in establishing sustainable competitive advantage. This study was conducted on export SMEs in Indonesia for three main reasons. First, Indonesian SMEs have a potential market spread across the American and European markets, with an ever-increasing number of customers. This encourages SMEs to improve product quality, value, and competitiveness to meet the needs of international markets (Arsawan, Koval, Rajiani et al., 2022). Second, with the increasingly important role of SMEs in increasing economic growth, fostering employment, and supporting sectors outside of oil and gas, it is necessary to improve business performance by optimizing the role of intellectual capital and open innovation (Surya et al., 2021). Finally, to increase sustainable competitive advantage, Indonesian SMEs need to prepare strategic flexibility to deal with potential turbulence, survive in difficult situations (Arsawan, De Hariyanti, et al., 2022; Miroshnychenko et al., 2021), and prepare a strategic plan to adapt to change (Gorondutse et al., 2020; Nassani & Aldakhil, 2021). Subsequently, this study not only enables the confirmation and expansion of theoretical knowledge regarding this particular concept, but also provides insightful information to SME managers, enabling them to adapt and manage SMEs and thus reinforce their competitiveness in the international market.

2. Theoretical Framework and Hypotheses Development

2.1. Sustainable Competitive Advantage

Sustainable competitive advantage is one of the essential concepts in strategic management, and a significant number of empirical studies have been produced on this topic.

Nevertheless, with the enormous amount of literature examining sustainable competitive advantage, the debate regarding the conceptualization of this concept remains (Arsawan, Koval, Rajiani et al., 2022; Mady et al., 2022). Furthermore, several studies are focusing on sustainable competitive advantage in the SME context. In management research, such as in broader strategic management, sustainable competitive advantage is generally conceptualized through one of two approaches: performance or competitive advantage. The performance approach proposes that an organization must possess a long-term plan to advance its business concept (Amjad et al., 2021; Gorondutse et al., 2020). Accordingly, this approach is generally measured based on organizational productivity and achievement (Migdadi, 2020). Meanwhile, the competitive advantage approach precisely defines how robust an organization is in optimizing unique resources, which can distinguish it from its competitors (Chatzoglou & Chatzoudes, 2018; Huang et al., 2015). Resultantly, performance alone is insufficient to examine sustainable competitive advantage. Scholars (Sharma & Sharma, 2020; Tu & Wu, 2021) assert that competitive advantage is the optimization of unique resources to produce rareness and meet customers' perceptions of value. This statement complies with the resource-based view, which states that competitive advantage results from the ability of an organization to create added value derived from a unique resource (Barney, 1991).

Consequently, predicting sustainable competitive advantage related to SMEs in the future must be based on performance and competitive advantage (Mady et al., 2022; Quaye, 2019). On the other hand, some researchers claim that the performance approach to sustainable competitive advantage may be insufficient to predict actual conditions in the future, yet it enables researchers to determine organizational competitiveness (Chatzoglou & Chatzoudes, 2018; Gutiérrez-Martínez & Duhamel, 2019). Hence, this makes the combination of performance and competitive advantage a prudent approach to measuring sustainable competitive advantage. Therefore, in this study, SMEs' sustainable competitive advantage will be considered via performance and the unique resources that they possess to establish a competitive advantage in a competitive market (Lin et al., 2020; Yang et al., 2021). Therefore, the following sub-sections discuss the determinants of sustainable competitive advantage.

2.2. Sustainable Competitive Advantage: Intellectual Capital

Intellectual capital has been a primary topic in strategic management, although its conceptualization is incredibly varied in the existing literature (Asiaei et al., 2020; Wang et al., 2016). Scholars (Castillo et al., 2019; Dabić et al., 2019) assert that a consensus has not yet been established regarding intellectual capital. Intellectual capital also be defined as knowledge that is beneficial for business performance (Weqar & Haque, 2020). Other researchers (Bontis et al., 2015; Dženopoljac et al., 2016) describe intellectual capital as an immaterial asset, which is not listed in organizational balance but is acknowledged to contribute positively to the performance of a business. Thus, the role of intellectual capital is proven to be fundamental in enhancing business performance (Mohammad Shafiee, 2022). Consequently, investing in intellectual capital is the primary source of

establishing sustainable competitive advantage (Asiaei et al., 2020). This discussion leads to the following hypothesis:

H1. Intellectual capital is significant for sustainable competitive advantage

2.3. Sustainable Competitive Advantage: Open Innovation

The existing literature defines open innovation as a construct covering new norms, challenges, and innovation process practices (Audretsch & Belitski, 2022). Open innovation improves the chance to gain complementary knowledge, leading to faster, higher-quality innovation and greater organizational productivity (Lam et al., 2021). A prior study by Barrena-Martínez et al. (2020) revealed how dimensions of intellectual capital (structural, human, and relational) contribute positively to the open innovation paradigm. This relationship further confirmed that intellectual capital is the crucial trigger for innovation; however, until the present time, it has been considered a stand-alone topic and has not received serious attention (Matricano et al., 2022). In addition, open innovation is deemed an essential strategy for long-term competitive advantage given the increasingly keen competition and dependency on external partners (Zhang et al., 2023). Hence, the construct of open innovation has become the organization's primary focus in exploring external knowledge and exploiting internal assets to orchestrate competitive advantage (Allal-Chérif et al., 2023; Barrett et al., 2021). Many knowledge collaborations with external partners will result in more opportunities to obtain technology, ideas, quality knowledge, and other intangible assets, and significant potential for profitable innovation (Greco et al., 2017). Then, the complementary and sustainable collaboration of external and internal assets can enhance innovation ability that eventually shapes their respective core competitiveness (Carmona-Lavado et al., 2021). Consequently, we formulated the following hypotheses:

H2. Intellectual capital is significant for open innovation

H3. Open innovation has a direct effect on sustainable competitive advantage

2.4. Sustainable Competitive Advantage: Business Performance

The literature confirms that intellectual capital is one of the crucial triggers in business performance (Campos et al., 2022; Verbano & Crema, 2016). Stakeholders consider that the application of measurable intellectual capital could help enhance performance. Moreover, the positive linkage between intellectual capital and business performance has been proven empirically (Campos et al., 2022; Özer et al., 2015). In this context, intellectual capital is proven to be closely related to qualitative performance (i.e., perceptions of innovation performance and adaptation performance); it refers to innovation performance, organization performance, and human resource performance. Intellectual capital is confirmed to be essential in SMEs; however, related literature remains unexplored (Demartini & Beretta, 2020). Although the role of intellectual capital has been verified empirically, there is inconsistency in the relationship with business performance, primarily regarding its direction and strength. Empirical studies have validated a signifi-

cant positive linkage between intellectual capital and business performance (Buallay et al., 2021; Singla, 2020; Soetanto & Liem, 2019). On the contrary, only a few studies have confirmed a significant negative linkage between intellectual capital and business performance (Britto et al., 2014; Morariu, 2014). Other studies (Chan, 2009; Firer & Mitchell Williams, 2003) have revealed an insignificant linkage between intellectual capital and business performance.

The literature reports that open innovation is another vital determinant for SME performance, which is considered a potential driver of growth and productivity (Albats et al., 2020). Open innovation enables SMEs to access technology that affects innovation performance positively, while simultaneously enhancing organizational performance (Tsai et al., 2022). This is feasible because open innovation promotes social changes, accelerates the adoption of technology, forms collaborative knowledge, and shapes organizational culture. Moreover, open innovation relies on environmental dynamism that facilitates the organization in acquiring external knowledge and technological infrastructure to enhance business performance (Popa et al., 2017). Furthermore, the role of business performance in establishing competitive advantage has been a significant research theme in the era of the knowledge-based economy. In order to establish sustainable competitive advantage, the organization requires an innovation culture; thus, it achieves sustainable performance (Arsawan, Koval, Suhartanto et al., 2022; Cavaleri & Shabana, 2018). Consequently, SME managers must be adaptive by building collaboration with external parties that primarily creates positive value, which is hard for competitors to imitate (Vuks & Sus, 2019; Wang, 2019). Furthermore, dynamic capability must be aligned and integrated with internal sources; hence, able to build a performance that manifests sustainable competitive advantage (Gutiérrez-Martínez & Duhamel, 2019). Subsequently, the following hypotheses were proposed:

H4. Intellectual capital has a direct effect on business performance
H5. Open innovation has a direct effect on business performance
H6. Business performance has a direct effect on sustainable competitive advantage

2.5. The role of technology adoption and strategic flexibility

The resource-based view (Barney, 1991) observes that competitive advantage can be accomplished by optimizing unique resources and dynamic capabilities. This theory further suggests that competitive advantage is achieved by sustaining high performance (Ferreira et al., 2020). Nevertheless, building performance requires adopting technology for the acceleration of agility and innovation (Panda & Rath, 2021). Previous studies that examined competitive advantage in various contexts (Qalati et al., 2021; Vu & Nguyen, 2022) have confirmed the relationship between technology and enhanced competitive advantage. Therefore, it is legitimate to include technology adoption as a potential determinant in the SME sector. Technology adoption has been widely acknowledged in many disciplines and research designs (Chinedu Eze et al., 2020; Vu & Nguyen, 2022). Moreover, the role of technology is considered to affect human behavior (Dezdar, 2017) primarily in terms of how it stimulates individuals to expedite knowledge to produce

innovative work behavior (Cepeda & Arias-Pérez, 2019; Stadler et al., 2022). Organizations that adopt technology consistently will be able to configure intellectual capital to be more creative and innovative (Stadler et al., 2022). This discussion leads to the following hypothesis:

H7. Technology adoption has a direct effect on (a) intellectual capital and (b) sustainable competitive advantage

Drawing from dynamic capabilities (Teece et al., 2009), an organization must consider devising a series of strategic plans to deal with unpredictable future scenarios. Consequently, the concept of strategic flexibility that emerges as the response to uncertainty represents a systematic effort to remain agile and resilient when dealing with environmental dynamism and market turbulence (Brozovic, 2018; Gorondutse et al., 2020; Guo & Cao, 2014). Accordingly, an organization should be responsive to possible threats and opportunities and should precisely create strategic plans (Weaven et al., 2021). Hence, the ability to adapt, reconfigure resources, and find alternative resources will make an organization more sustainable (Liu & Yang, 2020). In short, the crucial roles of strategic flexibility are related to the organizational effort to build sustainability using two mechanisms. Firstly, strategic flexibility challenges the manager to elevate knowledge in preparing essential ideas to change, according to the circumstances (Mohammad Shafiee, 2022). Strategic flexibility also enables the organization to transfer and integrate intellectual capital into ideas relevant to the current circumstances (Xiu et al., 2017). Therefore, an organization with high strategic flexibility can respond to change dynamically, resulting in the effectiveness of the organization's process of intellectual capital, thereby amplifying the value of knowledge (Gorondutse et al., 2020; Thomas, 2014). Secondly, strategic flexibility enables organizations to boost their ability to deal with various possibilities. In environmental dynamism, issues regarding sustainability have become the primary concern and have put enormous pressure on organizations to continue exploring their competitive advantage (Allal-Chérif et al., 2023). Accordingly, developing a strategy that adopts change is critical to remaining agile and resilient (Jafari et al., 2023). In order to remain agile and resilient, organizations must innovate and, therefore, possess a sustainable competitive advantage (Krishnan, 2021; Zhang et al., 2023). Thus, we formulated the following hypothesis:

H8. Strategic flexibility has a direct effect on (a) intellectual capital and (b) sustainable competitive advantage

Drawing from the resource-based view (Barney, 1991; Kock & Lynn, 2012), the present study's theoretical model examined the determinants of the impact of business performance on sustainable competitive advantage and investigated the role of technology adoption and strategic flexibility. This framework is illustrated in Figure 1.

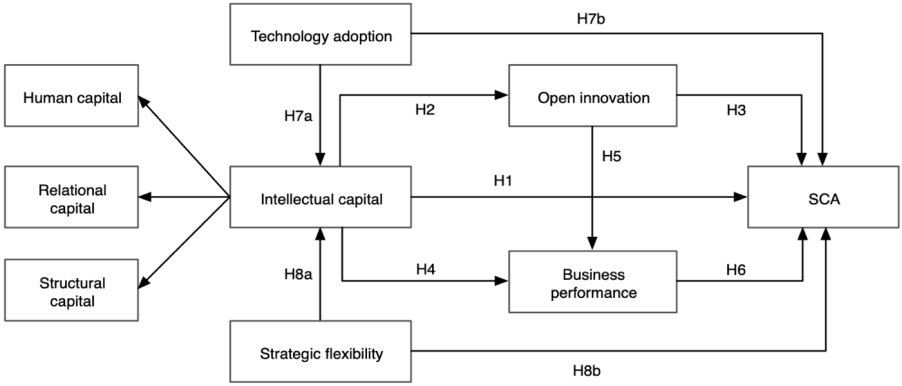

Figure 1. *A model for sustainable competitive advantage*

3. Methods

The use of quantitative approaches such as surveys, statistics and structural equation modeling (SEM) is intended to test a hypothetical model or assess the relationships between variables either directly or indirectly. In the social sciences, this methodology has been widely used, but requires ongoing justification (Sovacool et al., 2018). Because the current study examines hypotheses based on structural equations to achieve the research objectives, the quantitative approach is relevant.

3.1. Population and sampling procedure

This study comprised export SMEs active in transactions in international markets – specifically Europe, East Asia, and the United States. Employing the database from the government of Bali Province, we specified 460 export SMEs as the target population, which ultimately became the subjects of the study. Furthermore, the selection of the sample frame using a formula created by Krejcie & Morgan (1970), with a simple random sampling method, resulted in 210 SMEs being requested to participate in this study. We required three respondents from each SME within this sample frame. The representative respondents came from three levels of management: managers (top management), assistant managers (middle management), and key employees from four departments (low management). These levels were deemed to have strategic views regarding organizational policies associated with performance and sustainable competitive advantage. Given that the location of the study was spread across nine regencies, the data collection was conducted for 5 months (February to August 2022) utilizing emails, Google Forms, and direct visits with prior email notifications regarding this study. Subsequently, we collected 630 responses to be further examined to accomplish the objectives of this study.

3.2. Measurements

This proposed research model entailed sustainable competitive advantage and its determinants, including business performance, open innovation, technology adoption, strategic flexibility, and intellectual capital. All of these constructs have been developed and evaluated empirically by an abundance of empirical studies covering them. Consequently, conceptualizations and measurements were acquired from the existing literature. Table 1 presents these constructs and their sources.

Table 1. *Construct measurements*

Construct	Sources
Intellectual capital	Bontis et al. (2015); Castillo et al. (2019); Dženopoljac et al. (2016); Mohammad Shafiee (2022)
Open innovation	Parida et al. (2012); Tsai et al. (2022)
Strategic flexibility	Arsawan, De Hariyanti, et al. (2022); Brozovic (2018); Miroshnychenko et al. (2021)
Business performance	Aboramadan (2019); Arsawan, Koval, Suhartanto et al. (2022); Dabić et al. (2019)
Technology adoption	Okundaye et al. (2019); Suhartanto & Leo (2018)
Sustainable Competitive Advantage	Anwar et al. (2018); Arsawan, Koval, Rajiani et al. (2022); Sigalas & Papadakis (2018); Singh & Verma (2019)

A Likert scale from 1 – *strongly disagree* to 5 – *strongly agree* was utilized to examine all items in the study. Four academics with expertise in SMEs helped with the initial evaluation to confirm the measurement's comprehensibility and clarity. This was followed by a pilot test using a questionnaire for 30 respondents. These steps aimed to evaluate the conformity of instructions and questions, eventually resulting in a handful of minor adjustments. Sample description and summary statistics were generated using SPSS. Further, to investigate the model and examine the formulated hypotheses, the study employed partial least squares structural equation modeling (PLS-SEM), which was the adequate model for this study because the data distribution was not normal. Following the recommendation of scholars (Hair Jr et al., 2017), PLS was initially used to examine the reliability and validity construct. Then, it was used to measure the proposed models, evaluate the hypotheses, and investigate path coefficients in structural models. Finally, to confirm the data for analysis, we followed expert recommendations (Kock & Lynn, 2012), and PLS was utilized to measure the full collinearity variance inflation factor (VIF), which produced a value of 1.894. As the VIF value was less than 5, the common method met the criteria in this study (Hair Jr et al., 2017).

4. Results

4.1. Respondent profiles

The study comprised a total number of 630 respondents from 140 export SMEs. In Table 2, we present the respondents' demographic information. The position of supervisor (37.78%) was most common, followed by assistant manager (33.80%), and then manager (28.40%). This shows that the involvement of the respondents was practically even across the three levels of management, implying that establishing business performance for competitive advantage entails all of the elements in these organizations (Arsawan, Koval, Rajiani et al., 2022; Zhang et al., 2023). The ages of respondents ranged broadly, with 41–50 years being the dominant group (45.56%). The bachelor's level of education was most frequent (60.32%), which points to higher opportunities to build intellectual capital given high educational levels at a mature age. Moreover, a high level of education is a precondition to establishing knowledge networks and knowledge quality (Bouton et al., 2021; Jin & Shao, 2022). Respondents were predominantly male (74.13%), and the most common level of experience was 11–15 years (42.69%). This latter indicator implies that highly experienced respondents are essential pillars in establishing sustainable competitive advantage (Ganguly et al., 2019; Zhang et al., 2019).

Table 2. *Demographic profile of the sample*

Description		Frequency	Percentage (%)
Positions	Manager	179	28.40
	Assistant manager	213	33.80
	Supervisor	238	37.78
Age	<30	56	08.80
	31–40	189	30.00
	41–50	287	45.56
	51–60	98	15.56
Gender	Male	467	74.13
	Female	163	25.87
Education	Bachelor's degree	380	60.32
	Master's degree	233	36.98
	Doctoral degree	17	02.69
Experiences	<10	152	24.13
	11–15	269	42.69
	16–20	123	19.52
	21–25	86	13.65

4.2. Outer Model Measurement

Table 3 presents information indicating that the overall indicators of the loading factor were above 0.6. The value of average variance extracted (AVE) was greater than the recommended level of 0.5, while the composite reliability (CR) value was greater than 0.7. Additionally, the square root value of AVE was more significant than the value of construct correlation, which indicates that it met the requirements of discriminant validity. Therefore, these indicators met the validity and construct reliability requirements (Hair et al., 2016). Accordingly, the suggestion that if the value was less than 5 (i.e., 1.722–2.996) then data was free from the common method variance (Hair Jr et al., 2017), was followed.

Table 3. *Measurement of indicators*

Indicators	Loading	CR	AVE
Intellectual capital		0.946	0.593
Human capital		0.928	0.812
1. Entrepreneurial orientation	0.900		
2.Human resources' confidence to face difficult situations	0.900		
3. Technical qualifications	0.903		
Relational capital		0.922	0.663
1. Expert directories as tools to solve problems	0.814		
2. Meetings as innovation mechanisms	0.847		
3. Continuous relations with suppliers	0.846		
4. Continuous relations with clients	0.783		
5. Strategies to analyze competitors' information	0.780		
6. Strategies for market research	0.813		
Structural capital		0.915	0.783
1. Strategic alliances with groups of interest	0.873		
2. Creation of patents and other certifications	0.905		
3. Formal systems for transmitting knowledge	0.876		
Open innovation		0.936	0.646
1. Venturing	0.806		
2. Outward licensing of intellectual property	0.810		
3. Employee involvement	0.821		
4. Customer involvement	0.798		
5. External networking	0.803		
6. External participation	0.808		
7. Research & development	0.784		
8. Inward licensing of intellectual property	0.797		
Business performance		0.951	0.563
1. Product reliability	0.726		
2. Product durability	0.757		

Indicators	Loading	CR	AVE
3. Product characteristics	0.761		
4. Serviceability	0.737		
5. Comparison to competitors	0.717		
6. Satisfaction with the product	0.715		
7. Recommendations to others	0.733		
8. Exceeding the expectations	0.772		
9. High level of ability	0.772		
10. Net profit margin	0.734		
11. Return on asset	0.741		
12. Asset turn over	0.796		
13. New value	0.770		
14. Features	0.786		
15. Use of technology	0.731		
Technology adoption		0.932	0.555
1. Technology type	0.706		
2. Financial strength	0.732		
3. Infrastructure	0.725		
4. Skill and resources	0.754		
5. Government	0.744		
6. Culture	0.766		
7. ICT Training awareness	0.717		
8. Trust	0.753		
9. Perceived benefits	0.781		
10. Trend	0.761		
11. Generation	0.753		
Strategic flexibility		0.917	0.648
1. Organization can adjust its current plans effortlessly	0.772		
2. Organization is well-prepared to act accordingly	0.802		
3. Organization can adjust strategy changes	0.840		
4. Organization has the required competency to modify daily routines	0.826		
5. Organization can generate a new project proactively	0.802		
6. Organization can prioritize projects to succeed	0.785		
Sustainable competitive advantage		0.907	0.584
1. Value	0.778		
2. Service delivery system	0.736		
3. Growth and performance	0.742		
4. Market share	0.739		
5. Innovation	0.733		
6. Rareness	0.789		
7. Imperfectly non-imitable	0.827		

4.3. Inner Model Measurement

Following scholars' recommendations (Chin, 2010), the present study implemented the bootstrap method to investigate path coefficients and the implications of the overall indicators. The findings indicated a goodness-of-fit (GoF) value of 0.685. This highlighted the significance of the fit in the model (Henseler & Fassott, 2010). Consequently, the findings showed that the intended sustainable competitive advantage model was applicable in the SME sector. Further, the residual investigation denoted that the value of SRMR (standardized root mean squared residual) was 0.060; meanwhile, the value of NFI (normed fit index) was 0.069, suggesting the model's fitness (Tenenhaus et al., 2005). In addition, the examination of the *R*-squared value can explain that intellectual capital, open innovation, business performance, technology adoption, and strategic flexibility explained 0.905 (90.5%) of the variance in sustainable competitive advantage. The value of *R*-squared for business performance was 0.783 (78.3%), signifying that intellectual capital and open innovation explained the variance in business performance. The value of *R*-squared for the intellectual capital variable was 0.676 (67.6%), which was influenced by technology adoption and strategic flexibility. Meanwhile, the value of *R*-squared for open innovation was 0.672 (67.2%), which means that open innovation can be affected by intellectual capital. Subsequently, from the percentage variances explained, it can be shown that the influence of the independent variables on sustainable competitive advantage was very strong. Following the recommendations of experts (Chin, 2010), we also demonstrated that all variables had a qualified relevance prediction, because all of the Q^2 had positive values.

4.4. Hypotheses Testing

As presented in Table 4, intellectual capital has a direct effect on sustainable competitive advantage ($\beta = 0.559$, $p < 0.05$) and open innovation ($\beta = 0.819$, $p < 0.05$). Likewise, the effect of open innovation on sustainable competitive advantage ($\beta = 0.162$, $p < 0.05$) was significant. Hence, hypotheses H1, H2, and H3 were supported. Furthermore, the effect of intellectual capital and open innovation on business performance ($\beta = 0.610$, $p < 0.05$ and $\beta = 0.313$, $p < 0.05$) was significant, supporting hypotheses H4 and H5. The effect of business performance on sustainable competitive advantage ($\beta = 0.251$, $p < 0.05$) was significant, supporting hypothesis H6. Technology adoption significantly affected intellectual capital ($\beta = 0.363$, $p < 0.05$) but not with sustainable competitive advantage ($\beta = 0.016$, $p > 0.05$). Subsequently, hypothesis H7a was supported; however, hypothesis H7b was rejected. Lastly, the effect of strategic flexibility on intellectual capital ($\beta = 0.522$, $p < 0.05$) was significant, although the effect on sustainable competitive advantage was not significant ($\beta = 0.015$, $p > 0.05$), which supported hypothesis H8a, but rejected hypothesis H8b.

Table 4. *Hypotheses testing and effect on variables*

Hypotheses path	β	*t*-value	β	*t*-value	β	*t*-value
IC → SCA (H1)	0.559	14.579	0.350	9.452	0.908	33.887
IC → OI (H2)	0.819	42.463	-	-	0.819	42.463
OI → SCA (H3)	0.162	6.621	0,079	4.814	0.240	7.615
IC →BP (H4)	0.610	15.140	0.257	7.039	0.867	61.199
OI → BP (H5)	0.313	7.470	-	-	0.313	7.470
BP → SCA (H6)	0.251	7.361	-	-	0.251	7.361
TA → IC (H7a)	0.363	6.365	-	-	0.363	6.365
TA → SCA(H7b)	0.016	0.726	0.330	6.473	0.346	5.652
SF → IC (H8a)	0.522	9.547	-	-	0.522	9.547
SF → SCA (H8b)	0.015	0.585	0.474	8.751	0.489	8.279

Notes: IC = intellectual capital; OI = open innovation; BP = business performance; TA = technology adoption; SF = strategic flexibility; SCA = sustainable competitive advantage.

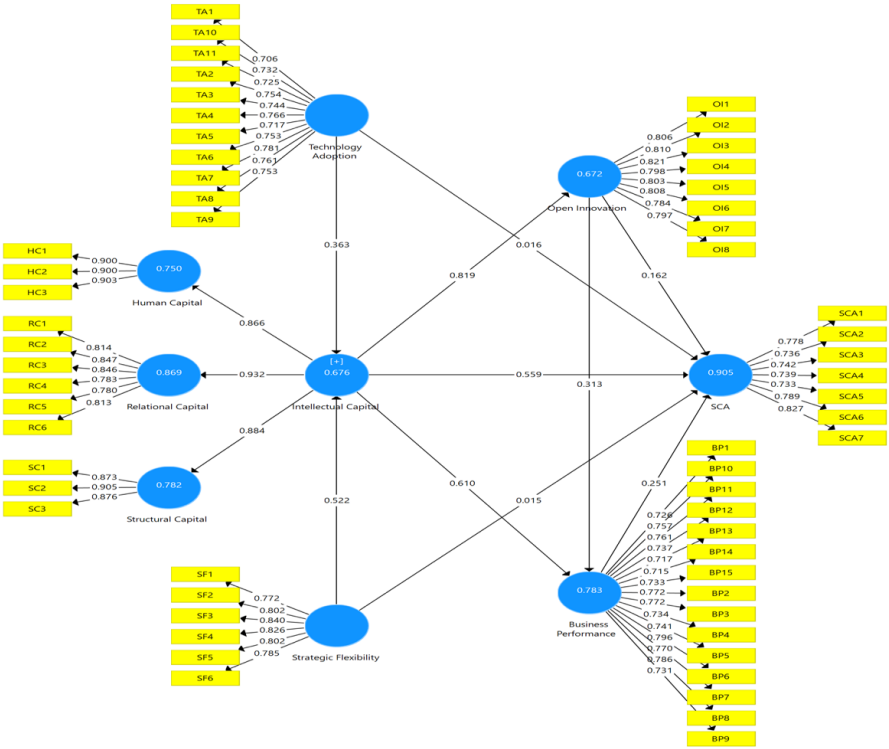

Figure 2. *Full model analysis*

5. Discussion

Environmental dynamism and turbulence constantly challenged SME managers to achieve competitive performance and establish sustainable competitive advantage. The accelerated growth of technology forces organizations to exploit opportunities and configure their overall resources to devise strategic plans compared to their competitors (Arsawan, De Hariyanti, et al., 2022). Given their limited resources, SMEs have been considered incapable of handling pressure and external competition. Hence, managers must actively seek high-quality resources to promote sustainable competitive advantage (Ying et al., 2019) besides investing in intangible assets – i.e., intellectual capital. The present study has expanded the resource-based view (Barney, 1991) concerning sustainable competitive advantage by measuring managers' perceptions of intellectual capital, open innovation, technology adoption, strategic flexibility, and business performance in the SME context. The concept of this study evolved from extensive academic literature, and was evaluated using SEM via a software program called Smart-PLS. The findings imply that immaterial resources, i.e., intellectual capital, enhance SMEs' business performance and sustainable competitive advantage.

In this study, intellectual capital was positively significant in affecting sustainable competitive advantage. The study's findings follow those of past studies (Bontis et al., 2015; Dženopoljac et al., 2016; Mohammad Shafiee, 2022), which concluded that intellectual capital is a crucial determinant of sustainable competitive advantage (Pan et al., 2021). To build sustainability, it is necessary to optimize intellectual capital because it is considered as the essence of knowledge, applied experience, technology and customer relations in the organization, with professional skills that represent the company's competitive advantage over its market competitors (AlQershi et al., 2023). In other words, its importance for business sustainability must be recognized and integrated into the research framework to increase awareness of its importance when considering market opportunities and skilled human resources (Cantele & Zardini, 2018; Koval et al., 2023).

There was also a significant linkage between intellectual capital, open innovation, and sustainable competitive advantage. This showed that intellectual capital helps to boost SMEs' open innovation and sustainable competitive advantage, and aligns with the findings from previous studies (Allal-Chérif et al., 2023; Barrena-Martínez et al., 2020; Barrett et al., 2021; Matricano et al., 2022). Furthermore, the linkage between intellectual capital and business performance was also significant, indicating that SMEs would achieve excellent performance by optimizing intellectual capital. These findings confirmed previous empirical evidence regarding the relationship between both constructs (Buallay et al., 2021; Campos et al., 2022; Özer et al., 2015; Verbano & Crema, 2016). The results of this study contradict the findings of previous researchers (Campos et al., 2022) who found no significant relationship between intellectual capital and business performance. Thus, intellectual capital is an important factor for the success of SMEs because to build competitive performance they must use knowledge and intangible assets more efficiently (Bansal et al., 2022). Thus, SMEs need quality, relevant and up-to-date knowledge to compete (Arsawan, Koval, Rajiani et al., 2022) and optimize their potential (Liu & Yang, 2020).

Another noteworthy finding in this study was the significant linkage between open innovation and business performance. This implied that SMEs with open innovation practices would develop a robust organizational culture to make social change and configure knowledge and technology to build performance (Popa et al., 2017; Tsai et al., 2022). Further, the significant linkage between business performance and sustainable competitive advantage indicated that SME managers optimize potential and resources into unique organizational value. This finding supports previous studies regarding the relationship between constructs (Arsawan, Koval, Rajiani et al., 2022; Cavaleri & Shabana, 2018; Gutiérrez-Martínez & Duhamel, 2019). Additionally, the linkage between technology adoption and intellectual capital was significantly positive. This provides evidence that technology stimulates human resources to accelerate their knowledge levels in grasping new methods and systems (Cepeda & Arias-Pérez, 2019) to support routine activities, creativity, and innovation (Stadler et al., 2022). Nevertheless, one finding was not as expected: the relationship between technology adoption and sustainable competitive advantage was insignificant. Consequently, this finding contradicts those of previous studies (Qalati et al., 2021; Vu & Nguyen, 2022) which revealed that the role of technology as a trigger for determining sustainable competitive advantage was paramount. A possible explanation for this is that export SMEs have not considered technology as a strategy to establish competitiveness. This is perhaps because technology adoption requires sufficient finances to provide infrastructure, skills improvement, perceived benefits, and training and development costs that cover all levels of employees.

Furthermore, this study also examined the linkage between strategic flexibility and intellectual capital. The findings revealed a significantly positive direction, corroborating the notion that organizations' abilities to devise flexible strategies enable them to integrate knowledge into viable solutions (Mohammad Shafiee, 2022; Xiu et al., 2017). Equally essential, strategic flexibility allows the organization to process the role of intellectual capital in enhancing the value of knowledge to counter environmental dynamism (Arsawan, De Hariyanti, et al., 2022; Gorondutse et al., 2020). Ultimately, the linkage between strategic flexibility and sustainable competitive advantage was insignificant. This unexpected finding contradicts previous studies (Allal-Chérif et al., 2023; Zhang et al., 2023), which revealed that the ability to devise a strategy that adopts change is the key to sustainable competitive advantage. Although insignificant, our findings have given crucial insights, especially for SMEs in Indonesia, to help companies devise strategic flexibility when encountering market turbulence and various scenarios that may occur in the unforeseeable future.

5.1. Theoretical implications

The present study offers several significant findings related to integrating technology adoption and strategic flexibility in comprehending sustainable competitive advantage. Firstly, this study revealed that technology adoption and strategic flexibility are vital in establishing sustainable competitive advantage in the SME sector. Notably, this study showed that the integration of technology adoption and strategic flexibility has a direct effect on intellectual capital and an indirect effect on sustainable competitive advantage.

The findings confirmed that the comprehension of sustainable competitive advantage in the SME context could be elevated when technology adoption and strategic flexibility values are added to the sustainable competitive advantage model. The complex mechanisms in the relationships between the antecedents of sustainable competitive advantage, business performance, technology adoption, and strategic flexibility are factors that no previous studies have adequately covered with this level of complexity. Although the present study found that technology adoption and strategic flexibility did not directly affect the establishment of sustainable competitive advantage in the SME sector, they contribute to intellectual capital, which has direct and indirect effects on sustainable competitive advantage. Intellectual capital plays an essential role in establishing sustainable competitive advantage for SMEs by fully mediating the roles between technology adoption and strategic flexibility towards sustainable competitive advantage. These findings validate the idea that technology adoption and strategic flexibility have a pivotal role in the development of sustainable competitive advantage in the SME sector, with the condition that this only occurs when managers have high-quality intellectual capital. Eventually, these findings present evidence supporting experts' claims (Teece et al., 2009) regarding applying a knowledge-based view in the SME sector.

Secondly, identifying the most crucial determinant of sustainable competitive advantage was a notable finding. Although business performance, open innovation, intellectual capital, technology adoption, and strategic flexibility have both significant direct and indirect effects, the present study showed that the total effect of intellectual capital has the most significant impact compared to other factors. This finding has adequately verified the results of past studies in the manufacturing service (Mohammad Shafiee, 2022; Rehman et al., 2022) and in the SME sector (Todericiu & Stăniţ, 2015) which underlined the crucial role of intellectual capital in establishing sustainable competitive advantage. Furthermore, this finding also indicated that configuring strong intellectual capital was the key factor in building sustainable competitive advantage. Therefore, theoretically, researchers examining sustainable competitive advantage must include intellectual capital as the critical factor in their sustainable competitive advantage models.

Thirdly, the examination of the order of intellectual capital hierarchy in the present study suggested another significant result. The hierarchal model of intellectual capital employed in this study indicates that the hierarchical order approach sufficiently captures the dimensions of structural capital, human capital, and relational capital. Subsequently, the investigation of the structure of intellectual capital hierarchy validated the usefulness of this particular examination approach to comprehend the significance of each dimension of intellectual capital (Bontis, 1998, 2001). Further, this finding also suggests that the most comprehensive evaluation of managers with appropriate business performance was exposed in the formation of hierarchal order. Theoretically, this finding expands the existing literature concerning intellectual capital in the SME sector (Asiaei et al., 2020; Demartini & Beretta, 2020; Vătămănescu et al., 2019). The order of intellectual capital hierarchy is relevant for researchers and business practitioners who stipulate the concise conceptualization of complex intellectual capital variables.

Ultimately, this study is one of several studies that explore and offer significant contri-

butions regarding sustainable competitive advantage, particularly in the SME sector. As previously discussed, many organizations, such as manufacturing businesses, hospitality companies, and even SMEs, have attempted to enhance their business performance. Nevertheless, these organizations should have taken advantage of intellectual capital, technology adoption, and strategic flexibility, which can make organizations more dynamic and flexible and can accelerate open innovation to achieve sustainable competitive advantage. On the contrary, organizations that exploit open innovation based on intellectual capital demand sustainable patterns, an appreciation of the role of knowledge, and a conception of how to establish robust and efficient relational collaboration (Asiaei et al., 2020; Chen & Kitsis, 2017; de Castro et al., 2004; Steinmo & Rasmussen, 2018). Since only a negligible part of these studies entailed sustainable competitive advantage, including the role of open innovation and technology adoption in intellectual capital, this study has provided indispensable insights for the literature in this field.

5.2. Managerial implications

Two crucial managerial implications can be derived from the present study. First, the results of this study revealed that boosting high-quality intellectual capital was the key factor for business performance and sustainable competitive advantage. They implied that financial and non-financial potential resources must be dedicated to creating and elevating knowledge. Specifically, efforts should be focused on the elements that drive a quality experience, such as establishing relationships and robust collaboration, lucrative contracts, and building solid connections among SMEs. SME managers are also required to offer employees opportunities to transmit their knowledge into great ideas. Consequently, managers are to innovate constantly to use relationships to obtain knowledge and create unique knowledge for the organization, meeting market expectations. Creating a knowledge-sharing culture and generating a reward and punishment system which supports knowledge spillover would assist employees and managers in sharing their ideas. Having standard operating procedures and a conducive work environment allows the organization to achieve the goal of bringing attention to other elements of the organization. These efforts should be closely integrated into SMEs' business processes to ensure that SME managers and employees apply the elements that promote intellectual capital in their routine activities in these organizations.

Second, this study highlighted the essential roles of technology adoption and strategic flexibility in determining sustainable competitive advantage, particularly by reinforcing intellectual capital. SMEs with strong adoption of technology and strategic flexibility tend to exploit available opportunities into potential benefits for their performance, create innovation, and utilize resources effectively. The strengthening effect is such that technology adoption and strategic flexibility generate intellectual capital, and indirectly contribute towards sustainable competitive advantage. SME managers can utilize this to manage aspects of technology and strategic planning that can align with the dynamic capabilities of the SMEs, incorporating technology adoption and strategic flexibility to provide benefits when developing new products.

6. Conclusions, limitations and further research

6.1. Conclusions

An abundance of previous studies have investigated sustainable competitive advantage. However, only a few have focused on integrating business performance determinants – i.e., intellectual capital, open innovation, technology adoption, and strategic flexibility, particularly in a developing country like Indonesia. Sustainable competitive advantage stipulates opportunities and reinforces SMEs, especially in developing countries, to continue contributing to nations' economic growth, providing employment, and contributing positively to gross domestic product. This study examined the roles of intellectual capital, open innovation, strategic flexibility, and technology adoption as drivers of business performance in expanding sustainable competitive advantage.

There were three significant conclusions that were drawn from this study. First, sustainable competitive advantage is a complex construct that does not merely entail intellectual capital but also business performance based upon open innovation. Second, the determinant factor that has the utmost influence on sustainable competitive advantage is intellectual capital because it has the total primary influence compared to other determinants. These findings underline that the role of intellectual capital is paramount in determining sustainable competitive advantage. Third, the examination of the order of intellectual capital hierarchy is notoriously complex and complicated. This analysis revealed that the relational capital dimension was the principal dimension, followed by the structural capital and human capital dimensions. Ultimately, SMEs that optimize open innovation based on intellectual capital value knowledge and know how to establish relational collaborations to build sustainable competitive advantage.

6.2. Limitations and further research

Although this study presented some notable findings regarding the determinants of business performance in influencing sustainable competitive advantage, it has some limitations. First, one limitation relates to the data collected from SMEs in Bali, Indonesia. Given the difference in SME managers' attitudes and behaviors, the findings of this study are most likely unable to be generalized. Consequently, replicating this study in other countries involving SMEs is strongly recommended. Replication and comparison may also be applicable in other industries, such as automobile, information communication technology, or technology-based companies. Second, another limitation relates to the variables included in the models: many variables potentially affecting sustainable competitive advantage were not included in this study. Determinants such as knowledge management, organizational learning, innovation performance, and new product development could benefit this study. Future studies can explore whether the inclusion of these variables in sustainable competitive advantage can intensify the robustness of the model and its explanatory power.

References

1. Aboramadan, M. (2019). Organizational culture, innovation and performance: A study from a non-western context. *Journal of Management Development*, *39*(4), 437–451. https://doi.org/10.1108/JMD-06-2019-0253
2. Alassaf, D., Dabić, M., Shifrer, D., & Daim, T. (2020). The impact of open-border organization culture and employees' knowledge, attitudes, and rewards with regards to open innovation: An empirical study. *Journal of Knowledge Management*, *24*(9), 2273–2297. https://doi.org/10.1108/JKM-02-2020-0122
3. Albats, E., Alexander, A., Mahdad, M., Miller, K., & Post, G. (2020). Stakeholder management in SME open innovation: Interdependences and strategic actions. *Journal of Business Research*, *119*, 291–301. https://doi.org/https://doi.org/10.1016/j.jbusres.2019.07.038
4. Allal-Chérif, O., Costa Climent, J., & Ulrich Berenguer, K. J. (2023). Born to be sustainable: How to combine strategic disruption, open innovation, and process digitization to create a sustainable business. *Journal of Business Research*, *154*, 113379. https://doi.org/10.1016/j.jbusres.2022.113379
5. AlQershi, N., Saufi, R. B. A., Ismail, N. A., Mohamad, M. R. Bin, Ramayah, T., Muhammad, N. M. N., & Yusoff, M. N. H. Bin. (2023). The moderating role of market turbulence beyond the COVID-19 pandemic and Russia-Ukraine crisis on the relationship between intellectual capital and business sustainability. *Technological Forecasting and Social Change*, *186*, 122081.
6. Amjad, F., Abbas, W., Zia-UR-Rehman, M., Baig, S. A., Hashim, M., & Khan, A. (2021). Effect of green human resource management practices on organizational sustainability: The mediating role of environmental and employee performance. *Environmental Science and Pollution Research*, *28*(22), 28191–28206.
7. Anwar, M., Rehman, A. U., & Shah, S. Z. A. (2018). Networking and new venture's performance: Mediating role of competitive advantage. *International Journal of Emerging Markets*, *13*(5), 998–1025. https://doi.org/10.1108/IJoEM-07-2017-0263
8. Ardito, L., Raby, S., Albino, V., & Bertoldi, B. (2021). The duality of digital and environmental orientations in the context of SMEs: Implications for innovation performance. *Journal of Business Research*, *123*, 44–56. https://doi.org/https://doi.org/10.1016/j.jbusres.2020.09.022
9. Arsawan, I. W. E., De Hariyanti, N. K., Atmaja, I. M. A. D. S., Suhartanto, D., & Koval, V. (2022). Developing organizational agility in SMEs: An investigation of innovation's roles and strategic flexibility. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(3), 149. https://doi.org/https://doi.org/10.3390/joitmc8030149
10. Arsawan, I. W. E., Koval, V., Rajiani, I., Rustiarini, N. W., Supartha, W. G., & Suryantini, N. P. S. (2022). Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage. *International Journal of Productivity and Performance Management*, *71*(2), 405–428. https://doi.org/10.1108/IJPPM-04-2020-0192
11. Arsawan, I. W. E., Koval, V., Suhartanto, D., Harbar, Z., & Maslennikov, Y. (2022). Employee-driven innovation capability: The role of knowledge, creativity, and time sufficiency. *Intellectual Economics*, *16*(2), 138–165. https://doi.org/10.13165/IE-22-16-2-08
12. Asiaei, K., Barani, O., Bontis, N., & Arabahmadi, M. (2020). Unpacking the black box: How intrapreneurship intervenes in the intellectual capital-performance relationship? *Journal of Intellectual Capital*, *21*(6), 809–834. https://doi.org/10.1108/JIC-06-2019-0147
13. Audretsch, B. D., & Belitski, M. (2022). The limits to open innovation and its impact on innovation performance. *Technovation*, *119*, 102519. https://doi.org/10.1016/j.technovation.2022.102519
14. Bansal, S., Garg, I., Jain, M., & Yadav, A. (2022). Improving the performance/competency of small and medium enterprises through intellectual capital. *Journal of Intellectual Capital*,

24(3), 830–853. https://doi.org/10.1108/JIC-07-2021-0189
15. Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108
16. Barrena-Martínez, J., Cricelli, L., Ferrándiz, E., Greco, M., & Grimaldi, M. (2020). Joint forces: Towards an integration of intellectual capital theory and the open innovation paradigm. *Journal of Business Research*, *112*, 261–270. https://doi.org/10.1016/j.jbusres.2019.10.029
17. Barrett, G., Dooley, L., & Bogue, J. (2021). Open innovation within high-tech SMEs: A study of the entrepreneurial founder's influence on open innovation practices. *Technovation*, *103*, 102232. https://doi.org/10.1016/j.technovation.2021.102232
18. Bhamra, T., Hernandez, R. J., Rapitsenyane, Y., & Trimingham, R. (2018). Product service systems: A sustainable design strategy for SMEs in the textiles and leather sectors. *She Ji: The Journal of Design, Economics, and Innovation*, *4*(3), 229–248. https://doi.org/https://doi.org/10.1016/j.sheji.2018.07.001
19. Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models. *Management Decision*, *36*(2), 63–76. https://doi.org/10.1108/00251749810204142
20. Bontis, N. (2001). Assessing knowledge assets: A review of the models used to measure intellectual capital. *International Journal of Management Reviews*, *3*(1), 41–60.
21. Bontis, N., Janošević, S., & Dženopoljac, V. (2015). Intellectual capital in Serbia's hotel industry. *International Journal of Contemporary Hospitality Management*, *27*(6), 1365–1384. https://doi.org/10.1108/IJCHM-12-2013-0541
22. Bouton, E., Tal, S. B., & Asterhan, C. S. C. (2021). Students, social network technology and learning in higher education: Visions of collaborative knowledge construction vs. the reality of knowledge sharing. *The Internet and Higher Education*, *49*, 100787. https://doi.org/https://doi.org/10.1016/j.iheduc.2020.100787
23. Britto, D. P., Monetti, E., & Rocha Lima, J. da. (2014). Intellectual capital in tangible intensive firms: The case of Brazilian real estate companies. *Journal of Intellectual Capital*, *15*(2), 333–348. https://doi.org/10.1108/JIC-10-2013-0108
24. Brozovic, D. (2018). Strategic flexibility: A review of the literature. *International Journal of Management Reviews*, *20*(1), 3–31. https://doi.org/10.1111/ijmr.12111
25. Buallay, A., Abuhommous, A. A., & Kukreja, G. (2021). The relationship between intellectual capital and employees' productivity: Evidence from the Gulf Cooperation Council. *Journal of Management Development*, *40*(6), 526–541. https://doi.org/10.1108/JMD-05-2019-0210
26. Campos, S., Dias, J. G., Teixeira, M. S., & Correia, R. J. (2022). The link between intellectual capital and business performance: A mediation chain approach. *Journal of Intellectual Capital*, *23*(2), 401–419. https://doi.org/10.1108/JIC-12-2019-0302
27. Cantele, S., & Zardini, A. (2018). Is sustainability a competitive advantage for small businesses? An empirical analysis of possible mediators in the sustainability–financial performance relationship. *Journal of Cleaner Production*, *182*, 166–176. https://doi.org/10.1016/j.jclepro.2018.02.016
28. Carmona-Lavado, A., Cuevas-Rodríguez, G., Cabello-Medina, C., & Fedriani, E. M. (2021). Does open innovation always work? The role of complementary assets. *Technological Forecasting and Social Change*, *162*, 120316. https://doi.org/10.1016/j.techfore.2020.120316
29. Castillo, A. E., Pacheco, G. V., Hernández-Fernández, L., Manotas, E. N., Borrero, T. C., & Silva, J. (2019). Factorial Analysis in the Intellectual capital's dimensions on micro, small, and medium-sized export enterprises. *Procedia Computer Science*, *160*, 567–572. https://doi.org/10.1016/j.procs.2019.11.046
30. Cavaleri, S., & Shabana, K. (2018). Rethinking sustainability strategies. *Journal of Strategy and Management*, *11*(1), 2–17. https://doi.org/10.1108/JSMA-08-2016-0050
31. Cepeda, J., & Arias-Pérez, J. (2019). Information technology capabilities and organizational

agility: The mediating effects of open innovation capabilities. *Multinational Business Review*, *27*(2), 198–216. https://doi.org/10.1108/MBR-11-2017-0088
32. Chan, K. H. (2009). Impact of intellectual capital on organisational performance: An empirical study of companies in the Hang Seng Index (Part 2). *Learning Organization*, *16*(1), 22–39. https://doi.org/10.1108/09696470910927650
33. Chatzoglou, P., & Chatzoudes, D. (2018). The role of innovation in building competitive advantages: An empirical investigation. *European Journal of Innovation Management*, *21*(1), 44–69. https://doi.org/10.1108/EJIM-02-2017-0015
34. Chen, I. J., & Kitsis, A. M. (2017). A research framework of sustainable supply chain management: The role of relational capabilities in driving performance. *International Journal of Logistics Management*, *28*(4), 1454–1478. https://doi.org/10.1108/IJLM-11-2016-0265
35. Chin, W. W. (2010). How to write up and report PLS analyses. In V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (eds.), *Handbook of Partial Least Squares: Concepts, Methods and Applications* (pp. 655–690). Springer. https://doi.org/10.1007/978-3-540-32827-8_29
36. Chinedu Eze, S., Olatunji, S., Chinedu-Eze, V. C., Inegbedion, H., & Bello, A. (2020). A theory grounded framework of information behaviour of SMEs on Emerging Information Communication Technology (EICT) adoption decision making. *International Journal of Business Information Systems*, *39*(3), 299–327. https://doi.org/10.1504/ijbis.2020.10025103
37. Dabić, M., Lažnjak, J., Smallbone, D., & Švarc, J. (2019). Intellectual capital, organisational climate, innovation culture, and SME performance: Evidence from Croatia. *Journal of Small Business and Enterprise Development*, *26*(4), 522–544. https://doi.org/10.1108/JSBED-04-2018-0117
38. Davcik, N. S., Cardinali, S., Sharma, P., & Cedrola, E. (2021). Exploring the role of international R&D activities in the impact of technological and marketing capabilities on SMEs' performance. *Journal of Business Research*, *128*, 650–660. https://doi.org/10.1016/j.jbusres.2020.04.042
39. de Castro, G. M., Sáez, P. L., & López, J. E. N. (2004). The role of corporate reputation in developing relational capital. *Journal of Intellectual Capital*, *5*(4), 575–585. https://doi.org/10.1108/14691930410567022
40. Demartini, M. C., & Beretta, V. (2020). Intellectual capital and SMEs' performance: A structured literature review. *Journal of Small Business Management*, *58*(2), 288–332. https://doi.org/10.1080/00472778.2019.1659680
41. Dezdar, S. (2017). Green information technology adoption: Influencing factors and extension of theory of planned behavior. *Social Responsibility Journal*, *13*(2), 292–306. https://doi.org/10.1108/SRJ-05-2016-0064
42. Dženopoljac, V., Janoševic, S., & Bontis, N. (2016). Intellectual capital and financial performance in the Serbian ICT industry. *Journal of Intellectual Capital*, *17*(2), 373–396. https://doi.org/10.1108/JIC-07-2015-0068
43. Falahat, M., Ramayah, T., Soto-Acosta, P., & Lee, Y. Y. (2020). SMEs internationalization: The role of product innovation, market intelligence, pricing and marketing communication capabilities as drivers of SMEs' international performance. *Technological Forecasting and Social Change*, *152*(January), 119908. https://doi.org/10.1016/j.techfore.2020.119908
44. Ferreira, J., Coelho, A., & Moutinho, L. (2020). Dynamic capabilities, creativity and innovation capability and their impact on competitive advantage and firm performance: The moderating role of entrepreneurial orientation. *Technovation*, *92–93*, 102061. https://doi.org/10.1016/j.technovation.2018.11.004
45. Firer, S., & Mitchell Williams, S. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital*, *4*(3), 348–360. https://doi.org/10.1108/14691930310487806

46. Ganguly, A., Talukdar, A., & Chatterjee, D. (2019). Evaluating the role of social capital, tacit knowledge sharing, knowledge quality and reciprocity in determining innovation capability of an organization. *Journal of Knowledge Management*, *23*(6), 1105–1135. https://doi.org/10.1108/JKM-03-2018-0190
47. Gorondutse, A. H., Arshad, D., & Alshuaibi, A. S. (2020). Driving sustainability in SMEs' performance: the effect of strategic flexibility. *Journal of Strategy and Management*.
48. Greco, M., Grimaldi, M., & Cricelli, L. (2017). Hitting the nail on the head: Exploring the relationship between public subsidies and open innovation efficiency. *Technological Forecasting and Social Change*, *118*, 213–225. https://doi.org/10.1016/j.techfore.2017.02.022
49. Grimsdottir, E., & Edvardsson, I. R. (2018). Knowledge management, knowledge creation, and open innovation in Icelandic SMEs. *SAGE Open*, *8*(4). https://doi.org/10.1177/2158244018807320
50. Guo, H., & Cao, Z. (2014). Strategic flexibility and SME performance in an emerging economy. *Journal of Organizational Change Management*, *27*(2), 273–298. https://doi.org/10.1108/JOCM-11-2012-0177
51. Gutiérrez-Martínez, I., & Duhamel, F. (2019). Translating sustainability into competitive advantage: The case of Mexico's hospitality industry. *Corporate Governance (Bingley)*, *19*(6), 1324–1343. https://doi.org/10.1108/CG-01-2019-0031
52. Hair, J. F., Hult, G., Tomas, M., Ringle, C. M., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM).* Sage publications.
53. Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*, *1*(2), 107–123.
54. Hameed, W. U., Nisar, Q. A., & Wu, H. C. (2021). Relationships between external knowledge, internal innovation, firms' open innovation performance, service innovation and business performance in the Pakistani hotel industry. *International Journal of Hospitality Management*, *92*, 102745. https://doi.org/10.1016/j.ijhm.2020.102745
55. Henseler, J., & Fassott, G. (2010). Testing moderating effects in PLS path models: An illustration of available procedures. In *Handbook of partial least squares* (pp. 713–735). Springer.
56. Huang, K. F., Dyerson, R., Wu, L. Y., & Harindranath, G. (2015). From temporary competitive advantage to sustainable competitive advantage. *British Journal of Management*, *26*(4), 617–636. https://doi.org/10.1111/1467-8551.12104
57. Jafari, T., Zarei, A., Azar, A., & Moghaddam, A. (2023). The impact of business intelligence on supply chain performance with emphasis on integration and agility–a mixed research approach. *International Journal of Productivity and Performance Management*, *72*(5), 1445–1478. https://doi.org/10.1108/IJPPM-09-2021-0511
58. Jin, Y., & Shao, Y. (2022). Power-leveraging paradox and firm innovation: The influence of network power, knowledge integration and breakthrough innovation. *Industrial Marketing Management*, *102*(December 2021), 205–215. https://doi.org/10.1016/j.indmarman.2022.01.007
59. Kahupi, I., Eiríkur Hull, C., Okorie, O., & Millette, S. (2021). Building competitive advantage with sustainable products – A case study perspective of stakeholders. *Journal of Cleaner Production*, *289*, 125699. https://doi.org/10.1016/j.jclepro.2020.125699
60. Khan, S. Z., Yang, Q., & Waheed, A. (2019). Investment in intangible resources and capabilities spurs sustainable competitive advantage and firm performance. *Corporate Social Responsibility and Environmental Management*, *26*(2), 285–295. https://doi.org/10.1002/csr.1678
61. Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, *13*(7). https://doi.org/10.17705/1jais.00302
62. Koval, V., Arsawan, I., Suryantini, N. P. S., Kovbasenko, S., Fisunenko, N., & Aloshyna, T.

(2023). Circular economy and sustainability-oriented innovation: Conceptual framework and energy future avenue. *Energies*, *16*(1), 243. https://doi.org/10.3390/en16010243
63. Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610.
64. Krishnan, H. A. (2021). Mindfulness as a strategy for sustainable competitive advantage. *Business Horizons*, *64*(5), 697–709. https://doi.org/10.1016/j.bushor.2021.02.023
65. Lam, L., Nguyen, P., Le, N., & Tran, K. (2021). The relation among organizational culture, knowledge management, and innovation capability: Its implication for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 1–16. https://doi.org/10.3390/joitmc7010066
66. Leckel, A., Veilleux, S., & Dana, L. P. (2020). Local open innovation: A means for public policy to increase collaboration for innovation in SMEs. *Technological Forecasting and Social Change*, *153*, 119891. https://doi.org/https://doi.org/10.1016/j.techfore.2019.119891
67. Lin, H., Hsu, I., Wenhsin, A., & Chung, H. (2020). Technological forecasting & social change creating competitive advantages: Interactions between ambidextrous diversification strategy and contextual factors from a dynamic capability perspective. *Technological Forecasting & Social Change*, *154*(January), 119952. https://doi.org/10.1016/j.techfore.2020.119952
68. Liu, H. M., & Yang, H. F. (2020). Network resource meets organizational agility: Creating an idiosyncratic competitive advantage for SMEs. *Management Decision*, *58*(1), 58–75. https://doi.org/10.1108/MD-10-2017-1061
69. Mady, K., Abdul Halim, M. A. S., & Omar, K. (2022). Drivers of multiple eco-innovation and the impact on sustainable competitive advantage: evidence from manufacturing SMEs in Egypt. *International Journal of Innovation Science*, *14*(1), 40–61. https://doi.org/10.1108/IJIS-01-2021-0016
70. Matricano, D., Candelo, E., Sorrentino, M., & Cappiello, G. (2022). Investigating the link between intellectual capital and open innovation processes: A longitudinal case study. *Journal of Intellectual Capital*, *23*(3), 538–557. https://doi.org/10.1108/JIC-02-2020-0020
71. Migdadi, M. M. (2020). Knowledge management processes, innovation capability and organizational performance. *International Journal of Productivity and Performance Management*, *71*(1), 182–210. https://doi.org/10.1108/IJPPM-04-2020-0154
72. Miroshnychenko, I., Strobl, A., Matzler, K., & De Massis, A. (2021). Absorptive capacity, strategic flexibility, and business model innovation: Empirical evidence from Italian SMEs. *Journal of Business Research*, *130*, 670–682. https://doi.org/10.1016/j.jbusres.2020.02.015
73. Mohammad Shafiee, M. (2022). Competitive advantage via intellectual capital: A moderated mediation analysis. *Journal of Intellectual Capital*, *23*(5), 957–997. https://doi.org/10.1108/JIC-05-2020-0152
74. Morariu, C. M. (2014). Intellectual capital performance in the case of Romanian public companies. *Journal of Intellectual Capital*, *15*(3), 392–410. https://doi.org/10.1108/JIC-05-2014-0061
75. Nassani, A. A., & Aldakhil, A. M. (2021). Tackling organizational innovativeness through strategic orientation: Strategic alignment and moderating role of strategic flexibility. *European Journal of Innovation Management*, *26*(3), 847–861. https://doi.org/10.1108/EJIM-04-2021-0198
76. Okundaye, K., Fan, S. K., & Dwyer, R. J. (2019). Impact of information and communication technology in Nigerian small-to medium-sized enterprises. *Journal of Economics, Finance and Administrative Science*, *24*(47), 29–46. https://doi.org/10.1108/JEFAS-08-2018-0086
77. Olamide, A., & Ogbechie, R. (2021). Social capital and business performance: a study of female-owned SMEs in the Nigerian informal sector. *Small Enterprise Research*, *28*(2), 190–205. https://doi.org/10.1080/13215906.2021.1901140

78. Özbuğday, F. C., Fındık, D., Metin Özcan, K., & Başçı, S. (2020). Resource efficiency investments and firm performance: Evidence from European SMEs. *Journal of Cleaner Production*, *252*, 119824. https://doi.org/https://doi.org/10.1016/j.jclepro.2019.119824
79. Özer, G., Ergun, E., & Yılmaz, O. (2015). Effects of intellectual capital on qualitative and quantitative performance: Evidence from Turkey. *South African Journal of Economic and Management Sciences*, *18*(2), a669. https://doi.org/10.17159/2222-3436/2015/v18n2a1
80. Pan, C., Jiang, Y., Wang, M., Xu, S., Xu, M., & Dong, Y. (2021). How can agricultural corporate build sustainable competitive advantage through green intellectual capital? A new environmental management approach to green agriculture. *International Journal of Environmental Research and Public Health*, *18*(15), 7900. https://doi.org/10.3390/ijerph18157900
81. Panda, S., & Rath, S. K. (2021). Information technology capability, knowledge management capability, and organizational agility: The role of environmental factors. *Journal of Management and Organization*, *27*(1), 148–174. https://doi.org/10.1017/jmo.2018.9
82. Parida, V., Westerberg, M., & Frishammar, J. (2012). Inbound open innovation activities in high-tech SMEs: The impact on innovation performance. *Journal of Small Business Management*, *50*(2), 283–309.
83. Parwita, G. B. S., Arsawan, I. W. E., Koval, V., Hrinchenko, R., Bogdanova, N., & Tamosiuniene, R. (2021). Organizational innovation capability: Integrating human resource management practice, knowledge management and individual creativity. *Intellectual Economics*, *15*(2), 22–45. https://doi.org/10.13165/IE-21-15-2-02
84. Popa, S., Soto-Acosta, P., & Martinez-Conesa, I. (2017). Antecedents, moderators, and outcomes of innovation climate and open innovation: An empirical study in SMEs. *Technological Forecasting and Social Change*, *118*, 134–142. https://doi.org/10.1016/j.techfore.2017.02.014
85. Qalati, S. A., Yuan, L. W., Khan, M. A. S., & Anwar, F. (2021). A mediated model on the adoption of social media and SMEs' performance in developing countries. *Technology in Society*, *64*, 101513. https://doi.org/https://doi.org/10.1016/j.techsoc.2020.101513
86. Quaye, D. (2019). Marketing innovation and sustainable competitive advantage of manufacturing SMEs in Ghana. *Management Decision*, *57*(7), 1535–1553. https://doi.org/10.1108/MD-08-2017-0784
87. Rehman, S. U., Bresciani, S., Ashfaq, K., & Alam, G. M. (2022). Intellectual capital, knowledge management and competitive advantage: A resource orchestration perspective. *Journal of Knowledge Management*, *26*(7), 1705–1731. https://doi.org/10.1108/JKM-06-2021-0453
88. Sharma, S., & Sharma, S. K. (2020). Probing the links between team resilience, competitive advantage, and organizational effectiveness: Evidence from information technology industry. *Business Perspectives and Research*, *8*(2), 298–307. https://doi.org/10.1177/2278533719887458
89. Sigalas, C., & Papadakis, V. M. (2018). Empirical investigation of relationship patterns between competitive advantage and superior performance. *Journal of Strategy and Management*, *11*(1), 81–111. https://doi.org/10.1108/JSMA-01-2017-0010
90. Singh, A. K., & Verma, R. (2019). Understanding role of market-orientated IT competence and knowledge sharing mechanism in gaining competitive advantage. *Global Business Review*, *21*(2), 418–435. https://doi.org/10.1177/0972150918824949
91. Singla, H. K. (2020). Does VAIC affect the profitability and value of real estate and infrastructure firms in India? A panel data investigation. *Journal of Intellectual Capital*, *21*(3), 309–331. https://doi.org/10.1108/JIC-03-2019-0053
92. Soetanto, T., & Liem, P. F. (2019). Intellectual capital in Indonesia: Dynamic panel approach. *Journal of Asia Business Studies*, *13*(2), 240–262. https://doi.org/10.1108/JABS-02-2018-0059
93. Sovacool, B. K., Axsen, J., & Sorrell, S. (2018). Promoting novelty, rigor, and style in energy social science: Towards codes of practice for appropriate methods and research design. *Energy Research and Social Science*, *45*, 12–42. https://doi.org/10.1016/j.erss.2018.07.007

94. Stadler, C., Helfat, C. E., & Verona, G. (2022). Transferring knowledge by transferring individuals: Innovative technology use and organizational performance in multiunit firms. *Organization Science*, *33*(1), 253–274. https://doi.org/10.1287/orsc.2021.1446
95. Steinmo, M., & Rasmussen, E. (2018). The interplay of cognitive and relational social capital dimensions in university-industry collaboration: Overcoming the experience barrier. *Research Policy*, *47*(10), 1964–1974. https://doi.org/10.1016/j.respol.2018.07.004
96. Suhartanto, D., & Leo, G. (2018). Small business entrepreneur resistance of ICT adoption: A lesson from Indonesia. *International Journal of Business and Globalisation*, *21*(1), 5–18. https://doi.org/10.1504/IJBG.2018.094092
97. Surya, B., Menne, F., Sabhan, H., Suriani, S., Abubakar, H., & Idris, M. (2021). Economic growth, increasing productivity of smes, and open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 1–37. https://doi.org/10.3390/joitmc7010020
98. Teece, D. J., Pisano, G., & Shuen, A. (2009). Dynamic capabilities and strategic management. *Knowledge and Strategy*, *18*(March), 77–116. https://doi.org/10.1093/0199248540.003.0013
99. Tenenhaus, M., Vinzi, V. E., Chatelin, Y.-M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, *48*(1), 159–205.
100. Thomas, E. F. (2014). Platform-based product design and environmental turbulence: The mediating role of strategic flexibility. *European Journal of Innovation Management*, *17*(1), 107–124. https://doi.org/10.1108/EJIM-06-2013-0055
101. Todericiu, R., & Stăniț, A. (2015). Intellectual capital – the key for sustainable competitive advantage for the SME's sector. *Procedia Economics and Finance*, *27*, 676–681. https://doi.org/ https://doi.org/10.1016/S2212-5671(15)01048-5
102. Tsai, F. S., Cabrilo, S., Chou, H. H., Hu, F., & Tang, A. D. (2022). Open innovation and SME performance: The roles of reverse knowledge sharing and stakeholder relationships. *Journal of Business Research*, *148*, 433–443. https://doi.org/10.1016/j.jbusres.2022.03.051
103. Tu, Y., & Wu, W. (2021). How does green innovation improve enterprises' competitive advantage? The role of organizational learning. *Sustainable Production and Consumption*, *26*, 504–516. https://doi.org/10.1016/j.spc.2020.12.031
104. Vătămănescu, E. M., Gorgos, E. A., Ghigiu, A. M., & Pătruț, M. (2019). Bridging intellectual capital and SMEs internationalization through the lens of sustainable competitive advantage: A systematic literature review. *Sustainability*, *11*(9), 2510. https://doi.org/10.3390/su11092510
105. Verbano, C., & Crema, M. (2016). Linking technology innovation strategy, intellectual capital and technology innovation performance in manufacturing SMEs. *Technology Analysis and Strategic Management*, *28*(5), 524–540. https://doi.org/10.1080/09537325.2015.1117066
106. Vu, N. H., & Nguyen, N. M. (2022). Development of small and medium-sized enterprises through information technology adoption persistence in Vietnam. *Information Technology for Development*, *28*(3), 585–516. https://doi.org/10.1080/02681102.2021.1935201
107. Vuks, V. B., & Sus, D. (2019). BPM and BI in SMEs: The role of BPM/BI alignment in organizational performance. *International Journal of Engineering Business Management*, *11*, 1–16. https://doi.org/10.1177/1847979019874182
108. Wang, C. H. (2019). How organizational green culture influences green performance and competitive advantage: The mediating role of green innovation. *Journal of Manufacturing Technology Management*, *30*(4), 666–683. https://doi.org/10.1108/JMTM-09-2018-0314
109. Wang, Z., Wang, N., Cao, J., & Ye, X. (2016). The impact of intellectual capital–knowledge management strategy fit on firm performance. *Management Decision*, *54*(8), 1861–1885.
110. Weaven, S., Quach, S., Thaichon, P., Frazer, L., Billot, K., & Grace, D. (2021). Surviving an economic downturn: Dynamic capabilities of SMEs. *Journal of Business Research*, *128*, 109–123. https://doi.org/https://doi.org/10.1016/j.jbusres.2021.02.009
111. WEF. (2019). *The Global Competitiveness Report*.

112. Weqar, F., & Haque, S. M. I. (2020). Intellectual capital and corporate financial performance in India's central public sector enterprises. *International Journal of Learning and Intellectual Capital*, *17*(1), 77–97. https://doi.org/10.1504/IJLIC.2020.105323
113. Xiu, L., Liang, X., Chen, Z., & Xu, W. (2017). Strategic flexibility, innovative HR practices, and firm performance. *Personnel Review*, *46*(7), 1335–1357. https://doi.org/10.1108/PR-09-2016-0252
114. Yang, M., Wang, J., & Zhang, X. (2021). Boundary-spanning search and sustainable competitive advantage: The mediating roles of exploratory and exploitative innovations. *Journal of Business Research*, *127*(February), 290–299. https://doi.org/10.1016/j.jbusres.2021.01.032
115. Ying, Q., Hassan, H., & Ahmad, H. (2019). The role of a manager's intangible capabilities in resource acquisition and sustainable competitive performance. *Sustainability*, *11*(2), 527. https://doi.org/10.3390/su11020527
116. Zaridis, A., Vlachos, I., & Bourlakis, M. (2021). SMEs strategy and scale constraints impact on agri-food supply chain collaboration and firm performance. *Production Planning and Control*, *32*(14), 1165–1178. https://doi.org/10.1080/09537287.2020.1796136
117. Zhang, Q., Oo, B. L., & Lim, B. T. H. (2019). Drivers, motivations, and barriers to the implementation of corporate social responsibility practices by construction enterprises : A review. *Journal of Cleaner Production*, *210*(February), 563–584. https://doi.org/https://doi.org/10.1016/j.jclepro.2018.11.050
118. Zhang, X., Chu, Z., Ren, L., & Xing, J. (2023). Open innovation and sustainable competitive advantage: The role of organizational learning. *Technological Forecasting and Social Change*, *186*(Part A), 122114. https://doi.org/10.1016/j.techfore.2022.122114