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Is Organizational Agility a Missing Link between the Innovation Capabilities-Firm Performance Relationship? Evidence from Manufacturing SMEs in Malaysia

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Abstract

In a dynamic business environment, innovation capabilities (IC) are crucial as it enables SMEs to swiftly respond to evolving customer demands, maintaining agility and thereby gaining a competitive edge. This study, framed from the perspective of dynamic capabilities, examines the relationships between IC, organizational agility (OA), and firm performance (FP). Using data from 313 manufacturing SMEs in Malaysia and applying PLS-SEM, the proposed model was tested. The results support the hypotheses, confirming the positive effect of IC on FP, IC on OA, and OA on FP. Moreover, the mediating role of OA in the IC–FP relationship has been also found.

Keywords: Innovation Capabilities, Organizational Agility, Firm Performance, Manufacturing SMEs

Introduction

Innovation practices are crucial to the survival and success of SMEs, serving as a key factor for long-term success (Adam & Alarifi, 2021). Research has shown that innovative SMEs outperform non-innovative ones in terms of financial performance and productivity, as innovation provides them with a competitive advantage (Hervas-Oliver et al., 2011; Tsoukatos et al., 2018). Innovation arises from the utilization of a firm's individual capabilities or a combination of them, contingent upon the firm's internal resources and prevailing market conditions (Alves et al., 2017). In simple terms, innovation relies on the capabilities of the firm. Innovation capabilities (IC) refer to the ability to continuously transform knowledge and ideas into new products, processes, and systems for the benefit of the firm and its stakeholders (Lawson & Samson, 2001).

Most research indicates a positive correlation between IC and firm performance (FP) within SMEs contexts (Saunila, 2020). However, the relationship between innovation and FP remains contentious. Moreover, a study in selected ASEAN countries have found a significantly negative relationship between process innovation and annual sales growth in the manufacturing sector (Na & Kang, 2019). Furthermore, a study on publicly listed companies in China indicates a significant negative correlation between technological innovation and firm performance (Zhang & Aumeboonsuke, 2022). Additionally, a study on SMEs in Indonesia reveal that product and service innovations have no impact on firm performance (Yulianto & Supriono, 2023). Given the discontinuous relationship between innovation and firm performance, it is possible that mediators may either strengthen or weaken this relationship.

The research suggests that in order to survive in a continuously changing external environment, firms need to possess both IC and agility (Francis & Woodcock, 2024). Organizational agility (OA) refers to the capability of a company to rapidly change or adapt in response to changes (Tallon & Pinsonneault, 2011). Organizations with IC have a clear advantage in swiftly addressing environmental challenges and effectively leveraging emerging products and market opportunities, surpassing non-innovative organizations. Consequently, this enhances overall FP (Tehranian et al., 2023). Therefore, OA may represent a key mechanism by which firms transform IC into FP. However, as shown in Table 1, many studies have mentioned the IC-OA-FP in their research model, but only one study has tested the mediating role of OA. Given the established value of IC for SMEs operating in dynamic environments, particularly in fostering agility and competitive advantage, the current literature exhibits a notable gap in understanding the mediating role of OA in the relationship between IC and FP. This presents a significant and promising avenue for future research.

Thus, this study will explore the connection between IC, OA, and FP in manufacturing SMEs in Malaysia. This study addresses four main research questions:
1. Is there any positive relationship between IC and FP?
2. Is there any positive relationship between IC and OA?
3. Is there any positive relationship between OA and FP?
4. Does OA mediate the relationship between IC and FP?

This study, grounded in the dynamic capabilities view (DCV), develops a research framework to explore the mediating effect of OA on the relationship between IC and FP within Malaysian manufacturing SMEs. This investigation will not only enhance understanding of DCV but also provide valuable insights for managerial practice. The remainder of this study reviews the literature and develops hypotheses, followed by sections on methodology, data analysis, and findings. Subsequently, a discussion elaborates on the results. The final sections present the theoretical and managerial implications, as well as limitations and directions for future research.

Table 1
Past studies on the IC-OA-FP relationship

Author/Year	Industry	Firm size	Country	Mediation Analysis	Findings
Ravichandran (2018)	Mixed	Mixed	USA	NO	Positive relationship between innovation capacity, organizational agility and firm performance.
Ashrafi et al. (2019)	Mixed	Mixed	Iran	NO	Positive relationship between innovative capability, firm agility and firm performance.
Ilmudeen (2022a)	Mixed	Mixed	China	NO	Positive relationship between innovative capability, business process agility and firm performance.
Troise et al. (2022)	Mixed	SMEs	Italy	NO	Innovation capability has positive effect on organizational agility; organizational agility has positive effect on financial performance and product/process innovation.
Al Humdan et al. (2023)	Service	Mixed	Australia	Yes	Supply chain agility significantly mediates the relationship between innovativeness and performance
Tehranian et al. (2023)	Manufacturing	Mixed	Germany	No	Positive relationship between innovation capacity, organizational agility and firm performance.

Literature Review and Hypotheses Development

Theoretical Background

The dynamic capabilities view provides a theoretical lens to investigate the relationship between IC, OA, and FP. Dynamic capabilities enable a firm to (1) identify and respond to opportunities and threats, (2) capitalize on market opportunities, and (3) sustain competitiveness by improving, integrating, and reconfiguring its intangible and tangible assets (Teece, 2007). IC is regarded as a significant dynamic capability, and there is a strong connection between them (Breznik & Hisrich, 2014). IC assists firms in continuously identifying, scanning, exploring, and implementing new opportunities and environmental demands both internally and externally. This enables firms to respond to changes in their internal or external environments and even take proactive actions to influence the environment (Breznik & Hisrich, 2014).

OA, as a higher-order dynamic capability, has a strong relationship with FP (Fainshmidt et al., 2016). OA is defined as a “learned, permanently available dynamic capability that can be performed to a necessary degree in a quick and efficient fashion, and whenever needed in order to increase business performance in a volatile market environment (Walter, 2021). IC is considered a lower-order dynamic capability (O’Cass & Sok, 2012; Singh et al., 2013). As previously mentioned, OA is regarded as a higher-order dynamic capability. According to the hierarchy of dynamic capability, higher-order dynamic capability is built upon lower-order one (Schilke, 2014). Therefore, in this study, IC can enhance the development of OA, which in turn improves FP. Consequently, OA can mediate the relationship between IC and FP. The conceptual framework of this study is shown in Figure 1.

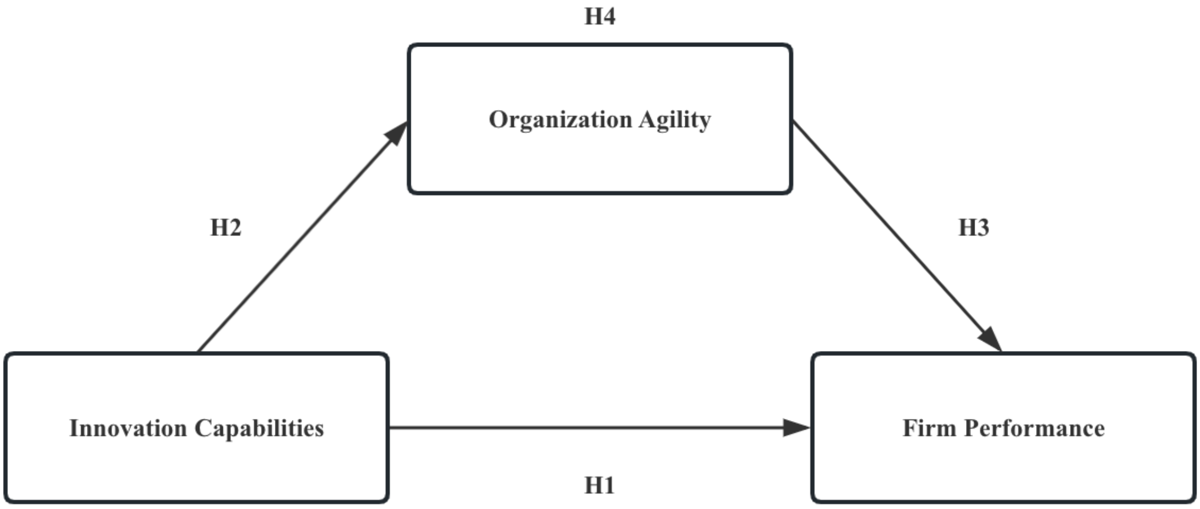

Figure 1 Conceptual framework

Innovation Capabilities and Firm Performance

Firms need IC to sustain themselves in a rapidly changing environment, making it a crucial driver of long-term business success (Le et al., 2020). When an organization possesses IC, it consistently transforms its ideas into new initiatives, thereby delivering increased value to its stakeholders (Le et al., 2020). IC encompasses various types, such as products, processes, organization, and marketing, and can contribute to FP (Saunila, 2020). Past study found that product innovation has a positive impact on sales growth compared to process innovation. Firms can enhance their competitiveness by introducing innovative products that boost customer satisfaction(Na & Kang, 2019). Moreover, process innovation represents a significant non-technological advancement for manufacturing firms (Aboal & Garda, 2016). Process innovation focuses on developing or enhancing the essential techniques, knowledge, processes, systems, procedures, and skills necessary to transform processes for creating products or services, ultimately leading to improved business performance (Maldonado-Guzmán et al., 2019). This study posits that for SMEs, enhancing existing products or developing new ones to meet customer needs can improve FP. Additionally, they can improve or create new processes to reduce costs and increase operational efficiency, ultimately enhancing FP. Based on the discussion, the following hypothesis was proposed:

H_1: There is a positive relationship between IC and FP.

Relationship between Innovation Capabilities, Organizational Agility, and Firm Performance

Organizations must engage in continuous innovation to maintain agility and thereby achieve a competitive advantage (Denning, 2013). The research suggests that IC contributes to OA in two (2) ways. Firstly, firms can swiftly improve products or services in response to market changes, and make appropriate decisions and implement them quickly, even during supply chain disruptions, to meet customer demands. Secondly, firms can rapidly adjust internally, demonstrating the ability to quickly adapt business processes to market and customer demand changes. Thus, if firms could achieve these objectives, FP would be improved (Tehranian et al., 2023). Therefore, for firms, innovation increases the opportunities to respond to changes and discover new opportunities. It can also facilitate the acquisition of competitive advantages, as it enables firms to build better products and services for customers. Thus, enhancing OA through IC helps firms to gain and maintain competitiveness (Wanasida et al., 2021). For SMEs, developing robust IC facilitates swift decision-making and enables rapid adjustments to business processes. This agility allows SMEs to respond quickly to market changes and meet customer demands effectively. Ultimately, this will contribute to performance. Therefore, OA is highly likely to bridge the relationship between IC and FP. Based on these discussions, the following hypothesis was proposed:

H_2: There is a positive relationship between IC and OA.
H_3: There is a positive relationship between OA and FP.
H_4: OA mediate the IC-OA relationship.

Methodology

This study employed systematic sampling. Systematic sampling is a probability sample drawn by applying a calculated skip interval to a sample frame (Schindler, 2018). This study employs the inverse square root method, proposed by (Kock & Hadaya, 2018). This method determines that, at a significance level of 5% and a minimum path coefficient of 0.2, the minimum sample size required is 155. The sample was randomly drawn from 2,121 manufacturing SMEs listed in the 52nd edition of the Federation of Malaysian Manufacturers (FMM) directory, reflecting the proportion of SMEs across 14 states in Malaysia. The questionnaire was disseminated via Google Forms to the owners and managers of these SMEs through email. Out of 1,635 questionnaires distributed, 320 responses were received over a span of more than six months. Of these responses, 313 were deemed valid, yielding a response rate of 19.63%, which met the required sample size.

Measurements

The questionnaire used in this study was adapted based on previous research to suit the Malaysian context. This study employs a 7-point Likert scale, ranging from 1 (Strongly disagree) to 7 (Strongly agree). All constructs were confirmed to be reflective after reviewing related articles. IC measured using five items, was adapted from (Borah et al., 2022). OA assessed with six items, was adapted from (Lu & Ramamurthy, 2011). FP evaluated with six (6) items, was adapted from (Anwar & Shah, 2021).

Analysis and Findings

This study employs PLS-SEM to test all hypotheses. The research suggested that PLS-SEM is suitable for situations that involve interaction effects, formative constructs, the inclusion of more than 40-50 variables, non-normal distributions, heteroscedasticity of variance, and small sample sizes (Lowry & Gaskin, 2014). PLS-SEM encompasses both the measurement model and the structural model. In this study, the measurement model is reflective. To assess it, we employed several metrics: indicator reliability, internal consistency (using Cronbach's α and composite reliability), convergent validity (measured by average variance extracted), and discriminant validity (evaluated through cross-loading, the Fornell-Larcker criterion, and the Heterotrait-Monotrait ratio). For the structural model evaluation, we utilized path coefficients, the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). Furthermore, we applied the bootstrapping method with 5,000 resamples to conduct path analysis and mediating effect analysis (Hair et al., 2021).

Assessment of Common Method Variance

Common Method Variance (CMV) refers to variance that is attributable to the measurement method rather than to the constructs the measures are assumed to represent (Podsakoff et al., 2003). This study employs self-reported questionnaires, which are likely to result in CMV. Moreover, to assess CMV in PLS-SEM, this study uses the unmeasured latent method construct proposed by (Podsakoff et al., 2003) and full collinearity assessment approach proposed by (Kock, 2015). The findings presented in Table 2 indicate that the baseline model outperforms the single-factor model significantly. When comparing the baseline model with the CMV model, the differences in the GFI, AGFI, NFI, TLI, and CFI metrics are all less than 0.01, while the differences in RMR and RMSEA are below 0.05. Thus, it can be concluded that this study does not exhibit significant CMV. According to Kock (2015), a model is free from CMV if the variance inflation factors (VIFs) within the inner model, obtained from a full collinearity assessment, are 3.3 or lower. Our results showed VIFs are less than 3.3, indicating that CMV does not pose a concern in this study.

Table 2
Assessment of Common Method Variance

	$\chi 2$/df	GFI	AGFI	NFI	TLI	CFI	SRMR	RMSEA
Criteria	< 5.000	> 0.900	> 0.900	> 0.900	> 0.900	> 0.900	< 0.05	< 0.08
Baseline model	1.490	0.920	0.901	0.952	0.982	0.984	0.031	0.040
Single factor model	8.231	0.536	0.439	0.729	0.727	0.753	0.110	0.152
CMV model	1.424	0.924	0.905	0.954	0.984	0.986	0.037	0.037
Δ[a]	-6.741	0.384	0.462	0.223	0.255	0.231	-0.079	-0.112
Δ[b]	0.066	-0.004	-0.004	-0.002	-0.002	-0.002	-0.006	0.003

Note: [a] Baseline model vs. Single factor model; [b] Baseline model vs. CMV model.

Assessment of Measurement Model

Table 3 illustrates the findings related to indicator loadings, Cronbach's α, composite reliability (CR), and average variance extracted (AVE) for this study. All indicator loadings for the variables surpass 0.7, signifying strong reliability of the measurement indicators (Hair et al., 2019). The Cronbach's α values for all constructs are approximately 0.95 (Hair et al., 2019), and the CR values exceed 0.7 (Diamantopoulos et al., 2012), indicating robust internal consistency of the constructs. Furthermore, the AVE values for all constructs are greater than 0.5, demonstrating satisfactory convergent validity for this study (Hair et al., 2019).

Table 3
Assessment of Measurement Model

Construct	Indicator	Loading	Cronbach's a	CR	AVE
Innovation capabilities	IC1	0.848	0.964	0.964	0.755
	IC2	0.824			
	IC3	0.822			
	IC4	0.840			
	IC5	0.811			
	IC6	0.846			
Organizational agility	OA1	0.876	0.911	0.913	0.692
	OA2	0.875			
	OA3	0.877			
	OA4	0.881			
	OA5	0.879			
	OA6	0.880			
Firm performance	FP1	0.873	0.941	0.941	0.771
	FP2	0.883			
	FP3	0.861			
	FP4	0.858			
	FP5	0.862			
	FP6	0.866			
	FP7	0.851			
	FP8	0.894			
	FP9	0.876			
	FP10	0.862			

Table 4 illustrates the criteria matrix for cross-loadings, revealing that the outer loadings of the constructs examined in this study (highlighted in bold along the diagonal) exceed the cross-loadings associated with other constructs (in regular font) (Chin, 1998). Table 5 presents the Fornell-Larcker criterion matrix, which indicates that the square roots of the average variances extracted (AVEs) of the constructs (also bolded along the diagonal) are greater than their correlations with other constructs (in regular font) (Fornell & Larcker, 1981). Additionally, Table 6 displays the Heterotrait-Monotrait ratio (HTMT) matrix, confirming that all HTMT values remain below the threshold of 0.85 (Henseler et al., 2015). These findings collectively support the validity of the study.

Table 4
Cross loadings

	IC	OA	FP
IC1	**0.848**	0.414	0.400
IC2	**0.824**	0.413	0.489
IC3	**0.822**	0.411	0.423
IC4	**0.840**	0.462	0.521
IC5	**0.811**	0.408	0.472
IC6	**0.846**	0.455	0.443
OA1	0.464	**0.876**	0.641
OA2	0.442	**0.875**	0.605
OA3	0.431	**0.877**	0.597
OA4	0.448	**0.881**	0.648
OA5	0.444	**0.879**	0.624
OA6	0.483	**0.880**	0.606
FP1	0.465	0.608	**0.873**
FP2	0.484	0.599	**0.883**
FP3	0.438	0.571	**0.861**
FP4	0.475	0.643	**0.858**
FP5	0.491	0.607	**0.862**
FP6	0.500	0.602	**0.866**
FP7	0.482	0.631	**0.851**
FP8	0.482	0.638	**0.894**
FP9	0.523	0.617	**0.876**
FP10	0.463	0.615	**0.862**

Table 5
Fornell-Larcker criterion

	IC	OA	FP
IC	**0.832**		
OA	0.515	**0.878**	
FP	0.553	0.707	**0.869**

Table 6
HTMT

	IC	OA	FP
IC			
OA	0.554		
FP	0.587	0.741	

Assessment of Structural Model

This research employs Variance Inflation Factor (VIF) analysis to identify potential collinearity issues among the constructs. As illustrated in Table 7, all VIF values are below 3, indicating that collinearity is not a concern in this study (Hair et al., 2011). Table 7 also details the findings from the path analysis, revealing a positive relationship between IC and FP (β = 0.258, p-value < 0.05), thereby corroborating **H_1**. Additionally, IC showed a positive correlation with OA (β = 0.515, p-value < 0.05), supporting **H_2**. Moreover, OA is positively associated with FP (β = 0.574, p-value < 0.05), which validates **H_3**. Furthermore, the mediation analysis results presented in Table 8 indicate that OA mediates the relationship between EC and FP (β = 0.295, p-value < 0.05), thus affirming **H_4**.

Table 7
Assessment of structural model

Hypothesis	Path	VIF	β	STDEV	T-value	Decision
H1	IC → FP	1.360	0.258***	0.059	4.375	Supported
H2	IC → OA	1.000	0.515***	0.055	9.437	Supported
H3	OA → FP	1.360	0.574***	0.063	9.172	Supported

Note: *** p<0.001.

Table 8 displays the values for R^2, F^2, and Q^2. The findings reveal that IC accounts for 54.8% of the variance in FP (R^2 = 0.548), indicating a moderate level of explanatory power for FP. However, the effect size is small (F^2 = 0.108), and IC demonstrates moderate predictive relevance for FP (Q^2 = 0.298). While IC showed moderate explanatory power for OA (R^2 = 0.265), it maintains a large effect size (F^2 = 0.360). Additionally, IC has moderate predictive relevance for OA (Q^2 = 0.256). Notably, OA exerts a large effect size on FP (F^2 = 0.535). This study obtained the specific F2 value corresponding to the indirect effect using the method proposed by (Gaskin et al., 2023). According to the thresholds suggested by Gaskin et al. (2023), the size of the indirect effect for OA is classified as large.

Table 8
Assessment of structural model

Path	β	STDEV	T-value	R^2	F^2	Q^2
Direct effect						
IC → FP	0.553***	0.051	10.873	0.548	0.108	0.298
IC → OA	0.515***	0.055	9.437	0.265	0.360	0.256
OA → FP	0.574***	0.063	9.172	N/A	0.535	N/A
Indirect effect						
IC → OA → FP	0.295***	0.043	6.855	N/A	0.111 [a]	N/A

Note: *** p<0.001; [a] Obtain from Stats Tools developed by Gaskin et al. (2023).

Discussions

This research has examined the interconnections among IC, OA, and FP. In terms of direct relationships, the results reveal several significant findings. Firstly, it was discovered that IC positively impacts FP, aligning with previous research outcomes (Jamai et al., 2021; Kijkasiwat & Phuensane, 2020; Liu & Huo, 2024; Na & Kang, 2019; Noone et al., 2022; Stanislawski, 2020; Younas & Rehman, 2021). As illustrated in Table 7, the explanatory power of IC on FP is moderate, and the effect size is small, indicating the presence of mediating variables that may enhance or diminish the relationship between IC and FP. Secondly, IC was found to have a positive effect on OA, which is consistent with earlier studies nations (Arsawan, et al., 2022; Ashrafi et al., 2019; Elazhary et al., 2022; López-Gamero et al., 2022; Pinho et al., 2022; Troise et al., 2022; Wanasida et al., 2021). The explanatory power of IC on OA is moderate, yet the effect size is large, suggesting that IC is a crucial enabler of OA. When firms possess robust IC, they are better equipped to swiftly and effectively meet the ever-changing consumer demands. Lastly, the findings show that OA positively influences FP, which also corroborates prior research (Devie et al., 2023; Motwani & Kataria, 2024; Nguyen et al., 2024). From the perspective of dynamic capabilities, OA signifies a firm's ability to adeptly manage uncertainties, a vital factor for sustaining competitive advantage and achieving long-term success.

In terms of the indirect relationship, the study found that OA mediates the relationship between IC and FP, a finding that may be the first of its kind among Malaysian manufacturing SMEs. The effect size of OA on the IC-FP relationship is substantial, suggesting that OA strengthens the connection between IC and FP. In this mediating relationship, IC has a significant effect on OA, and OA, in turn, has a large effect on FP. This implies that management in SMEs should focus on enhancing their IC, fostering innovation in products or services, as well as corresponding internal process innovations, to swiftly respond to market changes and better meet the evolving needs of customers. As a result, firms can become more agile and continuously improve their performance.

Theoretical and Practical Implications

The primary contribution of this study lies in uncovering the mediating role of OA in the relationship between IC and FP, an area that has received limited attention. By introducing an integrated framework encompassing these three variables, this research expands the understanding of dynamic capabilities within manufacturing SMEs in Malaysia. From the perspective of dynamic capabilities, IC is considered lower-order dynamic capabilities, while OA is viewed as a higher-order dynamic capability. Lower-order dynamic capabilities are built upon higher-order dynamic capabilities. Therefore, firms can enhance their IC to foster the development of OA, which ultimately contributes to improved performance.

The results of this study also offer valuable insights for managers and practitioners in manufacturing SMEs seeking to enhance FP. Innovation is a key driver of sustainable development for SMEs. Despite their limited resources, SMEs must still allocate valuable resources to the development of IC. This study proposes several practical recommendations. First, SMEs can comprehensively optimize internal processes through digital transformation, promoting process innovation, improving operational efficiency, and reducing production costs. Second, SMEs can foster technological innovation and the commercialization of research by collaborating with universities, leveraging academic talent and technical resources. Third, government support in the form of policy incentives and improved access to financing is essential to boost innovation efforts within SMEs. Finally, SMEs themselves must strengthen their R&D efforts and invest in talent development to enhance their innovation capacity and competitiveness.

Limitations and Future Directions

This study inevitably has some limitations. Firstly, the sample for this study is derived from the 52nd edition of the FMM directory. This directory includes only a portion of manufacturing SMEs, which may result in omissions. Therefore, future research is encouraged to collaborate with government agencies or business consulting firms to obtain a more comprehensive sample and further validate the findings of this study. Second, this research employed a questionnaire survey method. In order to gain deeper insights, future studies are recommended to use qualitative research methods, such as in-depth interviews, to capture more detailed information and provide new perspectives on IC in SMEs.

The results of this study suggested several potential avenues for future research. First, there may be additional mediating variables between intellectual capital (IC) and financial performance (FP) that could strengthen their relationship. Therefore, we recommend that future studies further investigate other mediators. Second, innovation is a resource-intensive endeavour, and small and medium-sized enterprises (SMEs) possess varying levels of resources. Thus, we suggest that future research examine how different levels of organizational resources impact the relationship between IC, organizational advantage (OA), and FP. Lastly, the relationship between IC and FP remains contentious. Consequently, we propose that future research could utilize meta-analysis and bibliometric analysis to clarify their relationship (Zhang et al., 2023, 2024; Zhang & Quoquab, 2022).

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