Collaboration with Triple Helix: The Mediating Effect of Mass Media in Expanding SMEs' Information Access

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ABSTRACT

Purpose: The study explores how collaboration among SMEs with the Triple Helix innovation ecosystem impacts their information access and performance. It also examines the mediating role of mass media.

Methodology/Approach: Data were collected from 545 SME managers and owners in Malang, Indonesia. SEM-PLS was used to analyse the data to examine the relationship of four latent variables: SME collaboration (COL), information access (IA), SME performance (SP), and collaboration with mass media (MM).

Findings: The study proves the pivotal role of SME collaboration with the triple helix ecosystem to improve SME information access and performance. It is also underscoring the considerable significance of mass media mediating roles.

Research Limitation/implication: The study demonstrates that SMEs can improve information acquisition through collaborations with the government, universities, and major corporations. It proposes expanding the 'triple helix' model to include mass media, thus enhancing SME development by augmenting information access capabilities alongside government, universities, and industry.

Originality/Value of paper: The study adds to the existing research on the triple helix innovation ecosystem by exploring how additional elements, beyond government, universities, and industries, collaborate to support SME development, suggesting the inclusion of mass media to create a quadruple helix ecosystem.

Category: Research paper

Keywords: SME collaboration; triple helix; innovation ecosystem; information access; mass media

Research Areas: Management of Technology and Innovation

1   INTRODUCTION

The significant role of Small and Medium Enterprises (SMEs) in advancing the economic growth of a nation has been widely acknowledged by various stakeholders and substantiated by scholarly investigations worldwide. In practice, a plethora of information indicates that SMEs often encounter challenges in enhancing their performance and fostering business expansion. One prominent impediment to performance enhancement within the SME sector is the limited access to information. The constraint in information accessibility has been identified as a significant restriction to the growth of SMEs, a situation witnessed not only in one country but across the globe, including the United Kingdom (O'Keeffe, 2016), China (Shi et al., 2008), and Pakistan (Imran et al., 2019), among others. Paradoxically, access to information plays a pivotal role in SME performance.

As elucidated by Sütöová (2018), the concept of information access refers to the availability and ease of acquiring information, which is crucial for informed decision-making. Such information encompasses government regulations, access to business capital, governmental support, training, market opportunities, potential consumers, raw materials, and more, all of which are pivotal for SME development. Regrettably, SMEs lack the privilege of facilely accessing such information. UNESCO highlights the lack of information access as a significant challenge confronting SMEs in developing countries (Primo and Khan, 2003). This assertion is corroborated by Shiferaw et al. (2015), who reveals that many SMEs struggle to access essential resources and information needed for business expansion, often resorting to constructing their internal information networks. The limitation of SMEs' access to knowledge, expertise, human resources, capital, and information is widely reported (Saunila, 2016), permeating nearly every aspect of their operations, including production, promotion, distribution, and research and Development (Lee et al., 2010).

However, it is not just SMEs; organisations generally do not possess an autonomous repository of all resources necessary for their development. In accordance with the Resource Dependence Theory (RDT) advanced by Pfeffer (1987) and Salancik, organisations cannot independently fulfil all their resource needs and must engage in transactions with other entities to supplement their deficiencies. Muzzi and Albertini (2015) argue that the limitation in resource access, particularly information, can be overcome through collaboration, both among SMEs and with other institutions such as universities, governments, and larger corporations. Furthermore, El Samra et al. (2019) posit that external partnerships for expanding information access can encompass various external entities such as customers, suppliers, competitors, allies, consultants, academic research institutions, and more. This underscores the potential breadth of collaboration.

External collaboration is believed to mediate information exchange between organisations (Milagres and Burcharth, 2019). Collaboration and networking serve

as endeavours to procure external resources (Karjalainen et al., 2021). Collaborative efforts afford organisations greater access to resources from external parties (Roundy et al., 2018). Given their internal information and inadequate funding constraints, SMEs greatly require external support (Seo and Lee, 2019).

The innovation ecosystem, a concept aimed at fostering collaboration, holds particular relevance. Carayannis and Campbell (2009) assert that an open innovation ecosystem involves diverse components such as government, universities, and larger corporations. To support the emergence and sustainability of these elements, Etzkowitz and Leydesdorff (1995) introduced the concept of the triple helix: the extent to which knowledge producers (academics), knowledge users (businesses), and policymakers (government) collaborate.

The innovation ecosystem is an ideal development space, facilitating collaboration among elements (Kao, 2012). Innovation cannot thrive in isolation in an ecosystem due to interdependencies among ecosystem members (Adner and Kapoor, 2010). Collaborative innovation development within this ecosystem ultimately bolsters performance (Vrgovic et al., 2012; Bullinger et al., 2009; Van de Vrande et al., 2009; Inkpen and Tsang, 2005). In an SME-focused study, Noya et al. (2023) affirmed that SME collaboration with the triple helix significantly enhances performance.

Initially introduced by Etzkowitz and Leydesdorff (1995), the triple helix concept has evolved through subsequent researchers adding additional helices. Scholars have modified the concept of the innovation ecosystem to include the quadruple helix (Carayannis and Campbell, 2022; Schocair et al., 2022; McAdam and Debackere, 2018; Miller et al., 2018; Afonso et al., 2012;), quintuple helix (Schocair et al. 2022; Carayannis et al., 2018; Carayannis and Campbell, 2009), and even n-tuple helix (Lew and Park, 2021; Park, 2014) by introducing elements beyond academia, corporations, and government, such as society, environment, consumers, and media. Involving these public institutions in the innovation ecosystem provides SMEs broader knowledge and information access (Radicic et al., 2020).

In this study, we propose mass media as an additional collaborative element to complement the triple helix. The role of media, along with the culture and values it fosters, is associated with the fourth helix in the quadruple helix model proposed by Carayannis and Campbell (2009), which is deemed crucial to the innovation ecosystem. The social cognitive theory of mass communication (Bandura, 2009) posits that media drive change by informing, enabling, motivating, and guiding audiences. Mass media can serve as a collaborative element with the innovation ecosystem, as it disseminates information about SME products to the public, including potential consumers. Mass media should strengthen its position in promoting SME products, acting as an intermediary between all stakeholders, providing necessary information to SMEs, and facilitating online marketing of their products.

However, within the existing literature, the role of mass media as an element of the innovation ecosystem, particularly in providing broader information access to SMEs to boost their performance and growth, has not been a predominant focus of researchers. Consequently, this study seeks to affirm the role of mass media in enhancing the impact of SME collaboration with the triple helix to augment its information access.

2   LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1   SME Performance

The examination of business performance has long captured the attention of numerous researchers within the scholarly sphere. In its broadest sense, performance is construed as the attainment or accomplishment of an activity. Performance represents a gauge of the extent to which a particular objective has been realised. In the context of business, performance is defined as the outcome of business activities (Kotane and Kuzmina-Merlino, 2017). Yildiz et al. (2014) define business performance as a company's capacity to achieve its objectives by delivering goods or services that meet customer expectations. Wood (2006), on the other hand, asserts that business performance is evaluated by measuring an organisation's triumphs or setbacks in attaining its goals. Within various empirical studies, performance encompasses multifarious dimensions and metrics, with some of the most prevalent being time, profits, quality, growth, productivity, flexibility, financial aspects, market share, customer satisfaction, and human resources. In pursuit of sustained advancement, it is incumbent upon SMEs) to maintain a positive business performance. Several indicators commonly employed to gauge business performance include elevated sales figures, an augmented customer base, customer satisfaction, and stakeholder contentment (Franco et al., 2016; Gronum et al., 2012; Wood, 2006).

This comprehensive overview underscores the significance of comprehending and assessing business performance. The dimensions encompassing performance metrics elucidate the multifaceted nature of business achievements. The multitude of indicators provides a nuanced assessment of business health, encompassing both financial and non-financial aspects. Within the SME context, maintaining a trajectory of positive business performance emerges as a fundamental imperative. By fostering robust business performance, SMEs can not only ensure their survival and growth but also contribute to broader economic development. As such, an incisive analysis of performance dimensions and measures remains paramount for SMEs aiming to thrive in dynamic market environments.

2.2   Information Access

The information comprises a structured and well-organised collection of useful facts that provide meaningful and comprehensive insights into a particular

condition or situation (McNab and Ladd, 2014; Valacich and Schneider, 2014). It represents a meaningful interpretation of data (Wang, 2015). Accurate and reliable information plays a pivotal role in rational decision-making within organisational contexts (Chen et al., 2015a). For enterprises to achieve success, access to pertinent information serves as a means to identify and explore business opportunities (Ulhøi, 2005). Every organisation requires information from both internal and external environments to mitigate uncertainties (Christopher and Lee, 2004). The accessibility of information stands as a crucial factor aiding in the enhancement of organisational performance. Information acquisition is also important for the learning process and facilitates adaptability (Cooper, 1995).

Given the pivotal role of information for business entities, several researchers have undertaken investigations in this domain (Potnis, 2015). Noteworthy studies have emphasised the importance of information in assessing business opportunities and instigating proactive measures within companies that ultimately yield favourable outcomes for their Development (Autio et al., 2013). Furthermore, information functions as a regulatory mechanism, augmenting satisfaction, reducing ambiguity by clarifying procedures, priorities, and decisions (Avram and Priescu, 2012), and enhancing innovation and competitiveness (Laužikas and Dailydait, 2015). Consequently, insufficient information can yield negative repercussions on the growth, sustainability, and performance of SMEs (Ropega, 2011; Edelman and Yli–Renko, 2010; Bendoly and Swink, 2007).

The foregoing discussion underscores the critical role of information in the context of organisational success. Insights from the research highlight how information, as a vital resource, significantly influences decision-making, adaptation, and overall business performance. The empirical studies referenced herein contribute to a nuanced understanding of the multifaceted impact of information on various dimensions of SME development and management. By recognising the manifold dimensions through which information exerts its influence, researchers and practitioners can craft strategic interventions to harness its potential and enhance the trajectory of SMEs in dynamic market landscapes.

2.3   Collaboration and Performance

Given their resource and knowledge constraints, SMEs necessitate collaboration to fuel innovation (Martynovich, 2011). Greco et al. (2016) assert that companies can reap benefits from collaboration, subsequently propelling their performance development. Further insights from the research by Harwiki and Malet (2020) suggest that while no significant correlation was found for Spanish SMEs, the innovation ecosystem significantly impacts the performance enhancement of Indonesian SMEs. Moreover, there exists empirical evidence underscoring the significance of collaboration and networking for SME performance (Zulu-Chisanga, 2021; Gerschewski et al., 2020; Franco et al., 2016), albeit divergent findings showing that SME networks do not substantially impact their performance (Manolova, 2010).

The innovation ecosystem emerges as a potential solution for SMEs to forge networks and collaborate on innovation development. Beyond its role in fostering innovation within SMEs, research corroborates the positive impact of the innovation ecosystem on SME outcomes and performance. Several studies have confirmed that interactions with the triple helix framework yield positive effects on organisational performance (Ribeiro and Nagano, 2022). In the context of SMEs, Noya et al. (2023) revealed a positive influence of the triple helix on SME performance. Ueasangkomsate and Jangkot (2019) further noted that SMEs not only witness performance improvements but also accrue diverse benefits from their collaboration within the triple helix framework.

Based on the aforementioned elaboration, the following hypothesis is formulated:

H1: Collaborative engagement of SMEs with the triple helix framework is positively and significantly correlated with the enhancement of SME performance.

2.4 Collaboration and Information Access

Ahuja (2000) underscores the role of collaboration as an information-gathering mechanism for firms. Moreover, it serves as an information-processing instrument since each indirectly connected firm can offer diverse interpretations of information. In the context of SMEs, a study conducted by Jha and Cottam (2021) unveiled that knowledge creation processes involving knowledge exchange are notably influenced by collaborative interactions among SMEs. Ferreras-Méndez et al. (2015) substantiate this relationship model. Their research findings reveal that SME collaboration with industry and non-industry partners enhances their absorptive capacity for new knowledge. Leveraging external resource assistance can bridge information and knowledge gaps (Chrisman and McMullan, 2004), a particularly valuable proposition for small business entities or resource-constrained SMEs. This assertion aligns with several researchers confirming a positive connection between external support and business performance among SME operators (Adam and Alarifi, 2021).

Jenssen and Koenig (2002) assert that building networks grants access to informational resources for companies. Elvekrok et al. (2018) corroborate this perspective, asserting that the primary advantage of participation in an innovation ecosystem lies in resource access, including information.

Building upon the aforementioned discussion, the following hypothesis is formulated:

H2: Collaborative engagement of SMEs with the triple helix framework is positively and significantly correlated with the enhancement of information access for SMEs.

2.5   Information Access and Performance

Information accessibility within a company is an invaluable asset, bearing consequential implications for outcomes, success, resilience, growth, and continuity (Imran et al., 2019; Chen et al., 2015a). The significance of information is paramount in the management decision-making process. Informed by accurate information, decision-making processes yield substantive benefits for the organisation (Sparks and McCann, 2015). This import of information holds for SMEs as well (Chiu et al., 2006). Empirical evidence underscores that adequate information has a positive impact on SME performance (Bendoly and Swink, 2007).

Furthermore, Chen et al. (2015b) ascertain that the networks an enterprise establishes bear an impact on its success. However, their research goes beyond this assertion, unveiling that this correlation is mediated by information access.

Based on the aforementioned elaboration, the following hypotheses are formulated:

H3: Access to information for SMEs is positively and significantly correlated with SME performance enhancement.

H4: The correlation between SME collaboration with the triple helix framework and SME performance enhancement is mediated by information access.

2.6   Mass Media

Mass media is a societal institution that produces and disseminates information to the entire population (Hirsch, 1977). Its primary function is to spread information. Traditionally, mass media referred to the four main mediums: newspapers, magazines, radio, and traditional TV. However, with the current technological advancements, all these media channels are now accessible digitally via the internet, blurring the distinction between traditional and digital mass media.

The term "mass media" serves as a means to publicise news. It also implies that the published news is consumed by the general public or the masses. The public has an interest in knowing vital information; thus, the main function of mass media is to provide and disseminate such information to the public (Saragih, 2009). It can be said that mass media plays a significant role in society. Schramm (1964) even asserts that communication through mass media has a profoundly positive and substantial impact on economic development.

In the context of SMEs, mass media can be a collaborative partner to enhance their access to information. Mass media functions to correlate information obtained from and for the target audience, ensuring that the public receives the information they need (Kovach and Rosenstiel, 2021). Mass media acts as a communication

and information bridge between SMEs and collaborative partners within the triple helix framework.

Based on the elaboration above, the following hypothesis is formulated:

H5: Collaboration with mass media mediates the relationship between SME collaboration with the triple helix framework and the enhancement of information access for SMEs.

The conceptual framework depicting the relationship between the variables under study is presented in Figure 1.
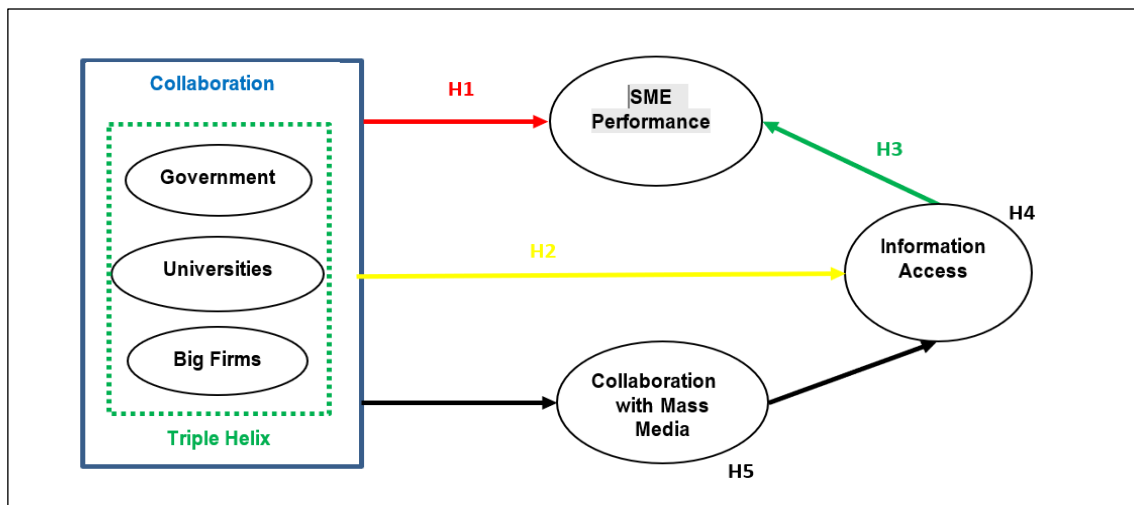

Figure 1 – Conceptual Framework

3 METHODOLOGY

In pursuit of the research objectives, quantitative data was gathered from SMEs affiliated with the Business Communication Forum of SMEs in Malang Regency through an online distributed questionnaire. The Forum encompasses 12 SME associations, representing approximately 600 various business units, all of which are included as the sample population. The respondents, predominantly business owners and managers, participated in the survey.

The selection of measurement items was based on a comprehensive literature review. Indicators previously employed in prior studies were adapted to suit the specific conditions of this research for measuring the respective constructs. Six items were used to evaluate collaboration with the government (Noya et al., 2023; Ueasangkomsate and Jangkot, 2019; Guerrero and Urbano, 2017), another six items to assess collaboration with universities (Noya et al., 2023; Ueasangkomsate and Jangkot, 2019; Guerrero and Urbano, 2017), and six additional items for measuring collaboration with large corporations (Noya et al., 2023; Ueasangkomsate and Jangkot, 2019; Guerrero and Urbano, 2017). Additionally, seven items were employed to gauge collaboration with mass media (Noya et al.,

2023; Ueasangkomsate and Jangkot, 2019; Zerfass et al., 2016), six items to measure information access (Imran et al., 2019; Sparks and McCann, 2015), and five items to assess the performance of Small and Medium Enterprises (SMEs) (Wijaya and Suasih, 2020; Chege and Wang, 2020; Kallmuenzer and Scholl-Grissemann, 2017; Franco et al., 2016; De Zubielqui et al., 2016; Gronum et al., 2012). All of these items were structured within an online survey questionnaire. Respondents were required to rate each item on a five-point scale, ranging from 1 (disagree) to 5 (strongly agree). The survey was distributed to SMEs in the Malang Regency of Indonesia, resulting in 545 valid responses. Data collection was conducted in October 2023.

The data analysis was conducted using Warp Partial Least Squares-Structural Equation Modelling (WarpPLS-SEM) software version 8.0. This software is used because it enables handling second-order constructs (Wetzels et al., 2009) and directly shows the impact of mediating variables (Kock, 2017). The analysis involved two phases: the first phase focused on the analysis of first-order constructs, which included dimensions of collaboration variables and also examined the validity and reliability of the measurement model. Second-order analysis was then performed to analyse the model of correlation between variables.

4   RESULTS AND DISCUSSION

The model in this study underwent a rigorous evaluation using Model Fit and Quality Indices as outlined in the WarpPLS User Manual (Kock, 2017). Based on that, The Average Path Coefficient (APC) is found to be statistically significant at a significance level of 1%, indicating that the latent variable in the model is significant. Similarly, the average R-squared (ARS) also shows statistical significance at the 1% level, signifying a meaningful relationship between the exogenous latent variable and the endogenous latent variable. This is further reinforced by the strong explanatory capability of the analyst's model, as demonstrated by the substantial Tenenhaus GoF index (0.616). Other indices are also acceptable as long as the Average Full Collinearity VIF (AFVIF) surpasses the predetermined standard. The elevated value of AFVIF implies that each major latent variable exhibits full collinearity. Consequently, the entire model can be considered appropriate for testing the research hypothesis.

The validity and reliability of the measurement model were tested based on the rules of thumb, according to Hair et al. (2014). The validity test was conducted by utilising Average Variances Extracted (AVE), while reliability utilised composite reliability and Cronbach Alpha. Statistical analysis shows that the cross-loading of all items in the measurement instrument is greater than 0.70, and the AVE is greater than 0.50. The composite reliability and Cronbach Alpha values for all variables are greater than 0.70. It demonstrates that the research measurement model's validity and reliability match the statistical requirements.

The data portrayed in Figure 2, which is further expounded in Table 2, reveals that all path coefficients exhibit positive values and p-values below 0.05. As reported in Table 2, H1 is significantly and positively confirmed. This signifies that collaboration with the triple helix ecosystem has a positive impact on SME performance. These findings corroborate prior research, advocating for SMEs to engage in partnerships with the triple helix ecosystem to enhance their performance (Maziriri et al., 2021; Ueasangkomsate and Jangkot, 2019).

Government, universities, and big firms possess valuable resources, primarily information resources, which SMEs lack access to. Collaborating with these entities opens avenues for information access to SMEs. This proposition gains further credence from the statistical analysis supporting H2, which indicates that collaboration with the triple helix ecosystem positively and significantly broadens information access for SMEs. Such findings align with earlier studies, exemplified by Ferreras-Méndez et al. (2016), which demonstrated that interaction with external partners enhances SMEs' capacity to absorb new information. Access to external resources aids SMEs in overcoming their information constraints.

Information access plays a pivotal role in an organisation. Comprehensive information supports an organisation in formulating corporate procedures and mechanisms, facilitating decision-making, and fostering innovation (Laužikas and Dailydait, 2015; Avram and Priescu, 2012). Ultimately, this condition enables a company's development. Hypothesis 3 (H3), supported in this study, reaffirms these premises.
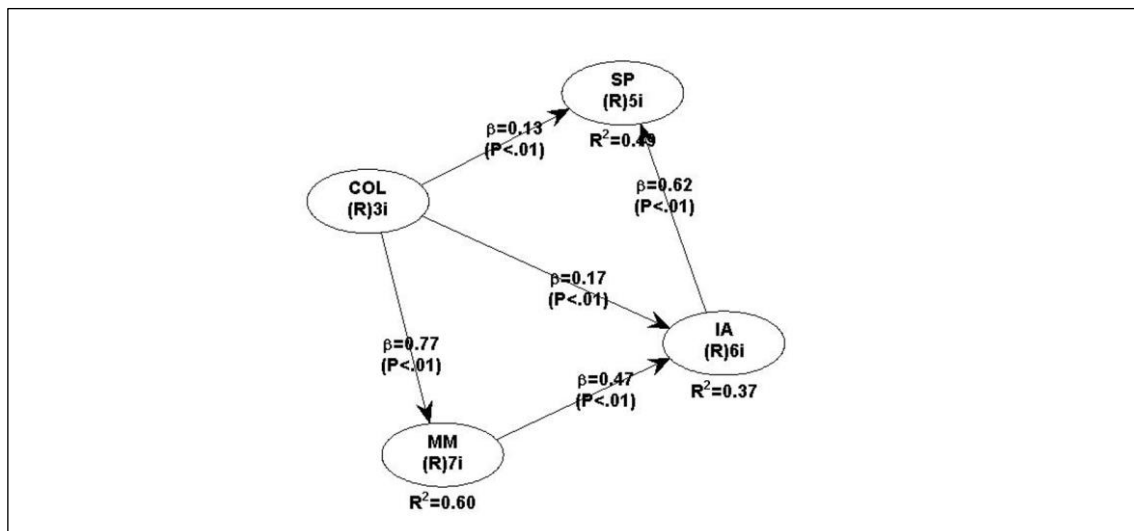

Figure 2 – Second-Order Statistical Analysis Result

Table 1 – Analysis Result

Correlation	Direct Effect		Indirect Effect		Total Effect	VAF
	Coefficient	P Value	Coefficient	P Value		
COL → MM	0.771	< 0.001				
COL → IA	0.173	< 0.001	0.361	< 0.001	0.534	0.676
COL → SP	0.133	< 0.001	0.107	< 0.001	0.463	0.367
MM → IA	0.468	< 0.001				
IA → SP	0.618	< 0.001				

In the meantime, H4 and H5 aim to uncover the mediating effects of information access and collaboration with mass media. The extent of these mediating effects is quantified using the Variance Account For (VAF), which measures the ratio between indirect effects and total effects. VAF values above 80% indicate full mediation, VAF values between 20% and 80% are categorised as partial mediation, and VAF values below 20% signify no mediating effect (Hair et al., 2014).

Based on the data presented in Table 1, it is observed that the correlation construct between collaboration and SME performance, mediated by information access, possesses a VAF of 0.367. This underscores that information access exerts a partially mediating effect on the relationship between collaboration and SME performance. However, a comparison of the indirect coefficient (0.107) with the direct coefficient (0.133) suggests that the mediating effect of information access in this correlation is relatively insignificant. Nevertheless, given the VAF value and a p-value exceeding 0.05, H4 can be confirmed.

Conversely, while the role of information access as a mediator exhibits a moderately weak to moderate effect, collaboration with mass media significantly mediates the correlation between collaboration with the triple helix and information access in SMEs. This finding aligns with the viewpoint of Milagres and Burcharth (2019), who contend that external collaboration plays a mediating role in facilitating information exchange among organisations. In this construct, the VAF value is 0.676, signifying a strong partial mediating effect. Notably, the indirect coefficient (0.361) surpasses the direct coefficient (0.173), underscoring that despite partial mediation, the role of mass media collaboration is pivotal in bridging SMEs to access information from government, universities, and large corporations. Mass media's various communication channels and information delivery methods (Khoshnodifar et al., 2016) empower them to extract and convey information from these entities to SMEs.

Table 2 – Hypothesis Test Result

Hypothesis	Construct	Relationship	Significance	Hypothesis Result
H1	COL → SP	Positive	Yes	Supported
H2	COL → IA	Positive	Yes	Supported
H3	IA → SP	Positive	Yes	Supported
H4	COL → IA → SP	Positive	Yes	Supported
H5	COL → MM → IA	Positive	Yes	Supported

The significance of media, alongside the culture and values it promotes within the context of the fourth component in the quadruple helix model proposed by Carayannis and Campbell (2009), is considered essential for the innovation ecosystem. According to the social cognitive theory of mass communication (Bandura, 2009), media plays a pivotal role in driving change by informing, empowering, motivating, and guiding its audiences. Mass media can function as a collaborative element within the innovation ecosystem, as it disseminates information to the general public, including potential consumers, regarding the products offered by SMEs. Mass media should reinforce its position in advocating for SME products by serving as an intermediary among all stakeholders, providing vital information to SMEs, and facilitating the online marketing of their products.

5   CONCLUSION

The findings of this study affirm the crucial role of SME collaboration with the triple helix ecosystem, both directly and indirectly, in enhancing information access and SME performance. Information access, represented by a moderately substantial coefficient, has proven to be a pivotal factor in boosting SME performance. In the context of enhancing information access for SMEs through collaboration with the triple helix ecosystem, mass media can be regarded as a mediator that extracts and transmits information from government, universities, and big corporations to SMEs. Within this construct, the indirect effect surpasses the direct effect, underscoring the significant importance of mass media collaboration for SMEs. Its effective communication functions will aid SMEs in expanding their information access.

This study carries several practical implications. Firstly, it suggests to SME owners and managers that they should consider improving their information access by engaging in collaborations with external partners such as government, universities, and big firms to enhance their firm's performance. Secondly, collaboration with mass media entails proactive and reciprocal actions undertaken by SMEs, extending beyond passive information consumption from mass media outlets such as radio, newspapers, television, and the Internet. There should be an active effort to engage in mutual interactions with mass media entities. Thirdly, concerning the expansion of information access for SMEs, the triple helix innovation ecosystem

requires additional elements, with mass media serving as a mediator for the transfer of information from government, universities, and large corporations to SMEs. The concept of the triple helix can be extended to a quadruple helix with the inclusion of mass media as an additional element. Within the quadruple helix ecosystem, mass media can serve as a supplementary component alongside government, universities, and industry, supporting the Development of SMEs by expanding their information access.

The limitation of this study is that the collaboration of SMEs with each element of the triple helix is still examined separately. Yet, as a unified ecosystem, this collaboration should be further investigated in terms of their mutual cohesion. This limitation could be addressed as an issue for future research. Another avenue for future research could explore additional elements beyond mass media that may play a role in the N-tuple Helix collaboration to support SME development.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.