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Open Innovation in MSMEs: The Mediation Role Between Human Capital and Innovation Culture and Its Impact on Business Performance

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ABSTRACT: Open innovation has an essential impact on innovation activities and the competitiveness of MSMEs. Apart from that, it is an exciting topic for academics and practitioners. Open innovation practices and human capital are more frequently discussed in large companies from a developed country perspective and are associated with higher business performance. However, the influence of the open innovation paradigm on human capital and its consequences on business performance in the context of developing countries have yet to be thoroughly explored. This research aims to analyze the influence of human capital and innovation culture in supporting open innovation practices on business performance. This research was conducted on MSMEs in Padang City, West Sumatra, Indonesia. Using quantitative methods, samples were taken using purposive sampling of as many as 200 MSME actors in Padang City. The findings in this research are that there is a positive and significant influence of human capital on open innovation, innovation culture on open innovation, and open innovation on business performance. Open innovation has also successfully mediated the relationship between human capital and business performance and innovation culture with business performance. The results of this research have important theoretical and practical implications for policymakers and MSME actors. These findings underscore the importance of human capital and innovation culture on business performance through open innovation. To improve MSMEs' performance, managers/owners must simultaneously strive to increase human capital and innovation culture through open innovation practices.

KEYWORDS: Human Capital, Innovation Culture, Open Innovation, Business Performance

I. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are essential for economic development, creating jobs, reducing unemployment, and improving the economy. Most MSMEs originate from small and home industries, serving the lower middle class, making them essential for a resilient community economy. Despite economic challenges and the threat of recession, MSMEs can develop through revitalization efforts. In Indonesia, MSMEs are the backbone of the economy, with 64.2 million businesses employing 116 million workers. The government focuses on digitalization to support MSMEs, integrating 4.3 million actors into the system. MSMEs are encouraged to embrace technological advances for growth and competitiveness. The Padang City Government collaborates with MSMEs by providing training and education to increase opportunities for promotion and innovation. For approximately 120,000 business actors in Padang City, including 45,000 MSMEs, the correct use of social media knowledge can lead to increased growth and improved business performance in the future.

The ability and knowledge of business actors to manage their business can improve the performance of MSMEs with the support of human resources (owners or business actors). Organizational performance is critical to achieving goals and surpassing competitors. (Pap et al., 2022). This is determined by the organization's ability to innovate, supported by open innovation. (Lopes et al., 2022). Innovation drives optimal organizational performance, reflecting the organization's primary goals. (Rumanti et al., 2023). Open innovation involving external parties positively influences various organizational performance measures. (Fetrati et al., 2022; Rumanti, 2021; Rumanti et al., 2023). Open innovation is necessary for long-term competitive advantage and improved performance, especially in micro, small, and medium enterprises (MSMEs) (Rumanti et al., 2023).

The influence of open innovation on organizational performance is not easy to investigate, even though, in practice and theory, the open innovation approach seems beneficial for organizations (Rumanti, 2021; Rumanti et al., 2023). All these analyses have reported on the importance of open innovation for SMEs by showing evidence based on existing research in this context

(Chabbouh & Boujelbene, 2020; Papa et al., 2018; Popa et al., 2017; Scuotto et al., 2017; Usman, 2018). Kraus is generally deep (Chabbouh, 2022), and publications related to open innovation in SMEs as a core field still need to be expanded in number.

Innovation capabilities are critical for companies to meet customer needs and adapt to external turbulence. However, organizations in emerging and developing markets need more resources and capital for successful innovation. (Le & Le, 2023). Researchers emphasize the role of human capital and knowledge in enhancing innovation competence. (Gui et al., 2022). Knowledge and human resources are invaluable for organizations to initiate change and achieve competitive advantage. Human capital with high involvement can formulate and develop the attitudes, skills, and behaviour necessary for innovation. (Le & Le, 2023). (Hossain & Kauranen, 2016) Despite the increasing importance of MSMEs in industry, much of the literature needs to contain more insight into MSMEs from an open innovation perspective. In this regard, only a few studies have focused on the antecedents that encourage openness among MSMEs. Therefore, there needs to be more understanding of how companies can adopt open innovation practices and translate openness into results. In addition, individual-level factors that determine firm-level openness still need to be improved. As a result, the "human side" of open innovation remains poorly understood.

Based on research results(Latifah et al., 2022), many studies have examined the determinants of innovation in SMEs in the last few decades. However, very few studies link human capital to innovation. Human capital is a set of skills, knowledge, capabilities, and attributes contained in humans, which are very important for a company's capacity to absorb and organize knowledge and innovate. Research on human resources has traditionally focused on education and training. Concern for motivationally relevant elements of human capital, such as employee job satisfaction, organizational commitment, and willingness to change in the workplace, have all been shown to drive innovation.(Lenihan et al., 2019). Companies must invest in various forms of human capital, namely a highly educated workforce, experienced managers, and strategic human resource (HR) practices to develop human capital through technical skills and competencies.(Capozza & Divella, 2019).

Although open innovation systems have drastically improved manufacturing performance, many organizations cannot utilize negation systems due to cultural barriers(Qureshi et al., 2021). Several studies argue that organizational culture shapes behaviour and performance (Qureshi et al., 2021).(Naranjo-Valencia et al., 2016)This study investigated the indirect relationship between organizational culture and performance through open innovation. It found that different cultures can promote or limit open innovation activities, depending on the values promoted by the organization.

The Resource-Based View (RBV) theory states that unique and rare resources become a competitive advantage for companies. (J. Barney, 1991; J. et al., 2001). These resources include human capital, the knowledge, skills, or abilities of employees in the organization. (Schultz, 1961) Organizational knowledge comes from human capital, while innovation comes from that knowledge. If an organization develops its human resources, including knowledge, skills related to creativity, and the development of new ideas, then innovation will be created.(Ouedraogo & Koffi, 2018).

II. CONCEPTUAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Social Exchange Theory (SET)

Social Exchange Theory (SET) was pioneered by (Homans, 1961) and developed by (Blue, 1964), explores social relationships in terms of mutual benefits and exchange. SET states that social behaviour is the result of exchanges in which individuals seek rewards while minimizing costs (Ibeku & Nwagwu, 2024). The main dimensions of SET include the perceived rewards in the exchange, the effort to minimize costs and the formation of trust through repeated interactions. Trust allows individuals to predict and anticipate the integration of external ideas and resources into the positive behaviour of others where the exchange is taking place (Cortez Mora et al., 2022). SET views social interaction as the basis of human relationships, emphasizing the role of reciprocity and mutual benefit in shaping social structures. Applications of this theory cover a wide range of social processes, offering a framework for understanding interactions and exchanges in social environments (Ibeku & Nwagwu, 2024).

This theory explains how individuals assess relationships with others based on their perceptions. Versus the balance between what is in and what is out of a relationship. the type of relationship that lasts, and the opportunities for better relationships with others. Social exchange theory provides a basis for thinking about the interactions of entrepreneurs, their attitudes, innovative cultures, and behaviours that can affect open innovation and overall organizational innovation (Engelsberger, 2022). SET explains the dynamics of reciprocal exchange and trust-building behaviours that enhance collaboration and performance in MSMEs (Ibeku & Nwagwu, 2024).

Human Capital

Human capital, in the context of HR management, refers to the value added by individuals through their skills, knowledge, and experience that can be optimized to achieve organizational goals. Effective development and management of human capital are

essential to a company's success and competitiveness (Noe et al., 2014). Human capital is considered one of the important resources for gaining a competitive advantage (Alkhateeb et al., 2016; Delery & Roumpi, 2017; Prajogo, DI; Oke, 2016).

From another view, human capital is the heart of innovation (AlQershi et al., 2019). This is related to the innovation, knowledge, skills, competence and capabilities of employees; employees produce human resources through their competence, attitude and intelligence. Competence includes skills and education; attitude includes dimensions of employee work behaviour, while intelligence is based on innovation and solutions to business problems (AlQershi et al., 2019; Bornay-Barrachina et al., 2017; Danquah & Amankwah-Amoah, 2017; Debrah et al., 2018). Organizations that apply high-engagement human resources to improve their innovation outcomes will transform existing capabilities into superior employee competencies and behaviours to innovate (Le & Le, 2023).

Culture of Innovation

(Hogan & Coote, 2014) emphasizes that the values, habits, and beliefs of organizational members shape the culture of the organization, including the culture of innovation. Such values include the courage to try new things, tolerance of mistakes, and a willingness to learn and adapt. Overall, a culture of innovation is a critical component of successful innovation in an organization. It includes supporting creativity, being open to new ideas, being willing to take risks, and systems that support experimentation and learning from failure. Culture demonstrates values and beliefs that provide a basis for predictable behaviours that employees follow (Shafiq & Qureshi, 2014). According to Gregory et al. (Qureshi et al., 2021), managers and management researchers assume that culture influences innovation in companies. Culture is a key element in obtaining desired innovation results.

On the other hand, Phillips (Qureshi et al., 2021) shows that culture can be an unlikely, however substantial barrier to innovation. Similarly, the existing literature on open innovation emphasizes that innovation culture is a significant challenge to the adoption of open innovation. In an organizational setting, innovation culture contributes to the discovery of entrepreneurial opportunities through behaviours and activities that result in new products, the provision of new services, improvements to current products and services, innovations that result in cost savings, or improvements to work processes. Therefore, it is essential to develop a culture of innovation in an organization so that all its members are continuously searching for new products and services (Ataei et al., 2024).

Open Innovation

Founder of open innovation (Chesbrough, 2003) suggests that open innovation has been proposed as a new paradigm for innovation management. In addition, if companies want to create value from their technologies, they must use the concepts of internal and external, as well as internal and external channels to the market. The use of knowledge inflows and outflows, which aims to accelerate internal innovation and expand the market for external innovation, is known as open innovation (Chabbouh & Boujelbene, 2020). Open innovation leads to a paradigm shift in innovation management (Bogers et al., 2019). Open innovation shows how practical concepts can be obtained from the market, internal and external stakeholders of the organization, and other sources. The rapid growth of technology drives the popularity of open innovation practices, organizations can accelerate internal and external innovation and expand markets through the inward and outward transfer of technology and knowledge (Rumanti, 2022). Organizational performance plays a key role in today's business competitiveness (Sucena et al., 2024). Organizational performance implies the ability to implement strategies that improve the organization and its results effectively.

Business Performance

Organizational performance is critical to the survival and success of a business. Various indicators can be used to measure innovation performance, such as the number of patents filed, the growth rate of new products, increased customer satisfaction, or improvements in operational efficiency. In addition, an assessment of the processes and organizational culture that support innovation is also needed (Rumanti et al., 2023). Every company tries to achieve good organizational performance in order to survive and compete with competitors. Performance measurement and analysis are critical in directing the organization toward realizing its strategic and operational goals. Organizational performance is information about the achievement of an organization to effectively implement strategies that improve the organization and its results (Kengatharan, 2019). Meanwhile, according to (Sucena et al., 2024), organizational performance is the ability of an organization to increase its productivity and consequently increase its competitive advantage over competitors.

Hypothesis Development

Human Capital and Open Innovation

A key component for business actors to survive and grow in a dynamic and competitive environment is innovation (Kim et al., 2021). The innovation process requires a lot of knowledge, experience, intelligence, and education from human resources or human capital (Ali et al., 2021; Latifah et al., 2022). Generally, human capital is seen as the most fundamental knowledge asset in an organization. An organization will excel in innovation if it has a good understanding of developing creativity in its human resources and especially the role of human capital, as part of intellectual capital, to enhance innovation (Ali et al., 2021; Chabbouh & Boujelbene, 2020; Fonseca et al., 2019; Latifah et al., 2022). Meanwhile, the conflicting results show that human capital does not influence innovation (Capozza & Divella, 2019). Human resources are a company's unique special assets that competitors cannot imitate. The knowledge, skills, and experience inherent in individuals play an important role in the innovation process (Schultz, 1961). Entrepreneurs who have high human capital tend to collaborate with external relations to exchange information and knowledge and to create innovation (Shin, 2017).

In the field of human resource research, particularly that which discusses MSMEs, there needs to be more research on the various forms of human capital that are capable of encouraging the exchange of knowledge between business actors in innovation (Annamalai et al., 2023). This study will provide solid insights and policies for business actors in various countries to collaborate and encourage healthy competition. Human capital is important because it facilitates the exchange of knowledge between businesses, thereby creating a network of relationships for business success. However, business actors need to gain awareness of the value of knowledge sharing. In addition, empirical research on the topic of knowledge sharing still needs to be conducted in the context of MSMEs. The importance of the concept of human capital in MSMEs has been widely recognized. However, the measurement presented in the theoretical model of how human capital can help businesses create value still needs to be improved (Sabando-Vera et al., 2022). Research in the context of developing countries shows that high-involvement HRM practices are essential and a wise choice to enhance innovation competency for organizations with limited resources in capital and technology because they enable companies to maximize the potential of employees' ability to innovate (Le & Le, 2023). Therefore, the following hypothesis can be put forward:

H1: Human capital has a positive and significant effect on open innovation.

Innovation Culture and Open Innovation

Researchers have discussed the culture for successful open innovation, including risk-taking, innovation, learning orientation, external integration, product champions, and rewards and incentives for innovation. However, there are limitations in understanding the relationship between organizational culture, open innovation systems, and organizational performance. Cultural elements need to be better mapped in terms of different cultural dynamics, and it is unclear which type of organizational culture is best suited to fostering open innovation systems in the manufacturing industry (Davoudi, 2018; Qureshi et al., 2021). Previous studies have shown that culture shapes corporate innovation outcomes (Naqshbandi & Tabche, 2018). A culture of innovation values the creation, diffusion and internalization of new ideas among its members and, thus, supports the development of its members and facilitates the creation and sourcing of ideas and knowledge exploration in the company (Naqshbandi & Tabche, 2018).

Although small and medium enterprises (SMEs) have the potential to drive innovation, encourage competition, and contribute to economic growth, their performance could be improved by various factors. Socio-cultural variables are closely related to the performance of SMEs (Ibeku & Nwagwu, 2024). According to the research results (Ibeku & Nwagwu, 2024), states that innovation culture has a significant positive effect on MSME performance. Therefore, the following hypothesis can be proposed: H2: Innovation culture has a positive and significant influence on open innovation.

Open Innovation and Business Performance

Open innovation is a conceptual framework for MSMEs to benefit from innovation through leveraging knowledge flows (Singh et al., 2021). Open innovation is a holistic approach to managing innovation, encouraging the exploration of internal and external sources, and integrating them with strong capabilities and resources (Yun et al., 2020). Interaction between an organization and its employees is critical to successful innovation and performance improvement (Alqershi et al., 2020; Pap et al., 2022; Rumanti et al., 2023). In the context of MSMEs, open innovation is a strategy for business leaders/owners to access external capabilities, supporting MSME performance (Scaliza et al., 2022). Through open innovation, organizations can innovate by interacting with external parties, improving organizational and economic performance, and adapting to the opportunities and challenges of digitalization (Brodny & Tutak, 2022).

Several studies have shown the importance of open innovation in organizational performance (Capozza & Divella, 2019; Chabbouh, 2021; Rumanti, 2021; Rumanti et al., 2023). Several studies have shown that open innovation positively affects various measures of organizational performance (Popa et al., 2017; Singh, 2021). Therefore, SMEs can benefit from external knowledge, as they are more responsive to market needs and also flexible compared to large organizations (Spit hoven, Vanhaverbeke, & Roijakkers, 2013) and tend to improve their overall performance through open innovation (Popa et al., 2017). Therefore, the following hypothesis can be put forward:

H3: Open innovation has a positive and significant effect on business performance

Open Innovation Mediates Human Capital And Innovation Culture On Business Performance

The literature highlights innovation as one of the most important factors influencing performance (Nieves & Quintana, 2018; Salem, 2014), where giving new entrants the opportunity to open up a market and gain a foothold in it provides the basis for a company's success by determining the level of competitiveness of the company. Several investigative studies have examined the impact of human resource management (HRM) practices on innovation performance. The literature shows that empirical findings on the relationship between innovation and SME performance are still minimal (AlQershi et al., 2019). In this research, several authors have shown that certain practices directly affect innovation performance (Nieves & Quintana, 2018). However, a different group of researchers found that this practice affects innovation indirectly (Nieves & Quintana, 2018).

Literature review shows that human capital and innovation culture variables are some of the factors that influence business performance through open innovation. Both variables are expected to influence the dependent variable, namely business performance, indirectly through the mediation of open innovation. In addition, human capital and innovation culture are expected to have an impact on the dependent variable with the mediation of open innovation. Therefore, the following hypothesis can be proposed:

H4: Open innovation mediates the relationship between human capital and business performance.

H5: Open innovation mediates the relationship between innovation culture and business performance.



Figure 1. Conceptual Framework

III. METHODOLOGY

This study analyzes the role of open innovation in mediating the relationship between human capital and innovation culture on business performance with the object of research on MSMEs in Padang City, West Sumatra. This study is aimed at MSME actors in Padang City. This study will use a quantitative approach with a survey method through the distribution of questionnaires. The questionnaire is aimed at MSME actors in Padang City. In this study, three analysis methods were carried out. First, all variables were searched in the existing literature. Several items were modified to fit the specific context of the study. All constructs were measured through responses on a five-point Likert scale (from 1 = strongly disagree to 5 = strongly agree), which was created in the questionnaire to measure respondents' responses (Hair et al., 2019). Second, the suitability of the questionnaire (measuring instrument) is tested with the measured (reliability test), and the accuracy of the measuring instrument is tested against the measured (validity test). Third, for the needs of the implementation of the data processing process, this study uses data analysis techniques using the Partial Least Squares Structural Equations Modeling (PLS-SEM) statistical technique, which is a statistical software SmartPLS statistical tool. Finally, a descriptive analysis is carried out to provide an overview of the weighting of the question items. The population in this study were MSME actors in Padang City. Sampling by purposive sampling was 200 respondents.

IV. RESULTS AND DISCUSSION

The study's respondents' profiles aim to describe the description or condition of the respondents being studied. Based on the distribution of 200 questionnaires, researchers get a picture of the respondent profile and other data.

Respondent Characteristics		Frequency	Percentage (%)
Gender	Man		
	Woman	78	39
Age of Business Owner	< 20 years	8	4
	21 – 30 years	92	46
	31 – 40 years	64	32
	41 – 50 years	27	13.5
	> 50 years	9	4.5
Age of MSMEs	< 2 years	59	29.5
	25 years	91	45.5
	> 5 years	50	25
Business Criteria	Micro	85	42.5
	Small	62	31
	Intermediate	53	26.5
Type of business	Food	79	39.5
	Drink	42	21
	Fashion	49	24.5
	Automotive	17	8.5
	Agribusiness	7	3.5
	Beauty	6	3
Operating revenues	≤ Rp. 500,000,-	12	6
	Rp. 500,001 - Rp. 1,000,000,-	79	39.5
	Rp. 1,000,001 - Rp. 2,000,000,-	72	36
	≥ Rp. 2,000,000,-	37	18.5
Last Education of Business Owner	Junior high school	13	6.5
	Senior high school	140	70
	Bachelor	47	23.5

Table 1. Respondent Characteristics

The respondents in this study were primarily female, namely 122 people (61%). The age of the actors/owners of MSMEs in this study was mostly 21-30 years old, namely 92 people (46%). Meanwhile, the age of MSMEs was dominated by MSMEs aged 2-5 years, namely 91 people (45.5%). The criteria for MSMEs with the majority of micro-businesses were 85 people (42.5%), the most in the type of food business, and as many as 79 people (39.5%). The income of the respondents' businesses was mainly in the range of IDR 500,000 - IDR 1,000,000 - as many as 79 people (39.5%), while most MSME actors had a high school education as many as 140 people (70%). The respondents who used Instagram social media were primarily respondents, namely 100 MSME owners (50%), who most used Instagram social media.

Next, validity and reliability tests are carried out. Convergent validity can be seen from the correlation between the item/indicator score and the construct score. The indicator is considered valid if the correlation value is greater than or equal to 0.60 (Hair et al., 2019)



Note: HC = Human Capital; IC = Innovation Culture; OI = Open Innovation; BP = Business performance Figure 1. PLS Algorithm Analysis Results

After data processing, there are still research variable indicators that have an outer loading value <0.6. In order to meet the requirements of convergent validity, the solution that can be given is to drop BP1 and BP2. So that the results of the outer loading value> 0.6 are declared feasible or valid and can be used for further analysis (Hair et al., 2019).

Discriminant testing validity can be done by looking at the discriminant validity of the measurement model with reflective indicators assessed based on the cross-loading of construct measurements. The results of the discriminant validity test are shown in Table 2. From the results of the discriminant validity test, the correlation between the human capital, innovation culture, open innovation, and business performance constructs and their indicators is higher than the correlation between the indicators and other constructs. These results indicate that the construct of each research variable is able to predict the indicators in the block better than the indicators in other models (Hair et al., 2019).

	Business Performance	Human Capital	Innovation Culture	Open Innovation
BP3	0.821	0.204	0.181	0.311
BP4	0.824	0.242	0.161	0.311
BP5	0.721	0.077	0.052	0.182
HC1	0.228	0.850	0.377	0.479
HC2	0.139	0.858	0.272	0.361
HC3	0.152	0.784	0.208	0.306
HC4	0.194	0.615	0.263	0.131
HC5	0.232	0.603	0.186	0.176
IC1	0.054	0.216	0.628	0.150
IC2	0.131	0.231	0.726	0.177
IC3	0.087	0.237	0.717	0.200
IC4	0.129	0.287	0.786	0.270
IC5	0.175	0.247	0.615	0.325
OI1	0.303	0.367	0.307	0.778
012	0.369	0.380	0.322	0.848
013	0.249	0.350	0.181	0.804
014	0.236	0.255	0.284	0.794
015	0.204	0.365	0.273	0.724

Table 2. Discriminant Validity Test Results Items Based on Cross-Loading

Another method to assess discriminant validity is to compare the square root of the Average Variance Extracted (AVE) value of each construct with the correlation between one construct and another construct in the model.

Variables	Performance	Human	Innovation	Open
	Business	Capital	Culture	Innovation
Performance Business	0.790			
Human Capital	0.238	0.750		
Innovation Culture	0.180	0.358	0.697	
Open Innovation	0.353	0.439	0.350	0.791

Referring to Table 3, the value of the indicator has an FLC value (The Fornell-Larcker Criterion), which is the largest on its latent construct when compared with the FLC value on other constructs. The constructs of human capital, innovation culture, open innovation and business performance obtained values that were greater than the correlation values between constructs with other constructs in the model so that the results have good discriminant validity (Hair et al., 2019).

The results of research data processing for construct reliability were measured using composite reliability and Cronbach's alpha.

Table 4. Composite Reliability and Cronbach's Alpha

Variables	Composite Reliability	Cronbach's Alpha
Performance Business	0.708	0.832
Human Capital	0.822	0.863
Innovation Culture	0.749	0.824
Open Innovation	0.851	0.893

The results of data processing show that the composite reliability and Cronbach's alpha values for all human capital, innovation culture, open innovation and business performance are more than 0.70. These results indicate that all constructs in the estimated research model have met the reliable criteria; the construct is declared reliable if the composite reliability and Cronbach's alpha values are > 0.7 (Hair et al., 2019).

The structural model in PLS is evaluated using R2 for the dependent variable and the path coefficient value for the independent variable, which is then assessed for significance based on the t-statistic value of each path.



Note: HC = Human Capital; IC = Innovation Culture; OI = Open Innovation; BP = Business performance Figure 2. PLS Boothstrapping Results Display

To assess the significance of the prediction model in testing the structural model, it can be seen from the T-statistic value between the independent variables to the dependent variables in the Path Coefficient table in the SmartPLS output below:

		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Information
H1	HC -> 0I	0.359	0.364	0.064	5,634	0.000	Accepted
H2	IC -> 0I	0.222	0.241	0.068	3.264	0.001	Accepted
H3	OI -> BP	0.353	0.363	0.058	6.116	0.000	Accepted

Table 5. Path Coefficients Results	s (Mean, STDEV, t-Value)
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Based on the results of the direct influence test in the table above, it can be explained that the T-statistic value> 1.96 and the level of significance shown through the P-values 0.000 <0.05. The results show that hypothesis 1, hypothesis 2 and hypothesis 3 are accepted. Hypothesis 1 is in line with research conducted by (Latifah et al., 2022; Sun et al., 2020) that human capital has a positive and significant effect on open innovation. These results indicate that human capital is an important variable that is considered by business actors and influences the openness of innovation for business actors in Padang City. In addition, open innovation practices emphasize collaboration both inside and outside the organization. Hypothesis 2 is in line with research (Barjak & Heimsch, 2021; Qureshi et al., 2021), which states that innovation culture influences open innovation in organizations. Business actors must focus on developing a culture of innovation in their business, especially how to collaborate when facing the increasing complexity and dynamics of the ever-changing business environment. Therefore, the views of business actors have the potential to change the culture of their business into a culture of innovation by valuing creativity, creating a conducive environment, and valuing competition. Hypothesis 3 is in line with the research (Chabbouh, 2020). Business actors need to be open to developing new ideas with partners, sharing knowledge, and having open opportunities for cooperation with external parties so as to improve the performance of MSMEs.

Table 6. Mean results, STDEV, T-values, P-values

		Original	Sample	Standard	T Statistics	Р	Information
		Sample	Mean (M)	Deviation	(O/STDEV)	Values	
		(0)		(STDEV)			
H5	HC -> OI -> BP	0.127	0.132	0.031	4.094	0.000	Accepted
H6	IC -> OI -> BP	0.078	0.088	0.029	2,658	0.008	Accepted

Based on the results of the indirect influence test in the table above, it can be explained that the T-statistic value> 1.96 and the level of significance shown through the P-values 0.000 <0.05, then the results show a significant effect. It can be explained that open innovation mediates human capital and innovation culture on business performance so that the H5 and H6 hypotheses are accepted. Hypothesis 6, in line with the research (Latifah et al., 2022), that human capital plays an important role in creating open innovation in business in the form of knowledge and skills inherent in each business actor that will be applied to the organization in an effort to improve business performance. This indicates that through the knowledge of heterogeneous business actors, MSMEs can export various knowledge, both tacit and explicit, to develop open innovation, which will have an impact on the success of business performance. Hypothesis 6 is in line with research (Lam et al., 2021), where open innovation is an intermediary of innovation culture to business performance. Innovation culture has become an important driver of open innovation. Business actors can control the complexity of innovation culture through open innovation to improve business performance. Open innovation implies the development of new values that have been generated by integrating markets and innovations from various businesses outside the boundaries of the organization.

CONCLUSIONS

The results of the study are (1) there is a positive and significant influence of human capital on open innovation, (2) there is a positive and significant influence of innovation culture on open innovation, (3) there is a positive and significant influence of open innovation on business performance, (4) open innovation mediates the relationship between human capital and business performance, and (5) open innovation mediates the relationship between innovation culture and business performance. Overall, this study has shown the important role of open innovation in MSMEs in facilitating human capital and innovation culture on business performance. Human capital in MSMEs in the form of knowledge and skills of business actors creates opportunities for collaboration and innovation among internal and external parties, developing a culture of innovation in the form of values such

as curiosity, creativity, flexibility and diversity. Open innovation requires openness, trust, responsibility, authenticity, and sustainability that can ultimately predict business performance. These findings provide a better understanding of the process by which human capital and innovation culture can support the development of open innovation in MSMEs, where MSMEs are currently faced with significant uncertainty and complex challenges in business.

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