



The mediating and moderating of absorptive capacity on human capital toward product innovation within MSMEs in Indonesia

Kusumah Arif Prihatna^{1*}

Idris Gautama So²

Hardijanto Saroso³

Sri Bramantoro Abdinagoro⁴

^{1,2,3,4}Management Department, BINUS Business School Doctor of Research in Management, Bina Nusantara University, Jakarta, Indonesia.

¹Email: kusumah.arif@binus.ac.id

²Email: igautama@binus.edu

³Email: hardijanto.saroso@binus.edu

⁴Email: sabdinagoro@binus.edu

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(* Corresponding Author)

Abstract

The purpose of this study is to explore the role of absorptive capacity as a mediating and moderating factor to enhance the impact of human resources on product innovation in MSMEs engaged in the culinary creative industry. This study adopts a quantitative approach and collects primary data through a survey conducted among a couple of MSMEs in the culinary creative industry. The data is later analyzed using Smart PLS. The findings indicate that human capital and absorptive capacity have an impact on product innovation. The relationship between human capital and product innovation is negatively moderated by absorptive capacity, which also mediates this relationship. The conclusion of this study highlights several key points. Firstly, it emphasizes that MSMEs possess significant potential for generating new and unique product innovations by leveraging increased human capital. Additionally, the study emphasizes the importance for MSMEs in order to enhance their absorptive capacity by strengthening external connectivity within their organizations. Lastly, it points out that the moderating effect of absorptive capacity can potentially reduce the positive influence of human capital on product innovation.

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1. Introduction

In today's intensely competitive business landscape, achieving product innovation is a key determinant of a company's success, including for Micro, Small, and Medium Enterprises (MSMEs). Therefore, it is essential to comprehend the factors that influence a company's ability to generate successful and innovative products. Human capital, which encompasses the knowledge, skills, and experience of employees, has long been recognized as a valuable resource for fostering innovation (Atiase & Dzansi, 2020; Fu, Liu, Yang, Jiao, & Jin, 2020; Marvel, Wolfe, & Kuratko, 2020; You, Zhou, & Jia, 2021). However, in dynamic environments, it becomes imperative to explore absorptive capacity, contribute to innovation and potentially influence the relationship between human capital and product innovation (Akram, Ghosh, & Joseph, 2021; Coronado-Medina, Arias-Pérez, & Perdomo-Charry, 2020; Gallegos, Salvador Durand, & Soria Gomez, 2020; Gao, Ding, & Wu, 2022; Jeong, Chung, & Roh, 2019). Hence, the primary objective of this study is to examine how absorptive capacity affects the relationship between human capital and product innovation as a mediating and moderating component.

A comprehensive understanding of the latent mechanisms and contextual determinants that intricately shape the relationship between human capital and product innovation is still necessary in light of the universally acknowledged significance attached to human capital's crucial role in guiding innovation.

An avenue of conceptual exploration holding considerable potential for illuminating that intricate dynamic is the construct of absorptive capacity, which denotes an organization's prowess in the procurement, assimilation, and strategic leveraging of external knowledge resources. Numerous empirical studies have been highlighted by the potential of absorptive aptitude to function as a mediating factor, expediting the transmission of knowledge from the external milieu to the organizational domain (Duan, Wang, & Zhou, 2020; Li, Zhu, Wei, & Yang, 2022; Stock, Hossinger, Werner, Schell, & Soluk, 2022; Tian et al., 2021). Nevertheless, the publication of absorptive capacity as a moderating factor in the influence of human capital on innovation remains circumscribed. Hence, the objective of present study is to investigate the degree to which absorptive ability in business entities can have a substantial impact on the efficacy of human capital in driving product innovation. This investigation places particular emphasis on micro, small, and medium-sized enterprises (MSMEs) operating within the culinary creative industry.

This study delves into the concept of human capital within the economic context, encompassing the individual or group-based human resources characterized by knowledge, skills, experience, and other attributes that contribute to economic value and productivity (Becker, 1964). Human capital acts as a vital component of intellectual capital, which encompasses non-financial assets associated with knowledge, skills, and intellectual capabilities (Edvinsson & Malone, 1997). The strategic management, development, and utilization of human capital are crucial for enhancing organizational performance, value creation, and facilitating innovation, efficiency, and competitive advantage (Kiran, Shanmugam, Raju, & Kanagasabapathy, 2022; Nicolás-Agustín, Jiménez-Jiménez, & Maeso-Fernandez, 2022). In addition to conducting general company study, scholars have also performed investigations on the impact of human capital on innovation in Small and Medium Enterprises (SMEs). These studies have revealed that personnel with extensive knowledge and skills play a crucial role in promoting innovation within these enterprises (Al-Jinini, Dahiyat, & Bontis, 2019; Madrid-Guijarro, Martin, & García-Pérez-de-Lema, 2021).

This study also examines absorptive capacity, which relates to an organization's capacity to acquire, assimilate, apply, and commercialize new knowledge derived from its external environment (Cohen & Levinthal, 1990; Zahra & George, 2002). The concept of absorptive capacity is a crucial facet of dynamic capacities, as it pertains to the assimilation of external knowledge. This plays a significant role in promoting organisational adaptability and creativity (Daspit, Long, & Pearson, 2019; Zhang, Gupta, Sun, & Zou, 2020). Absorptive capacity empowers organizations to effectively acquire, assimilate and turn external knowledge into practical insights, thereby empowering them to adapt to changing surroundings, capitalise on emerging possibilities, and foster innovation (Carvalho, Rossetto, & Piekas, 2021; Rodrigo-Alarcón, Parra-Requena, & Ruiz-Ortega, 2020). Considerable scholarly inquiry has been dedicated to examine the influence of absorptive ability on innovation, particularly within the context of small and medium-sized enterprises (SMEs). This body of research has established a solid groundwork for the present study. Notably, the aforementioned research provides evidence in favour of the proposition that SMEs possess the capacity to acquire, assimilate, and transform external knowledge into practical insights, ultimately aiming to stimulate innovation (Limaj & Bernroider, 2019; Ortigueira-Sánchez, Stein, Risco-Martínez, & Ricalde, 2020).

This study explores the domain of product innovation, which involves the generation and implementation of original ideas, designs, concepts, or features to enhance or revolutionise existing products. It also involves the development of entirely new products that provide improved attractiveness, functionality, efficiency, or substantial differentiation from existing offerings in the market. This study delves into the realm of product innovation, which encompasses the generation and implementation of original ideas, designs, concepts, or features to enhance or revolutionise existing products. It also involves the development of entirely new products that offer enhanced attractiveness, functionality, efficiency, or significant differentiation from existing offerings in the market (OECD, 2005). Product innovation constitutes a vital aspect of innovation capability and serves as a critical indicator of innovation performance. Organizations that demonstrate consistent capacity to measurable product innovations can establish a competitive advantage fulfil client demands and preferences, enhance product worth, and sustain relevance within a dynamic market environment (Cao, Le, & Nguyen, 2022; Le & Lei, 2019; Lei, Nguyen, & Le, 2019; Skalkos, Kafetzopoulos, Dimitrios, & Dimitris, 2019). Extensive research involving the variable of product innovation has been conducted within the context of SMEs, highlighting the noteworthy observation that SMEs possess the capacity to foster innovation in the domain of product development (Hanaysha, Al-Shaikh, Joghee, & Alzoubi, 2022; Rasheed, Shahzad, & Nadeem, 2021).

This study undertakes an examination of the intricate interactions among the variables in order to comprehensively assess their collective impact on the domain of product innovation. This inquiry extends its purview to examine the potential effects of mediating and moderating factors proposed by absorptive capacity in the intricate nexus between human capital and product innovation. The primary focus of this study is to explore the methods by which organisations can generate product innovations that are responsive to market demands, while also maintaining a competitive advantage. This is based on the understanding that the

knowledge and skills possessed by an organization's employees are influenced by external factors. By delving into the mediating function of absorptive capacity, this study aspires to unveil the mechanisms by which the acquired knowledge and proficiencies of employees materialize into tangible innovative outputs. Furthermore, the study aims to investigate the potential moderating effect of absorptive capacity on the overall relationship between human capital and product innovation. Accordingly, the research inquiries that steer the course of this investigation is delineated as follows: (1) To what extent does human capital wield a statistically significant influence over the realm of product innovation within the landscape of micro, small, and medium-sized enterprises (MSMEs) entrenched in the culinary creative industry? (2) To what degree does absorptive capacity function as a mediating agent within the dynamic interplay connecting human capital and product innovation within the purview of MSMEs operating within the culinary creative industry? (3) How does absorptive capacity manifest its moderating role within the intricate interplay between human capital and product innovation in MSMEs operating in the culinary creative industry?

To examine and explore the role of absorptive capacity, this study will utilise a quantitative approach. The collection of primary data will be facilitated by conducting a survey among a carefully selected sample of MSMEs operating within the culinary creative industry. The data that has been gathered will undergo regression analysis utilising Smart PLS in order to assess the hypotheses that have been put forth. The research sample will be randomly selected from the population of MSMEs operating in the culinary creative business in Indonesia. This selection will be based on predetermined inclusion criteria that are closely aligned with the research topic.

This research endeavours to make a substantial contribution to the current understanding of the interplay between human capital, absorptive capacity, and product innovation. The anticipated findings of this study hold the potential to provide practical guidance for managers and decision-makers, equipping them with valuable insights on how to enhance product innovation through the effective management of human capital and absorptive capacity. Additionally, this research aspires to enrich the academic literature in the domains of innovation management and human resources.

2. Literature Review

2.1. Absorptive Capacity

Absorptive capacity, introduced by [Cohen and Levinthal \(1990\)](#), denotes a company's ability to effectively acquire, assimilate, and apply new knowledge or values sourced through various external outlets. These sources encompass scientific research, technology, customers, competitors, and business partners, as they are all harnessed with the aim of leveraging for commercial purposes.

A strong absorptive capacity empowers enterprises to proficiently assimilate technologies, production methods, and best practices from external sources. The aforementioned skill empowers organisations to cultivate novel products, consequently augmenting their competitive edge within the industry. Furthermore, enterprises can adapt their production operations to align with evolving customer demands and the needs of developing markets, thereby ensuring their continued success ([Dasmit et al., 2019](#); [Zhang et al., 2020](#)).

Absorptive capacity, formulated by [Zahra and George \(2002\)](#), encompasses a series of routines and dynamic organizational processes that enable companies to acquire, assimilate, transform, and exploit knowledge from external sources. Acquisition entails the competency to recognize and evaluate external knowledge while assimilation entails the competency to absorb or incorporate external knowledge within the company. Transformation denotes to the competency to develop internal knowledge by incorporating external knowledge into the company's existing knowledge base. Exploitation signifies the competency to effectively leverage new internal knowledge.

[Zahra and George \(2002\)](#), introduced the concepts of potential absorptive capacity and realized absorptive capacity. Potential absorptive capacity pertains to an organization's future potential to acquire, assimilate, and apply external knowledge. It encompasses the organization's ability to develop the necessary resources and capabilities for effectively leveraging long term external knowledge. Potential absorptive capacity focuses on aspects that can be nurtured and enhanced over time. In contrast, realized absorptive capacity refers to the actual utilization and application of external knowledge by an organization for a specific point. It reflects the extent to which organizations have successfully acquired, assimilated, and applied external knowledge in their practices and innovations. Realized absorptive capacity is associated with tangible outcomes and the level of implementation of external knowledge that has been achieved.

2.2. Human Capital

Human capital, a concept popularized by [Becker \(1964\)](#), acknowledges the capacity of human labour to drive economic growth and bring benefits to individuals and organizations. It refers to the investments made by individuals in education, training, experience, and skills in order to enhance their abilities and productivity, with the ultimate goal of attaining higher future revenue and profits.

Human capital holds significant importance for companies as employees with diverse skills and knowledge enable organizations to pivot, innovate, and achieve sustainable long-term success. They enhance operational efficiency, make informed decisions, and contribute to the overall productivity of the organization.

Furthermore, they bring fresh perspectives, generate new ideas, and contribute to the development of innovative products, processes, and business strategies (Davenport, 1999).

In his work, Becker (1964) introduced the distinction between two fundamental concepts of human capital: general human capital and specific human capital. The concept of general human capital refers to a comprehensive knowledge, skills, and abilities that have wide relevance and may be applied across diverse occupational domains and industries. This type of human capital is transferable, allowing individuals to utilize their professional skills and problem-solving abilities in diverse contexts. Conversely, specific human capital refers to the specialized knowledge, skills, and experience that are specifically tailored to a particular job or industry, often obtained through industry-specific training.

2.3. Product Innovation

Product innovation refers to the application of innovative practices in the development of new or enhanced products. The exploration of innovation capability is a basic issue that has been extensively explored in scientific research (Cao et al., 2022; Le & Lei, 2019; Lei et al., 2019; Skalkos et al., 2019). Teece (2009), introduced the concept of innovation capability and proposes dynamic capabilities as a framework that enables companies to gain a competitive edge through continuous innovation and growth. Within this context, innovation capability represents a critical element of dynamic capabilities, encompassing the organization's capacity to effectively generate, manage, and integrate innovation.

Product innovation can be classified into four distinct typologies: incremental innovation, modular innovation, architectural innovation, and radical innovation. Incremental innovation is a strategic approach that focuses on improving the quality and modifying the composition of a product, while keeping its dimensions and underlying components unchanged. Modular innovation involves modifying the components of a product while maintaining its existing dimensions. Architectural innovation refers to the process of modifying the proportions of a product while preserving the integrity of its original components in alignment with the newly adjusted dimensions. Radical innovation encompasses significant changes to both the dimensions and components of a product, resulting in a complete transformation (Henderson & Clark, 1990).

Product innovation enables enterprises to distinguish themselves from competitors by providing unique and enhanced products, granting them a competitive advantage in the market. By effectively addressing customer needs, product innovation allows companies to stay ahead of the competition. Moreover, product innovation facilitates market expansion, leading to more cost-effective, durable, and value-added offerings that provide customers with greater satisfaction and value (Al-Jobor, Al-Weshah, Al-Nsour, & Abuhashesh, 2020; Falahat, Ramayah, Soto-Acosta, & Lee, 2020; Severo, Sbardelotto, de Guimarães, & de Vasconcelos, 2020).

2.4. Conceptual Framework

Skilled, creative, and innovative human capital, equipped with profound industry knowledge, technological expertise, and market insights, significantly contribute by generating original ideas and unique resolutions, thereby facilitating the creation of new products or the enhancement of existing ones. Research conducted by You et al. (2021) emphasizes that the relationship between human capital and product innovation is influenced by organizational learning and the availability of resources from industrial clusters. Therefore, companies should consider the industrial cluster context and leverage both internal and external knowledge and resources to maximize the positive impact of human capital on product innovation. Marvel et al. (2020), suggested that the collective human capital, encompassing skills, knowledge, and overall experience possessed by company founders, plays a crucial role in the expansion of the knowledge corridor, hence facilitating product innovation. The study additionally reveals that the coach ability of founders, referring to their inclination to actively seek, evaluate, and integrate feedback, is associated with improved utilisation of product innovation and the ability to generate product innovation. Furthermore, Fu et al. (2020) demonstrates that human capital, represented by executives' experience and the average educational level of employees, exerts a positive influence on organizational innovation, encompassing both product innovation and process innovation. Notably, women's ownership in organizations acts as a significant moderating factor that strengthens the relationship between human capital and innovation. According to Atiase and Dzansi (2020), human capital development, involving the enhancement of employees' skills, knowledge, and capabilities, has become a prominent source of strength for product innovation initiatives. In conclusion, previous research provides robust evidence that human capital significantly influences product innovation. Figure 1 illustrates the direct and indirect relationship between constructs as the basis of the hypotheses.

H. Human Capital significantly and positively affects Product Innovation.

The role of absorptive capacity is crucial in shaping product innovation as it enables the acquisition of new knowledge, fosters comprehension, integrates knowledge into the innovation process, and improves organisational adaptability to change. Gao et al. (2022), highlighted the importance of absorptive capacity in linking knowledge search with product and process innovation, underscoring that an organization's effective absorption of new knowledge contributes to its ability to generate product innovation. Furthermore, Coronado-Medina et al. (2020) demonstrated that absorptive capacity mediates the relationship between digital transformation and product innovation. The organization's ability to manage and leverage new knowledge acquired from digital transformation is instrumental in achieving successful product innovation.

Gallegos et al. (2020), emphasized the significance of fostering absorptive ability development in facilitating product creation was underscored. By building robust absorptive capacities and fostering strong relationships with markets and institutions, companies can achieve elevated level of product innovation. Akram et al. (2021), demonstrated the mediating role of absorptive capacity, encompassing both potential and realized absorptive capacity, among search breadth, search depth, and product innovation. Jeong et al. (2019), highlighted the important role of absorptive capacity in bridging external knowledge flows with product innovation, suggesting that increased absorptive capacity can foster both product and process innovation. In conclusion, based on previous research, it can be inferred that absorptive capacity exerts a significant influence on product innovation.

H₅. Absorptive Capacity significantly and positively affects Product Innovation.

Human capital, encompassing traits such as adaptability, rapid learning, broad knowledge, and diverse skills, plays a pivotal role in enhancing the capacity to comprehend and interpret new information. Individuals that exhibit these traits demonstrate a higher level of proficiency in accommodating and acclimating to alterations in their surroundings. Consequently, they contribute to the facilitation of organisations in assimilating, incorporating, and utilising knowledge within their unique organisational frameworks. Bye and Fæhn (2022), underscored the pivotal role played by human capital in enhancing absorptive capacity, wherein elevated levels of human capital enable individuals in comprehending, assimilating, and applying new knowledge more adeptly. This assertion aligns with the findings of Oliveira, Curado, Balle, and Kianto (2020), who expounded on the mediating function of human capital in shaping absorptive capacity, particularly in the context of knowledge sharing dynamics within an organization. They noted that individuals endowed with robust knowledge and skills are better positioned to facilitate the dissemination of knowledge across the organizational spectrum. Similarly, Wu (2020) demonstrated that absorptive capacity plays a mediating role in the intricate interplay between intellectual capital and innovation performance. As human capital constitutes an integral facet of intellectual capital, its potency in influencing an enterprise's capacity to assimilate knowledge and foster innovation performance is palpable. Furthermore, Kato (2020) demonstrated the conspicuous impact of human capital possessed by company founders on the contours of absorptive capacity. In this context, distinct dimensions of human capital, encompassing prior experience in innovation endeavours, industry-specific work exposure, and overarching educational attainment, collectively bolster the fabric of absorptive capacity, augmenting the enterprise's propensity to internalize external knowledge reservoirs. Ahmed, Guozhu, Mubarik, Khan, and Khan (2020), proffered the insight that human capital engenders a discernible influence on realized absorptive capacity, encompassing the processes of transforming and leveraging knowledge within the matrix of the constituent components of intellectual capital, which subsequently reverberates onto the broader terrain of business performance. By synthesising the findings of previous research studies, it can be convincingly argued that human capital plays a significant role in influencing absorptive ability.

H₆. Human Capital significantly and positively affects Absorptive Capacity.

The mediating role of absorptive capacity in the intricate nexus between human capital and product innovation entails the amalgamation of the knowledge and competencies inherent to human capital with novel insights acquired through the organization's endeavors to assimilate, comprehend, and apply external knowledge inputs. This fusion of cognitive resources is instrumental in engendering the genesis of product innovation. The potency of human capital's impact on absorptive capacity augments the potential for synergizing knowledge reservoirs, thereby fostering the realization of product innovation.

For absorptive capacity to effectively operate as a mediating intermediary in the dynamic interplay between human capital and product innovation, it is argued that two essential prerequisites must be fulfilled. Firstly, there must be a noticeable correlation between human capital and absorptive capacity. Secondly, absorptive capacity must display a clear link with product innovation (Hair, Black, Babin, & Anderson, 2019; Sekaran & Bougie, 2016). In this particular context, a preponderance of empirical evidence corroborates the linkage between human capital and absorptive capacity (Ahmed et al., 2020; Bye & Fæhn, 2022; Kato, 2020; Oliveira et al., 2020; Wu, 2020), while concurrently establishing the nexus between absorptive capacity and product innovation (Akram et al., 2021; Coronado-Medina et al., 2020; Gallegos et al., 2020; Gao et al., 2022; Jeong et al., 2019). Hence, it is plausible to deduce that absorptive capacity indeed mediates the intricate relationship existence between human capital and the realization of product innovation.

H₇. Absorptive Capacity significantly and positively mediates the relationship of Human Capital to Product Innovation.

The moderating function of absorptive capacity within the interrelationship between human capital and product innovation refers to how the organization's ability to acquire, assimilate, and apply new knowledge or values from various external sources influences the competencies and knowledge embedded in human capital, which in turn drives product innovation. In proportion to the discernible influence wielded by human capital upon the trajectory of product innovation, the prominence of absorptive capacity in shaping and channeling this influence attains heightened significance.

A moderating effect may occur in conditions where the independent variable has an influence on the dependent variable, and an intended moderating variable has a relationship on the both of independent and dependent variable (Hair et al., 2019; Sekaran & Bougie, 2016). In this case, human capital has an effect on

product innovation (Atiase & Dzansi, 2020; Fu et al., 2020; Marvel et al., 2020; You et al., 2021), human capital has a relationship with absorptive capacity (Ahmed et al., 2020; Bye & Fæhn, 2022; Kato, 2020; Oliveira et al., 2020; Wu, 2020), and absorptive capacity has a relationship with product innovation (Akram et al., 2021; Coronado-Medina et al., 2020; Gallegos et al., 2020; Gao et al., 2022; Jeong et al., 2019). Therefore, it can be concluded that absorptive capacity has a moderating effect on the relationship between human capital and product innovation.

H5. Absorptive Capacity significantly and positively moderates the relationship of Human Capital and Product Innovation.

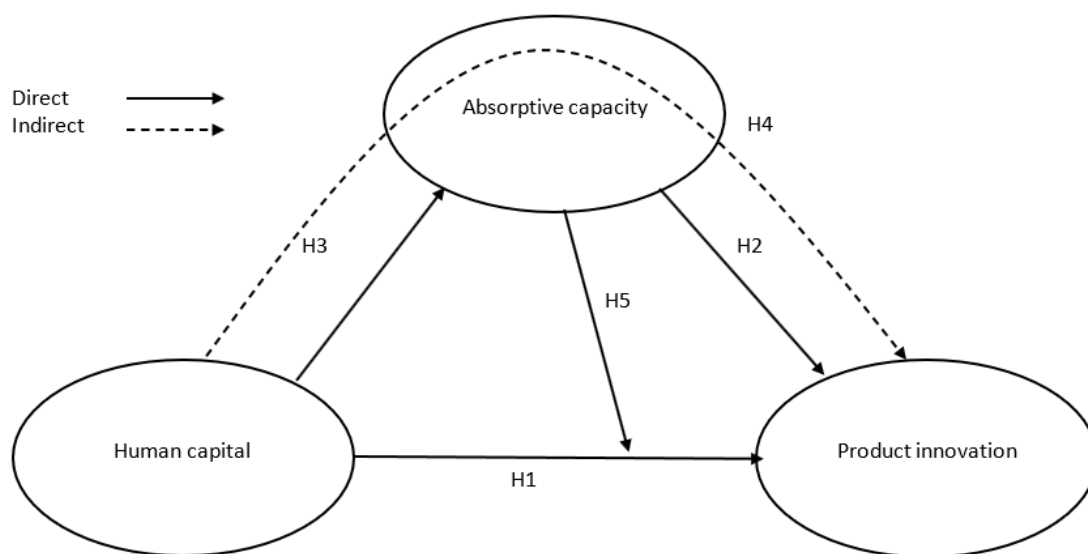


Figure 1. Conceptual framework.

3. Methodology

A quantitative methodology with a descriptive approach was utilized in this study to examine the hypothesized relationships. The use of a quantitative methodology facilitates the identification of patterns, relationships, and trends within the data, hence permitting the formulation of generalisations pertaining to the population being examined. On the other hand, a descriptive approach is employed to describe the characteristics, features, or behaviour of a specific population, sample, or phenomenon (Creswell & Creswell, 2017; Hair et al., 2019).

Table 1. Characteristics of samples.

Position of respondent		Company age	
Owner	55.8%	< 1 year	3.9%
Leader	38.8%	1 - 3 years	32.6%
Employee	5.4%	3 - 6 years	38.8%
		> 6 years	24.8%
Education of respondent		Number of employees	
Magister	3.9%	1 - 4 (Micro)	33.3%
Bachelor	47.3%	5 - 19 (Small)	33.3%
Diploma	22.5%	20 - 99 (Medium)	33.3%
High school	26.4%		
Age of respondent		Number of product variant	
17 - 25 years old	14.7%	1 - 5 variant	73.6%
26 - 35 years old	47.3%	6 - 10 variant	14.7%
36 - 45 years old	25.6%	11 - 15 variant	3.1%
46 - 55 years old	6.2%	16 - 20 variant	3.9%
56 - 65 years old	4.7%	26 - 30 variant	0.8%
> 65 years old	1.6%	> 30 variant	3.9%

Data collection was conducted through a cross-sectional survey using a 7-point Likert scale questionnaire consisting of 12 items based on the literature reviews. The questionnaires were distributed to randomly selected samples that were intended to represent specific groups. The objective was to obtain information that accurately reflects the perceptions, views, or attitudes towards the specific topic (Hair et al., 2019). The sample for this research comprised owners, leaders, or employees in the MSMEs' food and beverage creative industry in Indonesia. A total of 129 responses were collected, meeting the minimum sample size requirements as

recommended by Hair et al. (2019). Table 1 presents sample characteristics which show the characteristics of a group of units taken from the MSME population.

Absorptive capacity was measured using 4 items adopted from Zahra and George (2002) and based on the dimensions of acquiring, assimilating, transforming, and exploiting external knowledge. Human capital was measured using 4 items based on the concept of general human capital and specific human capital (Becker, 1964). Lastly, product innovation was measured using 4 items based on the typology of innovation (Henderson & Clark, 1990).

This study conducted data analysis and hypothesis testing using Smart PLS, which employs the PLS-SEM method as one of the analytical techniques within the framework of Structural Equation Modelling (SEM). Partial Least Squares (PLS) is the underlying concept utilized to assess the validity and reliability of the constructs in the outer model, evaluate the structural model, and examine the relationships between the constructs (Hair et al., 2019).

Table 2. Validity and reliability test.

Construct	Indicators	Indicator loading (Outer loading)	Construct reliability (Cronbach's alpha & composite reliability)	Convergent validity (AVE)	Collinearity test (VIF)
Absorptive capacity (AC)	AC1; AC2; AC3; AC4	0.858; 0.797; 0.851; 0.788	0.843 0.894	0.679	2.403; 1.917; 2.073; 1.583
Human capital (HC)	HC1; HC2; HC3; HC4	0.796; 0.804; 0.757; 0.747	0.782 0.858	0.602	1.625; 1.909; 1.471; 1.723
Product innovation (PI)	PI1; PI2; PI3; PI4;	0.852; 0.840; 0.880; 0.825	0.873 0.912	0.722	2.426; 2.998; 2.747; 2.834

Table 3. Discriminant validity.

Construct	Cross loadings	Fornell-Larcker Criterion			HTMT		
		AC	HC	PI	AC	HC	PI
Absorptive capacity (AC)	HC > PI, AC, HC*AC	0.824					
Human capital (HC)	AC > PI, HC, HC*AC	0.302	0.776		0.391		
Product innovation (PI)	PI > AC, HC, HC*AC	0.480	0.614	0.850	0.513	0.731	

Note: "*" indicates moderating variable between independent variable and dependent variable (as shown in SmartPLS).

Table 2 presents the measurement of the outer model which starts with an analysis of the outer loading. In this study, the outer loading values are higher than 0.708, suggesting that the indicators effectively capture and elucidate the structures they are intended to measure. The measurement process then proceeded with an analysis of *construct reliability*, *convergent validity* (AVE), *collinearity test* (VIF), and discriminant validity. The constructs demonstrate good reliability, with *Cronbach's alpha* and *composite reliability* values ranging from 0.7 to 0.95. The AVE (*Average Variance Extracted*) values are higher than 0.50, indicating that the constructs account for more than 50% of the variance in their respective indicators. Furthermore, the *collinearity test* reveals that the VIF (*Variance Inflation Factor*) values are below 3, suggesting the absence of significant multicollinearity in the model (Hair et al., 2019). Table 3 presents the results of the discriminant validity analysis, which examines the correlations among the constructs using *cross-loadings*, the *Fornell-Larcker criterion*, and the HTMT (*Heterotrait-Monotrait Ratio*). The cross-loadings of the measurement items suggest that the loadings of these items on their respective constructions are higher than their loadings on other constructs. This indicates that the sizes of the constructs are not significantly interconnected. In terms of the *Fornell-Larcker criterion*, it is expected that the square root of each construct's AVE is greater than its highest correlation with any other construct. Additionally, HTMT values below 0.90 indicate no potential issues with discriminant validity (Hair et al., 2019). The results of the validity and reliability analysis demonstrate good outcomes. Good validity and reliability help in the prevention of errors in decision-making and difficulties in replicating or generalizing results (Hair et al., 2019).

After analyzing the validity and reliability, it is necessary to evaluate structural model by analyzing *coefficient of determination* (R^2), *cross-validated redundancy* (Q^2), and *effect size* (f^2) shown in Table 4 and Table 5. The *Coefficient of determination* (R^2) evaluates the effectiveness of the regression model's prediction by measuring the extent to which the independent variable can account for the variability observed in the independent variable. The value of *coefficient of determination* can be raised by increasing the number of samples. R^2 for product innovation is greater than 0.5 indicating that the regression model's ability to predict product innovation is strong R^2 for Product Innovation is greater than 0.5, indicating that the regression model's ability to predict Product Innovation is strong (Hair et al., 2019).

Following the evaluation of validity and reliability, it is necessary to assess the structural model by analyzing the *coefficient of determination* (R^2), *cross-validated redundancy* (Q^2), and *effect size* (f^2) as shown in Table 4 and Table 5. The *coefficient of determination* (R^2) evaluates how well the regression model predicts the dependent variable by measuring the amount of variation in the dependent variable that can be explained by

the independent variables. Absorptive capacity exhibits an R^2 value less than 0.25, indicating weak predictive ability of the regression model for absorptive capacity. However, this is not considered to have a major impact on the overall structural model since absorptive capacity is a mediating variable. The coefficient of determination can be improved by increasing the sample size. On the other hand, product innovation exhibits an R^2 value higher than 0.5, indicating a strong predictive ability of the regression model for product innovation (Hair et al., 2019).

Table 4. Coefficient of determination and cross-validated redundancy.

Related to	R^2	Result	Q^2	Result
Absorptive capacity	0.091	Weak	0.059	Accepted
Product innovation	0.562	Strong	0.379	Accepted

The *Cross-validated Redundancy Coefficient* (Q^2), as presented in Table 4, is employed to assess the structural models' reliability and determine how well they can be applied to various populations. Absorptive capacity exhibits a low Q^2 value, while product innovation demonstrates a relatively high value. However, both of these values are greater than zero, indicating that the structural model pertaining to absorptive capacity and product innovation not only performs well for the specific sample but can also be applied to a broader population (Hair et al., 2019).

Effect Size (f^2), as depicted in Table 5, measures the strength and significance of the effect of independent variables on the variation of the dependent variable. A value of f^2 more than 0.15 but less than 0.35 indicates an intermediate effect, as observed in the cases of human capital and product innovation, absorptive capacity and product innovation, and absorptive capacity as a moderating variable and product innovation. An f^2 value lower than 0.15 but not below 0.02 suggests a small effect, as seen for human capital and absorptive capacity. A small value does not imply a failure in the structural model because the analysis must consider the calculation as a whole (Hair et al., 2019). The evaluation results pertaining to the *coefficient of determination* (R^2), *cross-validated redundancy* (Q^2), and *effect size* (f^2) indicate that, overall, the structural model remains suitable for analyzing the proposed hypothesis (Hair et al., 2019). Figure 2 illustrates that this research employs a research model that depicts the route coefficients between variables, the coefficient of determination (R^2) for endogenous variables, as well as the indicators and their corresponding loading values. This study employs a research model that depicts the route coefficients between variables, the coefficient of determination (R^2) for endogenous variables, as well as the indicators and their corresponding loading values.

Table 5. Effect size.

Relations	f^2	Effect
Human capital & Product innovation	0.168	Intermediate
Absorptive capacity & Product innovation	0.159	Intermediate
Human capital & Absorptive capacity	0.100	Small
HC*AC & Product innovation	0.204	Intermediate

Note: "*" indicates moderating variable between independent variable and dependent variable (as shown in SmartPLS).

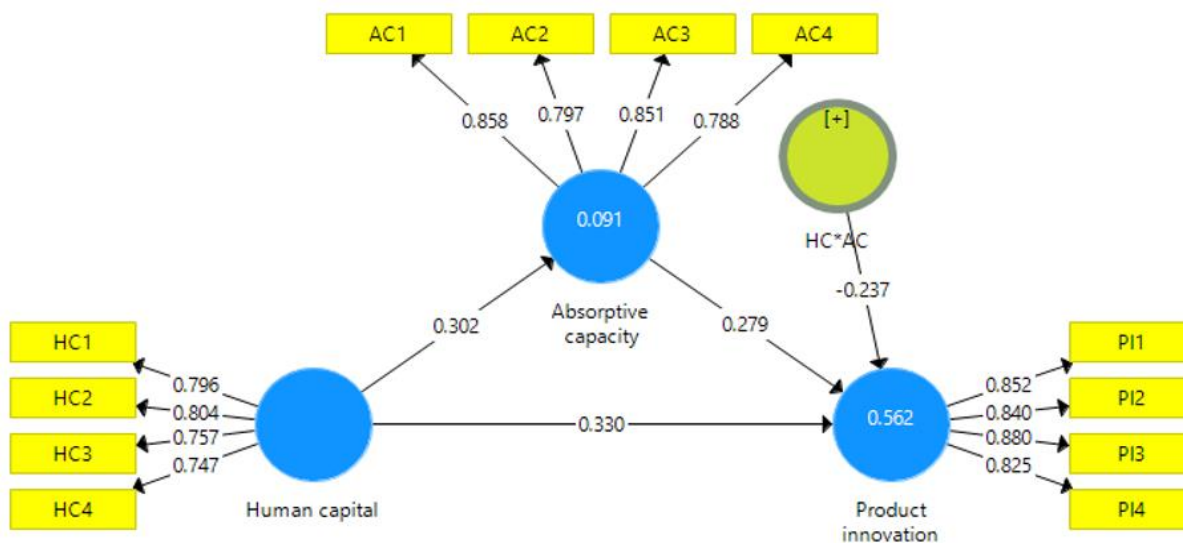


Figure 2. Research model.

Note: "*" indicates moderating variable between independent variable and dependent variable (as shown in SmartPLS).

4. Results and Discussions

4.1. Results

Good validity and reliability, along with the evaluation results of the *coefficient of determination* (R^2), *cross-validated redundancy* (Q^2), and *effect size* (f^2) that indicate feasibility, serve as the foundation for conducting regression analysis on the relationships between variables to determine whether the hypotheses should be accepted or rejected. A hypothesis is accepted when it demonstrates a positive effect, as indicated by a path coefficient that is greater than zero, and a statistically significant effect, as characterized by a t-value that exceeds 1.96 and a p-value that falls below 0.05, at a confidence level of 95%. (Hair et al., 2019).

Table 6. Direct effect structural model test.

Hypo-theses	Direct effects	Path coefficient	T-values	p-values	Hypotheses
H1	HC → PI	0.330	6.510	0.000	Accepted
H2	AC → PI	0.279	3.126	0.002	Accepted
H3	HC → AC	0.302	2.769	0.006	Accepted

Table 6 demonstrates the acceptance of Hypotheses 1 and 2, indicating that both human capital and absorptive capacity have a positive and significant impact on product innovation. Hypothesis 3 is also accepted, revealing a positive and significant effect of human capital on absorptive capacity. The acceptance of Hypothesis 1 establishes a fundamental requirement for the role of absorptive capacity as a moderating factor, while the acceptance of Hypotheses 2 and 3 establishes a fundamental requirement for the role of absorptive capacity as a mediating factor.

Table 7. Mediating Effect of Absorptive Capacity.

Hypo-theses	Mediating effect	Path coefficient	T-values	P-values	Hypothesis
H4	HC → AC → PI	0.084	2.046	0.041	Accepted

Table 7 demonstrates the acceptance of Hypothesis 4, indicating that absorptive capacity has a positive and significant mediating effect on the relationship between human capital and product innovation. This implies that absorptive capacity plays a crucial role in mediating the influence of human capital on product innovation.

Table 8. Moderating effect of absorptive capacity.

Hypo-theses	Moderating effect	Path coefficient	T-values	P-values	Hypothesis
H5	HC*AC → PI	-0.237	4.681	0.000	Partially Accepted

Note: “*” indicates moderating variable between independent variable and dependent variable (as shown in SmartPLS).

Table 8 demonstrates the partial acceptance of Hypothesis 5, revealing a significant moderating effect of absorptive capacity on the relationship between human capital and product innovation. Nevertheless, it is worth noting that the overall effect is adverse, suggesting that the presence of absorptive capacity diminishes the association between human capital and product innovation, hence offsetting the favourable impact of human capital on product innovation.

4.2. Discussion

This study aims to examine the relationships among human capital, absorptive capacity, and product innovation, with a focus on the mediating and moderating roles of absorptive capacity in the context of MSMEs in the culinary creative industry. The findings of this study provide support for several key aspects of the existing literature.

Hypothesis 1 is accepted, indicating a significant positive effect of human capital on product innovation. This finding aligns with previous research emphasizing the importance of high-quality human resources in driving product innovation (Marvel et al., 2020; You et al., 2021). The presence of skilled professionals and individuals with problem-solving abilities, as well as industry-specific training (Becker, 1964), strongly enables MSMEs in the culinary creative industry to develop various types of product innovations, such as incremental, modular, architectural, or radical innovations. MSMEs should prioritize the recruitment and retention of highly qualified individuals possessing the requisite expertise, competencies, and practical experience to actively contribute to the generation and advancement of groundbreaking goods. Hypothesis 2 is accepted, indicating a significant positive effect of absorptive capacity on product innovation. These findings are consistent with the literature, which highlights the importance of organizations' abilities to acquire, assimilate, and apply new knowledge from their external environment (Gao et al., 2022; Jeong et al., 2019). The stronger the organization's activities in acquiring, assimilating, transforming, and exploiting external knowledge (Zahra & George, 2002), the better equipped MSMEs in the culinary creative industry are to generate different types of product innovations that align with dynamic market demands. MSMEs must establish policies and capabilities that allow them to stay updated with market trends and adopt relevant knowledge to produce innovative products.

Hypothesis 3 is accepted, demonstrating that human capital also positively influences absorptive capacity. These results indicate that high-quality human resources can enhance an organization's ability to gather and assimilate new knowledge (Bye & Fæhn, 2022; Kato, 2020). The stronger the presence of general and specific human capital, including professional skills, problem-solving abilities, and industry-specific training (Becker, 1964), the better equipped MSMEs are to acquire, assimilate, transform, and exploit external (Zahra & George, 2002). MSMEs should seek human resources with the necessary knowledge, skills, and experience to strengthen their policies and capabilities in adopting the right knowledge that aligns with market trends.

Hypothesis 4 has been validated, providing confirmation of the mediating effect of absorptive capacity in the relationship between human capital and product innovation. With the corroboration of Hypothesis 1, the mediation mechanism manifests as a partial mediation. This process entails the integration of the knowledge and skills possessed by individuals with the external knowledge acquired through absorptive capacity, resulting in the development of innovative goods. Significantly, the heightened expression of the collective effects of human capital and absorptive capacity enhances the inclination to merge knowledge, thereby aiding the achievement of product innovation. Nevertheless, the influence of human capital on product innovation is found to be lower when mediated via absorptive capacity, compared to the direct impact of human capital on product innovation. This discrepancy implies that the infusion of external knowledge via absorptive capacity does not introduce a significantly discernible increment to augment the existing knowledge and skills resident within human capital. It is possible that the knowledge and skills possessed by individuals are already in sync with current trends, making additional knowledge less likely to provide significant new insights for integration. However, it is important to note that absorptive capacity still plays a significant role in mediating the relationship between human capital and product innovation, especially in the culinary creative industry's micro, small, and medium-sized enterprises (MSMEs).

Hypothesis 5 is partially accepted, primarily attributed to the noteworthy moderating influence exerted by absorptive capacity on the interplay between human capital and product innovation. It is pertinent to note that this moderating impact assumes a negative trajectory. Therefore, the effectiveness of utilizing existing knowledge and skills inside the workforce to promote product innovation is not enhanced by the introduction of external knowledge through absorptive capacity. Instead, it is noticeably reduced. This result suggests that the procedures involving the obtaining, incorporating, altering, and using of external knowledge need to be carefully aligned with the current knowledge and abilities inside the human capital framework. The alignment described ensures that external knowledge is not immediately perceived as new information that can enhance the knowledge and skills possessed by individuals, hence stimulating the creation of innovative products. This intricate calibration becomes especially pertinent within the realm of micro, small, and medium-sized enterprises (MSMEs) nestled within the culinary creative industry.

5. Conclusion

Absorptive capacity receives significant attention in this study as it seeks to elucidate its role as a mediating and moderating factor in the relationship between human capital and product innovation in MSMEs operating in the culinary creative industry in Indonesia. The research questions posed have been addressed, and the findings are derived from data processed and analyzed using Smart PLS, leading to conclusive outcomes.

The study confirms that human capital exerts a positive influence on product innovation, highlighting the importance of investing in the development of individual competencies, skills, and knowledge within culinary MSMEs in the creative industry. By enhancing human capital, MSMEs can unlock their potential to generate new and unique product innovations.

Additionally, the research demonstrates that absorptive capacity can act as a mediator between human capital and product innovation. The findings of the investigation demonstrate a noteworthy relationship between human capital and absorptive capacity, as well as the subsequent impact of absorptive capacity on product innovation. This implies that augmenting human capital within MSMEs can enhance their absorptive capacity, subsequently fostering positive impacts on product innovation. However, the mediation effect of absorptive capacity is found to be lower than the direct effect of human capital on product innovation. Absorptive capacity does not provide substantial external knowledge that can be effectively combined with the existing knowledge and skills of human capital to drive product innovation. To address this, MSMEs should strive to strengthen their absorptive capacity, such as by establishing stronger connections with external knowledge sources like business partners and industry networks.

Furthermore, absorptive capacity also functions as a moderator between human capital and product innovation. The findings reveal that the influence of human capital on product innovation is more pronounced when absorptive capacity is low. This implies that a greater absorptive capacity may mitigate the favourable impact of human capital on product innovation. This might be attributed to the enhanced capability of micro, small, and medium enterprises (MSMEs) to acquire and apply external information, consequently diminishing their dependence on internal resources.

Overall, the findings of this study enhance our understanding of the relationship between human capital, absorptive capacity, and product innovation within the context of MSMEs in the culinary creative industry. The results provide valuable insights and recommendations for culinary MSMEs to enhance their capabilities

in product innovation through investments in human resource development and the enhancement of their capacity to acquire external knowledge.

Lastly, it is worth noting that this research diverges significantly from previous studies as a whole. This is evident in terms of the research subjects, which encompass relevant stakeholders in MSMEs within the culinary creative industry. Furthermore, a comprehensive review of existing literature has failed to identify any prior studies that have investigated the specific variables of human capital, absorptive capacity, and product innovation concurrently, while also considering the potential mediating and moderating influence of absorptive capacity on the relationship between human capital and product innovation.

6. Policy Implication

This research provides implications for policymaking aimed at strengthening human resources and improving access to knowledge resources.

To begin with, the government or relevant institutions should formulate policies that support education and training programs specifically designed for business owners and employees in the MSMEs sector. One potential approach to address this issue is the implementation of policies aimed at establishing cost-effective training programs through partnerships with educational and training institutions, alongside industry associations. Such programs are expected to enhance individual-level human capital by equipping individuals with the necessary knowledge and skills required for product innovation.

Moreover, the government or related institutions should develop policies that enhance MSMEs' access to knowledge and information resources. One potential strategy entails fostering collaboration between micro, small, and medium enterprises (MSMEs) and research institutes, universities, or knowledge-based organizations in order to enhance the efficiency of knowledge dissemination. Additionally, the government could consider implementing policies such as providing research grants or funding for collaborative projects between MSMEs and knowledge institutions. These measures are intended to strengthen absorptive capacity within MSMEs and promote a culture of product innovation at the organizational level.

Overall, by implementing these policy recommendations, governments and related institutions can contribute to the growth and development of MSMEs in the culinary creative industry by bolstering their human resources and providing access to knowledge and information resources.

7. Limitation and Recommendation

This study has provided valuable insights, but it is essential to acknowledge its limitations and outline potential avenues for future research to further deepen our understanding of the subject matter.

Firstly, although the sample size in this study is deemed adequate, future research would benefit from utilizing a larger sample size. By implementing this approach, the results can be extended to a wider population, increasing the ability to detect genuine links or disparities, and providing improved control over other factors. Additionally, a larger sample size can reduce the risk of potential influences from unnoticed factors.

Secondly, it is crucial to consider external factors that cannot be exclusively controlled but may impact the relationship between human capital, absorptive capacity, and product innovation. Factors such as environmental conditions, market dynamics, or government policies should be taken into account in future studies to gain a comprehensive understanding of the topic.

Thirdly, it is recommended that future research can employ a longitudinal research design. This approach would provide an opportunity to identify causal relationships, particularly those related to the mediating factors and the moderating role of absorptive capacity, which are central to this study. Researchers can better assess the temporal dynamics and dynamics of the relationships among the variables by observing changes over time.

We may expand our understanding in this area and get deeper insights into the intricate interactions between human capital, absorptive ability, and product innovation by resolving these limitations and undertaking additional study in this direction.

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