Research Article

The Effect of Customer Knowledge Management on Competitive Advantage in Beekeeping MSMEs: Does Innovation Capability Play a Mediator Role?

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Abstract | This study aims to investigate the role of customer knowledge management (CKM) in achieving competitive advantage (CA) through innovation capability (IC) and the role of firm age as a moderator between IC and CA. This study uses a quantitative approach with Smart PLS 3.0 multivariate Structural Equation Model (SEM) analysis. Data were collected from a survey with 210 business people selected using a purposive method. The first inclusion criterion is running a micro, small, or medium enterprise (MSME) in the beekeeping industry (with business sizes determined based on the number of workers, assets, and turnover as stipulated in the Law of the Republic of Indonesia No. 20 of 2008 concerning MSMEs. The second criterion is having been in business for at least ten years. The findings show that IC mediates CKM in achieving CA. There are also positive impacts of CKM on IC, IC on CA, and CKM on CA. The results indicate that young firms have higher IC, empowering them to obtain CA. This study confirms that CKM, IC, and CA are intangible assets sensitive to firm age. However, this study is limited to honey product MSMEs in East Java and respondents with a business aged ten years and above. Nonetheless, the findings can inform future studies on other dynamic MSME products in food and non-food sectors, especially in a post-crisis context, such as the COVID-19 pandemic. Understanding dynamic MSME products can help the sector bounce back after a crisis so it can contribute to GDP and the economy.

Keywords | Customer knowledge management, Innovation capability, Competitive advantage, Honeybee product, Firm age, Indonesia

INTRODUCTION

The COVID-19 pandemic outbreak in 2020 tested businesses to their limits. The decrease in market stock during the pandemic was substantial, for example, in Spain by 25.1%, in Hong Kong by 14.7%, and in China by 12.1% (Shehzad et al., 2020). Competitive advantage (CA) was considered a condition to survive. It can help businesses navigate uncertainty and overcome issues arising from a crisis like the COVID-19 pandemic, such as distribution issues that affect the stability of the stock market, which eventually leads to financial decline (El-Chaarani et al.,

2022; Jiang et al., 2022; Li et al., 2022). As such, researchers in many countries have focused on CA (Gómez-Prado et al., 2022; Mahdi and Nassar, 2021; Mattera et al., 2021).

CA helps businesses to promote sustainable financial growth (Ilinova et al., 2021; Jain et al., 2017; Saeidi et al., 2015), which can be further facilitated by technological innovation (Ben-Zvi and Luftman, 2022). For example, the Internet of things (IoT) can promote stability in production and distribution and increase production cost efficiency and quality. Another driver for CA is innovation capability (IC). A study on creative industries in Taiwan has shown that IC has a positive effect on CA (Liu et al., 2019). This is because competitiveness is driven by the ability to innovate, including external networking skills to obtain knowledge and resources to fill the internal gap. In Portugal, the 14th most innovative country in the European Union, Ferreira and Coelho (2020) found that IC positively affects CA. Meanwhile, on a company level, Hwang et al. (2020) showed that IC positively affects CA at the Korea Technology Finance Corporation (KOTEC). As part of IC, the company's research and development (R and D) capabilities make the technology adoption seamless, thus the business people could accumulate knowledge and experience to improve their CA and other intangible assets. Based on the resource-based view (RBV) theory, innovation is the primary source of achieving CA. Innovativeness focuses on IC to satisfy customers and increase corporate value (Dotzel et al., 2013).

Empirical studies have also proven a direct impact of customer knowledge management (CKM) on IC. For example, Taherparvar et al. (2014) show how CKM affects IC in the banking sector in Guilan, Iran, as it encourages business people to continue to find actionable new ideas. Likewise, Taghizadeh et al. (2018) studied the banking sector in Bangladesh, showing that CKM has a positive effect on IC. CKM manages knowledge from, about, and for customers, allowing companies to collect and utilize external knowledge. An empirical study on the service sector in Jordan also shows that new knowledge can improve IC (Migdadi, 2020), which drives the development and introduction of new products. Another empirical study has proven a direct effect of CKM on CA; for example, CKM positively affects CA in Iranian insurance companies as it encourages the development of insurance products (Aghamirian et al., 2015). In other words, CKM is vital to CA, especially if a business has to compete in e-commerce and digital markets.

Research has revealed that there are five styles of CKM: prosumerism, team-based co-learning, mutual innovation, communities of creation, and ownership, which have been proven to increase CA through digital economic implications (Gibbert et al., 2002). In the food sector, to apply CKM successfully, companies need to use the CKM strategies together with the adjustment of organizational structure, such as by intensifying employee involvement, as well as with the improvement of the company's culture, such as the sense of belonging. In this case, business people can create new knowledge, transfer it, store it, and apply it according to technological, managerial, and organizational needs and capacity, allowing their companies to achieve CA.

Other empirical studies have shown the role of IC as a mediator. A study by Taherparvar et al. (2014) in the banking sector has shown that IC can mediate CKM and business performance. This means that higher business performance cannot be achieved by CKM alone but must be accompanied by IC because innovation is a driver of performance. Zehir et al. (2015) studied small and medium enterprises (SMEs) in Turkey, showing that IC partially mediates market orientation in export performance. The study also shows that business people need to innovate according to market orientation to achieve CA. In other words, new product development must align with customer needs and opportunities and consider the competition in foreign markets. A study by Hwang et al. (2020) on high-tech SMEs in Korea has also shown the role of IC in mediating entrepreneurial competencies and CA. IC implementation must be adjusted to the company's resources, e.g., human and technological resources, to facilitate CA. A study involving manufacturing MSMEs in Malaysia showed that IC could mediate intellectual capital and company performance (Aljuboori et al., 2022). Therefore, it is recommended that businesses invest in resource development.

Thus far, studies related to CKM and IC have only measured business performance in the banking sector (Taherparvar et al., 2014). Previous studies have also partially examined the impact of IC on CA (Hwang et al., 2020; Liu et al., 2019), CKM on IC (Taghizadeh et al., 2018a; Taherparvar et al., 2014), and CKM on CA (Aghamirian et al., 2015; Massa and Testa, 2009). However, the role of IC in mediating CKM and CA has not been proven empirically with a quantitative approach. Likewise, no empirical studies have shown the role of CKM, IC, and CA in the livestock sector, especially in beekeeping SMEs in developing countries. This gap warrants further examination because MSMEs contribute significantly to GDP in developing countries (Tambunan, 2011). In addition, honey products are highly demanded by society, especially during a health crisis such as the COVID-19 pandemic, but the supply cannot always fulfill the demand due to the impact of climate change (Attia et al., 2022).

This research contributes to the literature two-fold by (1) providing empirical evidence of the dynamics between CKM, IC, and CA in beekeeping SMEs and (2) examining the role of firm age in moderating IC and CA. The findings are expected to provide practical implications for beekeeping SMEs facing the hypercompetitive era.

LITERATURE REVIEW

THE LINK BETWEEN CUSTOMER KNOWLEDGE MANAGEMENT (CKM) DAN INNOVATION CAPABILITY (IC)

Research has provided empirical evidence on the relationship between CKM and IC, for example, in banking services in Bangladesh (Taghizadeh et al., 2018). The IC measurement is divided into two dimensions: The quality and the speed of innovation. The results show that CKM, comprising the knowledge from, about, and for customers, influences the quality of innovation. In implementing CKM, companies can improve their ability to integrate with customers through value creation. Companies can understand consumers' behavior, expectations, satisfaction, and feedback when exchanging information with customers. This knowledge determines the level and speed of innovation.

In a service company in Jordan, a study by Migdadi (2020) showed that CRM indirectly affected IC. CKM is measured through six dimensions: (1) knowledge acquisition, (2) diffusion, (3) application, (4) knowledge from, (5) about, and (6) for customers. Meanwhile, IC is measured by involving five dimensions, namely innovations in (1) product, (2) process, (3) administration, (4) marketing, and (5) service. This study confirms the role of CKM in driving IC, which in turn, drives CA.

Taherparvar et al. (2014) examined private banks in Iran involving 265 bank managers as their respondents. The results show that CKM positively affects employees agility and quality of innovation and performance in their operations and finances. The study also shows differences in the influence of knowledge from, for, and about customers on various dimensions of innovation and performance. Through CKM, companies can identify changes in the external environment and make new changes based on customer needs, improving their IC and performance. However, the studies mentioned above are limited to the banking industry and non-food companies. Therefore, this study aims to examine the food industry in developing countries, with the first hypothesis formulated as follows.

H1: Customer Knowledge Management (CRM) positively affects Innovation Capability (IC)

THE LINK BETWEEN INNOVATION CAPABILITY (IC) AND COMPETITIVE ADVANTAGE (CA)

A study in the shipping industry in Norway has shown that achieving CA necessitates the ability to innovate (Jenssen, 2003). In this case, innovation includes the ability to retain and attract customers. Achieving CA means that companies must be able to integrate innovation capabilities and resources in a way that is difficult to imitate. Companies must differentiate their products as a competitive edge in the broader economic realm.

Ferreira and Coelho (2020) conducted a study involving 387 entrepreneurs in Portugal and found a positive influence of IC on CA. Aside from creativity, IC is needed to manage resources effectively so business people can explore and exploit resources and innovate continuously until they achieve CA. Meanwhile, a study by Hwang et al. (2020) examined the high-technology MSME, the Korea Technology Finance Corporation (KOTEC). The results show that research and development (R and D) capabilities boost not only innovative capability but also innovative practices that lead to CA. In other words, achieving sustainable competitive advantage requires the ability to innovate continuously through R and D as a basis for technological innovation. In addition, complementary capabilities that support IC must be developed, including marketing.

An empirical study by Lo and Tian (2020) involving tertiary institutions in Hong Kong with a total of 166 respondents shows that IC positively affects CA. Employees can capture, create, share, utilize, and apply new knowledge through knowledge management. The ability to share, exchange, and jointly create new knowledge can cultivate innovation capacity and develop a competitive advantage. From a technological point of view, a study by Yu et al. (2017) involving 315 industries in China showed that IC positively affected the sustainability of CA. Knowledge encourages process and product technology innovation so that CA can be achieved. A product will be more valuable, difficult to imitate, and have a unique value proposition through technology, which means CA is obtained.

H2: Innovation capability (IC) positively affects Competitive Advantage (CA)

THE LINK BETWEEN CUSTOMER KNOWLEDGE MANAGEMENT (CKM) DAN COMPETITIVE ADVANTAGE (CA)

Aghamirian et al. (2015) conducted interviews with 210 experts from insurance companies. The study results show that knowledge from, for, and about customers positively affects CA in e-commerce. CKM allows companies to provide quality products and services for customers. The

use of e-commerce can bridge producers and customers to become knowledge partners. Managing customer knowledge through e-commerce allows a company to achieve sustainable CA because e-commerce can store detailed information about customers. As such, companies can design products and services that suit customer needs, which in turn, increases customer loyalty.

Research by Massa and Testa (2009) has shown that in the food sector, CKM positively affects CA because knowledge is the driving force of CA and encourages innovations to improve products, resulting in increased profits and market share expansion. Lee et al. (2016) studied large-scale MSMEs in Malaysia with a total of 195 respondents, showing that knowledge management positively affects CA. The accumulated knowledge fosters innovative methods and processes so that employees can disseminate this knowledge for various new ideas and experiences. Besides, external partnerships can build knowledge among employees so that ineffective actions can be minimized and knowledge capital can be accumulated optimally. Knowledge creation should be encouraged on an ongoing basis to build an innovative culture, which eventually helps obtain CA.

Examining entrepreneurs in South Africa, Ndlela and du Toit (2001) show a relationship between continuous knowledge management and CA because knowledge is considered a driver of economic growth. Knowledge can increase intangible corporate resources that drive business success. Knowledgeable human resources, especially on the leadership level, can carry out strategic actions that bring value to their companies. They continuously seek innovation, product development, and information update to create new products. Knowledge specific to customers (CKM) can provide a lot of information about customers, which is a capital to provide the best products and services for customers.

Newman (1997) used the Johari Window concept of effective communication to study leaders knowledge. The results showed a relationship between knowledge and CA, indicating that the leaders knowledge impacts strategic decisions. In other words, CEOs must be able to evaluate the company in view of market potential and exploit resources to create innovation with a unique value proposition that distinguishes their products from the competitors' products. Meanwhile, Danskin et al. (2005) examined textile companies using a qualitative approach. The results show companies need to develop knowledge systems based on internal and external knowledge to achieve CA. Adequate internal knowledge raises the awareness of knowledge improvement. Meanwhile, adequate external knowledge can improve the quality of products and services throughout the value chain. An empirical study by

Chuang (2004) involving 177 employees in manufacturing companies showed that knowledge management had a positive effect on CA. Knowledge propels innovations that eventually drive CA.

H3: Customer Knowledge Management (CKM) positively impacts Competitive Advantage (CA)

THE ROLE OF INNOVATION CAPABILITY (IC) AS A MEDIATOR

An empirical study by Taherparvar et al. (2014) shows the role of IC in mediating CKM and business performance in the banking industry. They used a quantitative approach with data collected from interviews with 265 respondents employed in 35 private banks in Iran. The results show that IC mediates CKM and business performance. Bank employees with the ability to innovate result in higher business performance. This indicates that achieving higher business performance cannot rely on CKM alone. IC support is needed. Likewise, Zehir et al. (2015) interviewed 474 owners of 186 SMEs in the manufacturing sector in Turkey. The results showed that IC partially mediates market orientation and export performance. This study suggests that business people must be able to innovate according to market orientation to achieve CA. New product development must be in accordance with customer needs and opportunities in the global markets.

Hwang et al. (2020) examined the high-technology SMEs in Korea using a quantitative approach. The results show that IC mediates entrepreneurial competencies and CA and that IC has a positive effect on CA. Business people must align their human resources with the available technological and other resources. Meanwhile, Aljuboori et al. (2022) examined manufacturing MSMEs in Malaysia with 262 respondents. The results confirm the role of IC in mediating intellectual capital and company performance. Thus, business people are advised to invest in developing resources. In other words, this decision can be a new strategy to achieve better financial performance. Based on a collection of previous studies, the fourth hypothesis is formulated as follows.

H4: Innovation Capability (IC) mediates the impact of Customer Knowledge Management (CKM) on Competitive Advantage (CA)

THE LINK BETWEEN INNOVATION CAPABILITY (IC) AND COMPETITIVE ADVANTAGE (CA) MODERATED BY FIRM AGE

A study by Li and Liu (2014) involves 217 entrepreneurs in China. The results show that firm age moderates the link between dynamic capabilities and CA. This study shows that business size and firm age determine the

ability to innovate and achieve CA. Meanwhile, a study by Chatterjee et al. (2021) shows that business performance affects competitiveness. In this case, age becomes a control variable of business performance, which can positively influence competitiveness. Likewise, a study by Abd Aziz and Samad (2016) observed food SMEs in Malaysia, showing that companies aged less than five were considered more innovative than those over five. Nonetheless, previous studies have not captured the impact of IC on CA as moderated by firm age the turbulence during the pandemic, especially in the livestock MSMEs. Therefore, the final hypothesis is formulated as follows.

H5: Firm Age moderates the impact of Innovation Capability (IC) on Competitive Advantage (CA)

RESEARCH HYPOTHESES

H1: Customer Knowledge Management (CRM) positively affects Innovation Capability (IC)
H2: Innovation capability (IC) positively affects Competitive Advantage (CA)
H3: Customer Knowledge Management (CKM) positively impacts Competitive Advantage (CA)
H4: Innovation Capability (IC) mediates the impact of Customer Knowledge Management (CKM) on Competitive Advantage (CA)
H5: Firm Age moderates the impact of Innovation Capability (IC) on Competitive Advantage (CA)

RESEARCH MODEL

The first objective of this study is to examine the effect of customer knowledge management (CKM) on Innovation Capability (IC), which has been shown to have a positive impact in the service sector (Migdadi, 2020; Taghizadeh et al., 2018b; Taherparvar et al., 2014). Research in large industries in developed countries has also shown that IC positively impacts Competitive Advantage (CA) (Ferreira and Coelho, 2020; Hwang et al., 2020; Jenssen, 2003; Lo and Tian, 2020). Intangible assets like this need to be studied in developing countries, especially in the MSME sector, which contributes significantly to economic growth (Tambunan, 2011), especially during a crisis such as the COVID-19 pandemic. Firm characteristics may also support the achievement of CA; for example, experienced companies can achieve CA through IC. However, there has not been empirical evidence on the role of firm age as a moderation variable of the impact of IC on CA. Previous studies have shown that the impact of another intangible asset, dynamic capabilities (DC), on CA is moderated by firm age (Li and Liu, 2014).

The novelty of this study is three-fold. First, this study introduces a unified model previous studies have not covered, i.e., CKM and IC as independent variables and CA as dependent variables. Thus far, the CKM, IC, and

CA models are partially observed in studies on business performance (Taherparvar et al., 2014). Second, this study provides a new pathway, i.e., IC mediating the effect of CKM on CA. Third, this study provides a new idea about firm age in moderating the impact of IC on CA. The literature review results are summarized in the following model, which also depicts the study hypotheses: (Figure 1)
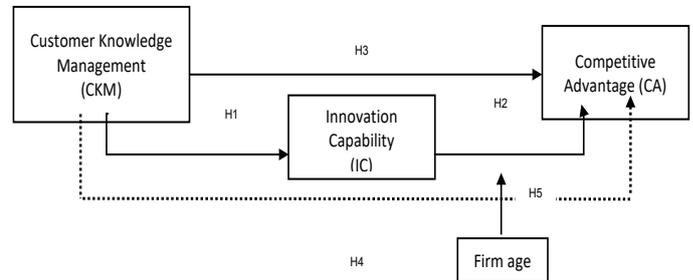

Figure 1: Empirical model of beekeeping MSMEs' competitive advantage in Indonesia.

MATERIALS AND METHODS

RESEARCH INSTRUMENT

The three latent variables in this study are Customer Knowledge Management (CKM), Innovation Capability (IC), and Competitive Advantage (CA). The CKM variable consists of 19 indicators covering knowledge from, about, and for customers, adopted from previous studies (Bhalla, 2010; Chua and Banerjee, 2013; Taghizadeh et al., 2018a; Taherparvar et al., 2014; Zembik, 2014). The next variable is innovation capability (IC), consisting of process and product innovation, with eight indicators adopted from previous studies (Migdadi, 2020; Panayides, 2006; Saunila, 2020; Su et al., 2018). Lastly, the competitive advantage (CA) variable includes operational performance consisting of six indicators adopted from previous studies (Li and Liu, 2014b; Liu et al., 2019; Saeidi et al., 2015). We used a Likert scale for all indicators in the questionnaire ranging from 1 for strongly disagree to 5 for strongly agree. Detailed information about indicators for each latent variable is presented in Table 1.

QUESTIONNAIRE DEVELOPMENT

In developing the questionnaire, we first determine the objectives and scope of the research based on the literature review. Then, we classify the constructs based on the research objectives, which include: (1) the effect CKM, i.e., knowledge from, about, and for customers, as an independent variable on IC as a dependent variable, i.e., process and product innovation; (2) the effect of IC as an independent variable, on the dependent variable, i.e., operational performance; (3) the influence of CKM as an independent variable on operational performance as a dependent variable; (4) the effect of IC as a mediator variable of the impact of CKM on operational performance.

(5) the effect of the firm age variable as a mediator variable on the impact of IC on operational performance.

We examined the questionnaire using validity and reliability tests for each variable. Then, we analyzed the results using multivariate Structural Equation Model (SEM) analysis with Smart PLS 3.0 software. The data collection was carried out between March and September 2022 during the COVID-19 pandemic. The questionnaires were distributed to respondents in a hardcopy form through the interview method. The question items are presented in Table 1.

Table 1: Research variables and indicators.

Customer knowledge management	
(Bhalla, 2010; Chua and Banerjee, 2013; Taghizadeh *et al.*, 2018a; Taherparvar *et al.*, 2014; Zembik, 2014)	
Knowledge from customer	I provide opportunities for my customers to communicate their ideas for product development and innovation
	I regularly ask my customers about the honey products we offer
	I regularly check the quality of competitors' products with my customers
	I regularly ask about the product that my customers need
	I always ask customers for their feedback on the changes we make
Knowledge about customer	I always check my customers references
	I always inform my customers about the terms and conditions for using the product
	I obtain information about honey products requested by my customers
	I obtain information about my customers' problems and complaints
	I have information about my customers' employment and income
	I collect information about my customers' preferences and trends from social media
	I look for information about my customers opinions and preferences in different locations
Knowledge for customer	I always inform my customers about new products
	I regularly inform about the innovation in the new products
	I regularly inform my customers about the benefits of new products innovation
	I share information about prices and production processes with my customers
	I involve my customers in the new product development
	I provide information to my customers about promotions in offline stores and online stores (social media and e-commerce)
	I help my customers to make the best decisions in purchasing products
Innovation capability	
(Migdadi, 2020; Panayides, 2006; Saunila, 2020; Su *et al.*, 2018)	
Process inno-vation	I always try new ideas
	I seek to gain knowledge from the external environment
	I strive to update production equipment and machinery
	I tend to be quick in adopting technology that supports the production process
Product inno-vation	I became a pioneer in the introduction of new products
	I am agile in developing new products based on new knowledge
	I can use raw materials, product functions, and new product designs
	I can increase the number of new products in the last five years
Competitive advantage	
(Li and Liu, 2014b; C.-H. Liu *et al.*, 2019; Saeidi *et al.*, 2015)	
Operational performance	I can offer unique products with benefits that competitors cannot offer
	I offer higher quality products than competitors
	I am more flexible in facing risks and challenges than my competitors
	I have a competitive advantage over my competitors
	I can do better research, development, and innovation in business than my competitors
	I have a better business image than my competitors

SAMPLING

This research focuses on beekeeping SMEs in East Java. Java Island contributes up to 85% of the total availability of honey on the national level. We chose beekeeping businesses because honey is a dynamic product. Climate change may disrupt product availability. This disruption was exacerbated by the impact of the restriction policies during the pandemic. Another consideration is that East Java has contributed to an increase in the number of food and beverage (F and B) MSMEs on the national level, with the second-highest number of MSMEs in 2019, namely 746,732.

In addition, F and B MSMEs show higher use of technological innovation, i.e., 69% to reach customers, 26% to support business processes, and 23% for market analysis. The data collection locations were in the honey development centers in East Java across districts including Kediri, Malang, and Probolinggo. These locations were selected based on information from the Association of Honey Beekeepers in East Java. The purposive sampling inclusion criteria are as follows:

1. MSME beekeepers of Apis cerana and Apis mellifera, the superior breeds in Asia, with the determination of business sizes as stipulated in Law No. 20 of 2008 concerning MSMEs based on the number of workers, assets, and turnover.
2. The business has run for at least ten years, as businesses tend to be too dynamic in the first ten years. The company ages are categorized into two: Young firms for companies less than 15 years old and old firms for companies over 15 years old (Darroch, 2005).
3. The total sample is 210 honey beekeepers across Kediri, Malang, and Probolinggo regencies.
4. The survey was conducted by interview using enumerators from Brawijaya Univesity Indonesia. The procedures have been approved by Brawijaya University Approval committees.

RESULTS AND DISCUSSION

The study results obtained from the 210 respondents were analyzed using descriptive statistics, resulting in the respondent profiles (Table 2).

VALIDITY AND RELIABILITY ANALYSES

The validity of the data was ensured using the multivariate Structural Equation Model (SEM) analysis with Smart PLS software. We carried out two stages of testing. First, the convergent validity test aims to test the construct validity in measuring the elements in the independent variables, i.e., CKM and IC. The Average Variant Extracted (AVE) value requirement must be above 0.5 (Hair et al., 2012). It should be noted that this research is exploratory, testing

new pathways that have not been studied previously. Second, the reliability is tested through Cronbach Alpha with a minimum value limit of 0.5 (Taber, 2018). The Composite Reliability (CR) test requires meeting a limit value of 0.6 (Dash and Paul, 2021). Furthermore, the loading factor value in all models must be > 0.6 (Hair et al., 2017). Tables 3 presents the results of the validity and reliability tests of the independent variables.

Table 2: Respondent profiles.

Description	Respondent profile	
	Number	Percentage
Business profile		
Age		
20-40	60	28,57
40 above	150	71,43
Gender		
Male	205	97,62
Female	5	2,38
Occupation		
Primary	199	94,76
Secondary	11	5,24
Business capital		
Self-capital	32	15,24
Capital from formal sources	36	17,14
Capital from non-formal sources	9	4,29
Self and formally sourced capitals	133	63,33
Income		
< 10 million	65	30,95
10-20 million	102	48,57
Above 20 million	43	20,48
Asset		
0-50 million	45	21,43
20-500 million	135	64,29
Above 500 million	30	14,29
Turnover		
0-300 million	113	53,81
300-2,5 million	89	42,38
Above 2,5 million	8	3,81
Firm age		
< 15 years	84	40
Above 15 years	126	60
Formal education		
No education	2	0,95
Primary level	40	19,05
Junior level	61	29,05
Senior level	96	45,71
Graduate	10	4,76
Postgraduate	1	0,48
Table continued on next page.............		

Description	Respondent profile	
	Number	**Percentage**
Family size		
< 5 people	186	88,57
More than five people	24	11,43
Employees		
Family members	167	79,52
Professionally recruited	43	20,48
Motivation		
Saving/investment	76	36,19
Business oriented	134	63,81
CKM understanding		
Customers need for honey products		
Primary	61	29,05
secondary	149	70,95
Highly demanded honey products		
Pure honey	162	77,14
Honey derivative products	8	3,81
Mixed	40	19,05
Motivations to buy honey products		
Health	201	95,71
Lifestyle	9	4,29
Purchase frequency per month		
Zero	99	47,14
Once	60	28,57
Twice	33	15,71
Thrice	15	7,14
Four times	3	1,43
Frequently purchased products from competitors		
Unknown	146	69,52
Known	64	30,48
The best competitors' brands		
Unknown	160	76,19
Known	50	23,81
Producer's understanding of competitors' innovations		
Unknown	170	80,95
Known	40	19,05
Most impactful social media		
Facebook	80	38,10
Instagram	102	48,57
TikTok	28	13,33
Technology acceptance		
Product sales method		
Offline	118	56,19
Online	1	0,48
Hybrid	91	43,33
Table continued on next column...............		

Description	Respondent profile	
	Number	**Percentage**
E-mail		
Using	173	82,38
Not using	37	17,62
Microsoft		
Not using	206	98,10
Using	4	1,90
Digital payment		
Cash	102	48,57
Bank transfer (mobile, QRIS)	74	35,24
e-money	34	16,19
Social media analysis		
Not using	176	83,81
Using	34	16,19
Product quality assurance as innovation		
Business license (SIUP)		
No	56	26,67
Yes	154	73,33
Home-industry food product certification (SPP-PIRT)		
No	58	27,62
Yes	152	72,38
National agency of drug and food control (BPOM)		
No	206	98,10
Yes	4	1,90
Indonesian national standard (SNI)		
Yes	210	100
No	0	0

Table 3: Validity and reliability tests.

Con-struct	Second order	Item	Load-ing	CA	CR	AVE
Competitive advantage model						
	CKM			1,000	1,000	1,000
KFRC		X1	0,707			
KFC		X2	0,910			
KAC		X3	0,743			
	IC			0,553	0,809	0,682
ISP		Y1	0,736			
IQ		Y2	0,907			

HYPOTHESIS TESTING

The results of data analysis using Smart PLS 3.0 show that the Goodness of Fit, shown by the SRMR value in the CKM and CA path model through IC, is 0.084. SRMR value of less than 0.10 is generally considered favorable (Fueki et al., 2011; Ramírez-Correa et al., 2019). This means that the proposed model is appropriate. Meanwhile,

Table 4: Hypothesis test.

Hypothesis	Relationship	Std. beta	Std. Error	t-value	p values	Decision
Direct effect						
H1	CKM >>> IC	0,818		25,190	0,000	Supported
H2	IC >>> CA	0,272		3,435	0,001	Supported
H3	CKM >>> CA	0,473		5,460	0,000	Supported
Indirect effect						
H4	CKM > IC >CA	0,222		3,381	0,001	Supported
H5	IC*Firmage > CA	-0,069		2,397	0,017	Supported

the NFI values are 0.821 and 0.746. The NFI value must be between 0 to 1. The closer to the value 1, the better (Arbabi et al., 2022; Hair et al., 2013). This study shows that IC in the model is driven 66.9% by CKM, and CA is 50.2% driven by IC moderated by firm age.
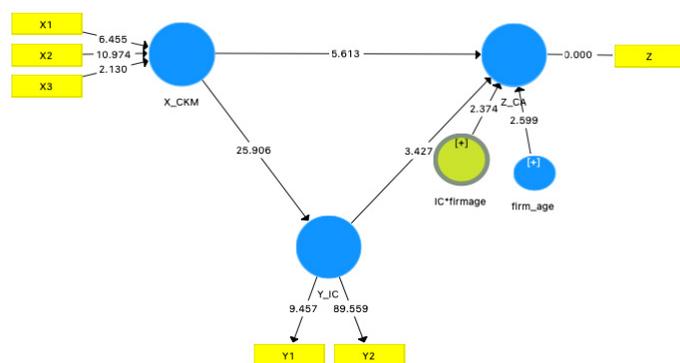

Figure 2: Empirical model of the impact of CKM on CA moderated by IC.

Figure 2 and Table 4 shows the structural model of the SEM analysis results, showing the differences in the influence of each path in the model of CKM impact on CA through IC. The results show that the first hypothesis (H1) (t-value = 25.190) is accepted. This pathway proves that CKM has a positive effect on IC. Likewise, the second hypothesis (H2) (t-value = 3.435) proves that IC positively affects CA. The third hypothesis (H3), with a value (t-value = 5.460), is accepted. This means that CKM has a positive effect on CA. Meanwhile, the indirect effect hypothesis, as shown in hypothesis four (H4) with a value (t-value = 3.381), is accepted. This indicates that IC can mediate the influence of CKM on CA. The final hypothesis (H5) (t-value = 2.397) is also accepted, but the firm age variable weakens the relationship between IC and CA. The older the company, the weaker the ability to innovate, which influences the company's ability to obtain CA. This suggests that younger companies can innovate better, showing more possibility to realize CA.

This study examines the path of IC in mediating CKM and CA in beekeeping MSMEs in East Java. The empirical results show that CKM positively affects IC. Customer knowledge can inform product and service innovations that align with customer needs. CKM allows companies (producers) to co-create value with consumers (Esper et al., 2010; Gibbert et al., 2002; Gohary and Hamzelu, 2016). Relationships between producers and consumers make innovation more efficient (North and Kumta, 2020; Skotis et al., 2013) because businesses understand the end-to-end consumer journey from knowing the product, to considering a purchase, repeating orders, and forming customer loyalty. Innovations can be more effective and efficient when producers are focused on aligning with customer behavior.

For MSME business people, especially in developing countries, knowledge transfer is vital to help them recognize innovation opportunities. Social capital that facilitates knowledge transfer is needed to improve skills in innovation (Romijn and Albaladejo, 2002). However, when businesses experience limited financial resources, it is often difficult to increase social capital, especially external trust. In this case, innovation will not thrive because there is a fear of failure of process and product.

This study also shows a positive effect of IC on CA, indicating that implementing innovation in business processes and products will allow companies to achieve CA. A previous study by Weerawardena (2003) shows that innovative companies that continue to progress will achieve sustainable CA. By innovating continuously, companies will eventually find unique strategies that competitors cannot imitate to obtain CA (Liu and Fang, 2016). MSME business people need these unique strategies to navigate market volatility. In the case of highly competitive F and B products, stringent quality assurance, security, and a continuity strategy are needed so that products remain competitive. Companies must also ensure that their human resources can keep up with these standards so CA can be obtained. In sum, CA depends on the company's ability to innovate (Brem et al., 2016; Dereli, 2015), which is essential in the era of the knowledge economy.

The study results also show that CKM positively affects CA, which can be defined as the company's ability to provide the best value for customers that they cannot find in competitors (Mehri and Hoseini, 2004). Therefore,

companies need to know about their customers by learning from their customers directly. This knowledge will eventually benefit the customers. Since MSME resources are often limited, customer information is the primary source of knowledge to develop a product that aligns with customers' needs. Therefore, CKM is an essential source of feedback for companies to innovate in production processes and product development, as well as in streamlining the product sales system (Aghamirian et al., 2015; Rowley, 2002).

In addition, this study also proves that IC plays an important role in mediating CKM and CA. This is because IC accumulates knowledge from, about, and for customers to create strategies different from competitors (Teece, 1998). CKM and CA will increase if a company incorporates IC in business processes and product development. In other words, knowledge management and technological innovation will allow companies to innovate effectively and efficiently, hence obtaining CA eventually (López-Nicolás and Meroño-Cerdán, 2011). Knowledge capital determines how much innovation can be achieved by a company so that it can obtain CA (Darroch, 2005).

Lastly, this study proves that the older a company is, the less innovative it is and the less likely to obtain CA. Startup companies that have run their business for less than 15 years (young firms) can innovate better than those aged 15 years and over (old firms). Young firms are considered more agile in innovation, probably attributable to the age of their human resources. Innovations are often synonymous with managing social, mobile, analytic, cloud, and Internet of Things (SMACIT) technology. Young startup companies are often dominated by young people aged 20-40 years, so their technological knowledge assists them in innovation, and companies have a bigger chance of obtaining CA. The results also show that young firms prioritize research and development, including introducing radical product innovations to differentiate their products from those in the market (Coad et al., 2016) to compete in the hypercompetitive era. Therefore, young firms take more risks and deal with uncertainties more effectively (Wagner and Llerena, 2011). A previous study mentions that young firms are quicker accessing new knowledge and can take risks with their partners (Flatten et al., 2011).

In sum, the age of a company affects business people to innovate in obtaining CA. This consideration is relevant to the blooming startup businesses in Indonesia, especially for F and B MSMEs such as beekeeping businesses, whose products often face market volatility.

This study contributes to the existing literature by (1) establishing new theories related to CKM and IC in the livestock MSME sector, (2) providing empirical evidence

of the positive effect of IC on CA, (3) providing evidence that CKM can help businesses obtain CA, (4) providing evidence that IC can facilitate businesses to achieve CA through CKM, and finally (5) providing evidence that young firms are more innovative and influential for businesses to obtain CA. On a practical side, IC is an alternative concept that can be implemented in businesses to achieve CA apart from CKM. Age must also be considered when pushing IC to achieve CA.

It should be noted that this study is limited to beekeeping MSMEs with *Apis mellifera* and *Apis cerana* breeds in East Java, so it has not been able to generalize cases of other products. The generalizable aspect is the firm age variable. This study is also limited to respondents who have run their businesses for at least ten years. Therefore, future researchers can use firm size, education, and age of the CEO as potential moderating variables mediating IC in achieving CA. Finally, this study can be tested on other dynamic products in the food and non-food MSME sectors, especially in the context of a health crisis like the COVID-19 pandemic. MSMEs contribute substantially to GDP, so optimizing their capabilities post-pandemic is vital for the economy.

CONCLUSIONS AND RECOMMENDATIONS

The empirical result of this study can be generalized to a wider population to provide information related to the intangible assets of MSMEs in the livestock sector in developing countries. The knowledge-based view can also be implemented in the service sector, which can support the availability of food products. Apart from the theoretical contribution, the finding provides an alternative for companies in making decisions related to the pursuit of CA through intangible assets. Lastly, firm age is variable in beekeeping MSMEs, with young firms achieving CA more quickly. This aspect can also be a consideration for companies in deciding to improve IC to achieve CA.

The findings of this study have several practical implications that can be applied in real-world scenarios. Firstly, the empirical results can be generalized to a wider population, providing valuable information regarding the intangible assets of micro, small, and medium enterprises (MSMEs) in the livestock sector of developing countries. This information can assist policymakers, industry professionals, and stakeholders in understanding the role and significance of intangible assets in MSMEs, thereby enabling them to make informed decisions and devise appropriate strategies. Moreover, the knowledge-based view proposed in this study can be implemented beyond the livestock sector and extended to the service sector as

well. By leveraging intangible assets, such as intellectual capital and human capital, service oriented MSMEs can enhance their operational efficiency and quality of services, ultimately contributing to the availability of food products. This implication highlights the potential for cross-sectoral knowledge transfer and the broader application of intangible asset management principles.

While this method allows for the examination of relationships between variables, it may not capture the richness and complexity of the phenomena under investigation. Future research could incorporate qualitative methods such as interviews or case studies to gain deeper insights into the mechanisms and contextual factors influencing CKM, IC, and CA. In terms of future research directions, investigating the dynamics of MSME products in the context of post-crisis situations, such as the COVID-19 pandemic, holds great relevance. Understanding how CKM and IC contribute to the recovery and resilience of MSMEs after a crisis can provide valuable insights for policymakers and practitioners. Additionally, exploring the role of digital technologies and online platforms in facilitating CKM and enhancing IC in MSMEs would be an interesting avenue for future research.

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NOVELTY STATEMENT

This research contributes to the literature two-fold by (1) providing empirical evidence of the dynamics between CKM, IC, and CA in beekeeping SMEs and (2) examining the role of firm age in moderating IC and CA. The findings are expected to provide practical implications for beekeeping SMEs facing the hypercompetitive era

AUTHOR'S CONTRIBUTION

Jaisy Aghniarahim Putritamara: Conceptualization, Methodology, Software, Writing – original draft, Writing – review & editing.
MB hariyono: Writing – review & editing, Supervision, Methodology, Data curation.
Budi hartono: Writing – review & editing, Supervision, Methodology, Data curation.
Hery Toiba: Writing – review & editing, Supervision, Methodology, Visualization, Investigation.
Hamidah nayati utami: Investigation, Validation, Data curation.
Moh Shadiqur Rahman: Conceptualization, Methodology, Software, Writing – original draft, Writing – review & editing.
Tina Sri Purwanti: Validation, Data curation, Project administration, Visualization, Writing – review & editing.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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