

Volume: 5
Number: 1
Page: 221 - 233

Article History:

Received: 2026-07-19
Revised: 2026-08-10
Accepted: 2026-09-19

SUSTAINABLE INNOVATION CAPABILITY AS A MEDIATOR BETWEEN INTELLECTUAL CAPITAL AND COMPETITIVE ADVANTAGE: EVIDENCE FROM COURSE AND TRAINING INSTITUTIONS IN INDONESIA

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Abstract:

This study aims to examine the influence of human capital, structural capital, and relational capital on competitive advantage by positioning sustainable innovation capability as a mediating variable in Course and Training Institutions (LKP) in Indonesia. The approach used in this study is quantitative with AMOS-based Structural Equation Modeling (SEM) analysis techniques. Data were collected from 299 Course and Training Institutions (LKP) participating in the industry, business, and work-based resource improvement program (IDUKA) through a saturated sample/total sampling method. The analysis results show that human capital, structural capital, and relational capital have a significant effect on sustainable innovation capability and competitive advantage. In addition, sustainable innovation capability is also proven to significantly mediate the relationship between the three intellectual capital variables and competitive advantage. This finding emphasizes the importance of synergistic intellectual capital management to strengthen sustainable innovation capability as a strategy to gain a competitive advantage in the non-formal education services sector. The novelty of this study lies in the integration of the Resource-Based View model and Dynamic Capability Theory to reveal the mediating mechanism of sustainable innovation capability in the context of Course and Training Institutions (LKP), which has never been studied empirically before.

Keywords: Human Capital, Structural Capital, Relational Capital, Sustainable Innovation Capabilities, Competitive Advantage, Course and Training Institutions (LKP)

INTRODUCTION

Educational and training institutions are required to provide a variety of knowledge so that the workforce has the skills needed by the economy, including agility and adaptability (Indrawati and Kuncoro, 2021). From a business perspective, educational and training institutions are a highly competitive sector of the education and training services sector due to their profitability (Ball, 2018). The business world faces increasing competition due to globalization and the emergence of new technologies. Competition in education and training services is not only local or national, but also global. Referring to the General Agreement on Trade in Services (GATS), formulated by the World Trade Organization (WTO) in 1995, education and training are a category of services that can be traded internationally, including non-formal education services. Therefore, educational and training institutions, as business organizations, must continuously strive to achieve a competitive advantage to maintain their sustainability in today's complex and uncertain business climate. Competitive advantage refers to the extent to which a company creates more economic value than competitors in



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a given product market, noting that economic value is the difference between the perceived value of a product, measured by its willingness to pay, and the costs incurred (Maritan and Peteraf, 2018).

Meanwhile, competitiveness implies an institution's ability to position itself effectively in its business field to achieve and maintain an advantage over competitors (Vasiliev, 2022). Experts and researchers have identified numerous factors that determine the competitive advantage of business organizations, one of the primary ones being innovation (Hermundsdottir and Aspelund, 2021). By innovating, business organizations can generate significant value and make resources more dynamic and realistic in the context of a dynamic business environment, implying that innovation plays a crucial role in companies achieving sustainable competitive advantage (Hwang et al., 2020). Therefore, companies need to build and possess sustainable innovation capabilities to create and manage innovations to achieve a competitive advantage (Mendoza-Silva, 2021). Educational and training institutions need innovation capabilities to be able to innovate and outpace competitors, thereby achieving a sustainable competitive advantage. Most previous studies have concluded that innovation capabilities serve as the basis for achieving a company's competitive advantage (Samson et al., 2017). Innovation capabilities are strongly correlated with a company's competitive advantage (Alghamdi and Agag, 2024; Tiengtavaj et al., 2017; Wongsansukcharoen and Thaweepaiboonwong, 2023) and are capable of transforming the knowledge generated within a company into a competitive advantage (Yu et al., 2017).

Furthermore, innovation capabilities significantly strengthen a company's competitive advantage through human resources (Liu et al., 2019a). The results of these studies suggest that innovation capabilities empower companies to manage and utilize their resources to achieve a competitive advantage, and one of the most important resources of training institutions is intellectual capital. Well-managed intellectual capital can provide the benefits desired by the market (Dzenopoljac et al., 2017).

Intellectual capital is built by three important elements: human, structural, and relational capital (Roos et al., 1997). Human capital is capital represented by employees to create intellectual capital through their competence, abilities, and dexterity, and is a key element of intellectual capital to achieve competitive advantage (Yaseen et al., 2016). The existence of human capital must also be supported by the existence of other intellectual capital elements, namely structural capital, as stated by Bontis et al. (2020), that structural capital is an infrastructure that supports human resources and knowledge, such as innovative behavior, self-development, quality and corporate culture. Companies with strong structural capital can find a better fit between human capital and relational capital (Yaseen et al., 2016). Relational capital is capital that manages and regulates the company's external relationships, including relationships with suppliers, customers, and stakeholders (Smriti and Das, 2018). Relational capital views external actors as a source of competence for an organization because they update the organization's overall competencies and rejuvenate the knowledge base, preventing it from becoming obsolete in a volatile environment (García-Merino et al., 2014).

In the context of Course and Training Institutions (LKP) businesses, the relationship between the three components of intellectual capital (human, structural, and relational capital) and competitive advantage, either directly or mediated by sustainable innovation capabilities, remains poorly understood. In various other contexts, inconsistent results have been found regarding this relationship. Some researchers have found that all three components of intellectual capital have a significant influence on competitive advantage, such as Dewi et al. (2019), Obeidat et al. (2017), and Pangidoan & Nawangsari (2022). Others have found the opposite, such as Azzahra (2018), Mardatillah et al. (2020), and Rumerung et al. (2019). Furthermore, the role of sustainable innovation capability as a mediator of the influence of the three components of intellectual capital on



competitive advantage is not yet fully understood, particularly in the context of the Course and Training Institution (LKP) business. Therefore, this study proposes to analyze the influence of the three components of intellectual capital: human, structural, and relational capital, on competitive advantage through the mediating role of sustainable innovation capability, in the context of Course and Training Institutions (LKP) in Indonesia.

Intellectual Capital and Sustainable Innovation Capability. Intellectual capital encompasses human capital, which, when managed effectively, offers significant potential for value creation within an organization and, therefore, has a direct impact on innovation (Diebolt and Hippe, 2019). Human capital, particularly employee knowledge, is a key factor for innovation (Fonseca et al., 2019). Companies with high-quality human resources are more likely to identify opportunities and take initiatives in creating business innovation (Liu et al., 2019), meaning human capital is a determining factor in a company's capability for sustainable innovation. Another component of intellectual capital, structural capital, underpins new product development performance by transforming knowledge into value or benefits (Aramburu et al., 2015). Structural capital plays a role in formalizing the knowledge held by each individual within the company into organizational knowledge (Belmonte da Silva et al., 2021), which then determines the formation of a company's capability for sustainable innovation. Beltramino et al. (2020) support this by finding a positive relationship between structural capital and corporate innovation. Compared to the other two components of intellectual capital, relational capital provides a company with tangible value that is no less valuable. Relational capital is formed from an organization's relationships with its partners and customers, and they are seen as a source of competence for the organization because they update the organization's overall competency and rejuvenates the knowledge base, preventing obsolescence (García-Merino et al., 2014). In business competition, the key to creating profits and improving performance is winning customer loyalty and trust, and building long-term friendly relationships with them (Udayana et al., 2021). Relational capital influences business performance (Iazzolino et al., 2018) and innovation capability in general (Ryu et al., 2021). Thus, the following relationship between the three components of intellectual capital and sustainable innovation capability can be proposed.

Hypothesis 1. Human capital has an influence on sustainable innovation capability.

Hypothesis 2. Structural capital has an influence on sustainable innovation capability.

Hypothesis 3. Relational capital has an influence on sustainable innovation capability.

Intellectual Capital and Competitive Advantage. Strategy is crucial for a company's success in achieving competitive advantage, but the role of human capital is crucial (Paulus, 2017). Business strategies will be successful if supported by the quality of human capital through knowledge, skills, abilities, and involvement in organizational processes and activities (Aman-Ullah et al., 2022). Human capital is a construct that exists at the individual level (Khan & Quaddus, 2018) and is a source of a company's competitive advantage (Paulus & Murdapa, 2017). Human capital must be managed well to make a positive contribution to the organization, referring to another component of intellectual capital, namely structural capital. Structural capital includes explicit knowledge or codified knowledge artifacts, and organizational mechanisms and structures that support employee productivity or performance (Chatterjee et al., 2022). Without structural capital, intellectual capital will be human capital, so organizations with strong structural capital can find a better match between their human capital and relational capital (Yaseen et al., 2016). In today's rapidly changing world, corporate success relies heavily on an organization's ability to create effective and dynamic communication with customers, suppliers, and strategic partners (Gogan et al., 2014), demonstrating the importance of relational capital for achieving better business performance (García-Merino et al.,



2014). Ultimately, superior performance allows organizations to achieve a competitive advantage (Sigalas & Pekka Economou, 2013). Based on these arguments, the following hypotheses are proposed.

Hypothesis 4. Human capital has an influence on competitive advantage.

Hypothesis 5. Structural capital has an influence on competitive advantage.

Hypothesis 6. Relational capital has an influence on competitive advantage.

Sustainable Innovation Capability and Competitive Advantage. Sustainable innovation capability is a company's ability to persistently and innovatively combine all types of elements (human, material, and knowledge resources) dynamically to achieve sustainable competitive advantage and continuously realize economic benefits (Chen, 2016). The concept of sustainable innovation is a part of innovation and is also called supportive innovation, a type of innovation that triggers competition between companies in the same sector and encourages companies to innovate (Wang et al., 2023). This capability involves certain goals such as feeling responsible for minimizing the environmental damage they cause, responding to changes in consumer habits through innovations primarily applied in production and marketing processes, or being willing to display a sustainable vision to compete with other rival companies in a global environment, and ultimately ensuring profit maximization (Ozturk and Gerekan, 2021). To achieve competitive advantage, organizations must continuously improve the quality of their processes and products, which means they need to have sustainable innovation capabilities (Chen, 2016). Based on these arguments, the following hypothesis is proposed.

Hypothesis 7. Sustainable innovation capability has an influence on competitive advantage.

Mediating Effect of Sustainable Innovation Capability. Innovation capability refers to a company's overall ability to transform, adapt, and implement ideas and knowledge into new and continuous processes, systems, products, and services for the company's strategic interests through innovative behaviors and processes (Shou et al., 2017). Previous studies have demonstrated the role of innovation capability in strengthening intellectual capital and making a positive contribution to the company. Liu et al. (2019) found that innovation capability acts as a mediator in the relationship between human capital, competitive advantage, and organizational performance. Aljuboori et al. (2021) demonstrated that intellectual capital exerts an increasingly strong influence on company performance through the mediating role of innovation capability. Hwang et al. (2020) also demonstrated that the influence of intellectual capital in the form of entrepreneurial competency becomes stronger on competitive advantage after being mediated by innovation capability. Based on this empirical evidence, the following hypothesis is proposed.

Hypothesis 8. Sustainable innovation capability mediates the influence of human capital on competitive advantage.

Hypothesis 9. Sustainable innovation capability mediates the influence of structural capital on competitive advantage.

Hypothesis 10. Sustainable innovation capability mediates the influence of relational capital on competitive advantage.

The hypotheses that have been formulated are then integrated into a conceptual model regarding how human, structural, and relational capital influence competitive advantage through sustainable innovation capabilities, as shown in Figure 1 below.

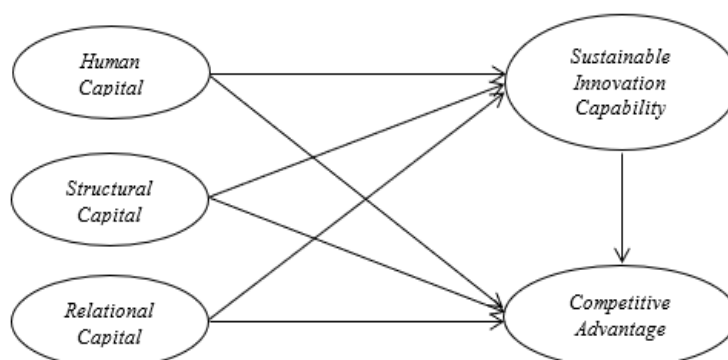


Figure 1. Conceptual Model

METHODS

This research data was obtained from 299 Course and Training Institutions in Indonesia participating in the Industry, Business, and Workplace Standards Human Resource Development Program (IDUKA), organized by the Directorate of Courses and Training, Directorate General of Vocational Education, Ministry of Education and Culture of the Republic of Indonesia. The sampling technique used was total sampling, with all members of the population being sampled. Data were collected through a questionnaire developed based on previous research. Respondents were representatives of education and training institutions, primarily institutional leaders or directors. The questionnaires were distributed online and in person. All respondents returned the questionnaires, and all were found to be valid and reliable for data analysis.

Competitive advantage was measured using three dimensions adapted from Kuncoro & Suriani (2018): service uniqueness, quality, and price. Sustainable innovation capability was measured using five dimensions adapted from Chamsuk et al. (2017): course and training program innovation, process innovation, service innovation, marketing innovation, and organizational innovation. Human capital was measured using three dimensions adapted from Huang et al. (2007): employee capabilities/competencies, employee development, and retention. Structural capital is measured through two dimensions, also adapted from Huang et al. (2007): product/service development and organizational infrastructure. Relational capital is measured through three dimensions adapted from Bozbura (2004): market relationships, environmental relationships, and customer relationships. These measurements use a five-point Likert scale (1 = strongly disagree; 5 = strongly agree).

The data analysis technique in this study uses a Structural Equation Modeling (SEM) approach with the assistance of AMOS software to simultaneously test causal relationships between latent variables in a single integrated model. The analysis begins with testing the measurement model through Confirmatory Factor Analysis (CFA) to assess construct validity and reliability, taking into account factor loading values, Average Variance Extracted (AVE), and Composite Reliability (CR). Next, the structural model is tested to test hypothesized relationships between latent constructs based on parameter estimates, Critical Ratio (CR) values, and p-value significance. The overall model's suitability is evaluated using several goodness-of-fit indicators. To test the indirect influence or mediation effect, the Sobel Test approach is used, which calculates the significance of the mediation path based on the coefficient value and standard error of the path in question using an online calculator (<http://quantpsy.org/sobel/sobel.htm>).

RESULTS AND DISCUSSION

Before hypothesis testing, the initial step in data analysis is to evaluate the feasibility of the measurement model. This evaluation is conducted through Confirmatory Factor Analysis (CFA) using Goodness-of-Fit indicators, namely CMIN/DF, GFI, AGFI, TLI, CFI, NFI, IFI, and RMSEA. The test results in Table 1 show that all these indices meet or exceed the recommended threshold values, indicating that the proposed model has demonstrated an excellent level of fit.

Table 1. Model Goodness-of-Fit Index

Feasibility Index	Minimum Limit	Result	Conclusion
CMIN/DF	≤ 3.00	1.445	In accordance
GFI	≥ 0.90	0.945	In accordance
AGFI	≥ 0.90	0.920	In accordance
TLI	≥ 0.90	0.990	In accordance
CFI	≥ 0.90	0.993	In accordance
NFI	≥ 0.90	0.976	In accordance
IFI	≥ 0.90	0.993	In accordance
RMSEA	≤ 0.08	0.039	In accordance

The CFA results (Table 2) also show that all indicators have loading factors above 0.70, indicating that convergent validity has been met. Reliability testing was conducted by calculating the Composite Reliability (CR) and Average Variance Extracted (AVE) values, all of which met the minimum criteria (CR > 0.70 and AVE > 0.50), indicating that the constructs in the model have adequate internal consistency and validity.

Table 2. Construct Validity and Reliability Test

Construct	CR	AVE	Conclusion
Human Capital	0,725	0,725	Valid and Reliable
Structural Capital	0,868	0,686	Valid and Reliable
Relational Capital	0,754	0,754	Valid and Reliable
Sustainable Innovation Capability	0,796	0,795	Valid and Reliable
Competitive Advantage	0,758	0,724	Valid and Reliable

After the measurement model was declared feasible, the analysis continued with the structural model to test the relationships between the latent constructs as stated in the hypotheses. The path estimation results are presented in Table 3, and all tested direct effects were statistically significant ($p < 0.05$), thus supporting hypotheses H1 to H7.

In addition to the direct effect, an analysis was also conducted to test the indirect effect or mediating role of Sustainable Innovation Capability. The Sobel test was used, and the results showed that the indirect path from Human Capital, Structural Capital, and Relational Capital to Competitive Advantage through Sustainable Innovation Capability was significant at the 5% level, thus supporting hypotheses H8 to H10 as partial mediation.

Table 3. Results of Structural Model Test (Direct Effect) and Mediation Test (Sobel Test)

Hypothesis	Direct Path	Estimate	C.R.	p-value	Conclusion
H1	HC → KIB	0,356	5,900	0,000	Supported
H2	SC → KIB	0,192	2,732	0,006	Supported
H3	RC → KIB	0,373	6,059	0,000	Supported
H4	HC → KB	0,138	2,833	0,005	Supported
H5	SC → KB	0,310	4,791	0,000	Supported
H6	RC → KB	0,102	2,028	0,043	Supported
H7	KIB → KB	0,482	7,275	0,004	Supported
Hypothesis	Indirect Path	Estimate	C.R.	p-value	Conclusion
H8	HC → KIB → KB	0.072	4,505	< 0.05	Partial Mediation
H9	SC → KIB → KB	0.040	2,718	< 0.05	Partial Mediation
H10	RC → KIB → KB	0.080	4,812	< 0.05	Partial Mediation

This study demonstrates that human capital significantly influences sustainable innovation capabilities in training and course institutions (LKP). Human capital, encompassing individual knowledge, skills, and abilities, is a key driver of innovation processes that adapt to industry needs. The respondents in this study, the majority of whom had higher education backgrounds and experience in education and training, emphasized the importance of employee development programs and continuous learning in driving innovation. Flexible and market-responsive training and course institutions (LKP) rely heavily on the competence of instructors and managers who are able to design innovative education and training methods. This finding reinforces the Resource-Based View, which positions human capital as a source of strategic advantage, and the Dynamic Capability Theory, which views it as the foundation of adaptive learning. These findings are also supported by Liu et al. (2019) and Sulistyono & Ayuni (2019), who show that human capital drives innovation and excellence through a mediating process. Practical implications: Training and course institutions (LKP) need to systematically invest resources in the development of their teaching staff as a fundamental strategy for building a culture of innovation.

Structural capital has also been shown to contribute significantly to sustainable innovation capabilities. Structural capital, such as work procedures, information systems, and organizational culture, strengthens innovative processes within training institutions. An organized structure enables more effective knowledge management and encourages collaboration between departments. In the context of Course and Training Institutions (LKP), the existence of curriculum documents, performance evaluation systems, and an open work culture are essential elements that facilitate continuous innovation. In accordance with Dynamic Capability Theory, an adaptive organizational structure enables the creation of an innovation system that is responsive to external changes. Research by Belmonte da Silva et al. (2021) and Smriti & Das (2018) supports this view. These findings imply that strengthening structural aspects such as documentation systems, quality management, and innovative routines should be a strategic priority in the development of Course and Training Institutions (LKP).

Furthermore, Relational Capital demonstrates a strong influence on Sustainable Innovation Capability. Relational capital, in the context of Course and Training Institutions (LKP), encompasses partnerships with industry, businesses, customers, and other stakeholders. These external networks provide a source of inspiration and access to market needs, which are then translated into innovative

education and training services. Close interactions with strategic partners enable institutions to gain valuable feedback and accelerate adaptation to change. From a Dynamic Capability perspective, active external relationships strengthen an organization's sensitivity to environmental dynamics. García-Merino et al. (2014) and Ryu et al. (2021) demonstrate that relational capital is a crucial lever for organizational innovation. Practical implications: Course and Training Institutions (LKP) need to actively expand their networks with industry partners as a strategy to encourage collaboration-based innovation.

The three dimensions of Intellectual Capital have also been shown to have a direct influence on Competitive Advantage. Human capital enables institutions to provide superior services through competency-based innovation among instructors and staff. Structural capital creates efficiency and consistency of service through standardized systems and procedures. Relational capital strengthens market position through reputation, customer loyalty, and strategic partnerships. All three are intangible resources that are difficult to imitate and serve as the foundation for competitive value creation. Within the Resource-Based View framework, these three forms of capital complement each other and form a sustainable advantage. Research by Dewi et al. (2019) and Smriti & Das (2018) supports this relationship. Consequently, the management of Course and Training Institutions (LKP) needs to design an integrated intellectual capital management strategy to encourage consistent, long-term competitiveness.

The research also demonstrates that Sustainable Innovation Capability significantly impacts Competitive Advantage. The ability of Course and Training Institutions (LKP) to continuously innovate is a valuable differentiating factor in the competitive education and training services industry. Innovation in services, curriculum, training methods, and business models provides an advantage in attracting participants and responding to industry needs. Within the Dynamic Capability framework, sustainable innovation results from an organization's ability to continuously reconfigure its resources. Research by Chen (2016) and Wang et al. (2023) suggests that sustainable innovation drives the achievement of economic value and long-term competitiveness. The implication of these findings is the importance of building a structured innovation system within education and training institutions to maintain a competitive position sustainably.

Furthermore, the mediation test results indicate that Sustainable Innovation Capability significantly mediates the relationship between Human Capital, Structural Capital, and Relational Capital on Competitive Advantage. It means that the advantages derived from intellectual capital will not be fully realized without innovative mechanisms that manage and direct this potential. Innovation becomes a strategic channel that converts internal assets into tangible advantages in the marketplace. It suggests that intellectual capital requires innovative capabilities to generate sustainable competitive impact. This finding is reinforced by Liu et al. (2019), Hwang et al. (2020), and Sulistyo & Ayuni (2019), who highlight the mediating role of innovation capabilities in strengthening the influence of intellectual capital on performance. Practical implications: Course and Training Institutions (LKP) need to position innovation as a core element in their resource management and external relations strategies to bridge potential into actual excellence.

Overall, the results of this study strengthen the validity of a theoretical model that integrates the Resource-Based View and Dynamic Capability Theory in explaining the achievement of competitive advantage through sustainable innovation. These findings not only contribute academically to the development of knowledge management and innovation theory but also provide practical guidance for Course and Training Institution (LKP) managers in designing strategies based on their intangible assets. In the increasingly competitive climate of non-formal education services, success is determined not only by the quality of resources but also by the ability

to manage them strategically and innovatively. Therefore, strengthening intellectual capital and developing a sustainable innovation system should be a priority in training institution development policies. This initiative will be an important foundation for maintaining the relevance, sustainability, and competitive advantage of Course and Training Institutions (LKP) in the era of economic and technological transformation.

CONCLUSION

This study emphasizes the crucial role of Intellectual Capital – consisting of Human Capital, Structural Capital, and Relational Capital – in building Competitive Advantage through Sustainable Innovation Capabilities in Course and Training Institutions (LKP) in Indonesia. The analysis shows that all three dimensions of intellectual capital directly contribute to increased institutional competitiveness, and this influence is strengthened through the mediation of sustainable innovative capabilities. These findings strengthen the theoretical foundations of the Resource-Based View and Dynamic Capability Theory in the context of non-formal educational institutions, emphasizing that intangible assets need to be dynamically managed to generate sustainable competitive advantage. With this approach, innovation is no longer simply a response to external changes but becomes a strategic internal strength. Therefore, the success of Course and Training Institutions (LKP) in creating and sustaining competitive advantage depends heavily on how they build, develop, and integrate intellectual capital into their evolving innovation systems.

The findings of this study have important practical implications for managers and leaders of Course and Training Institutions (LKP). First, human capital development must be a strategic priority through investment in continuous education and training and the establishment of a learning culture at all levels of the organization. Second, Structural Capital needs to be strengthened by creating a knowledge management system, documented work procedures, and innovative evaluation mechanisms that encourage continuous improvement. Third, Relational Capital management should be directed at strengthening external networks with industry partners and customers, and encouraging cross-sector collaboration to increase service relevance. Furthermore, management needs to ensure that all elements of intellectual capital are integrated into a structured and measurable institutional innovation strategy. This way, Course and Training Institutions (LKP) can build an innovation system that is not only reactive to market needs but also proactive in creating added value and differentiation.

This research opens up opportunities for further research in the future. First, future research could expand the study object to include formal educational institutions, multinational private training institutions, or other educational sectors to test the model's generalizability. Second, a longitudinal approach is recommended to capture the dynamics of innovation capabilities and their impact on long-term performance. Third, other dimensions of intellectual capital, such as spiritual capital or digital capital, could be added to the model to enrich understanding of the factors driving innovation in the era of digital transformation. Furthermore, mixed methods can also be used to delve deeper into the qualitative processes behind the relationships between variables. By expanding the context and methodological approach, further research is expected to be able to provide broader theoretical and practical contributions in developing the competitiveness of Course and Training Institutions (LKP) in Indonesia.

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