Research article

Spurring SMEs' performance through business intelligence, organizational and network learning, customer value anticipation, and innovation - Empirical evidence of the creative economy sector in East Java, Indonesia

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ABSTRACT

Several studies have explored firm performance in the post-Covid-19 pandemic era. However, there is not much research to find reports divulging the complex relationship dynamics between business intelligence, organizational and network learning, customer value anticipation, and creative economy-based small-medium enterprises (SMEs) performance in developing countries. This study aims to uncover the complexity of those relationships. The quantitative data were collected from 313 creative economy-based SMEs in East Java, Indonesia. Using PLS-SEM, this study disclosed that business intelligence practices could not directly impact SMEs' performance. Business intelligence will be crucial to SMEs' performance with the support of organizational learning as a mediator. The finding also confirmed the presence of serial mediation of organizational learning and innovation in the relationship between business intelligence and SMEs' performance. However, the role of network learning and innovation is also important, considering their relatively large direct impact on SMEs' performance. The theoretical implications of this research broke the boundaries of strategic management theory in resource-based view and knowledge-based view in the latest era, where creative economy-based SMEs have been able to mobilize resources to carry out business intelligence to realize innovation and high performance. Further research is suggested to explore the role of business intelligence in promoting specific performance areas, such as marketing performance, financial performance, and human resource management. In addition, it is advisable to choose more specific research subjects, including those in the culinary subsector, and pay attention to other areas, e.g., the demographics of respondents in the model as a control variable.

1. Introduction

The performance of small-medium enterprises (SMEs) in the post-pandemic era of Covid-19 has been in the spotlight of many scientists, e.g. Ref. [1] highlighted the declining performance of 273 SMEs at the company level operating in commercial,

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manufacturing, service, or construction industries in certain geographical areas in Finland due to a competitive mindset contaminated by high-performance growth aspirations [2], examined the impact of identity-based entrepreneurial passion on the performance of 193 established SMEs in Ghana [3], identified the mediating role of green product innovation between green entrepreneurial orientation, green transformational leadership, and the performance of 384 manufacturing SMEs operating in Amman, Jordan [4], discussed the export performance of 329 SMEs in Vietnam and how they are developing their internal skills to face external challenges arising from the digitalization process and the COVID-19 crisis [5], analyzed the role of learning in an organization while measuring and managing the sustainable performance of 710 manufacturing sector SMEs operating in Laos [6], examined the impact of international resources on the sustainable performance of 380 Pakistani SMEs through the mediating role of green entrepreneurial orientation [7], tested the influence of organizational creativity and open innovation on the performance of 206 SMEs spread across several regions in Indonesia., and [8] explored how 247 Vietnamese SMEs can leverage information technology (IT) to overcome crises, exploit innovative opportunities, adapt to changing market conditions, and drive new competitive initiatives. This is due to the prominent role of creative economy-based SMEs as the drivers of economic growth in Indonesia and other countries [9]. East Java is no exception; one of the regions contributing 14.92% of Indonesia's national gross domestic product (GDP) [10]. This province has much potential in the creative economy sector, which is supported by 113 startups [11,12] to face the turbulent business environment as a result of accelerating digital transformation [13] during the Covid-19 pandemic. The number of creative economy-based SMEs will continue to grow, even from the activities of homemakers who are familiar with digital literacy and the ease of doing business today [14].

Fast-changing shifts that trigger fierce competition between businesses force every SME to determine the right strategic steps [15]. Even though the local market is experiencing a severe recession, SMEs must continue to survive [16]. The new normal era starting in 2022 is the beginning of the rise of SMEs in almost all parts of the world to return to operations and compete in local and global markets. East Java's economic performance also grew by approximately 5.34% in 2022 [17], and in the first quarter of 2023 compared to the fourth quarter in 2022 (q-to-q), it experienced a growth of 1.02% [18]. This success is inseparable from the contribution of the creative economy sector, which reaches 60% [19].

However, many challenges must be faced by SMEs in the creative economy sector at this time, including, first, the Covid-19 pandemic, which has made the creative economy sector one of the components of society that was first hit. This forces the creative economy to be innovative and adaptive to revive in the new normal era [20]. In this regard, creativity and innovation are needed to face global competition in the digital era [21]. All innovations must be carried out carefully with attention and have risk anticipation, a reliable security system, and a consumer protection system [22]. Second, high-quality human resources and mastery technology are required to meet the demands of the global creative economy industry [20]. Third, high interest rates, inflation, and declining exports should be managed appropriately to deal with issue [23]. The last issue is that the rate of digital transformation, marketing and sales, and supply chains to export countries are experiencing a slowdown [24].

This challenge is a complex problem for the growth and development of SMEs in the creative economy sector in Indonesia, especially in East Java, the second largest contributing province to the national creative economy [19], so it is crucial to think about how the performance of SMEs based on the creative economy in East Java can continue to increase.

Several studies have indicated that the performance of firms is affected by business intelligence. For instance, a study conducted by Ref. [25] examined innovation companies in Science Park, comprising a total of 196 staff members, and found that both business intelligence and innovation have an impact on the behavior of these companies. However, it was observed that there is no significant relationship between Operations and the financial performance of these companies. The study conducted by Xu et al. [26] delved further into the topic by investigating how startups can identify and prioritize issues and problems when introducing new products or services using Business Intelligence. Similarly, Wang et al. [27] revealed that the capabilities and reflection of Business Intelligence have an influence on performance capabilities. Additionally, Alsaad et al. [28] put forward the suggestion that there are ongoing predictions which state that the utilization of business intelligence (BI) capabilities will lead to improved performance of new service products. Furthermore [29], made the discovery that the application of business intelligence (BI) is driving the transformation of information engineering to optimize business decisions and operations, resulting in high performance. Lastly [30], proposed that business intelligence and analytics (BI&A) can support innovation, provide organizational value, and enhance performance.

Business Intelligence is indispensable for SMEs to collect, process, and analyze data to be converted into practical business value in managerial decision-making [25]. Business intelligence generates information to support business decisions by gathering or differentiating data from internal and external sources. This function is identified as business intelligence sensing capabilities that enable companies to leverage data and transform it into imperative and relevant knowledge to support strategic decisions and operations planning [29].

However, whether business intelligence explains SMEs performance through some mediators in developing nations like Indonesia remains empirically not known. In addition, there are gaps in the literature which prove that business intelligence cannot directly affect company performance [31]. Business intelligence does affect performance financially positively [25,31], but not marketing performance [31]. Hence, there needs to be more research in looking for what factors can mediate the relationship between business intelligence and SMEs performance.

Several studies have considered organizational learning in the relationship between business intelligence and firm performance [32–35] because it will indeed be difficult for SMEs to directly apply business intelligence results in achieving performance without learning. However, for SME-class businesses in developing countries with limited resources, the use of networks is needed to support learning [10], so network learning is compulsory contemplate [26,31,36,37]. An empirical gap is found where not all organizational learning directly affects firm performance [25,35]. Therefore, this gap attracts mediation in the form of innovations produced by companies, and innovation has also proven to play a major role in achieving SMEs performance [25,26,28,30]. Meanwhile, not only organizational learning predisposes to innovation, but network learning also positively induces innovation [31,36].

In addition, customer value anticipation (CVA) has also significantly affected innovation [38]. CVA, through customer feedback metrics, is suggested to play a major role in breaking firm performance [39]. A prior study remarked that the ability of SMEs to understand and anticipate what customers will value in the future requires business intelligence [28]. Thus, a compound relationship exists between business intelligence and SMEs' performance, organizational learning, network learning, CVA, and innovation. This complex relationship becomes a conceptual framework that shows the novelty of this study. Business intelligence practiced at SMEs in East Java, Indonesia with limited resources, certainly uses something other than high-tech systems as is performed in large companies in developed countries. In this matter, simple business intelligence, consciously or unconsciously, must have been carried out by creative economy-based SMEs in East Java.

The extent to which the impact of business intelligence practices on innovation and SMEs' performance needs to be examined, thus raising research questions: (RQ1) Does business intelligence practice has a crucial role in increasing SMEs' performance? (RQ2) Do organizational learning and innovation have a serial mediation role in increasing SMEs' performance through business intelligence? (RQ3) Do network learning and innovation have a serial mediation role in increasing SMEs' performance through business intelligence? and (RQ4) Do CVA and innovation have a serial mediation role in increasing SMEs' performance through business intelligence?

The first major contribution from this research is the development and boundaries of the strategic management theories of resource-based view (RBV) and knowledge-based view (KBV), where creative economy-based SMEs in developing countries can mobilize resources to do business intelligence in realizing innovation and high performance. Second, this study will provide insight for creative economy-based SMEs to consider the practice of business intelligence, either directly or directly, in improving business performance. Business intelligence results must be studied by taking into account learning from networks and CVA to produce the best innovations that can be realized, which ultimately impact SMEs' performance.

2. Theoretical review and hypotheses

2.1. Resource-based view (RBV) and knowledge-based view (KBV) as the grand theories

The resource-based theory of firms (RBT), known as the resource-based view (RBV) framework, is the grand theory most widely used as the basis for management strategy research. RBT continues to evolve to explain sources of sustainable competitive advantage at the firm level [40–42]. According to RBV, only companies with valuable, rare, inimitable, and non-substitute (VRIN) resources can achieve sustainable competitive advantage and superior performance [43]. Other literature also suggests the evolution of RBV into a VRIO framework (Value, Scarcity, Imitability, and Organization) because 'organizational' strategic resources are considered prominent to determine company growth or performance [44,45].

Through the VRIO framework, RBV focuses on the relationship between internal resources and corporate strategy. Many scholars have researched ways to acquire resources from an internal perspective, such as through innovation [37,46], where innovation can represent "VRI" within the VRIO framework. However, the RBV has been criticized for needing to be more precise about the competencies required for development [47].

Recently, the RBV emphasized that knowledge ownership and the Knowledge-Based View (KBV) are critical in ensuring competitive advantage and sustainable performance. Thus, RBV-KBV theory has evolved, moving from focusing on physical resources to knowledge-based resources to encourage innovation [48]. RBV also encourages the development of KBV [31] which has attracted numerous scholars to acquire resources through knowledge and learning, including the importance of business intelligence in this era to acquire important knowledge that can improve the quality of company resources [42,49–51]. From the knowledge acquired, companies will acquire learning such as organizational learning [25,52], and network learning [26,31]. Thus, knowledge and learning, whether in organizational learning, network learning, or the ability to perform business intelligence, can represent the "O" in the VRIO framework.

Previous research has examined the role of organizational and network learning in leveraging corporate resources to enhance the innovation and performance of firms, where key knowledge is based on the level of business intelligence [42,49]. However, more is needed to obtain resources from an internal perspective alone. In addition, several scholars have proven the importance of paying attention to external parties, especially customers, so customer value anticipation needs to be carried out in order to find changes in customer value and develop products that match these changes in value [25,31]. This level of knowledge also depends on business intelligence [28]. On the other hand, consumer perceptions of innovation produced by a company will be better when the company can anticipate customer needs [53]. Hence, there is a need for company resources that can read and anticipate customer value in order to achieve innovations that suit customer needs and ultimately improve company performance.

In the context of SMEs in developing countries like Indonesia, small companies use fewer resources than large companies. Therefore, embedding business intelligence, even though it may not be high-tech, is critical to the growth and survival of SMEs. In line with this, we posit how SMEs based on the creative economy can carry out business intelligence to gain important learning from the organization, network, and their customers' side to generate innovation and achieve high performance. Thus, company performance is enhanced through the deployment and development of resources for innovation.

2.2. Business intelligence and SMEs' performance

Business intelligence is a set of methods, processes, and technologies used to turn raw data into meaningful results. A prior study also revealed that business intelligence is an invaluable and irreplaceable internal resource that can help companies develop and expand their knowledge base, especially for managers [31]. Business intelligence is the process of integrating knowledge and turning it

into useful information for an organization. The business intelligence system provides updated, reliable, and adequate business information, which helps organizations understand the impact of business information through data capture and analysis. Thus, the information obtained can be a reference for companies to make changes [27]. Business intelligence is a procedure used to collect, store and evaluate data to help make better organizational decisions [54].

Business intelligence has been proven to be strong in improving firm performance [26,27,31,55]; higher business intelligence will significantly impact SMEs' performance. However, these findings are refuted by empirical evidence showing the inability of business intelligence to affect firm performance directly [31]. Business intelligence does affect financial performance positively [25,31], but not marketing performance [50,55].

Based on the KBV which is built on the RBV by viewing knowledge as the main asset for companies to achieve superior performance, and assessing Business Intelligence as one of these assets because it can be used to obtain information and contribute to increasing the knowledge available to managers [37], then we argue that business intelligence is an intangible, but valuable and rare resource and capability of SMEs that competitors do not necessarily have, so it is not easily duplicated. Thus, high business intelligence is very beneficial for SMEs to achieve superior performance.

Therefore, we speculate that business intelligence can affect business performance in general, while at the same time seeking answers from (RQ1).

H1.   Business intelligence has a crucial role in improving SMEs' performance.

2.3. Business intelligence, organizational learning, innovation, and SMEs' performance

There was a relationship between organizational learning, innovation, and firm performance [35], where it was evident that the influence of organizational learning innovation was robust but not on firm performance. This was contrary to several studies that show a significant effect of organizational learning on company performance [5,33]. The significant effect of innovation on firm performance was also proven [35]. This was in line with several studies that prove the strong influence of organizational learning on innovation [34,35,50,52]. Likewise, the effect of innovation on firm performance was also significant, and these results were in line with numerous previous studies [37,45,56,57]. However, the mediating role of innovation has not yet been shown on the influence of organizational learning on firm performance [35]. Researchers solely revealed the direct influence, highlighted the dimensions of organizational learning and innovation, and highlighted the differences in the analysis results between four industrial sectors: chemicals and plastics, furniture and wood, metal-mechanical and metallurgy, and textiles and apparel in Brazil [35].

Other studies with different objects, regarding innovative companies located in Science Park also revealed the relationship between organizational learning, innovation, and firm performance [25] with the complexity of the relationship considering the role of business intelligence as an exogenous variable. However, the research results also did not support the direct effect of organizational learning on firm performance. In addition, research also did not reveal the mediating role of innovation on the effect of organizational learning on firm performance or the influence of business intelligence on firm performance. Even though studies revealed a significant effect of business intelligence on organizational learning, which supports previous research [32], there is also a significant effect of business intelligence on innovation, which supports previous research revealing the important role of innovation in a positive direction [25,37]. The study also suggested the robust influence of business intelligence on firm performance, which was contrary to previous research, which proved the not strong influence of business intelligence on firm performance [31].

Business Intelligence is a company's knowledge assets [37]. Meanwhile, based on KBV-RBV, organizations improve performance through gathering capabilities and sharing knowledge. Individual knowledge is transformed into organizational knowledge through the organizational learning process [58], which aims to encourage innovation that can ultimately achieve superior performance [48]. Based on KBV-RBV, we argue that business intelligence is a unique resource that produces important knowledge. Learning and sharing knowledge in the organizational learning process is important for companies to engage in innovation. SMEs can achieve a competitive advantage due to these intangible resources, thereby achieving superior performance.

These empirical findings provide a research gap to reveal the role of serial mediation of organizational learning and innovation on the effect of business intelligence on firm performance. Based on some of this empirical evidence, we formulate hypotheses related to (RQ2).

H2.   Organizational learning and innovation have a serial mediation role in increasing SMEs' performance through business

3. Intelligence

3.1. Business intelligence, network learning, innovation, and SMEs' performance

Several studies have examined the effect of business intelligence on innovation performance. Some papers found a positive and significant effect of business intelligence on firm performance [25,26,28], including other studies focusing on organizational performance [27], while other studies are on the contrary [31,55]. In addition, some scholars have tried to prove the mediating role of network learning and innovation variables on the influence of business intelligence on firm performance [26,31]. Business intelligence does not have a direct and significant positive impact on company performance, so it must first go through serial mediation to get support from network learning and innovation. If business intelligence enhances, network learning also increases, stimulating an escalate in innovation impacting company performance, especially financial performance.

Empirical gaps also occur in the direct relationship between the four variables, such as the insignificant effect of business

intelligence on network learning [26] and its significance in other studies [55]. Network learning was also not found to have a significant effect on innovation [26], while some other works have proven that network learning can significantly increase innovation [31]. Likewise, with the effect of innovation on firm performance, an empirical gap was found where several studies proved the strong influence of innovation on firm performance [25,28,31]. However, there are conflicting research results which revealed that the influence of innovation on firm performance is not robust [26].

Innovation has also been shown to partially mediate between business intelligence and new service product performance [28,36]. Slightly different results also occur for different objects; for example, digital startups use more technology in conducting business intelligence, the characteristics of business intelligence affect the success of startup businesses, there is a significant relationship between innovation and startup business performance, and network learning influences startup success [26,37].

While, large companies have the means to develop the knowledge used in innovation. However, small firms require more resources, forcing them to seek external knowledge through networks [37]. Network learning emerges as a means of gaining knowledge, as the RBV-KBV theory explains. So, for example, Business Intelligence is an important asset for obtaining RBV-KBV-based knowledge. Business intelligence is an asset that can strengthen network learning, especially for small companies in developing countries like Indonesia, which have limited resources. The results of network learning are useful for finding innovations and producing superior performance.

Hence, evidence of the existence of the mediation role of network learning and innovation on the influence of business intelligence on firm performance is still being debated and provides research gaps to test models on different objects, so, we formulate hypotheses related to (RQ3).

H3. Network learning and innovation have a serial mediating role in increasing SMEs' performance through business intelligence.

3.2. Business intelligence, customer value anticipation, innovation, and SMEs' performance

Customer value anticipation (CVA) has also significantly affected innovation [38]. CVA capacity is linked with understanding and predicting what individual consumers will appreciate about the products or services offered. Business intelligence capabilities relate to a company's ability to understand and anticipate what customers will value in the future [28]. CVA, through customer feedback metrics, is known to play a major role in breaking firm performance [39]. New service products require business intelligence to anticipate what customers expect in the future, and this knowledge will impact the resulting innovations, which can ultimately
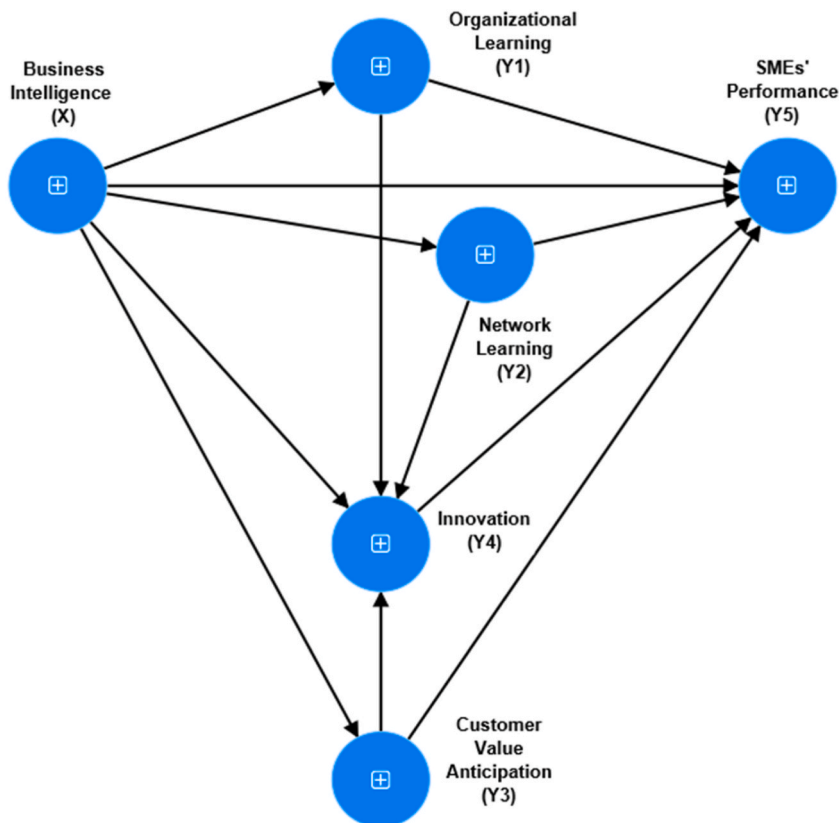

Fig. 1. The research model based on prior studies and relevant literature.

improve the firm's performance, specifically innovation performance [28].

The speed at which activities occur between idea conception and product realization until it is launched on the market is very dependent on the knowledge the company has [28]. Based on the RBV-KBV theory, which states that one of the knowledge assets is business intelligence [37], business intelligence can be used to anticipate the value expected by customers and carry out innovation so that innovative products can be launched immediately.

Therefore, there is a relationship between business intelligence, CVA, innovation, and innovation performance, although research linking these four variables is relatively rare, especially when associated with SMEs' performance in general, so here we formulate a hypothesis to find answers (RQ4) as follows.

H4. CVA and innovation have a serial mediating role in increasing SMEs' performance through business intelligence.

4. Methodology

This research adopted a quantitative approach by applying sophisticated Partial Least Squares Structural Equation Modeling (PLS-SEM) to understand the complex relationship between business intelligence and innovation performance, mediated by organizational learning, network learning, customer value anticipation, and innovation (see Fig. 1). The target population was creative economy-based SMEs in East Java, Indonesia, represented by owners, managers, or at least heads of office. SMEs were randomly selected through purposive sampling with the criteria of SMEs that have been running for at least two years, considering that during the two years of the Covid-19 pandemic, more than 50% of SMEs earned less income with lower profit margins and experienced a decline in asset value during the pandemic [59]. Thus, the SMEs that are the subject of this research are SMEs that survived during the Covid-19 pandemic, so that SMEs' performance can be measured.

The total population of creative economy-based SMEs in East Java is 1927 SMEs (East Java Prov, 2022). Based on Hair et al. (2020) The minimum number of samples is at least 5–10 times the number of indicators. The total indicators in this study were 42 indicators. Thus, the targeted sample number is 210–410 SMEs. In order for the target number of samples to be obtained optimally, we distributed 600 questionnaires offline. The distribution of questionnaires was carried out by meeting the heads of several creative economy

Table 1
Respondent's demographic.

Categorical		Frequency	%
Position	Owner	69	22
	Manager	128	41
	Head Officer	116	37
Gender	Male	166	53
	Female	147	47
Age	21–30 years old	81	26
	31–40 years old	160	51
	41–50 years old	63	20
	>50 years old	9	3
Education	Senior High School	97	31
	Diploma	72	23
	Bachelor Degree	131	42
	Postgraduate Degree	13	4
Creative Economy Sector	Architecture	9	2.9
	Interior-Design	6	1.9
	Visual Communication Design	6	1.9
	Product Design	3	1
	Fashion	63	20
	Film Animation Video	11	3.5
	Photography	11	3.5
	Crafts	63	20.1
	Culinary	83	26.5
	Music	7	2.2
	Application	18	5.8
	Game-Development	14	4.5
	Publishing	10	3.2
	Advertising	3	1
	TV & Radio	2	0.6
	Performing Arts	2	0.6
	Home art	2	0.6
Business Experience	2–10 years	224	71.6
	>10 years	89	28.4
Number of Employees	5 - 19 employees	208	66.5
	20 - 99 employees	105	33.5
Average Revenue	≤100 million IDR	56	17.9
	100 - 300 million IDR	173	55.3
	≥300 million IDR	84	26.8

Source: Primary Data – Authors Own (2023)

communities in East Java. The questionnaire was provided in hard copy to be distributed to community members. The number of questionnaires that were filled out by respondents and returned to researchers is 162 questionnaires. Thus, the response rate using the offline method was 27%.

Taking into account the large percentage of low response rate, the distribution of questionnaires was also carried out online using google form links distributed through WhatsApp and telegram groups in each community. The communities sampled in this study include the Malang Creative Fusion network, Pelanusa Community, Batu Creative Club, Sidoarjo Creative, Banyuwangi Youth Creative Network, and IDSF. The total number of online questionnaire responses received was 292 respondents from until the specified deadline (on May 15th, 2023). The number of response rates for online methods cannot be determined because creative economy actors in each community can be members of more than one community.

The data collection includes hybrid sector employees from various sectors: Communication, product design, Film-Animation-Video, Crafts, Music, game development, Publishing, Advertising, Performing Arts, and Home Art. After undergoing data scanning and empty data, we finally obtained 384 samples filled with complete data. Next, we removed sample data obtained from SMEs that had been in business for less than two years; to fulfill the purposive sampling technique, 43 SMEs were detected, bringing the total sample to 341 SMEs. Then, we also removed constant data, where the respondent's response to each statement in the questionnaire was the same, to reduce bias for 28 data samples. In the end, we obtained 313 data samples, which we analyzed with the demographics of the respondents in Table 1.

We have maintained due diligence and ethical compliance during data collection through the 'Due Diligence Checklist', which is checked regularly by the Institute for Research and Community Service, Institut Teknologi dan Bisnis Asia Malang. This is important to ensure the accuracy of the data we obtain, mitigate risks, and gain insight into the survey process before we analyze the data. Our

Table 2
Research variables measuring items.

Latent Constructs	Items
Business Intelligence (X) adapted from Ref. [31]	SME understands what customers want (X1)
	SME recognizes the shortcomings or advantages of their products (X2)
	SME knows who their competitors are (X3)
	SME knows the main capabilities and resources of competitors (X4)
	SME recognizes the weaknesses of competitor (X5)
	SME knows the strategy used by competitors (X6)
	SME recognizes the bargaining power of their customers (X7)
	SME aware the level of competition in the industrial environment (X8)
	SME can produce reports that are easy to understand (X9)
Organizational Learning (Y1) adapted from Ref. [35]	SME provides support when employees show new ideas (Y11)
	SME always respond well to employee initiatives to generate new ideas (Y12)
	SME provides easy ways to solve every problem (Y13)
	SME always encourage employees to interact with the external environment (Y114)
	SME has no difficulty finding new resources to handle new projects (Y15)
	SME encourages employees to communicate (Y16)
	SME provides freedom and openness to communicate in each work team (Y17)
	SME facilitate knowledge sharing between work teams (Y18).
	SME provides access to cross-functional work (Y19)
	SME often involve employees in decision-making processes (Y110)
	SME takes policies following the views of employees (Y111).
	SME makes every employee feel involved in making company decisions (Y112)
Network Learning (Y2) adapted from Ref. [31]	SME facilitates the incorporation of new knowledge obtained from communication networks (Y21)
	SME solve every problem based on new knowledge gained through the network (Y22)
	SME can condition the transfer of knowledge from external parties into the company through internal communication networks to plan new projects (Y23)
	SME is able to turn inactive network learning resources into productive ones (Y24)
CVA (Y3) adapted from [28,60]	SME cooperates with suppliers to anticipate changes in material requirements (Y31)
	SME cooperates with suppliers to predict material requirements (Y32)
	SME cooperates with suppliers to modify supplier products and services to suit changing needs (Y33)
Innovation (Y4) Adapted from Ref. [31]	SME sets goals (new products/processes) for companies in the future realistically (Y41)
	SME believes that there is a balanced potential and risks that must be considered to achieve company targets (Y42)
	SME thinks about innovative strategies (Y43)
	SME is always looking for new opportunities to innovate (Y44)
SMEs' Performance (Y) adapted from Ref. [31]	SME experiences rapid development (Y51)
	SME profit margins continue to grow (Y52)
	Profitable SME (Y53)
	SME net profit continues to increase (Y54)
	SME market share continues to increase (Y55)
	Return on investment is always in the positive direction (Y56)
	SME capital continues to increase (Y57)
	SME financial efficiency continues to increase (Y58)
	Customer satisfaction with creative products continues to increase (Y59)
	SME revenue growth continues to increase (Y510)

Source: Authors Own (2023)

research process has also been declared ethically feasible under the following research standards: social value, scientific value, risk, persuasion, and research guidelines and regulations by the Head of the Institute for Research and Community Service, Institut Teknologi dan Bisnis Asia Malang based on Ethical Approval certificate No. 0444/I.1/LP2M/ITB-ASIA/XII/2022 which obtained on December 8th, 2022. Before obtaining ethical approval, the questionnaire is checked first by the ethics committee of Institute for Research and Community Service. Points to consider in checking research ethics include: (1) Social values to ensure the protection of research subjects from physical and psychological risks (2) Scientific value, is a comprehensive assessment of various scientific aspects of a research study consisting of: suitability of research design and whether the chosen research method is in line with research objectives, examination related to data analysis procedures to ensure accuracy and suitability in interpreting research findings. (3) Risk, is an assessment and mitigation of potential risks related to research, which includes: physical and health risks for participants or researchers, psychological impacts that require support or counseling, confidentiality and privacy risks related to personal data, potential conflicts of interest that affect the integrity of research (4) Persuasion, namely persuasive efforts in obtaining the consent of participants or related groups in research. (5) Established research guidelines and policies.

We obtained the data in Table 1 from the biodata of the respondents who filled out the first questionnaire. As for the 42 item statements that we added to the questionnaire to measure variables, ten items were adapted from Ref. [31] to measure innovation performance, as many as nine items were adapted from Ref. [31] to measure business intelligence. In addition, 12 items adapted from Ref. [35] to measure organizational learning, while four items adapted from Ref. [31] to calculate network learning. Later, three items adapted from Refs. [28,60] to measure customer value anticipation, whilst four items adapted from Ref. [31] to evaluate Innovation. Considering the condition of SMEs in Indonesia which still have limited technology, we do not involve all the items from the reference papers, thus, the 42 items are shown in Table 2.
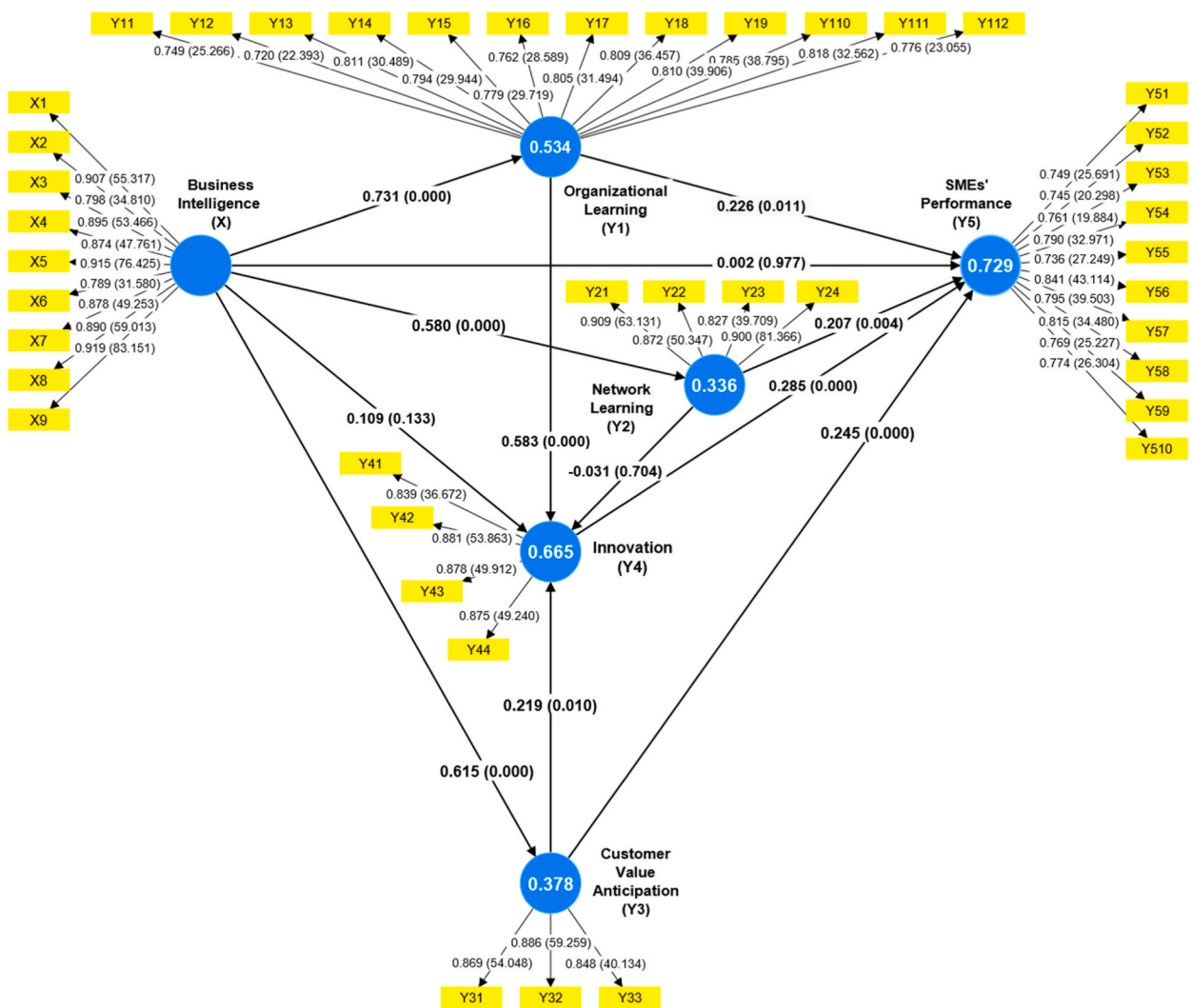

Fig. 2. The PLS-SEM complex-structural-model.
Source: SmartPLS vr. 4.0.9.3 Output – Authors Own (2023)

4.1. Common method variance (CMV) test

Each research respondent is a representative of the company, so the respondent who answered the questionnaire on behalf of the company raises the potential for CMV [61]. In this study, we used Harman's single factor test under SPSS ver.26 software, resulting in the conclusion that CMV is not a problem in this research since the eigenvalue is 13.146, contributing 29.77% of the total variance. In addition, the variance threshold value proposed from previous research [61,62] is 50%, which means a single factor cannot explain more than 50% of the variance in our data set.

4.2. Non-response bias test

To test for non-response bias, we followed the steps in previous research [63] by looking at the level of statistical significance of the difference between initial survey responses (response from 33% of initial respondents) and later surveys (response from the last 33% of respondents), based on the assumption that the opinions of late respondents represent the opinions of non-respondents. To do this, we used the Lavene test (One-Way ANOVA) using SPSS ver. 26 software and found no significant differences between the two groups in any of the constructs examined in this study at the 5% significance level.

To perform inferential statistical analysis and test hypotheses, we use PLS-SEM analysis. The reasons for choosing PLS-SEM analysis are not much different from previous studies [64], including having a high capacity to handle complex models, being able to maximize the variance explained by endogenous constructs, being able to estimate parameters efficiently, allows a complete analysis of relationships from the latent construct level to the indicator level. In addition, the nature of our research is exploratory to estimate theories and models, and PLS-SEM performs better than classical regression methods. We also convey another reason based on our experience using the latest SmartPLS version 4, that the PLS-SEM Bootstrapping results are consistent with repeated iterations and the graphical output can be presented in a complex manner from both the outer and inner model sides (see Fig. 2).

5. Results and discussions

5.1. PLS-SEM measurement of external-model

Each item used to measure the latent construct is considered capable of reflecting the latent construct if it has a loading factor value of at least 0.70 [65,66]. This condition is a valid research instrument, as the numbers appear on the line between indicators and variables (see numbers not in brackets) in Fig. 2. PLS-SEM has proven the validity of the research instrument because each item has a loading factor value of more than 0.70.

Meanwhile, if viewed at the level of latent constructs, the validity test can be performed by reviewing the Average Variance Extracted (AVE) value, which must be greater than 0.5. As shown in Table 3, the AVE value of each latent construct is greater than 0.5, indicating the research instrument that measures the latent construct is valid. The reliability of the research instrument can be considered reliable if it has a required Cronbach's-Alpha value of more than 0.6 and a required Composite-Reliability (CR) value of more than 0.8. Based on the data in Tables 3 and it is known that the Cronbach's-Alpha and CR values of each latent construct have fulfilled the critical value, indicating this research instrument is reliable.

5.2. PLS-SEM measurement of internal-model

The inner model measurement of the PLS-SEM is used to review the feasibility of the formed structural model. The three measures considered in this study are (1) the R-squared value (test of determination), which indicates what percentage of endogenous latent constructs are explained by exogenous latent constructs, and (2) the Goodness of Fit (GoF), which indicates the feasibility of the model, or in other words, whether there is no significant difference between the observed object and the object that is categorized as expected. According to Chin's criteria [67,68], there are three categories of the strength of the influence of latent exogenous constructs on endogenous according to the determination test. Suppose the R-squared value is at least 0.67. In that case, it is categorized as having a strong influence, a minimum of 0.33 as having a moderate influence, and a minimum of 0.19 as having a weak influence.

As illustrated in Fig. 2, the influence of business intelligence on organizational learning is quite strong, with an R-squared value of 0.534. It is also known that the influence of business intelligence on network learning is classified as moderate, with an R-squared value

Table 3
Validity and reliability test result.

	Cronbach's alpha	Composite reliability (rho a)	Composite reliability (rho c)	The average variance extracted (AVE)
Business Intelligence (X)	0.961	0.963	0.967	0.766
Organizational Learning (Y1)	0.943	0.944	0.951	0.617
Network Learning (Y2)	0.900	0.902	0.930	0.770
Customer Value Anticipation (Y3)	0.836	0.838	0.901	0.753
Innovation (Y4)	0.891	0.892	0.925	0.754
SMEs' Performance (Y5)	0.927	0.928	0.939	0.605

Source: SmartPLS vr. 4.0.9.3 Output – Author Own (2023)

of 0.336. Likewise, the influence of business intelligence on customer value anticipation is classified as moderate, with an R-squared value of 0.378. The influence of business intelligence, organizational learning, network learning, and customer value anticipation on innovation is relatively strong, with an R-squared of 0.665 (around 66.5% of innovation is explained by business intelligence, organizational learning, network learning, and customer value anticipation). Meanwhile, the influence of business intelligence, organizational learning, network learning, customer value anticipation, and innovation on SMEs performance is relatively strong, with an R-squared value of 0.729 (around 72.9% of SMEs performance is explained by those variables).

The value of Goodness of Fit (GoF) is calculated using the Tenenhaus formula [65,69], i.e., $GoF = \sqrt{AVE \times R^2}$.

GoF Organizational Learning $= \sqrt{0.617 \times 0.534} = 0.574$.

GoF Network Learning $= \sqrt{0.770 \times 0.336} = 0.509$.

GoF Customer Value Anticipation $= \sqrt{0.753 \times 0.378} = 0.534$.

GoF Innovation $= \sqrt{0.754 \times 0.665} = 0.708$.

Gof SMEs Performance $= \sqrt{0.605 \times 0.729} = 0.664$.

A large GoF value is at least 0.38 [68,69]. Based on the calculation results, it is clear that organizational learning, network learning, customer value anticipation, innovation, and SMEs performance have a large GoF as the value of each latent construct is more than 0.38 so that the structural model formed is assessed according to real conditions in the field.

5.3. Hypotheses test

The hypothesis of this study was tested through the *t*-test, where if the t-statistics value was >1.96 (normal z-score value at 5% significance level) and the p-value <0.05, it was stated that the effect of exogenous latent constructs on endogenous was significant. Meanwhile, the value of the path coefficient or original sample (O) indicates the direction of the influence of exogenous variables on endogenous, whether positive or negative. The output of the hypothesis test in Fig. 2 indicated the values listed on the lines between latent constructs; the values not in brackets are the path coefficient values, and the values in brackets are the values of the p-value. In more detail, the result of hypothesis testing can be seen in Table 4.

Based on the conceptual model and the path coefficient or original sample (O) values in Table 4 or Fig. 2, the PLS-SEM main structural model is obtained, including:

Path 1: Y1 = 0.731 X + e1.

Path 2: Y2 = 0.580 X + e2.

Path 3: Y3 = 0.615 X + e3.

Path 4: Y4 = 0.109 X + 0.583 Y1 - 0.031 Y2 + 0.219 Y3 + e4.

Path 5: Y5 = 0.002 X + 0.226 Y1 + 0.207 Y2 + 0.245 Y3 + 0.285 Y4 + e5.

Where X is business intelligence, Y1 is organizational learning, Y2 is network learning, Y3 is customer value anticipation, Y4 is innovation, Y5 is SMEs' performance, and e is the error terms.

Table 4
Hypotheses test results.

Latent Constructs Relationship	Original sample (O)	T statistics (|O/STDEV|)	P values	Inference	Supported/Rejected Hypothesis
Direct Effects					
Business Intelligence (X) - > SMEs' Performance (Y5)	0.002	0.028	0.977	(+) Not Significant	H1 Rejected
Business Intelligence (X) - > Organizational Learning (Y1)	0.731	16.724	0.000	(+) Significant	
Organizational Learning (Y1) - > SMEs' Performance (Y5)	0.226	2.542	0.011	(+) Significant	
Business Intelligence (X) - > Innovation (Y4)	0.109	1.502	0.133	(+) Not Significant	
Innovation (Y4) - > SMEs' Performance (Y5)	0.285	3.931	0.000	(+) Significant	
Organizational Learning (Y1) - > Innovation (Y4)	0.583	7.675	0.000	(+) Significant	
Business Intelligence (X) - > Network Learning (Y2)	0.580	11.524	0.000	(+) Significant	
Network Learning (Y2) - > SMEs' Performance (Y5)	0.207	2.848	0.004	(+) Significant	
Network Learning (Y2) - > Innovation (Y4)	−0.031	0.381	0.704	(−) Not Significant	
Business Intelligence (X) - > Customer Value Anticipation (Y3)	0.615	13.297	0.000	(+) Significant	
Customer Value Anticipation (Y3) - > SMEs' Performance (Y5)	0.245	3.605	0.000	(+) Significant	
Customer Value Anticipation (Y3) - > Innovation (Y4)	0.219	2.583	0.010	(+) Significant	
Specific Indirect Effects					
Business Intelligence (X) - > Organizational Learning (Y1) - > Innovation (Y4) - > SMEs' Performance (Y5)	0.121	2.985	0.003	Serial Mediation	H2 Supported
Business Intelligence (X) - > Network Learning (Y2) - > Innovation (Y4) - > SMEs' Performance (Y5)	−0.005	0.350	0.726	Not Serial Mediation	H3 Rejected
Business Intelligence (X) - > Customer Value Anticipation (Y3) - > Innovation (Y4) - > SMEs' Performance (Y5)	0.038	2.106	0.035	Serial Mediation	H4 Supported

Source: SmartPLS vr. 4.0.9.3 Output Modified by Authors (2023)

The statistical analysis shows that business intelligence does not significantly impact SMEs' performance, considering the path coefficient value of 0.02 (positive), with a t-statistics value of 0.028 (<1.96), and a p-value of 0.977 (>0.05). These results do not support the first research hypothesis that business intelligence cannot directly impact SMEs' performance. This answers the first research question (RQ1), which confirms that business intelligence cannot directly improve SME performance.

At the same time, business intelligence is proven to significantly impact organizational learning with a path coefficient of 0.731 (positive), a t-statistics value of 16.724 (>1.96), and a p-value of 0.000 (<0.05). Organizational learning is also confirmed to significantly impact SMEs' performance, with a path coefficient of 0.226 (positive), a t-statistics value of 2.542 (>1.96), and a p-value of 0.011 (<0.05). The next results indicate that business intelligence insignificantly impacts innovation, with a path coefficient of 0.109 (positive), a t-statistics value of 1.502 (<1.96), and a p-value of 0.133 (>0.05). While innovation significantly impacts SMEs' performance with a path coefficient of 0.285 (positive), a t-statistics value of 3.931 (>1.96), and a p-value of 0.000 (<0.05).

Later, organizational learning can significantly promote innovation, with a path coefficient of 0.583 (positive), a t-statistics value of 7.675 (>1.96), and a p-value of 0.000 (<0.05). Meanwhile, business intelligence is proven to significantly impact network learning, with a path coefficient of 0.580 (positive), a t-statistics value of 11.524 (>1.96), and a p-value of 0.000 (<0.05). Network learning also significantly impacts SMEs' performance, with a path coefficient of 0.207 (positive), a t-statistics value of 2.848 (>1.96), and a p-value of 0.004 (<0.05). While, network learning insignificantly impacts innovation, with a path coefficient of −0.031 (negative), a t-statistics value of 0.381 (<1.96), and a p-value of 0.704 (>0.05).

Business intelligence is proven to significantly impact CVA with a path coefficient of 0.615 (positive), a t-statistics value of 13.297 (>1.96), and a p-value of 0.000 (<0.05). CVA is also proven to significantly impact SMEs' performance, with a path coefficient of 0.245 (positive), a t-statistics value of 3.605 (>1.96), and a p-value of 0.000 (<0.05). In addition, CVA significantly impacts innovation, with a path coefficient of 0.219 (positive), a t-statistics value of 2.583 (>1.96), and a p-value of 0.000 (<0.05).

Later, the indirect impact of business intelligence on SMEs' performance through organizational learning and innovation was significant, with an indirect path coefficient of 0.121 (positive), a t-statistics value of 2985 (>1.96), and a p-value of 0.003 (<0.05). Thus, organizational learning and innovation were serial mediators. Business intelligence will significantly impact SMEs' performance by considering organizational learning and innovation.

Furthermore, the indirect impact of business intelligence on SMEs' performance through network learning and innovation is insignificant, with an indirect path coefficient of −0.005 (negative), a t-statistics value of 0.350 (<1.96), and a p-value of 0.726 (>0.05), implying that network learning and innovation are not serial mediators. This result automatically answers (RQ3), where the field data does not prove the existence of the serial mediating role of network learning and innovation in increasing SMEs' performance through business intelligence.

Lastly, the indirect impact of business intelligence on SMEs' performance through CVA and innovation is significant, with an indirect path coefficient of 0.038 (positive), a t-statistics value of 2.106 (>1.96), and a p-value of 0.035 (<0.05). Thus, it indicates that CVA and innovation are serial mediators. This result answers the fourth research question (RQ4), where it is proven that CVA and innovation have a serial mediation role in increasing SMEs' performance through business intelligence.

5.4. Discussion

The results of this study were interesting, covering the complex relationship between business intelligence and organizational learning, network learning, CVA, innovation, and SMEs performance. First, business intelligence was not proven to have a direct impact on SMEs performance. These results support previous research which states that company performance is not directly affected by business intelligence [31], especially marketing performance [55]. The results of this study contradict several previous studies which show the robust influence of business intelligence on company performance [25,26,31,70], in which the higher the business intelligence will promote the higher of the SMEs performance.

The performance measured in this study was business performance in general, including business development, profit margin growth, net profit increase, market share increase, positive return on investment, capital increase, financial resource efficiency, customer satisfaction, and growth rate [55]. SMEs in East Java, Indonesia, are different from SMEs in developed countries which use a lot of technological approaches in conducting business intelligence. Thus, business intelligence measured is a practice that is not systemic or does not use certain technologies, such as applications or AI. Business intelligence was measured more based on the knowledge of SMEs about customer needs, the weaknesses and strengths of their creative products in the market, the size of competitors, the main resources and capabilities of competitors, the strengths and weaknesses of competitors, and the strategies of competitors. The bargaining power of its customers, awareness of the competitive industry environment, and easy-to-understand business reports [55].

The results of business intelligence practices did not directly impact SMEs performance because most small businesses require more resources. Not all data obtained from the field could be integrated into information directly useful for SMEs development. All existing information needs to be studied in advance by the organization, also known as organizational learning [25,32,33,52]. The findings indicate the role of organizational learning as a mediator. The higher the business intelligence practice, the more knowledge that can be learned by organizations that are needed to innovate, which will ultimately have an impact on SMEs' performance.

This finding contrasts with previous research, which did not show a robust influence of organizational learning in increasing SMEs' performance [25,35]. However, the aforementioned studies indicate that organizational learning had a stronger influence on the innovations produced; it is the results of innovation that can increase SMEs' performance. Hence, the conflicting results were not too contradictory, considering they just showed the strength of the mediation function, whether partial mediation or complete mediation. This result may be explained by the differences of research subjects. In detail, the subject of this research was creative economy-based

SMEs in developing countries with limited resources, which are automatically constrained in carrying out high innovation, so the direct impact of organizational learning on SMEs' performance is more felt than innovation results. While previous papers were carried out on SMEs in developing countries, which greatly utilized organizational learning to carry out high innovation to increase performance because innovation is the most important factor in improving company performance in this digital era.

Organizational learning is essential for SMEs in Indonesia. Some consensus believe that the variety of new knowledge can change existing knowledge [56,71–73]. New knowledge can generate insights useful in making management decisions, especially determining the best innovations or other decisions to improve company performance. Therefore, it is important to provide support and encouragement when employees submit new ideas, respond to each employee's initiative, simplify the resolution of each problem, and encourage employees to interact with the business environment, whether competitors, customers, academics, suppliers, technology institutions, government, and others, involving employees in making important decisions, increasing cross-functional teamwork, and others [35].

Unfortunately, even though business intelligence has a positive impact on network learning, the results of this study reveal that the impact of network learning on the innovations produced is negative and insignificant. This indicates that the higher the network learning can reduce the innovations produced, even though the decrease is relatively small. However, network learning also has a significant positive impact on SMEs' performance. This result indicates that SMEs cannot facilitate the incorporation of new knowledge obtained from communication networks to innovate. In addition, SMEs are also not able to solve every problem based on new knowledge acquired through the network, have not been able to condition the transfer of knowledge from external parties into the company through communication internal networks to plan innovation projects and has yet to turn inactive network learning resources into productive ones. The results of Network Learning are more used to improve SMEs' performance, especially in marketing instead of innovation.

Furthermore, these findings align with previous studies [26], proving that network learning is not remarkably useful for increasing innovation, even for producing high company performance. This result is on the contrary with the findings in previous research [31], which revealed the strong influence of network learning on innovation, which in turn impacts company performance. Again, the problem lies in the differences in research subjects, differences in industrial sectors, differences in countries, and the performance of the companies being measured. Thus, even though network learning does not have a significant impact on innovation, it is still important to consider supporting SMEs performance [26,31,37,50] and high network learning results from high business intelligence practices as well [31].

There are many networks of creative economy entrepreneurs or creative communities in East Java, such as the Malang Creative Fusion network, a relatively large and well-known network in Malang. There is also the Surabaya Creative Network (SCN) and an even larger network, namely the Indonesia Creative Cities Network (ICCN) in the East Java region. Unfortunately, this research shows that SMEs still need to improve in facilitating the integration of new knowledge obtained from communication networks. SMEs need to utilize new knowledge obtained through networks to solve problems optimally. SMEs are also less conditioned to the transfer of knowledge from external parties into the company through internal communication networks to plan new projects, and SMEs are still less able to transform inactive network learning resources into productive ones so that existing networks still do not have a strong impact on the resulting innovation, even though the performance of SMEs in general provides quite satisfactory results. This condition occurs because the focus of participation in the network is more on gaining market expansion than on innovation.

The lack of integration of new knowledge obtained from communication networks or misinterpretation of information or news, especially in difficult economic times such as during the COVID-19 pandemic, which occurred suddenly and very quickly, can make SMEs hesitate to set clear, realistic goals (new products/processes) for companies in the future. Many SMEs are not sure that there is a balance between potential and risks that must be faced in the future, let alone have to think about innovative strategies, because once again, limited resources are the main barrier. This is what makes network learning hurt innovation. Fortunately, this effect is not significant. This is because most of the respondents in the sample of SMEs studied are young, productive people who are strong in facing challenges, looking for new opportunities, and innovating.

This research also shows the significant role of customer value anticipation (CVA) in increasing Innovation, which can promote SMEs' performance. This finding is in line with several previous studies [28,38,74]. By paying attention to CVA, SMEs must have strong relationships with suppliers to anticipate changes in production needs [28,38,60] to achieve operational efficiency of companies that can lead to overall SMEs performance. The innovations that SMEs in East Java can carry out are mostly not based on high technology, but these SMEs can set realistic future goals regarding new products/processes. The CEO or company owner believes they must consider the potential and risks in balance. To achieve company goals, CEOs drive innovative strategies even though they know some of them will fail and continually look for new opportunities for innovation. Innovation is the most powerful tool currently available to face intense competition so that, in the end, it achieves high business performance [75].

5.5. Theoretical implications

This present research outcome provides theoretical contributions to the limitations of strategic management theory in resource-based view (RBV) and knowledge-based view (KBV). This study highlights the need for creative economy-based small-medium enterprises (SMEs) in developing countries to mobilize resources by incorporating business intelligence to realize innovation and high performance, but they are still limited to simple processes instead of using sophisticated systems or technology. In addition, knowledge management practices are still not optimal in the network learning process, so they do not have a strong impact on the innovation produced. Thus, the conceptual model further proves that innovation success and business performance are a function of business intelligence capabilities through organizational learning and customer value anticipation.

Efforts to understand the role of RBV-KBV in adopting innovation to improve SME performance in developing countries should be discussed and understood in current management literature. Prior to this research, there had been research that facilitated the relationship between digital services and competitive advantage to strengthen the relationship between RBV, KBV, and innovation [48], but not in the context of knowledge and learning, or SME performance. Other research demonstrates the relevance of three individual determinants (i.e., openness to others, assertiveness, and balancing skills) that expand the RBV and KBV by identifying key determinants representing an important resource base for leveraging internal and external knowledge. In the engagement of SMEs in multiplex boundary work for collaborative innovation [76]. However, both studies use empirical evidence from SMEs from developed countries whose resource conditions differ greatly from those of developing countries such as Indonesia.

In this research, the RBV has been developed to cover knowledge transfer, and the KBV has been developed to cover organizational learning and networks and address customer values. Recently, along with the increasing development of digital technology, the RBV-KBV theory has also developed along with research on change and reconstruction, as has been proven in this research. The innovations created depend on linking knowledge at intra- and inter-organizational levels through multiplex work boundaries. The resource-based view (RBV) and knowledge-based view (KBV) can provide valuable and complementary insights to understand the determinants of the degree to which individuals enable knowledge exchange through collaborative innovation work boundaries [76].

5.6. Practical implications

This study also contributes immensely to the development of SMEs by providing some practical contributions. First, owners or managers of creative economy-based SMEs in East Java should view business intelligence as an important strategic decision to produce innovation and improve business performance. Hence, business intelligence results must be studied first through optimal organizational learning. It is time for SMEs to fully realize that they have carried out simple business intelligence and try to improve it because it will support business success in the future. The most visible strength of SME business intelligence in East Java today is its ability to produce reports that are easy to understand. Factors that still need to be improved are SMEs' knowledge regarding the advantages or disadvantages of their products and SMEs' knowledge regarding the strategies used by competitors. These two weak factors will endanger SMEs in the future if they are not immediately improved. Like it or not, SMEs must become digital technology literate despite limited resources. SMEs do not have to have an independent Business Intelligence system; SMEs can utilize various information technology platforms or machine learning that are already available. Through digital media, SMEs can obtain information in real-time to increase their knowledge, which ultimately impacts organizational learning that can support innovation and achieve high performance.

In the organizational learning process, SMEs must respond with good employee initiatives to generate new ideas and make every employee feel involved in company decision-making. In this way, SMEs can better define new processes and products and are better able to seek new opportunities for innovation, which ultimately results in superior performance. Moreover, SMEs combine cooperation with suppliers to anticipate changes in material needs, work with suppliers to predict material needs, and modify products and services to suit changing needs. In that case, the resulting performance will be even higher.

What needs to be paid attention to is the role of SMEs in the network. When networking, SMEs should focus on more than just market expansion and marketing targets. SMEs should use all knowledge obtained from networking to learn and produce innovation and high performance.

Second, SMEs must also pay attention to anticipating customer value so that the innovations produced follow customers' needs. Thus, it recommends that managers optimize business intelligence by leveraging existing technology. When internal resources are not capable of creating a custom system, there is already a lot of machine learning available, such as Tableau, Microsoft Power BI, QlikView, SAP Business Objects, and IBM Cognos Analytics. However, there is a continuing challenge and homework regarding human resources who can carry it out. In this matter, SMEs must enhance their networks, especially with academics, consultants, and the government.

SMEs with a budget can ask consultants to overcome their shortcomings in mastering digital systems or technology. SMEs can also collaborate with academics through student internships and community service programs. Through these two programs, SMEs will gain knowledge sharing regarding the use of digital technology and assistance from academics (students and lecturers). SMEs can also participate in workshops and business incubation programs organized by the government. It is well known that COVID-19 has made the business world increasingly dependent on technology to be competitive and efficient. However, SME digital transformation and innovation require policies, initiatives, and government assistance through clear and targeted programs [77].

6. Conclusion

This research has attempted to investigate the link between business intelligence, organizational learning, network learning, customer value anticipation (CVA), innovation, and creative economy-based SMEs performance in East Java of Indonesia. The findings indicate that business intelligence does not directly impact SMEs' performance because the data generated from business intelligence practices needs to be integrated into knowledge that must be learned through organizational learning. If this is offset by CVA, it will give birth to innovations that ultimately impact SMEs' performance. Hence, even though the impact of serial mediation network learning and innovation presence on the relationship between business intelligence and performance is not supported by field data in this study, network learning still need attention to improve SMEs' performance. The theoretical implications of this research break the boundaries of strategic management theory resource-based view (RBV) and knowledge-based view (KBV) in the latest era, where creative economy-based SMEs in developing countries have been able to mobilize resources to carry out business intelligence, even

though in a simple way, to realize Innovation and high performance.

The limitation of this research is that it has yet to explore the causes of the insignificant effect of network learning on innovation. Thus, future research can conduct qualitative studies to obtain more in-depth information regarding the relationship between network learning with Innovation. In addition, this research still uses economy creative-based SMEs as samples, while future research is recommended to involve specific samples, for example, in the culinary sector only, the sector with the highest number in East Java. Researchers can also pay attention to other provinces, such as West Java, which has the largest creative economy exports in Indonesia. Further scholars are also expected to explore the role of business intelligence in more specific performance areas, such as marketing performance, financial performance, and human resource management, and include the demographics of respondents in the model as a control variable. The data distribution in PLS-SEM analysis is only possible to assess statistical significance using the Bootstrapping technique.

Data availability

Data for this study may be obtained upon request from the corresponding author.

Ethical Approval

All procedures conducted in studies involving human participants adhered to the ethical standards set by the Institute for Research and Community Service, Institut Teknologi dan Bisnis Asia Malang.

CRediT authorship contribution statement

Widiya Dewi Anjaningrum: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Nur Azizah:** Writing – original draft, Supervision, Resources, Project administration, Funding acquisition, Data curation, Conceptualization. **Nanang Suryadi:** Writing – review & editing, Validation, Software, Resources, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e27998.

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