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Let's Explore! The Factor, Reliability, and Validity Analyses of Readiness for a Knowledge-Based Economy Among Undergraduate Students

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Abstract: Knowledge-based economy is an economic model students need to be prepared for a future economic model that uses knowledge as its main resource. Therefore, this study developed and validated instruments for constructing knowledge-based economy readiness among undergraduate students. This study used an online questionnaire with 120 respondents of economic education students in educational universities in East Java, Indonesia, for exploratory factor analysis and 417 respondents for confirmatory factor analysis. Then, statistical analysis was conducted using exploratory factor analysis in SPSS and confirmatory factor analysis in AMOS. This study first developed five factors of knowledge of economics, readiness for economic challenges, readiness for education, readiness for infrastructure, and readiness for innovation, consisting of 27 items. However, one item was removed because the loading factor was below .50. Consequently, 26 items were retained because the loading factor was significantly greater than .50. The Cronbach's alpha value for each item of the knowledge-based economy readiness construct was >.60 and met all goodness of fit index criteria, which means that it meets the requirements and can measure the construct of knowledge-based economy readiness. Since this study meets the validity and reliability requirements of the constructs leading to knowledge-based economy readiness, these results will help students prepare for the current and future knowledge-based economy. They can be used in developing economic education curricula in higher education.

Keywords: *Economics education, exploratory and confirmatory factor, higher education, knowledge-based economy, undergraduate students.*

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Introduction

The Sustainable Development Goals (SDGs) are global action plans developed by world leaders, including developing nations like Indonesia, to eradicate poverty, reduce inequality, and preserve the natural world. The SDGs contain 17 goals and 169 targets expected to be achieved by 2030 (Aleixo et al., 2020; Castro & Lopes, 2021). The 4th SDG, i.e., education, and the 8th SDG, i.e., decent work and economic growth, are needed in shaping the K-economy. These aspects should be a new paradigm in human capital development, including the foundation of the post-pandemic recovery (Lawrence & Lawrence, 2019; Makarenko et al., 2021). In addition, SDGs can be a benchmark for the transition to a knowledge-based economy (K-economy) and contribute to the development of human resources and industrial technologies through innovation, contributing to sustainable economic growth (Aleixo et al., 2020; Makarenko et al., 2021; Toimbek, 2021).

Today's economies in developed countries are based on knowledge and information (Calvo, 2021). They are called knowledge-based economy (K-economy) because knowledge is considered the most important and most productive source of wealth creation (Castro & Lopes, 2021; Ravi & Janodia, 2022; Sørensen et al., 2016). As a form of Indonesia's willingness to support the implementation of the 4th SDG and the 8th SDG (Ravi & Janodia, 2022), Indonesia should prepare a K-economy, not only from the government's side but especially from the students' side as the young generation. The preparation could also start in one of the most populous regions in Indonesia, East Java. Apart from that, K-economy is necessary to become an economic model in Indonesia because Indonesia will have a Golden Indonesia program in 2045, aiming for foreign workers to enter Indonesia freely. Therefore, it is necessary to prepare the younger generation, especially students, with everything that will support their readiness for the K-Economy to meet the economic challenges.

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The K-economy is an economic development concept in which innovation and access to knowledge drive productivity growth. It is a future economic model that almost all countries, including developing countries, have been attempting to achieve. The K-economy has been used in developed countries (Bag et al., 2018; Bano & Taylor, 2015). The K-economy concept is part of a broad economic and social theory (Švarc & Dabić, 2017). The K-economy is a source of innovation in which information, communication, and technology (ICT) form the basis for the growth of human resource creativity. The K-economy has made economic actors more advanced and competitive. The K-economy is now critical for every country, as the ICT revolution is bringing changes impacting each country's productivity. In addition, advances in science and technology have led to increased human resources, whether in companies or governments. The global world has the effect of lowering tariffs, liberalizing capital, reducing transportation and transaction costs, changing demand, and increasing income, which has the potential to be an engine for the existence of the K-economy (European Commission Directorate-General for Enterprise, 2004; Yeo & Lee, 2020).

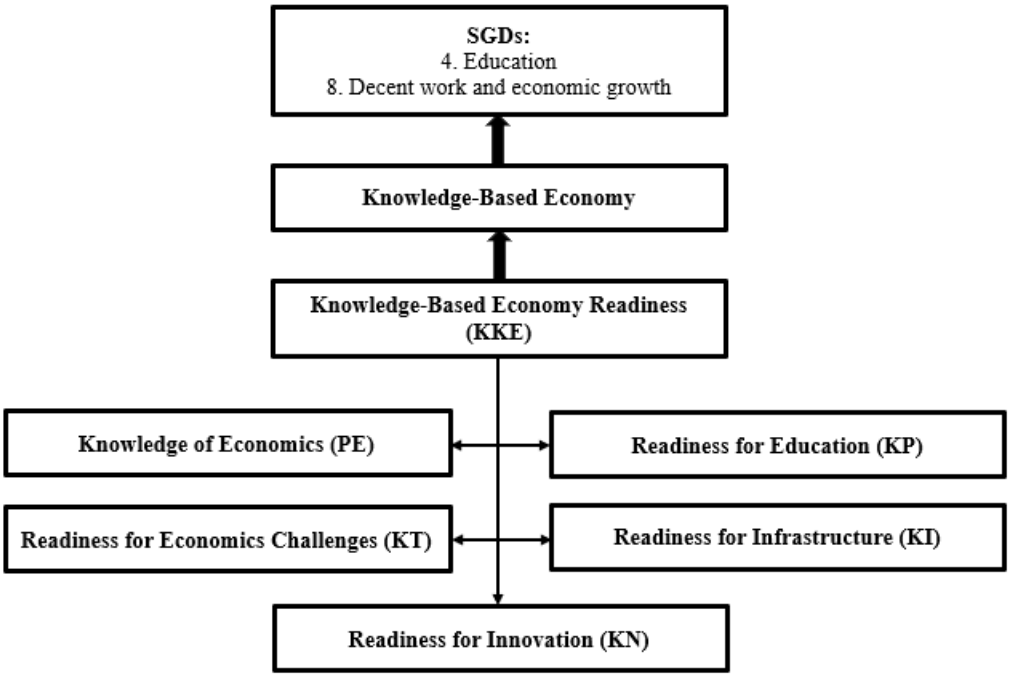

Figure 1. Conceptual Framework of Study for K-Economy Readiness

Knowledge-based economy readiness (KKE) is important for implementing the 4th and 8th SDGs. This is so important because students, as the younger generation of the Indonesian nation, need to teach the things included in the pillars of the K-economy. These include economic education, entrepreneurial skills, a social environment, ICT facilities, digital literacy, and social media, the cornerstones of the K-Economy that support all of this (Adrangi et al., 2021; Makarenko et al., 2021; Sørensen et al., 2016). Thus, in Indonesia, particularly in the East Java region, a K-economy needs to be built from the ground up through the education of undergraduate students, as it is an economic model based directly on the expenditure, circulation, and use of knowledge and information. It represents the emergence of an extraordinary K-economy that brings many benefits to Indonesia now and in the future.

To improve students' readiness for the K-economy, the world of education, especially universities, has an important role in preparing undergraduate students. Enhancing higher education's position in the search for a better future will help universities to become a practical example of the possibility of the future of the young generation (Kohl et al., 2022). The increasing activity of undergraduate students in education and business at the university suggests that more and more universities recognize sustainable development as a significant challenge for students and are making changes in line with the K economy (Kohl et al., 2022; Salman et al., 2020; Weiss & Barth, 2019). According to the World Bank, the K-economy consists of four pillars: innovation, education and prevention institutions, technology and information infrastructure, and the economy (Adrangi et al., 2021; Durazzi, 2019; European Bank for Reconstruction and Development, 2019; Toimbek, 2021; Wirba, 2021).

According to the World Bank, education is one of the most important keys to the K-economy, especially economic education (Salman et al., 2020; Weiss & Barth, 2019). Students' economic education significantly impacts their decision to take action to improve their KKE in the present and future (Rohimah, 2021; Widiansyah, 2017). Based on the K-economy pillar, according to the World Bank, it can be concluded that the dimensions for knowledge-based economy readiness (KKE) are knowledge of the economy (PE), readiness for economic challenges (KT), readiness for education (KP), readiness for infrastructure (KI), and readiness for innovation (KN). Accordingly, this study uses these dimensions to measure students' readiness for a K-economy. Based on the described problems and facts from previous research, this

research is very interesting to discuss. We hope this research can be used as a reference for developing economic education curricula, especially in universities, to prepare students for a K-economy.

Literature Review

The K-economy is an economic development concept in which innovation and access to knowledge drive productivity growth. The K-economy is a future economic model developed and adopted by almost all nations, including developing countries (Bag et al., 2018; Bano & Taylor, 2015; Wirba, 2021). The concept of a K-economy is part of a comprehensive economic and social theory (Švarc & Dabić, 2017). K-economy is a source of innovation, and ICT is the basis for the growth of human resource creativity. The K-economy has forced economic factors to become more advanced and competitive. K-economy is very important for every country today because the changing revolution of ICT (information, communication, and technologies) affects the productivity of every country; advances in science and technology have led to an increase in human resources, whether companies or governments carry them out; the global world has the effect of lowering tariffs, liberalizing capital, reducing transportation and transaction costs, and changing demand and increasing income, which is potentially a driver for the existence of the K-economy (European Commission Directorate-General for Enterprise, 2004; Yeo & Lee, 2020).

On the other hand, the K-economy refers to the economy that develops by applying different knowledge. Combining various knowledge and talents leads to innovative thinking and technologies that produce intellectual property and products of high-quality (Heng et al., 2012; Junarsin et al., 2023). Creating, transferring, and applying knowledge and information also drive the K-economy. It enables countries to improve their economies by developing efficient and effective ways to produce goods and services and deliver them to more people at low-cost (Castro & Lopes, 2021; Nurmalia et al., 2020). By effectively using human skills and knowledge, the country's wealth is gradually outpacing the creation of wealth derived from natural resources (Friedman, 2005).

The transition to the K-economy is fueled by the growing awareness that the country's ability to generate, adapt, and apply new knowledge is increasingly critical to the future growth of the economy, employment, and societal welfare growth (Archibugi & Coco, 2005; Cooke & Piccaluga, 2006; Švarc & Dabić, 2017). Technological advances developed by companies and scientific studies and converted into commercially successful innovations are believed to drive technological change. As a result of the cumulative accumulation of technological advances, the country, particularly Indonesia, is experiencing economic growth and social prosperity (Calvo, 2021; Nurmalia et al., 2020). As a developing country preparing for a K-economy, Indonesia can implement these milestones (European Bank for Reconstruction and Development, 2019; World Bank Institute, 2009).

Table 1. K-Economy Pillars According to World Bank

Pillars	Education & Training	ICT Infrastructure	Economic Incentives & Institutional Regime	Innovation System
Information	Educated and skilled residents are required to create, share and apply knowledge.	A dynamic ICT infrastructure, from radio to the internet, is needed to allow effective communication, dissemination, and processing of information.	The knowledge economy relies on a regulatory and economic climate that encourages investment in ICT and entrepreneurship.	A network of research centres, universities, think tanks, private enterprises, and community groups is needed to utilize the expanding global knowledge base, adapt it to local needs, and generate new knowledge.

Source: Adaptation (European Bank for Reconstruction and Development, 2019; World Bank Institute, 2009)

Indonesia is also one of the countries that focus on human resources for economic growth. For this reason, Indonesia, especially the East Java region, must create the necessary conditions to organize the community's K-economy. Indonesia, which has the largest population in Southeast Asia, should be able to manage its human capital well because human capital is the most important factor in promoting economic development (Badan Pusat Statistik, 2021). In order to make the readiness of Indonesian people a K-economy, provisions are needed in various aspects. This is because 70% to 85% of economic growth in developed countries is achieved through using and applying new knowledge in education, shopping technology, and other areas to achieve sustainability. Based on the pillars of a K-economy according to the World Bank and existing conditions, undergraduate students can prepare for a K-economy by acquiring knowledge in economics (PE), readiness for economic challenges (KT), readiness for education (KP), readiness for infrastructure (KI), and readiness for innovation (KN). Applied knowledge and aspects play an essential role in the economic development of a K-economy (Jones, 2016; Makarenko et al., 2021). Therefore, knowledge-based economy readiness (KKE) must be prepared to implement the ongoing K-economy model that is being carried out.

Methodology

Research Design

This research employed a survey to establish reliable measures to build knowledge-based economy readiness (KKE) among undergraduate students. Quantitative data were collected using self-administered survey questionnaires from the JotForm online application. The research also included an extensive literature review to find items used to assess KKE constructions. Additionally, we performed internal and external validity checks on content, structure, and methodology using standards and outside expert input to ensure the hypothesis' validity and dependability. To determine whether the content was accurate, we evaluated it using a panel of four economists from different universities in Indonesia. As of this writing, there have been no items that have been overlooked during the validation process.

Sample and Data Collection

One hundred twenty economic education undergraduate students from East Java educational universities were randomly chosen before the self-administered questionnaire for Exploratory Factor Analysis was distributed. Then, 417 respondents were chosen for Confirmatory Factor Analysis. The Harman one-factor test was used to check for Common Method Bias (CMB) and ensure the quality of the data collection in this study (Podsakoff et al., 2012). The statistical result showed that CMB was not a concern in this research because the total variances extracted by a single factor for the samples were 37.5%, which is < 50%.

This study utilized 27 items to measure the extent of students' knowledge-based economy readiness (KKE). As a result of the responses of 120 respondents to 27 items in the questionnaire, one item was omitted as it did not meet the specified loading factor decision. The other 26 items, however, still could be used. The results confirmed that the students did not obtain sufficient internet connection from the government for their knowledge-based economy readiness (KKE).

Analyzing of Data

The researchers created items based on the opinions and theories established for each research construct. Later, the self-administered form was distributed. More details of the 27 items are presented in Table 2.

Table 2. Items in the Questionnaire of K-Economics Readiness

Construct	Construct Code	Measurement	Sources
Knowledge of economics	PE1	I understand that the economy in Indonesia needs a change towards a knowledge-based economy (K-economy)	(European Bank for Reconstruction and Development, 2019; Organisation For Economic Co-Operation and Development, 2004; World Bank Institute, 2009)
	PE2	I understand that as a student, I need to prepare for better changes in the Indonesian economy	
	PE3	I understand that unemployment in Indonesia can be reduced by preparing for K-economy	
	PE4	I understand that poverty in Indonesia can be reduced by preparing for K-economy	
	PE5	I understand that a knowledge-based economy (K-economy) can improve the quality of human resources	
Readiness for economic challenges	KT1	I am ready to participate and face global economic competition	(European Bank for Reconstruction and Development, 2019; Organisation For Economic Co-Operation and Development, 2004; World Bank Institute, 2009)
	KT2	I am ready to participate in and face the development of the digital economy	
	KT3	I am ready to compete in economics	
	KT4	I am ready to participate in a sustainable economy	
	KT5	I am ready to participate in economic development	

Table 2. Continued

Construct	Construct Code	Measurement	Sources
Readiness for education	KP1	I prioritize education for the future	(European Bank for Reconstruction and Development, 2019; Organisation For Economic Co-Operation and Development, 2004; World Bank Institute, 2009)
	KP2	I use education as capital for the future	
	KP3	I studied economic education as my readiness for a knowledge-based economy (K-economy)	
	KP4	I went to the university of my own free will	
	KP5	I went to university because it benefited my readiness for a knowledge-based economy (K-economy)	
	KP6	I went to university because I wanted to get my diploma of readiness for knowledge-based economics (K-economy)	
Readiness for infrastructure	KI1	I have a strong internet network from the government	(European Bank for Reconstruction and Development, 2019; Organisation For Economic Co-Operation and Development, 2004; World Bank Institute, 2009)
	KI2	I have a strong internet network from the university	
	KI3	I have an internet network from private (data package, personal Wi-Fi)	
	KI4	I have tools (laptops, computers, smartphones) to make it easier for me to access information for my readiness for a knowledge-based economy (K-economy)	
	KI5	I use rooms and classes at the university that are in the process of learning for my readiness for a knowledge-based economy (K-economy)	
Readiness for innovation	KN1	I am ready to start learning entrepreneurship for my readiness for a knowledge-based economy (K-economy)	(European Bank for Reconstruction and Development, 2019; Organisation For Economic Co-Operation and Development, 2004; World Bank Institute, 2009)
	KN2	I enjoy being creative in coming up with something new for my readiness for a knowledge-based economy (K-economy)	
	KN3	I enjoy innovating for my readiness for a knowledge-based economy (K-economy)	
	KN4	I enjoy producing products from studying at university for my readiness for a knowledge-based economy (K-economy)	
	KN5	I am happy to own the copyright of my work for my readiness for a knowledge-based economy (K-economy)	
	KN6	I am happy to have a patent for my readiness for a knowledge-based economy (K-economy)	

Source: Research Instrument of K-economy among University Undergraduate Students

Following data collection, SPSS 22 was used to apply the EFA method. The criteria for the investigation findings through EFA were divided into several interests, namely (a) maintaining items that have a correlation or relationship with the items studied based on the results of the Kaiser-Meyer-Olkin (KMO) and Bartlett examinations, with criteria $p < .05$ and KMO value > .50; (b) preserving items that can be utilized for future analysis based on eigenvalues and factor loadings, with total eigenvalues criteria > 1 and percentage of variance eigenvalues criteria ± 60%, and (c) Cronbach's alpha values with factor loadings parameters in each construct ± .5 (Hair et al., 2010; Labidi, 2022).

This study also used the Confirmatory Factor Analysis for the construct validity of KKE among undergraduate students. Then, we used AMOS to validate the constructs (Confirmatory Factor Analysis). The Confirmatory Factor Analysis was carried out to ensure that each variable studied has configuration validity and construct reliability as needed so that in this analysis, the validity and reliability of the confirmatory factors no longer look at each indicator item but confirm the fit between measurement models based on theory and previous research with empirical data in the field. The

Confirmatory Factor Analysis test was also used to test the extent to which the measured variables can represent constructs or variables that have been thought of beforehand (Hair et al., 2010). The criteria of validity are required in the CFA procedure: (a) construct validity, (b) convergent validity, and (c) discriminant validity. For reliability, using CFA results, researchers could calculate composite reliability for constructs. The CFA procedure used a Goodness of Fit Index (GoF) to determine construct validity. The GoF index categories that must be met for construct validity are parsimonious, absolute, absolute, and incremental fit (Awang, 2014; Hair et al., 2010). The required validity and reliability are RMSEA values < .08, CFI and TLI > .9, Chisq/df < 3.0, Average Variance Expected (AVE) > .5, Composite Reliability (CR) > .6 (Awang, 2014; Hair et al., 2010).

Results

In the factor analysis, 27 items in the KKE construct item were tested and divided by dimensions among university students, particularly five items in the PE, KT, KP, KI, and KN dimensions. EFA results are presented in Table 2, which includes: (a) the KMO and Bartlett tests, (b) eigenvalues, (c) factor loading, and (d) Cronbach's alpha scores in each dimension.

Kaiser-Meyer Olkin (KMO) and Bartlett's Tests

Table 3. KMO and Bartlett's Tests of K-Economy Readiness

KMO and Bartlett's Tests (K-Economy Readiness)	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Knowledge of economics)	.815
Bartlett's Test of Sphericity (Approx. Chi-Square)	321.189
Df	10
Sig.	.000
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Readiness for economic challenges)	.635
Bartlett's Test of Sphericity (Approx. Chi-Square)	157.176
Df	10
Sig.	.000
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Readiness for education)	.826
Bartlett's Test of Sphericity (Approx. Chi-Square)	361.267
Df	15
Sig.	.000
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Readiness for Infrastructure)	.644
Bartlett's Test of Sphericity (Approx. Chi-Square)	176.384
Df	10
Sig.	.000
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Readiness for innovation)	.834
Bartlett's Test of Sphericity (Approx. Chi-Square)	501.209
Df	15
Sig.	.000

Source: Result SPSS Data Analysis of K-Economy Among Undergraduate Students

Eigenvalues

Eigenvalues based on varimax rotation have a total number >1. In contrast, cumulative eigenvalues (%) indicate a > value of 60%, specifically 68.067% for the PE dimension, 71.862% for the KT dimension, 61.830% for the KP, 73.431% for the KI dimension, and 67.756% for the KN dimension (Table 4). Based on these findings, it is possible to infer that all items have an overall value >1 and a cumulative eigenvalue > 60%. As a result of the eigenvalue findings, all items in the KKE construct can be applied as a data collection tool.

Table 4. Components and Total Variance Explained by K-Economy Readiness

Construct	**Initial Eigenvalues**			
	Component	**Total (%)**	**Variance (%)**	**Cumulative (%)**
Knowledge of economics (PE)	1	3.403	68.067	68.067
Readiness for economic challenges (KT)	1	2.334	46.670	46.670
	2	1.260	25.192	71.862
Readiness for education (KP)	1	3.710	61.830	61.830
Readiness for infrastructure (KI)	1	2.368	47.355	47.355
	2	1.304	26.076	73.431
Readiness for innovation (KN)	1	4.065	67.756	67.756

Source: Result SPSS data analyses of K-economy among Undergraduate Students research

Factor Loading

Two indicators, namely the dimension of KT and KI, produce two components of the total explained variance. However, this indicator has no sub-indicators and only two orders. Hence, only one component would be evaluated for the loading factor on the component matrix. While not every item has a loading factor of ± .50, as for the KI dimension, one item (coded as KI1) has a loading factor of < .50, specifically .000. Therefore, one item must be discarded of the five items used to measure the KI dimension.

Table 5. Components and Items Used in The Study

Construct	Item Code	Loading 1
Knowledge of economics (PE)	PE1	.848
	PE2	.804
	PE3	.814
	PE4	.821
	PE5	.837
Readiness for economic challenges (KT)	KT1	.645
	KT2	.775
	KT3	.773
	KT4	.634
	KT5	.562
Readiness for education (KP)	KP1	.824
	KP2	.749
	KP3	.736
	KP4	.812
	KP5	.813
	KP6	.799
Readiness for infrastructure (KI)	KI1	.000
	KI2	.515
	KI3	.735
	KI4	.859
	KI5	.848
Readiness for innovation (KN)	KN1	.778
	KN2	.806
	KN3	.893
	KN4	.796
	KN5	.833
	KN6	.827

Source: Result SPSS Data Analyses Study of K-Economy Among University Students

Cronbach's Alpha

Cronbach's alpha value for each item in constructing KKE is > .60. Specifically, Cronbach's alpha value for the PE code with .881, followed by the KP code with .868, and the KN code with .903 has very high-reliability values due to the discriminant index is .70 < r11 < .90 (Jihad & Haris, 2013). Consequently, Cronbach's alpha value PE code is .881, and the KP code is .868, suggesting they are highly reliable. On the other hand, the KT code Cronbach's alpha is .687, and the KI code is .627, indicating that the codes have moderate reliability. All items in each dimension also have different distinguishing abilities. However, all can be used since each item has met the requirements and can be used to collect data (Table 6).

Table 6. Reliability Analysis of The Items for K-economy Readiness

No.	Sub- Construct	Code	Number of Items	Cronbach's Alpha	Discriminant Index	Interpretation of Differentiating Power
1	Knowledge of economics	PE	5	.881	.70 < r11 < .90	High Reliability
2	Readiness for economic challenges	KT	5	.687	.40 < r11 < .70	Moderate Reliability
3	Readiness for education	KP	6	.868	.70 < r11 < .90	High Reliability
4	Readiness for infrastructure	KI	5	.627	.40 < r11 < .70	Moderate Reliability
5	Readiness for innovation	KN	6	.903	.90 < r11 < 1.00	Very High Reliability

Source: Result SPSS Data Analyses of K-economy Among Undergraduate Students Research

Table 5 provides a summary of the EFA findings. Of the four EFA results, namely the KMO and Bartlett tests, eigenvalues, factor loadings, and Cronbach's alpha values, all items in the KKE construct met the criteria. As a result, all items can be utilized to measure the extent to which PE, KT, KP, KI, and KN dimensions for KKE among undergraduate students.

After we get the EFA results, we need CFA to validate whether all items from the KKE construct measured in EFA can be used. The KKE construct has five sub-constructs, so CFA is carried out (Awang, 2014; Hair et al., 2010).

First Order CFA

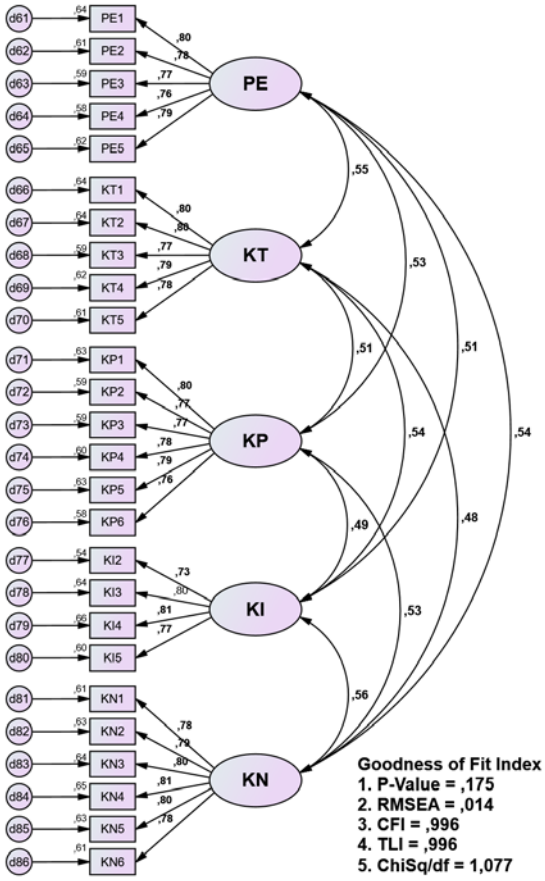

Figure 2. The First Order CFA Result for K-Economy Readiness Construct

The first-order CFA of the K-economy readiness construct shows in Figure 2. It also shows that the factor loading of all indicator items has a value of > .50, by acceptable factor loading criteria > .50 (Awang, 2014; Hair et al., 2010). Factor loading for all indicator items ranges from .73 to .81. Figure 2 also shows that these items have shown a good correlation with their latent variables. Previously, in EFA, there was 1 item that did not meet the criteria, namely KI1. However, in the CFA analysis, all items were met, so the total instrument items in the K-economy readiness construct (KKE) can be accepted in the first-order CFA measurement has 26 instrument items. This means that all items in this sub-construct can accommodate respondents' understanding of the purpose of this study so that there is a common perception between researchers and respondents who assess that the K-economy readiness has five sub-constructs (PE, KT, KP, KI, and KN).

It is also known that the correlation value for each factor or dimension that represents the construct of K-economy readiness starts with .49 to .56, meaning that the correlation of each factor is in the criterion smaller than .85 (Kline, 2016), so it can be concluded that each factor represents five sub-constructs of K-economy readiness (PE, KT, KP, KI, and KN) have differences from each other. After paying attention to factor loadings and correlation values, the next step is to look at the Goodness of Fit index (GoF). From the GoF value, it is known that the model in the first-order CFA test appears to have an appropriate criterion value. This can be seen from the RMSEA value < .08. TLI and CFI also have values > .90. By paying attention to the test criteria of the first level of CFA that have met the requirements of the analytical test, the next step is to test the second-order CFA.

Second Order CFA

The result of the second-order CFA for measuring the K-economy readiness construct is shown in Figure 3. The results of the second-order CFA show that the index value on the K-economy readiness construct meets the required GoF index criteria and does not reduce the number of indicators that have been approved in the first-order CFA analysis, so in the

second-order CFA analysis, there are no modifications and deleted items. The analysis results also show that the loading factor values of the five sub-constructs included in the K-economy readiness construct have loading factor values> .5.

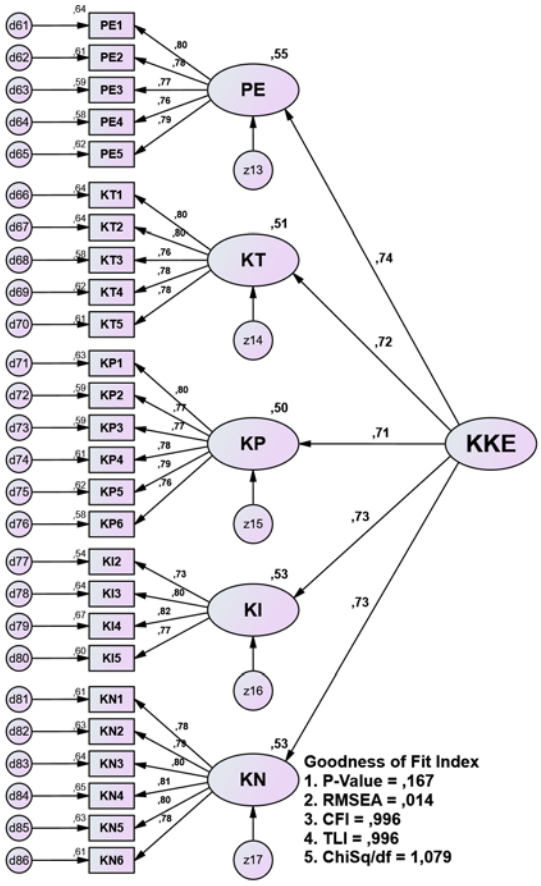

Figure 3. The Second Order CFA Result For K-Economy Readiness Construct

Then, the loading factor for each dimension in each sub-construct of K-economy readiness is also > .50, ranging from .76 to .82. This means that the loading factor belonging to the five sub-constructs and the loading factor belonging to each dimension has met the test criteria of a loading factor value > .5 (Ferdinand, 2002; Hair et al., 2010). The results of the second-order CFA for the K-economy readiness construct also show that all the GoF value criteria have met the GoF criteria required in the construction of the model ChiSq/df = 1.079, TLI = .996, CFI = .996, and RMSEA = .014. In other words, the results of the second-order CFA of the K-economy readiness construct prove that the K-economy readiness construct consists of five main dimensions (PE, KT, KP, KI, and KN).

Table 7. Summary of Second Order CFA Result of K-Economy Readiness Construct

Construct	Sub-Constructs	Loading Factors	Construct Reliability (CR ≥ .70)	Average Variance Extracted (AVE ≥ .50
K-economy readiness (KKE)	Knowledge of economics (PE)	.74	.848	.879
	Readiness for economic challenges (KT)	.72		
	Readiness for education	.71		
	Readiness for in education (KP)	.73		
	Readiness for in infrastructure (KI)	.73		

Based on Table 7, the CR and AVE values in the K-economy readiness construct also show values that CR > .70 and AVE > .50. Therefore, it can be concluded that the subconstructs in the K-economic readiness construct (PE, KT, KP, KI, and KN) have internal consistency and have conceptual differences.

Discussion

According to the result of this study, not all items of the construct KKE (knowledge economy readiness) have a relationship or correlation between these items, as there is 1 item (KI1) with a loading factor < .50. KKE includes 27 questions that test items on the dimensions PE (knowledge of economics), KT (readiness for economic challenges), KP

(readiness for education), KI (readiness for infrastructure), and KN (readiness for innovation). From the results of EFA and CFA, only 26 items can be used to measure the K-economy readiness of university students.

Based on the result, PE (knowledge of economics) is the base of knowledge undergraduate students should have in their knowledge-based economic readiness (KKE) (Safara, 2022; Švarc & Dabić, 2017; Toimbek, 2021). The K-economy is a knowledge-based economic model in which university students must prepare for this economic change. With knowledge-based economy readiness (KKE), undergraduate students are expected to reduce unemployment as they can create their jobs with the knowledge they possess. Also, by preparing for a K-economy, undergraduate students can improve the quality of their human resources (Andrés et al., 2021; Kurniati et al., 2021). In addition, readiness to face economic challenges indicates whether students are ready to face the economy when it comes to their economic knowledge. In addition, undergraduate students must be prepared to compete globally with the digital economy, a set of knowledge-based economies. Most importantly, students must be well prepared for the knowledge economy (K-economy), also part of the SGDs (Bag et al., 2018; Yeo & Lee, 2020).

KP (readiness for education) must also be prepared for the K-economy among undergraduate students (Junarsin et al., 2023; Yeo & Lee, 2020). Undergraduate students must prioritize their education because education is the most important asset for their future in a K-economy. Moreover, undergraduate students have the most important capital they need to prepare well for their education. A well-prepared education is also inextricably linked to the readiness of the infrastructure available to students. Undergraduate students with adequate infrastructure will easily find the information they need (Hadad, 2017; Yeo & Lee, 2020). A well-organized infrastructure, such as a good internet network and adequate educational facilities, will facilitate information uptake for undergraduate students in the knowledge-based economy readiness (KKE).

Undergraduate students with PE (knowledge of economics), KT (readiness for economic challenges), and KP (readiness for education) are expected to be ready to innovate (Leavy, 2021; Penco et al., 2019). They must have creativity, entrepreneurial skills, and a desire to develop themselves (Penco et al., 2019). In addition, students must also prepare the infrastructure (KI) for their knowledge-based economy readiness (KKE) because infrastructure is an essential element in supporting economic growth and technological development. In the context of a K-economy or digital economy, infrastructure becomes even more important as it provides access to technology and the Internet, which are key elements of the digital economy (Muryanto et al., 2022; Rae, 2019; Topleva, 2018).

As the future generation of leaders and drivers of digital economy development, students must prepare the infrastructure for K-economy readiness (KI). This is because by preparing the infrastructure, students can accelerate the digital economy development in the future, opening up new job opportunities, increasing business competitiveness, and facilitating access to online transactions for the community. Students can prepare infrastructure for the K-economy by developing technology (ICT) and digital literacy skills, accessing technology and the Internet, and networking with digital economy stakeholders (Paige, 2002; Ukwoma et al., 2016). Students can use ICT to search economic databases, analyze trends, collect data, and gain deep insights into economic issues to improve their readiness for the K-economy. In this way, students can participate in accelerating digital economic development and promote better economic growth in the future (Benedict, 2019; European Bank for Reconstruction and Development, 2019; Subroto, 2014).

In a K-economy, (KN) innovation and creativity are key to developing new products and services that meet ever-changing market demands. As future leaders and drivers of the K-economy, students need to prepare for innovation to be ready for the K-economy. Students need to foster creativity and innovation (Adijaya et al., 2023) to prepare innovations for the K-economy to develop creativity and innovation skills (Avcu & Ayverdi, 2020), which are essential in the K-economy that focuses on developing new products and services (Larraz et al., 2017; Siddiqui & Afzal, 2022). Then, they must increase competitiveness. By preparing for innovation, students can help increase their country's or region's competitiveness in the global marketplace, where innovation and technology are key factors in determining business success. Students who support economic growth will innovate, and the creativity students create can help boost economic growth by creating new jobs, increasing productivity, and raising national income. They can solve social and environmental problems because student innovations can also help solve social and environmental problems, such as developing environmentally friendly technologies or solving public health issues. By preparing innovations, students can help create a stronger and more sustainable K-economy in the future (Kurniati et al., 2021; Weiss & Barth, 2019).

Undergraduate students who have done what is necessary for knowledge-based economy readiness (KKE) have also directly contributed to advancing the Indonesian state. Their contribution to the economy with good knowledge-based economy (KKE) readiness is expected to improve the Indonesian economy. As a result, students with knowledge-based economy readiness (KKE) are expected to reduce unemployment in Indonesia with the knowledge that can be used as capital for them (Munyuki & Jonah, 2022; Prasetyo, 2020; Zhang et al., 2022). Knowing what factors are needed to prepare for the K-economy, it is hoped that they can be used as a reference and to design an economics education in universities to prepare students for the K-economy.

In addition, knowledge-based economy readiness (KKE) among undergraduate students can make an important contribution to the world of education as they become competent resources, foster innovation in teaching, face future challenges, and become future leaders. Undergraduate students skilled in K-economy can significantly contribute to

economic learning in the classroom, as they can understand and apply economic concepts better and more sophisticatedly. Thus, they can be a valuable resource for lecturers and other students to develop an understanding of economics.

Knowledge-based economy (KKE) readiness among undergraduate students can help improve the quality of economics teaching in the classroom (Manderino & Castek, 2020; Susilowati, 2016). They may have more innovative ideas and perspectives on teaching and learning economics. This can help lecturers or teachers develop more effective and engaging student teaching strategies. Students prepared for a K-economy will have the skills necessary to address future challenges such as the digitization of the economy, the Industrial Revolution 4.0, and global economic changes. They can provide insights into how to deal with these changes and integrate technology into the teaching economics (Grabinski et al., 2020; Homan, 2015). Students trained in K-economy have the potential to become future leaders in economics. They may have the expertise and knowledge necessary to lead change and innovation in other industries and sectors of the economy (Moro-Visconti et al., 2020; Zainal & Matore, 2019). Currently, K-economy readiness for some countries, particularly Indonesia, is still viewed in terms of the entire country and government. K-economy readiness from the education perspective, especially undergraduate students, has not been focused on. Undergraduate students are the young generation that can drive the economy in Indonesia if they are ready for the K-economy from the perspective of education. Therefore, the readiness for a knowledge-based economy (KKE) among undergraduate students can contribute greatly to education and the economy.

Conclusion

The study used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess the extent of items in the dimensions of knowledge-based economy readiness (KKE) among undergraduate students. Based on the results, knowledge-based economy (KKE) readiness items consisting of knowledge of economics (PE), readiness for economic challenges (KT), readiness for education (KP), readiness for infrastructure (KI), and readiness for innovation (KN) dimensions can be used to measure knowledge-based economy (KKE) readiness among undergraduate students. However, when determined by EFA, it turns out that 1 item was deleted, KI1, because the value of Cronbach's alpha <.5. Based on the results of EFA and CFA, this study can be a relevant measurement tool. However, it must be adapted to the respondents' conditions and the study site.

Further study is also strongly advised, especially concerning other influencing factors. It is anticipated that by understanding what factors need to be considered in K-economy readiness, it will be possible to use this as a reference and design an economics education curriculum at universities to prepare students for K-economy. Moreover, this research implies that improving students' knowledge and skills is necessary to prepare them for K-economy. This research is expected to provide new information for educators and policymakers in revising and developing student curricula by understanding what needs to be prepared for the K-economy, the public needs to anticipate the preparation of the K-economy for economic growth and development in Indonesia.

Recommendations

Future researchers should study the K-economy from the perspective of different levels of education. Then, the next researcher can further examine the K-economy from other midwives to use as a reference for learning planning at different educational levels. In addition, with this research result, educators have the advantage of preparing methods, models, and strategies for teaching economics so that they can be able to select and arrange relevant materials, develop structured lesson plans and choose appropriate teaching strategies to help undergraduate students understand a better economic concept for preparing K-economy.

Limitations

This study on knowledge-based economy was conducted only in higher education institutions in East Java Province, Indonesia. In addition, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used in this study to measure students' preparation for the K-economy. Since the research sample is only undergraduate students in economic education students, it needs to be extended to other fields.

Ethics Statements

The studies involving human participants were reviewed and approved by the Universiti Kebangsaan Malaysia. The participants provided their written informed consent to participate in this study.

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Authorship Contribution Statement

Nagari: Conceptualization, design, analysis, writing, and drafting manuscript. Sahid: Reviewing, critical revision of manuscript, and supervision. Hussin: Reviewing, supervision.

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