

A Systematic Literature on K-Economy Readiness in Higher Education

Una literatura sistemática sobre la preparación de la K-economía en la educación superior

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Abstract

Objective: This paper aims to: (1) identify the factors that influence K-Economy readiness in higher education; (2) map the factors that influence K-Economy readiness based on the four pillars of K-Economy; and (3) analyze the implications of factors influencing K-Economy readiness for the role of higher education in the K-Economy era. By knowing the factors that influence K-Economy readiness, the results of this study can make a practical contribution to higher education in the world so that it can fully participate and be ready to compete in the K-Economy era. **Methodology:** This paper uses a systematic literature review to answer research questions, while the PRISMA technique is used to collect and screen Scopus and WoS articles from 2000 to 2022. **Results:** This paper finds nine factors influencing K-Economy readiness in higher education. The nine identified factors refer to the competencies needed in the K-Economy era. **Discussion and conclusions:** Strategic external partnerships with higher education must be done continuously in the future. Workers and employers continue to prioritize education as the nature of work has changed, and there is a need for those who work to continuously improve their skills. Higher education should emphasize exceeding student expectations by examining the demands of the target job market to fulfill those needs.

Keywords: economic transformation, human capital, pillars of knowledge economy.

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Resumen

Objetivo: Este artículo tiene como objetivo: (1) identificar los factores que influyen en la preparación de la k-economía en la educación superior; (2) mapear los factores que afectan a la disponibilidad de la K-ecología basándose en los cuatro pilares de la economía k; y (3) analizar las implicaciones de los factores influyentes para la preparación del papel de la educación alta en la era de la Economía k. Conociendo los factores que influyen en la preparación de la k-economía, los resultados de este estudio pueden hacer una contribución práctica a la educación superior en el mundo para que pueda participar plenamente y estar listo para competir en la era de k-economía.

Metodología: Se utiliza una revisión sistemática de la literatura para responder a las preguntas de investigación, mientras que la técnica PRISMA se utiliza para recoger y escanear artículos Scopus y WoS de 2000 a 2022. **Resultados:** Este artículo encuentra nueve factores que influyen en la preparación de K-Economy en la educación superior. Los nueve factores identificados se refieren a las competencias necesarias en la era de la economía k. **Discusión y conclusiones:** Las asociaciones estratégicas externas con la educación superior deben realizarse continuamente en el futuro. Los trabajadores y los empresarios siguen priorizando la educación a medida que la naturaleza del trabajo ha cambiado, y hay una necesidad de que los que trabajan mejoren continuamente sus habilidades. La educación superior debe enfatizar la superación de las expectativas de los estudiantes al examinar las demandas del mercado de trabajo objetivo para satisfacer esas necesidades.

Palabras clave: transformación económica, capital humano, pilares de la economía del conocimiento.

Introduction

“Knowledge has become the key economic resource and the dominant-and perhaps even the only-source of competitive advantage” (Drucker, 1992)

Drucker's statement describes the transition from an economy with a labor-intensive and capital-intensive industrial model to a Knowledge Economy (K-Economy). The K-Economy refers to a global economic system that is driven by demand for economically beneficial information, ideas, theories, knowledge, and skills that can be easily conveyed through the effective use of technology (Cowan et al., 2000; Machlup, 1962). K-Economy is a term used to describe the increasing dependence of modern economies on knowledge, information, and highly skilled labor (Aparicio et al., 2021). Globalization and technological advancements have transformed the modern economy into a K-Economy" that requires rapid skill development, thorough knowledge acquisition, and increased responsibility (Hadad, 2017).

At the end of the 20th century, higher education was a strong and widespread system of institutions that had to change all the time. It would have long ago passed into history if it had not been able to adapt freely (Scott, 1993). Higher education has changed a lot since the turn of the 21st century. This is because technology is changing quickly and new job categories are being made. Workers and employers continue to pay attention to the educational aspect as the nature of work has changed, and there is a need for those working

to **continuously** improve their capacities (Altbach et al., 1999). Therefore, increasing the levels of educational achievement for all young people would be the most influential governmental response to high youth unemployment rates (Lehmann, 2009).

The connection between the K-Economy and education refers to the need for a highly-skilled workforce that is accessible to all those who are motivated and have the means to obtain a good education (Lauder et al., 2020). Education level is employed as a general indication in determining the appraisal of human capital (Han et al., 2008). Educational processes, values, and skills that are beneficial for humans, including students, can increase their learning abilities and productivity (Adriani, 2019). The higher the quality of a country's human resources, the greater its effectiveness and productivity in reducing unemployment (Adriani, 2019; Atmanti, 2005; Maringe, 2015; Rohimah, 2021).

Both scholarly research and public policy discussions are now heavily centered on participation in higher education. It is partially attributable to ongoing efforts to expand the higher education system in accordance with larger goals promoting the K-Economy (Field et al., 2012). In addition, significant market shifts and intense competition compel universities to prioritize brand marketing to differentiate their educational offerings from those of their rivals (Todea et al., 2022). The K-Economy requires comprehensive and highly transferable meta-cognitive skills, such as problem-solving and the capacity to continue learning by upgrading existing skills and acquiring new skills through formal education, lifelong learning, workplace learning, and less formal settings (Peters et al., 2003; Riboud et al., 2007).

Higher education should aim to produce graduates who are prepared for the world of work, and preparation for the world of work is equated with the acquisition of particular abilities and traits (Jackson et al., 2019). The K-Economy is built on four pillars: education and skills, the ICT infrastructure, the economic and institutional regime, and the innovation system (Aryani, 2020; Bak et al., 2022; Barkhordari et al., 2019; Phale et al., 2021; World Bank Institute, 2009). Education and skills are related to the need for humans who are educated and skilled enough to create knowledge.

A dynamic information infrastructure is also required to facilitate effective communication and data processing (Barkhordari et al., 2019). In addition, it is necessary to have an economic and institutional framework that provides incentives for the creation, dissemination, and efficient application of knowledge. Lastly, there is a need for an innovation system that can capitalize on ever-evolving global knowledge, adapt it to local needs, and transform it into a product with market value.

By offering relevant academic courses and job training, higher education can help prepare students for the future workforce. Preparing students for college and careers in the 21st century requires collaboration between secondary schools, colleges and institutions, policymakers, and industry (DiBenedetto et al., 2016). Focusing on creativity, critical thinking, communication, and collaboration is crucial for preparing students for success in the 21st century workplace and in life (Partnership for 21st Century Learning, 2015).

To find areas of agreement and continue K-Economy study, a detailed review of the field's predecessors was conducted (Choong et al., 2022). K-Economy research also evaluates and synthesizes existing collections of knowledge (Aparicio et al., 2021). This paper focuses

on the preparedness of higher education to participate in the K-Economy, which can benefit both internal and external stakeholders. This paper aims to: (1) find the factors that affect K-Economy readiness in higher education; (2) map those factors according to the four pillars of K-Economy; and (3) figure out what those factors mean for the role of higher education in the K-Economy era. The results of this study can help global higher education get ready for the K-Economy by showing what factors affect K-Economy readiness. This will allow higher education to fully participate and be competitive in the K-Economy era.

Method

Rationale

In a systematic literature review (SLR), researchers can comprehend the general context and identify research gaps by examining the relevant literature (Xiao, 2008). In addition, a concise overview of the topic helps develop hypotheses and addresses a particular research question (Kraus et al., 2020). When SLR methods are executed correctly or without bias during the search, identification, assessment, synthesis, analysis, and summary of research, decision-makers and scientific practitioners can benefit from accurate findings and conclusions. (Mengist et al., 2020).

In this paper, the literature on K-Economy readiness in higher education is examined using a systematic review approach. The search for K-Economy-related articles began in early 2000 and will continue until August 2022. In the 1900s or towards the end of the 20th century, the concept of the K-Economy emerged, and at that time, K-Economy books and articles began to be researched and published. The average number of K-Economy-related article publications indexed by Scopus and Web of Sciences (WoS) continues to rise until 2021, with the exception of 2022, for which publication data is only available through August. Following is the trend in the number of articles indexed by Scopus and WoS on the topic of K-Economy from 2000 to 2022:

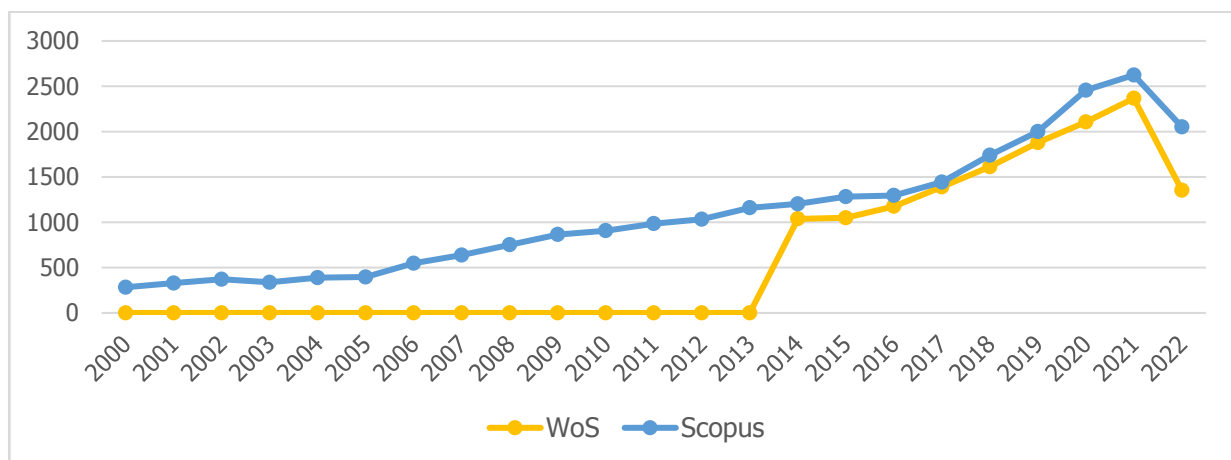


Figure 1.

Trends in the number of k-economy articles indexed by Scopus and WoS from 2000 to 2022.
Source: authors' own processing, based on search results for Scopus and WoS articles.

This trend indicates that the K-Economy has received considerable attention (Choong et al., 2022). Thus, the continuation of K-Economy research is still possible. This article makes use of two databases (Scopus and WoS). Scopus is the largest and most organized database available. Moreover, WoS is the most prestigious database because it can affect research productivity indicators of academic institutions in the global ranking system (Gasparyan et al., 2013).

In addition, the researcher seeks articles beginning in 2000 because that year marked the beginning of the 21st century, which continues to this day. Higher education was required at the end of the 20th century to adapt to rapid technological changes (Scott, 1993). In addition to economic changes, the 21st century marks the transition from the industrial to the knowledge era (Erdem, 2019).

Data collection

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) technique was used during the data collection process. Due to its thoroughness and transparency, the PRISMA technique was chosen as the data collection and filtering framework. In addition, a PRISMA process flow diagram can enhance the quality of the literature review by facilitating the reader's comprehension of the entire procedure and the paper's parameters (Moher et al., 2010). PRISMA recommends that SLR reports include a summary, introduction, research questions and objectives, methodology, results, discussions, and conclusions (Thomé et al., 2016). The data search begins with the selection of keywords pertinent to the topic of this paper (Table 1).

Table 1.
Key words of the initial screening of articles.

Criteria	Databases	
	Scopus	WoS
Keywords	(TITLE-ABS-KEY (K-Economy) OR (knowledge-based economy) OR (knowledge economy) OR (K-Economy readiness) AND (higher education))	K-Economy (Title) or knowledge-based economy (Title) or knowledge economy (Title) or K-Economy readiness (Title) and higher education (Title)

Source: authors' own processing, based on Scopus and WoS articles search processes.

This approach uses the three suggested identification, screening, and inclusion processes (Figure 2).

The number of Scopus and WoS articles discovered between 2000 and 2022 was 6,301. In addition, screening was conducted on the number of articles by selecting the document type (articles), language (English), and four research fields (social sciences, education and educational research, arts and humanities, and business and economics), yielding a total of 692 articles.

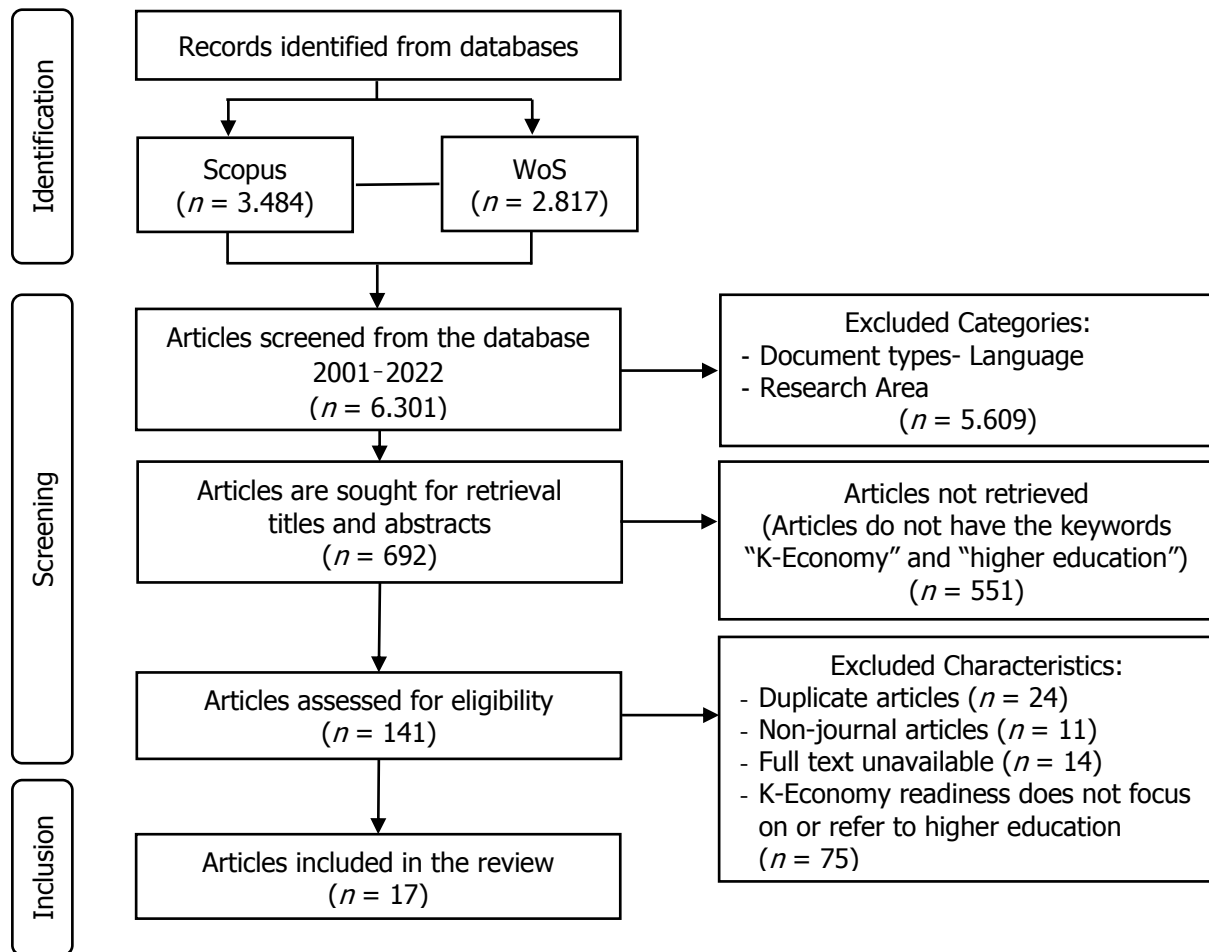


Figure 2.

The procedure for determining article eligibility using the PRISMA method.

Source: authors' own processing, based on the steps of the PRISMA method.

The next step involved searching the articles for the collection's title and abstract, as well as the terms "K-Economy" and "higher education". Many articles discuss K-Economy, but not all relate it to higher education; 141 articles were found after being screened. Using the PRISMA method, the procedure for locating specific articles will be evaluated (Figure 2). Enhancing the quality of the literature review, the PRISMA process flow diagram helps readers comprehend the overall procedure and scope of the study (Csizmadia et al., 2022).

In addition, 141 articles were prepared to be evaluated for eligibility (Figure 2), and we used study characteristics to determine the number of articles that could be included in the review. Articles that do not match the characteristics of the study are discarded. This includes duplicate articles, non-journal articles, and articles for which the full text was unavailable. The discussion of economic preparedness did not emphasize higher education, so 17 articles were analyzed. The mapping of screening results (Table 2) consists of the year the article was published, the name of the author, the country of origin, and the aims of the study.

Table 2.
The mapping of screening results.

Year	Authors	Country	Conclusions
2000	Christopher J. Hemingway and Tom G. Gough	United Kingdom	<ol style="list-style-type: none"> 1. Information systems and information technology have a growing impact on individuals, organizations, and societies. 2. Individuals may be unable to obtain the benefits of increased access to information due to illiteracy and a lack of ICT skills. 3. In the knowledge society, the development of a supportive ICT infrastructure is a crucial enabler of corporate activities. 4. The importance of collaboration with external partners of universities and industry or companies.
2007	Peter John Williams	South Africa	<ol style="list-style-type: none"> 1. By actively transferring knowledge, higher education must adapt to shifting conditions. 2. The significance of collaboration between universities and external partners from industry or commercial e-learning development enterprises.
2012	Lucienne Abrahams and Patrick FitzGerald	Slovakia and Europe	<ol style="list-style-type: none"> 1. Participation of students in internship programs with external parties is crucial for academic learning in higher education. 2. Open knowledge systems must be readily accessible to all higher education stakeholders. 3. In the world of higher education, which is constantly evolving, institutional autonomy can be expanded to include new values. 4. Research and innovation activities in higher education institutions are K-Economy readiness factors. 5. Cooperation between institutions of higher education and external partners enables the generation of new knowledge.
2013	Zuzana Melicheríková	South Africa	<ol style="list-style-type: none"> 1. The significance of increasing student and academic mobility 2. Human capital development in educational institutions is correlated to the growth of the K-Economy. 3. Entrepreneurship refers to activities in which higher education collaborate with businesses to establish new enterprises. 4. Increasing the number of patents can foster research innovation.
2014	Newman Wadesango, Cosmas Maphosa, George Moyo	South Africa	<ol style="list-style-type: none"> 1. Postgraduate degrees equip graduates with the necessary analytic and problem-solving skills to drive the K-Economy. 2. Research support programs for graduate students must be implemented.
2016	Tuğberk Kaya and Mustafa Sağsan	Northern Cyprus	<ol style="list-style-type: none"> 1. The formation of international student unions is a form of human capital development. 2. Knowledge “roadmap” capacity-building initiatives invest in modern IT infrastructure.

Year	Authors	Country	Conclusions
			<ol style="list-style-type: none"> 3. The coexistence of information pertinent to transparency and vision can substantially demonstrate an institution's capacity to generate knowledge. 4. The significance of unrestricted access to social media and websites. 5. The importance of driving innovation and research.
2018	Ruxandra BEJINARU	Romania	<ol style="list-style-type: none"> 1. Our university's contribution to the creation of economic value will increase if we provide students with the finest skills. 2. Higher education should contribute more to the development of students' general abilities and to arouse their inclination to become entrepreneurs. 3. Students involved in research activities can develop their skills.
2018	Wieslaw Grebski and Michalene Grebski	United States	Among the forms of cooperation with external university partners are apprenticeships, practitioner involvement in learning, and research programs.
2019	Eko Sakapurnama, Martani Huseini, Pantius D Soeling	Indonesia	<ol style="list-style-type: none"> 1. Collaboration with investors from outside the university is required for startup formation. 2. To enhance the entrepreneurial skills and mindset of students and staff, institutions of higher education can provide assistance, mentoring, and training through entrepreneurship workshops. 3. Increasing patents can encourage research innovation.
2019	Orlando Pereira and Maria Joao Raposo	Portugal	It is important for students' intrapersonal and interpersonal development that they be able to employ the most modern technology.
2020	Djonde Frega A. Antiado, Fermin G. Castillo. Jr., James Ryan P. Reblando, Maher Ibrahim Tawadrous	United Arab Emirates	Non-educational employees in higher education must have a training and development plan that incorporates professional, personal, and health development.
2020	Punia Turiman, Kamisah Osman, Tengku Siti Meriam, and Tengku Wook	Malaysia	<ol style="list-style-type: none"> 1. In order to innovate in the 21st century, creativity is a crucial skill. 2. In the current K-Economy, important skills that students must possess include the ability to solve complex problems, flexibility, self-regulation, curiosity, creativity, and the willingness to take risks.
2020	Sajida Parveen, Babak Mahmood, Saira Siddiqui, Ayesha Ch., Mudassar Mushtaq	Pakistan	Collaboration with external partners, IT infrastructure, funding and incentives, research and innovation, access to knowledge, and the development of human capital in universities have a greater correlation with the emergence of a K-Economy.

Year	Authors	Country	Conclusions
2021	Amol C. Adamuthe and Sandeep U. Mane	India	<ol style="list-style-type: none"> 1. To meet the requirements of employers seeking capable working professionals with problem-solving skills, the capacity for lifelong learning, and ethical responsibility, learning innovation is essential. 2. The importance of cooperation between higher education and industry.
2021	Jonathan Blackledge	United Kingdom	<ol style="list-style-type: none"> 1. Universities must adjust to rapidly changing conditions in order to enhance students' technological proficiency. 2. The significance of university and external cooperation.
2021	Tatiana Fumasoli and Federica Ross	Europe	<ol style="list-style-type: none"> 1. The significance of involving students in internship programs with external constituents in higher education academic learning. 2. The significance of pursuing external scholarship partners for higher education.
2022	Cahyo Crys dian	Indonesia	Among the forms of cooperation with external university partners are fellowships for students, research programs, and partnerships with industry or businesses.

Source: authors' own processing, based on data from 17 articles.

In accordance with the objectives of this study through a screening process using the PRISMA method (Figure 2), the mapping of screening results consists of articles that discuss factors that can influence K-Economy readiness in higher education. There are those who do studies at the postgraduate level and some who do studies at the undergraduate level. In addition, there were also those who took a sample of academic staff at the university. The 17 articles found over the last 23 years came from countries on four continents, namely 6 from the Asian continent, 7 Europe, 1 America and 3 Africa.

Results

Based on the aims of this study, we identified the factors that emerged from the 17 articles, which are determinants of K-Economy readiness in higher education. Then, we map these factors into the four K-Economy pillars as the main K-Economy dimensions. The factors that emerge are classified based on the suitability of each scope of the K-Economy pillar according to (World Bank Institute, 2009) which are used to measure and monitor K-Economy developments in a country. The four pillars consist of: (1) education and training; (2) information infrastructure; (3) economic incentive and institutional regime; and (4) innovation system.

The World Bank Institute's Knowledge for Development Program (K4D) has created this four-pillar framework for countries to use as the foundation for their transition to a knowledge economy (Table 3). Additionally, a nation can compare its capacity to compete in the global knowledge economy to that of other nations.

Table 3.
Description. The four pillars of the K-economy.

Education and training	Information infrastructure	Economic incentive and institutional regime	Innovation system
The country's citizens require education and skills that enable them to create and share content, as well as effectively use it.	The effective communication, dissemination, and processing of information requires a dynamic information infrastructure.	The country's economic and institutional structure must encourage the effective application of existing and new knowledge and the growth of entrepreneurship.	The country's innovation system—comprised of businesses, research centers, universities, think tanks, consultants, and other organizations—must be able to access the growing stock of global knowledge, assimilate and adapt it to local requirements, and develop new technologies.

Source: authors' own processing, based on data from (World Bank Institute, 2009)

Based on the description of the four economic pillars (Table 3) and the findings of the 17 selected articles (Table 2), we identified nine factors on K-Economy readiness in higher education (Table 4).

Based on (Table 4), the first pillar consists of two factors: learning innovation and human resource development. The second pillar includes access to knowledge and IT infrastructure factors. The third pillar includes entrepreneurial ecosystem factors as well as funding and incentives. Lastly, the fourth pillar includes governance, research and innovation, and collaboration with external partnership factors.

Learning innovation

Several types of learning innovations were used in higher education to prepare for the K-Economy, including research mentoring programs for graduate students, according to the findings of the article review (Wadesango et al., 2014), enhancing 21st-century student skills: problem-solving skills, critical thinking, originality skills, active learning (Bejinaru, 2018), and flexibility, self-regulation, curiosity, creativity, and taking a risk (Turiman et al., 2020).

To innovate in the twenty-first century, creativity is a crucial talent. Important abilities for students to have to solve complex problems and multiple challenges in today's K-Economy (Turiman et al., 2020). At any university level, providing students with the best skills is intrinsically linked to strategic thinking and the development of knowledge strategies. It will increase our universities' contribution to economic and social value creation and their role in accelerating our economic growth (Bejinaru, 2018).

The postgraduate degree equips graduates with the essential analytical and problem-solving skills for driving the K-Economy (Wadesango et al., 2014). The higher the graduation rate, the greater the demand for postgraduate graduates to serve the economy. Therefore, there is a need for an academic support program for students to increase the postgraduate degree completion rate.

Table 4.
The mapping of K-economy readiness factors.

Author (s)	Four pillars of K-economy								
	(1)			(2)		(3)		(4)	
	Education & training			Information infrastructure		Economic incentive & institutional regime		Innovation system	
	Nine Factors of K-Economy Readiness								
	Learning Innovation	Human Capital Development	Access to Knowledge	IT Infrastructure	Entrepreneurial Ecosystem	Funds and incentives	Governance	Research and innovation	Collaboration with External partnership
(Hemingway et al., 2000)			•	•				•	•
(Williams, 2007)	•								•
(Abrahams et al., 2012)			•				•	•	•
(Melicheríková, 2013)	•	•			•			•	•
(Wadesango et al., 2014)	•								
(Kaya et al., 2016)	•	•	•	•			•	•	
(Bejinaru, 2018)	•				•			•	
(Grebski et al., 2018)									•
(Sakapurnama et al., 2019)					•			•	•
(Pereira et al., 2019)	•								
(Antiado et al., 2020)		•							
(Turiman et al., 2020)	•								
(Parveen et al., 2021)	•	•	•	•		•		•	•
(Adamuthe et al., 2021)	•								•
(Blackledge, 2021)	•								•
(Fumasoli et al., 2021)	•								•
(Crysdian, 2022)									•

Source: authors' own processing, based on the findings of the selected articles.

Higher education must adapt to changing circumstances, and the institutional transformation that may occur, by actively developing e-learning and knowledge transfer (Williams, 2007). Thus, it is important not only to improve student skills in adopting the latest technology (Blackledge, 2021), but also to improve postgraduate students' intrapersonal and interpersonal skills: relational, social, and emotional skills (Pereira et al., 2019).

Increasing academic mobility and student mobility (Melicheríková, 2013) or involving students in internship programs with external stakeholders is essential for academic learning in higher education (Abrahams et al., 2012; Fumasoli et al., 2021; Melicheríková, 2013). This is associated with the need for employers to seek out professional abilities, problem-solving skills, the capacity for lifelong learning, and ethical responsibilities (Adamuthe et al., 2021).

Human capital development

There is a significant and positive correlation between human capital development and the emergence of the knowledge economy. The development of human capital has a direct and positive effect on the emergence of the K-Economy (Parveen et al., 2021). Regarding the development of human capital in higher education, two things were discovered: for students and non-teaching staff. The formation of student unions, associations, and clubs to promote a more international environment is a form of student human capital development (Kaya et al., 2016). This is beneficial for enhancing students' abilities to respond to cultural diversity.

Additionally, training for non-teaching staff is deemed essential. Continuously providing academic, administrative, and non-academic personnel with professional development activities is essential. Each non-educational employee must grow personally and professionally, and the institution must create a training and development plan as part of performance evaluation. The training areas include professional, personal, and health development. The training areas include professional, personal, and health development (Antiado et al., 2020).

In the description of the growth of human capital, it is said that students' ability to adapt to different international cultures (their social and cross-cultural skills) contributes to this growth. The development of human capital development in educational institutions is closely related to the growth of the K-Economy (Melicheríková, 2013). Factors that can impact K-Economy readiness in higher education include the professional skills of non-teaching staff, as well as the professional skills of teaching staff.

Access to knowledge

There is a relationship between educational institutions that provide access to knowledge and the growth of the K-Economy. The higher access to the knowledge offered by educational institutions, the higher the creation of a K-Economy. It shows that the creation of a K-Economy will increase if educational institutions expand access to knowledge (Parveen et al., 2021). According to

Open access that can be easily accessed by all stakeholders in higher education in the form of websites or social media (Kaya et al., 2016), and added to an open knowledge system (Abrahams et al., 2012).

Mobile application development should be a priority for universities (Kaya et al., 2016). The websites and student portals of universities should be user-friendly, have extensive, up-to-date content, and provide an efficient communication channel. The utilization of access to knowledge is inextricably linked to the utilization of ICT. As already demonstrated, internal and external stakeholders are users of knowledge access. Therefore, all stakeholders must possess ICT literacy and skills in order to acquire the necessary information effectively, efficiently, and optimally. Low literacy and the provision of ICT skills may prevent individuals from reaping the benefits of greater access to information (Hemingway et al., 2000).

IT infrastructure

Education and training institutions from both the public and private sectors must collaborate or compete to meet industry requirements as the educational landscape is redefined. Information technology (IT) capability comprises attributes that enhance an organization's use of fundamental IT. The development of a supportive ICT infrastructure is a crucial enabler of corporate activities in the knowledge society (Hemingway et al., 2000).

Capacity-building initiatives in the knowledge "roadmap" invest in a modern IT infrastructure. In addition to providing the fastest possible Wi-Fi connectivity, universities are increasing the number of computer laboratories (Kaya et al., 2016). Rich infrastructure has a positive and significant relationship with the development of the K-Economy. It shows the connection between institution infrastructure and the emergence of the K-Economy (Parveen et al., 2021).

Entrepreneurial ecosystem

Today, universities are held to a higher standard in terms of their contributions to society. In order to become part of the university-government-industry triple helix, they must establish a third mission relating to the delivery of services to society. Universities should therefore contribute more to the development of students' general abilities and to the stimulation of their desire to become entrepreneurs (Bejinaru, 2018). Higher education has the potential to encourage people to be entrepreneurs by bringing together campus life, government, and business. Multiple start-up collaborations with investors from outside the university constitute the means (Sakapurnama et al., 2019).

Entrepreneurship refers to activities involving higher education institutions in the creation of new companies or the development of an innovative culture within higher education institutions in collaboration with businesses, the term is also used to describe the development of an innovative culture within higher education institutions (Melicheríková, 2013). The entrepreneurial factor is determined by entrepreneurial skills and thinking, with higher education providing mentoring, coaching, and training in entrepreneurship workshops to improve the entrepreneurial skills and mindset of students and staff (Sakapurnama et al., 2019).

Funds and incentives

The factor of "funds and incentives" is included in the economic incentive pillar of the K-Economy because of the provision of incentives, such as financial incentives for research activities, which is a type of economic incentive. Funding and incentives have a significant impact on the development of the K-Economy (Parveen et al., 2021). The development of the K-Economy will accelerate with more investment by educational institutions. Higher education should encourage researchers by giving them opportunities to advance their roles in science and technology and to innovate for knowledge development, such as awards and payments (incentives).

Governance

The coexistence of relevant information with transparency and vision might significantly indicate a university's ability to generate knowledge. So, information desks should be set up to track current trends (Kaya et al., 2016). While, academic values such as institutional autonomy can be expanded to include new values in the changing world of higher education and translated into value for the university and society in the form of scholarly knowledge production, knowledge for advancing society, cultural contributions of local and global significance, knowledge for commercially oriented productivity and competitiveness, and transfer of high-level skills (Abrahams et al., 2012).

Research and innovation

There is a positive and significant relationship between research and development and the growth of a K-Economy. It demonstrates that a better environment for research and development can increase the growth of the K-Economy (Parveen et al., 2021). Based on a study of the articles we reviewed, the efforts made to support research and innovation activities in higher education as a factor of K-Economy readiness are improved the quality, integrity of research, and academic freedom (Abrahams et al., 2012), encourage innovation (Kaya et al., 2016), increase the number patents (Melicheríková, 2013; Sakapurnama et al., 2019), and manage the information system academic community well (Hemingway et al., 2000). If students are involved in research activities, they can develop their skills (Bejinaru, 2018). In terms of innovation on the business side and the effectiveness of research and development, knowledge transfer is also important (Melicheríková, 2013).

Collaboration with external partnership

One of the goals of higher education institutions is to educate qualified students who can meet the needs of the labor market in the K-Economy era (Melicheríková, 2013). Therefore, cooperation between higher education and business needs to be improved. The forms of collaboration with external partners of higher education include cooperation with industry or companies, such as student internships, practitioner involvement in learning, and research programs (Adamuthe et al., 2021; Blackledge, 2021; Crysdián, 2022; Grebski et al., 2018; Hemingway et al., 2000; Melicheríková, 2013; Parveen et al., 2021), commercial e-learning developers (Williams, 2007), investors, who invest in building up start-ups (Sakapurnama et al., 2019), knowledge creation (Abrahams et al., 2012); government, surrounding communities, high schools, and alums (Grebski et al., 2018); and scholarship partners (Fumasoli et al., 2021).

Discussions and conclusions

Based on a systematic review of the literature, this paper finds that various factors influence K-Economy readiness in higher education. Nine identifiable factors can be mapped based on the four pillars of K-Economy, including: (1) learning innovation; (2) human capital development; (3) access to knowledge; (4) IT infrastructure; (5) entrepreneurial ecosystem; (6) funds and incentives; (7) governance; (8) research and innovation; and (9) collaboration with external partnerships. In this section, an analysis of the implications of factors influencing K-Economy readiness for the role of higher education will be discussed.

It was found that collaboration with external partners, access to knowledge, IT infrastructure, research and innovation, funding and incentives as well as developing human capital in universities have a more significant relationship with the creation of a knowledge economy (Parveen et al., 2021). This means that these factors influence K-Economy readiness in higher education. Other factors such as governance, learning innovation, and entrepreneurial ecosystems were also found to be other important factors that have an influence on K-Economy readiness in higher education.

The pressures, responses, and challenges faced by higher education impact many aspects of life and organizations, including governance (Gibb et al., 2013). Policies, procedures, and short/long-term strategies should be adequately defined and communicated. The ability of higher education institutions to create good governance requires good management as the results of the study (Januri et al., 2018) obtained that the factors that influence university governance are management competence and commitment. Higher education must improve graduate quality and compete with other universities based on transparency, efficiency, and public accountability. Governance involves universities producing knowledge to create social or economic value in the knowledge economy (Abrahams et al., 2012).

Almost every Higher Education Institution (HEI) in the globe is attempting to accommodate new forms of learning as the pace of innovation in learning and teaching accelerates (Salmon, 2014). As an example of the results of research (Jarreno, 2022), the choice to invest in online learning technology for the advancement of education in higher education is solely driven by the need to meet increasing market demands. Factors of learning innovation focus more on improving students' skills which include: 21st-century thinking skills, ICT skills in adopting the latest technology, and managerial skills (interpersonal and ikhaintrapersonal skills).

It is related to the 21st-century learning framework, which describes the skills, knowledge, and expertise that students must master in order to succeed at work and in life; it is a combination of content knowledge, specific skills, expertise, and literacy (Partnership for 21st Century Learning, 2015). These skills are useful for students in adapting to the current digital era, so that they are able to become smart digital users. Students continue to engage in digital activities and access it frequently, despite being aware of the risks in the digital environment and the impact on their digital behavior, because the digital environment has become a part of their everyday lives (Maza-ávila et al., 2023).

Higher education is seen as a productive investment in human capital to increase a country's economic capability (Batool et al., 2021). The application of knowledge, as expressed in areas such as research and development, entrepreneurship and innovation, and at the level of education and individual skills, is now recognized as one of the primary drivers of global economic growth, productivity, and competition (OECD, 1996). Entrepreneurship, technical and business experience, IT and information capabilities, and high-quality management are all important to the success of a knowledge-driven economy. This has significant implications for teaching and research (Hemingway et al., 2000).

Forming strategic business partnerships and universities is a solution to overcome problems in the K-Economy era. According to the findings study of (Mikhaylov et al., 2019), several of Russian areas actively involve universities in conjunction with industry. Universities are regarded as the primary source of intellectual capital for the regional innovation system. In addition to supporting the implementation of lifelong learning, entrepreneurship is an act that involves higher education institutions to create new businesses or develop an innovative culture within higher education institutions that work closely with businesses.

More intensive university-business collaboration is needed as this is the only way graduates can adjust to the requirements of employers (Melicheríková, 2013). The knowledge economy is built primarily on processing intangible resources, which necessitates different abilities from knowledge workers than industrial workers (Bejinaru, 2018). Preparing students for college and careers in the 21st century is a complex task that requires collaboration between secondary schools, colleges and institutions, policymakers, and industry (DiBenedetto et al., 2016). Therefore, a curriculum that is more student-centered will not only have an impact on students but also on teachers as learning facilitators who are required to be more widely involved in continuous learning (Williams, 2007).

Increased collaboration between industries and higher education is advantageous for generating new knowledge through research and innovation (Parveen et al., 2021). Investing in R&D activities will be the foundation of the K-Economy. Furthermore, money should be made available for national and international conferences and research networks where researchers can present their work and learn from other researchers in their field (Kaya et al., 2016). Research and innovation activities in higher education are closely related to funding and incentives. Restructuring academic incentives and reward structures will benefit the research field (Grant, 2021).

Meanwhile, research funding is needed to meet expenses (human and material) and the smooth implementation of research projects. Any means should raise funding and incentives for the creation of knowledge (Neema et al., 2021). According to (Asian Development Bank, 2007), incentives are provided to increase skills because incentives are required to develop sectors that support knowledge, empower knowledge, and are knowledge-intensive. In the most general terms, an incentive is anything that motivates a person to do something, and the ability to analyze economic incentives indicates an individual's level of economic literacy (Efendi et al., 2019). Economic literacy is defined as the ability to define and analyze incentives in the case of the economy at work (As'ad et al., 2020; Dilek et al., 2018; Yayar et al., 2017). Funds and incentives are included in the economic incentive pillar of the k-

economy because of the provision of incentives, such as financial incentives for research activities, which is a type of economic incentive.

The ambition for countries to continue to progress in the industrialization and globalization of their societies gave rise to the evolution of human capital development (Perepelkin et al., 2016). Higher education is a productive investment in human capital to increase a country's economic capability (Batool et al., 2021). Human capital and education are closely linked, and education is constantly changing because education is a fundamental element of national growth (Badea et al., 2012). The impact of the emphasis placed on education will depend on how learning institutions design their programs. Higher education needs to focus more on exceeding student expectations by assessing the needs of the target job market and adjusting programs to meet those needs (Aljohani et al., 2022).

The results of this study are in line with a study by (OECD, 1996) which stated that non-teaching employees play an essential role in the academic environment as they help educational institutions on the technology side. The skills and knowledge of the people living in a society are essential for its development as a knowledge-based economy and society (Tocan, 2012). Making good use of access to knowledge is one of the key success factors in the K-Economy (Aparicio et al., 2021). The existence of information technology and communication infrastructures provides a great impetus to codifying specific forms of knowledge (OECD, 1996). wherein individuals apply their knowledge of existing work tasks to learn new work tasks (Fadel et al., 2008).

Higher education institutions are seen as critical drivers of socioeconomic development in the so-called K-Economy (Fumasoli et al., 2021). The development of the K-Economy puts science as the primary source of excellence or competitiveness and economic growth for the nation, as well as the role of higher education as a direct driver of a country's economic progress in the future (Sakapurnama et al., 2019). Universities have always exhibited adaptation to changing conditions, but there is little evidence of their success in accommodating the scope and unprecedented rate of change of the K-Economy (Williams, 2007).

Higher education is required to adapt quickly to technological changes and the creation of job categories because it must be ready to compete in producing high-skilled resources needed in the k-economy era. It is necessary to comprehensively identify the factors that can support the readiness of the k-economy in higher education. Educators are urged to collaborate with employers to determine which jobs their students are prepared for. Therefore, a detailed identification of the characteristics that can support k-economy preparation in universities is required.

This paper systematically finds nine factors of K-Economy readiness in higher education that can support the four pillars of K-Economy. External partners should work closely with higher education institutions to ensure that the knowledge and skills required in the industry are taught in higher education. They can collaborate in various fields, such as learning innovation, human capital development, access to knowledge, IT infrastructure improvement, entrepreneurship, funding and incentives, research and innovation, and governance.

Besides being able to become a discourse for higher education to be able to fully participate in the K-Economy, the results of this research can also become the basis for government policies in each country in encouraging universities to compete in the K-Economy era. This literature review is limited to identifying the factors that influence K-economy readiness in higher education from a search across four research areas (social sciences, education and educational research, arts and humanities, business and economics). Therefore, further research can be suggested to examine the topic more broadly and examine the government's role in supporting K-Economy readiness in higher education.

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