

Digital leadership in enhancing research innovation culture in higher education: Avenue for further research

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ABSTRACT

The world has recently encountered an unexpected condition - Covid-19, which has sparked a growing interest in educational leadership research, particularly in higher education. This interest is driven by the need to create an environment that fosters collaboration, openness to improvement, and adaptability in the face of unforeseen challenges. Among the topics gaining prominence in higher education is Digital Leadership, a blend of transformational leadership and digital technology. This study aims to bridge the gap between theory and practice in order to enhance the Research Innovation Culture in Higher Education within the context of educational leadership in the 21st century. A systematic review analysis was conducted to provide an overview of existing literature on digital leadership quality, research innovation culture in universities, and the future trajectory of educational leadership in the 21st century. The analysis identified key problems requiring further investigation and revealed patterns of theories and methods employed by previous researchers and participants. The findings indicated a clear correlation between the application of digital leadership and the enhancement of research and innovation culture in universities. Consequently, the implications of this research call for the establishment of a research and innovation culture that optimizes the Tri Dharma of Higher Education. By improving educational leadership and promoting digital leadership, universities can build a foundation for future growth and development. Embracing a research and innovation culture will not only help address unforeseen challenges but also lead to valuable outcomes that benefit higher education institutions and society as a whole.

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Introduction

The 21st century marks the beginning of an unprecedented and fast-paced technological digitalization revolution. Digitalization is a process of constant change with open results that requires constant readjustment at all levels of the organization. Due to the power of digitalization today, leaders need to be aware that their work environment and the demands placed on themselves and their organizational members are changing.

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Leadership no longer only involves distributing and monitoring tasks and how those tasks are completed, but also involves creating space for developing the creative potential of organizational members through collaboration and continuous learning, in which leaders must also actively participate. It is the only way to create a pool of organizational members with valuable research and innovation skills (Hensellek & Simon, 2020). As a result, today's digital followers, leaders, and citizens have instant access to vast amounts of information, and there has been a greater spread of knowledge than ever before. Moreover, as information technology has opened up new opportunities for sharing knowledge, information and work responsibilities, most of the traditional hierarchical leadership theories and models have become obsolete and irrelevant because they were not designed for the digital age. As artificial intelligence technologies and tools replace traditional managerial positions in organizations, and as enterprise workers become increasingly involved in a variety of lead and follow roles in today's virtual organizations, there is a greater need for new models of leading and following in virtual spaces, where participants can acquire various types of leading and following competencies that are more relevant for the digital era. Leadership like any other social transaction is a two-way and relationship-based process. According to research, organizational culture and leadership are interdependent (Anand et al., 2011). While leadership plays an important role in shaping culture (Anand., 2011) it also depends on culture (House et al., 2014).

The 21st century is known as the digital era or the knowledge age, with one of the most prominent characteristics of this century, namely the increasingly interconnected world of science, so that the synergy between them becomes faster. In the era of education in the 21st century, the renewal of new knowledge and learning resources are increasingly updated with the incessant universities carrying out research activities. Recently, many research has been intensively conducted in universities in the context of implementing one of the Tri Dharma of Higher Education, namely on the dharma of research and community service by the academic community consisting of lecturers and students as scientists. Through the level of activity of a university conducting research also describes the quality of the university. Academics, especially lecturers and students, are important actors in research at universities. Through research or research in universities, a research culture will be formed where the research capabilities of scientists consisting of lecturers and students will also be formed.

Moreover, there are problems in the academic aspect, namely research/research achievements and community service which will have an impact on the publications produced. For universities, the current publication is a benchmark for the progress of education, especially at the higher education level. Based on data published in articles, the government has succeeded in increasing the number of scientific publications. The progress of a nation can be seen from the results of research and development of science and technology. Indonesia's scientific publications at the ASEAN level for 2018 based on data from Scopus were 33,953, occupying the first position. However, Indonesia's publications for the years 2019 to 2022 have decreased, which is second at 28,374, behind Malaysia with 28,404. Through the formation of a culture of research and culture of innovation, it will also indirectly have an impact on the formation of a mental revolution for the nation's next generation. This can happen because by getting used to a research culture & innovation culture, students who act as agents of change will form strong personalities with critical, innovative, and visionary thinking going forward to adjust the dynamics of research.

The existence of limited research related to digital leadership, innovation culture and research culture which are interrelated but discussed separately is the main focus of writing this article. The purpose of this research is to reveal the existence of a new leadership in the 21st century, namely digital leadership that can directly improve the culture of innovation and research culture of universities. Therefore, this research focuses on the common thread that can be drawn between digital leadership, innovation culture and research culture in higher education which can have an impact on increasing one of the

tridharmas of higher education, namely research and community service. This study aims to explore in depth the opportunities of Digital Leadership in Enhancing a Culture of Research Innovation in Higher Education for the Future Direction of 21st Century Leadership. In line with the research conducted by (Roffei, 2016), the research results show that a positive external institutional environment will create a positive culture of innovation. In addition, a positive institutional external environment will lead to positive innovative behavior in students, supported by research conducted by (Sasmoko et al., 2019) that digital leadership has a strong influence on innovation management.

Method

The method used in this study uses an analytic qualitative observation research method or approach. Literature or literature study can be interpreted as a series of activities related to the methods of collecting library data, reading, observing and taking notes, then processing research materials (Zed, 2003). In literature research, there are at least four main characteristics that the author needs to pay attention to, First, the author or researcher is dealing directly with text (nash) or numerical data, not with direct knowledge from the field. Second, library data is "ready to use" which means that researchers do not go directly to the field because researchers deal directly with data sources in the library. Third, library data are generally secondary sources, in the sense that researchers obtain materials or data from second-hand sources and not original data from first-hand data in the field. Fourth, the condition of library data is not limited by space and time (Zed, 2003). Based on the foregoing, the data collection in research is carried out by reviewing and/or exploring several journals, books, and documents (both printed and electronic) as well as other sources of data and/or information deemed relevant to the research or study. Qualitative data analysis where in this study in the form of opinions expressed by experts regarding digital leadership, innovation culture, and research culture in universities in the 21st-century era, these data are used as a basis to strengthen the author's argument in analyzing digital leadership opportunities in improving culture research and innovation at universities in Indonesia.

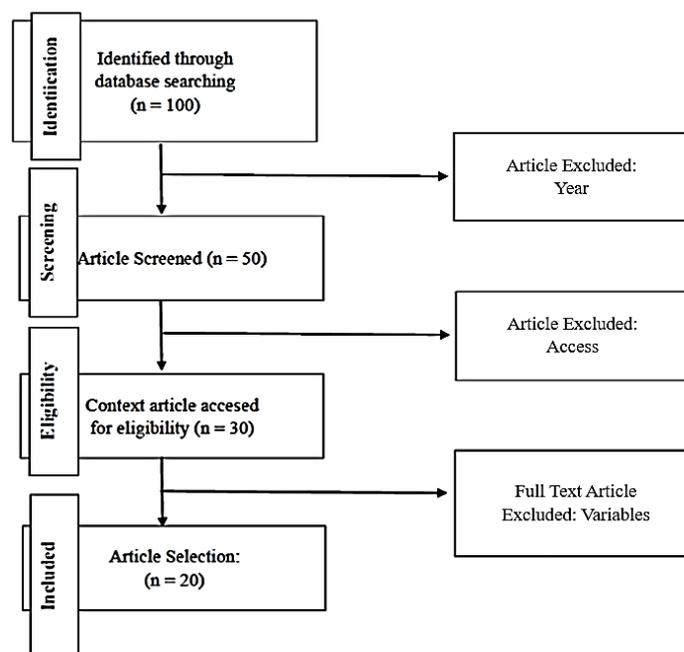


Figure 1. PRISMA Flowchart
Step by Step Systematic Literature Review Method

The PRISMA flowchart (Figure 1) shows the articles that came from the initial research. A screening process was then conducted to identify duplicate and irrelevant articles, downgrading articles related to improving the quality of teachers and principals and the future direction of education in the twenty-first century. Additional examination confirmed that only 20 articles matching the inclusion and exclusion criteria were included.

The number of journal articles in the study was recorded as this information can guide future research designs. Figure 1 below describes the systematic review method described in the inclusion criteria section. The table lists the types of data collected, thus revealing the direction of each study reviewed which is shown in Figure 1.

Results

Leadership in digital era: main challenge

Leadership issues have been studied from various perspectives and in different contexts (Brock, 2019). The actual challenge in the theoretical context is marked by the realization of transactions between the static world and the digital world. The latter requires special competencies and abilities that can improve organizational relationships in the referring ecosystem (El Sawy et al., 2016). In other words, theorizing about leadership has changed from modern, static leadership theory emphasizing leader-people (eg, traits) to increasing recognition of the discursive resources and organizational relationships involved in leadership practice (Raelin, 2016). In addition, digital leadership not only refers to the facts to run a business in the era of artificial intelligence but also has the right digital skills to spur scientific change and innovation.

Leadership ability (Westerman & Bonnet, 2014) refers to the ability to create a transformative digital vision, energize employees through engagement, focus on digital governance, and build technology leadership. In particular, five factors are critical to understanding how digital leaders can positively impact a company's success: (1) Delegated decision making: This means that decisions are made at the appropriate level closest to the customer; In this sense, leaders must share power and support others to make the right decisions; (2) Collaborative achievement: It refers to working together as a team to achieve a common result; The leader must enable the team to operate effectively and work well throughout the entire process; (3) Agility: Relating to always improving and adapting to changing circumstances according to purpose and direction; (4) Purpose and direction: This is closely related to the importance of storytelling and the use of narrative in leadership work; (5) Authenticity: Build trust and build company reputation; In this view, leaders act with integrity and balance to build trusting relationships.

This kind of leadership also requires leadership capabilities that are very important in developing internal and external collaborations to jointly generate ideas and strategies for digital change. Digital leadership can also be considered a strategic factor that affects the well-being of internal human resources (Zeike et al., 2019). Consistent with research conducted by Brynjolfsson and McAfee, 2014, digitization is characterized by three distinct drivers: (1) exponential growth of digital technology; (2) the digitalization economy; and (3) compatibility of different technologies. An important aspect of technology is the relationship between people and things through technology. An important role is played by social media platforms, which build a large network of personnel; the same approach can be used with companies (social collaboration platforms). At the same time, the 'Internet of things is setting up a network of machines, wearables, products, etc. Based on this network, a large amount of data is generated. This big data can be used (in real-time) for data analysis to make predictions. To do that, artificial intelligence is becoming increasingly important. The concept of industry 4.0 is at the center of these technological aspects.

In the Industry 4.0 era, manufacturing systems can create what (Liu et al., 2019) calls 'cyber twins' from the physical world and make intelligent decisions through communication and collaboration in real-time (Wang et al., 2016). Industry 4.0 combines

embedded production system technology with intelligent production processes to pave the way for a new technological era that will transform models in all walks of life. Technological developments have an impact on new competitive environments, new competitors, new products and services, etc. based on the possibilities of new technologies. As mentioned by (Petry, 2018), the digital world can be understood as a VUCA environment. It is an acronym that stands for volatility (changes frequently), uncertainty (lack of predictability), complexity (interdependence of different elements), and, at the very least, ambiguity (causation confusion). All managers need to adapt their leadership style to the VUCA environment in the digital age. However, it is important to emphasize that all individuals are too tense in a VUCA environment. Digital leaders need to use collective intelligence in the organizations they lead (Huang et al., 2020; Lam & Huang, 2015). In addition, digital leaders need to lead openly, give and receive feedback, and be open to criticism. In this sense, digital leadership is leadership open to change.

Development of higher education research in ASEAN

The continuous development of research and its internationalization through publications has been a significant force for higher education over the last four decades and has become the focus of much scientific research (Kosmützky & Putty, 2016). A recent systematic review of higher education research outlined more than 2300 academic articles on internationalization from more than 3300 authors, (Kuzhabekova et al., 2015) which has grown rapidly since the 1980s (Yemini & Sagie, 2016). Indeed, internationalization has been dubbed a 'vital aspect of higher education in the twenty-first century (Klopper, 2020).

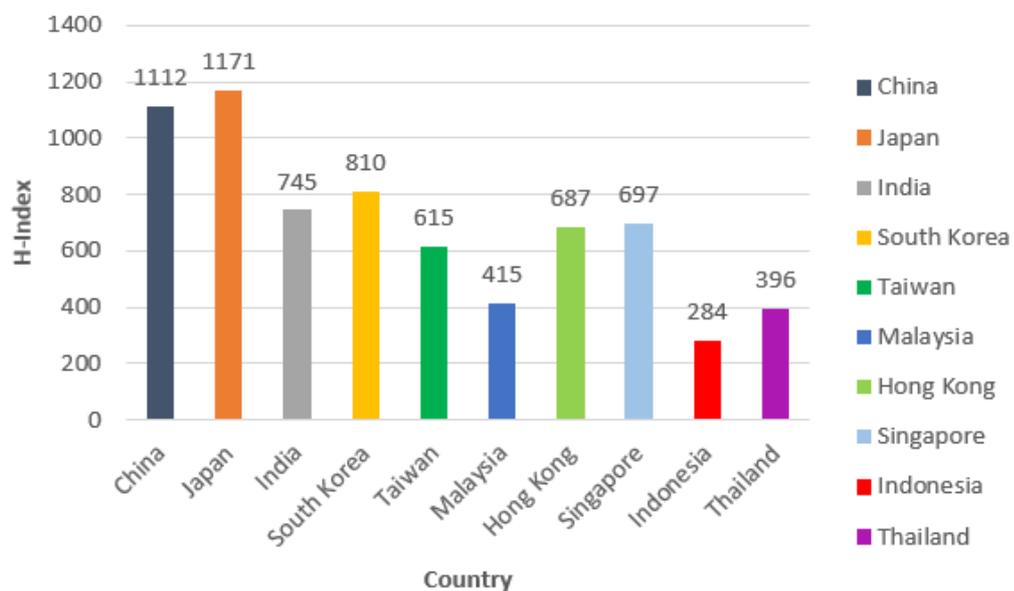


Figure 2. Graph of the Top 10 ASEAN H-Index Ranks
Source: Scimago. Jr

One of the benchmarks or research developments and their impact on Higher Education can be seen through the H-Index of an article or journal. The H-Index is an indicator of the impact of a researcher on the development of his scientific field. Scientists with a high h index greatly influence the scientific production of other researchers and determine the development of their field (Gualberto & Zych, 2012). The H-index, originally proposed by (Hirsch & Buela-Casal, 2014) is defined as the maximum value of h such that h publications by authors have at least h citations each. (Lutz Bornmann et al., 2011) stated that considering the high and low h-index results in better decisions regarding the progress of science and research resources that can contribute to the progress of a nation.

Based on data quoted from Scimago. jr that Indonesia is ranked 9th out of the top 10 countries in ASEAN in terms of the H-Index, it is explained in Figure 2. The graph above shows that in the top 10 nominations, Indonesia is in the lowest number 2 H-Index category. Supported by data from Scimago.Ir year 2022, in sampling universities with the highest number of research and innovations in Indonesia, when compared to other countries, the results show that Indonesia is at the lowest rank at the ASEAN level, as explained in Figure 3.

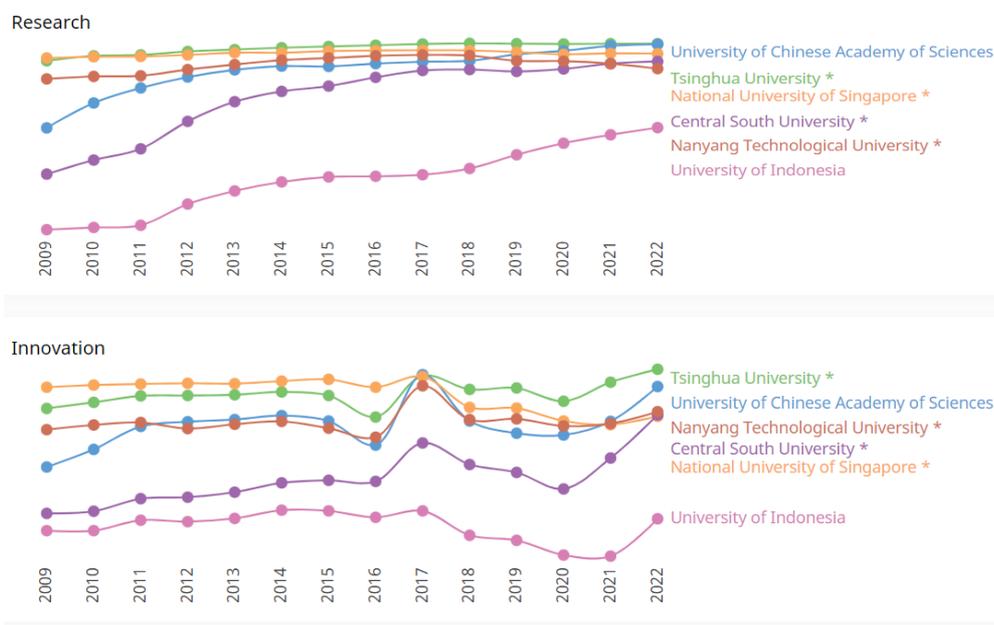


Figure 3. Graph of ASEAN-level Higher Education Research and Innovation
Source: Scimago.Ir

From Figure 2 and Figure 3, it can be seen that Indonesia is still included in the category of countries with a fairly low number of research and innovation. From this, it can be concluded that it is necessary to improve the research culture and innovation culture of the Indonesian state.

Development of higher education research in Indonesia

Having a world ranking is certainly an achievement of the vision and mission of every university in Indonesia. All universities are competing to improve the quality of learning and research to get the best ranking in the world and to get the World Class University award (Ichsani, 2017). In realizing this dream, Higher Education Institutions must fulfill the reference that underlies this World Class University ranking. One of the barometers that can be used is the Webometrics Ranking of World University (WRWU).

Webometrics is an interesting opportunity for universities in various countries, especially Indonesia to enjoy world university rankings. In Webometrics ranking techniques mostly take the factor of "life" of universities in the Internet world. This includes accessibility and visibility of university sites with a weight of 50%, electronic publications with a weight of 15%, open access to research results with a weight of 20%, connectivity with the industrial world and international activities of a university with a weight of 15% (Aguillo et al., 2020). From this description, it can be concluded that related to research, the percentage is quite dominating, namely 35%.

Higher Education rankings have been used to assess the quality of higher education. Assessing higher education includes academic evaluation and research (Boholano et al., 2014). (Samarasekera & Amrhein, 2020) identified the Academic World Ranking of

Universities, QS World University Rankings, and Times Higher Education Rankings as the most widely accepted international rankings. One common characteristic of these three ratings is the priority placed on research productivity. This confirms the argument that when research is defined as generating new knowledge, it becomes the hallmark of a university (Marchant, 2009). Times Higher Education in partnership with Thomson Reuter rates universities based on their performance in the following areas: “Teaching”, “Research”, “Quotes”, “Industrial Revenue” and “International outlook”. The “Teaching”, “Research” and “Quote” criteria are weighted 30% in the overall ranking score while the areas “Industrial income” and “International views” are weighted 2.5% and 7.5%, respectively. The “Teaching” criteria include the learning environment while the “Research” criteria include volume, income, and reputation. “Quote” refers to the influence of research. These criteria reveal how research in the world ranking of universities is emphasized and assessed through observable and measurable outcomes.

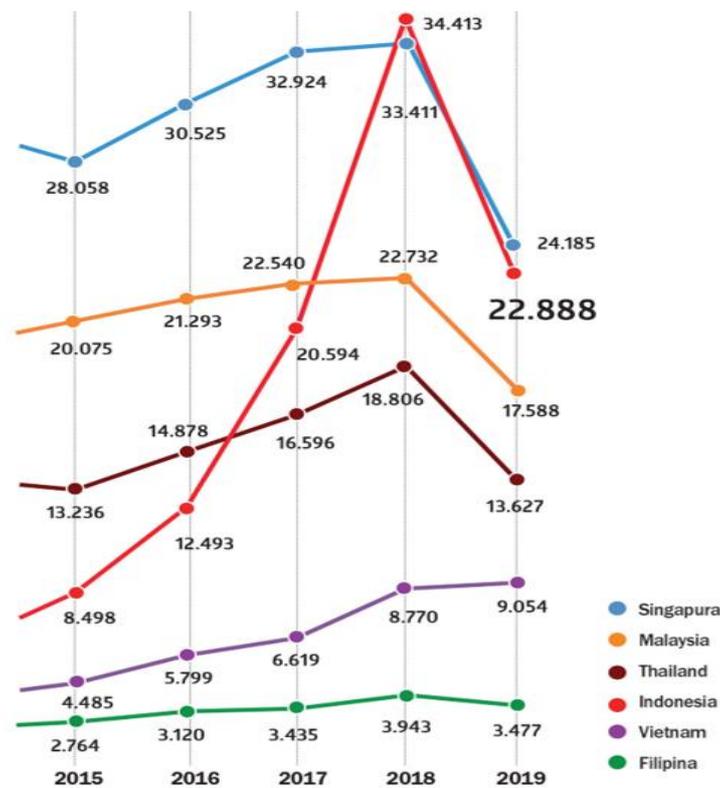


Figure 4. Scopus Publication Trends for ASEAN Countries 2015-2019
Sources: KEMRISTEKDIKTI

In Figure 4, it can be seen that Indonesia's achievements in publications in international journals as one of the research indicators have increased significantly, whereas in the ASEAN sphere Indonesia has been ranked first in the last two years. However, our efforts must not stop. Research, aside from being directed to produce innovative products and responding quickly to the needs of the community, research results also need to be directed at obtaining protection of intellectual property rights (IPR).

Recognizing the importance of the role of research and community service in universities, the Directorate General of Research and Development Strengthening always encourages the establishment of centers of excellence that can provide answers to various problems at the regional, national and global levels. The development of national centers of excellence by utilizing existing expertise in various universities with a particular focus, whether sector-based, commodity-based or national strategic issues, is always improved by involving various scientific disciplines. The strategy carried out by the Directorate

General of Research and Development Strengthening is to provide broader authority in the management of research to universities through research decentralization programs and community service, while national issues are accommodated through national competitions. Meanwhile, for issues that are considered strategic, the Directorate General of Research and Development Strengthening can assign assignments to universities that have high competence in the relevant field through an assignment scheme. The Directorate General of Research and Development Strengthening realizes that improving the quality of research will be able to encourage increased competitiveness and strengthen the Indonesian National Qualifications Framework (KKNI). The Indonesian government is highly committed to improving the quality and quantity of academic publications. Funding support for research is expressly stated in Law Number 12 of 2012 concerning Higher Education Article 89 that universities receive State Higher Education Operational Assistance (BOPTN) in which at least 30% is allocated for research activities. In line with better funding support from the government, universities must manage their research agendas more professionally, including by utilizing information and communication technology (ICT) (Directorate of Research and Community Service of Indonesia, 2018).

The important role of the tri dharma of higher education is an important milestone that creates an educated young generation in an effort to form an intellectual generation that is able to build the nation and can succeed in the 21st-century education era. Through the tri dharma of higher education, one of which is research and service, it is hoped that universities are ready to Face the era of 21st-century education with rapid technological developments, universities are also required to produce quality graduates. Where through the dharma of research and service, universities are expected to be able to implement a more innovative learning system through a curriculum that can improve students' abilities, especially in the fields of research and service. But in reality, there are still many universities in Indonesia that ignore the importance of the dharma of research and innovation culture as part of the Tri Dharma of Higher Education.

Discussion

The importance of digital leadership in higher education

In general, the term “digitalization” can be viewed from two angles (Petry, 2016). On the one hand, this can be understood technically as the conversion of analog data into digital information. On the other hand, it can be seen holistically as the development of society as a whole which is driven by technological developments in the electronic data processing. This leads to new challenges and opportunities, as it results in widespread changes at all levels of the economy and society, fundamentally changing the way people communicate and interact with one another. The Organization for Economic Co-operation and Development (OECD Science, 2016) describes digitalization as a current megatrend that has an impact on all areas of our lives, one of which is in the field of education.

The pressure to innovate is reflected in two theoretical approaches that are highly relevant in leadership research (Leitch et al., 2013). First, the focus has shifted from an interest in the classic personality traits of a lonely leader at the top towards leadership as a role itself defined not by individual traits but by their interactions in social and organizational contexts (Day, 2020; Thorpe et al., 2019). Second, leadership, similar to digital transformation, is increasingly understood as a process that involves all members of the organization and is intended to develop leadership competencies across the organization rather than just individual executives, which also demonstrates the importance of good leadership at lower levels. organizational level (Day, 2020). Together, these two developments highlight the importance of social and organizational context as factors influencing successful leadership (Leitch, 2013).

In the era of 21st century education, especially in Indonesia, universities are faced with the challenge of fulfilling the 21st century, known as the knowledge age, which is

oriented to the tri dharma of higher education and provides a touch of 21st-century characteristics, namely digitalization and the development of knowledge. the era of 21st century education. The tri dharma of higher education is three basic pillars that must be fulfilled by the academic community. To be able to fulfill the tri dharma of higher education which consists of education and teaching, research and innovation culture, and community service, a new paradigm is needed to encourage the optimization of the achievement of the tri dharma of higher education. What we need to underline here is the second point, namely research and s innovation culture. Focusing on research and innovation culture will indirectly answer the challenges of the 21st century, which is known as the knowledge age with the characteristics of digitalization. Because through research and innovation culture in universities, a 21st-century education era will be formed which is known as the optimal knowledge age with a society with a culture of research and a culture of innovation. Through research and dedication carried out by students, their knowledge will develop along with the research culture and innovation culture combined with digitalization in the 21st century education era.

The demands of changing mindsets in 21st century humans also demand a very big change in national education, which we know our education is a legacy of the old education system whose contents are memorizing facts without meaning. Changing the Indonesian education system is not an easy job. The Indonesian education system is one of the largest education systems in the world, which includes about 30 million students, 200 thousand educational institutions, and 4 million educators, spread over an area almost the size of the European continent. However, this change is a must if we do not want to be run over by the changing global era.

Need for exploring digital leadership to increase research and innovation culture in Indonesia

Problems related to the culture of research and innovation are interesting topics among education observers. This is because research productivity is very low, as the results of an international survey on the number of research publications put Indonesia on the order of 62 out of 239 countries. Japan is the Asian country with the largest number of publications and ranks third in the world with 1.2 million documents. Indonesia's order is far below other developing countries such as India (9), South Africa (35), Malaysia (37), Egypt (42), Thailand (43), and Pakistan (46). The reason expressed by ([Frans Mardi Hartanto, 2014](#)) why research often fails is because of the low or even absence of a research and innovation culture.

In line with the demands of learning objects occupied by students to have skills, knowledge, and abilities in the fields of technology, media, and information, learning and innovation skills as well as life and career skills, it is necessary to build a culture and abilities that must be possessed by students so that students are ready to face the next century. this 21. If we look at the 21st-century learning framework where there are four main characteristics that must be possessed, namely critical thinking, communication, collaboration, and creativity, then we will go to a culture that can build all these characteristics, namely a culture of research and innovation.

A culture of research and innovation is an important lens for practitioners and policymakers to view their practices and policies. Many societies have placed a great deal of emphasis on developing and maintaining a research culture to promote evidence-based practices and policies over the centuries. For this society, research is seen as a means of generating knowledge and tackling problems facing humanity. There is much emphasis on developing the thinking habits necessary to develop curiosity and informed decision-making. Recently, Bhutan has also given some importance to research in academia which is accompanied by challenges that must be faced.

In line with what is stated by ([Hanover Research, 2014](#)) as an important area for promoting positive research and innovation culture is effective leadership, productive

institutional characteristics, training and support, research recognition (internal and external), research centers, and research programs, and networking and collaboration. Long-term investment in a research capacity is an important aspect of building a strong research culture (Hanover Research, 2014).

Research culture, according to (Evans, 2012), refers to shared values, assumptions, beliefs, rituals, and other forms of behavior that are directed at recognizing the value and significance of research practices and their results. Research efforts are considered important and meaningful in the overall operation of the academic community. Activities such as sitting as a panel member in an oral defense, supervising and guiding researchers, writing research papers, and presenting them at national and international conferences are agents for enhancing research culture (Narbarte et al., 2018). However, activities alone are not enough. Existing studies of the research culture of educational institutions reveal that in order to claim the presence of a strong research culture, there must be clear indicators of valued research practices and outcomes. If it is observed, that this output does not come at once, it shows that the development of research culture occurs in certain phases. (Stahmer et al., 2017) even challenged institutions to create comprehensive research plans and investigations to ensure that goals from basic science to the application can create an impact in society.

In the Philippines, (Wong, 2019) reports that there is a need for capacity building to boost productivity which is characterized only as conducting research and writing research reports. However, due to the increasing demand for meeting International standards for higher education institutions, higher education institutions are looking for ways to produce quality research for International publications and citations. (Mirasol & Inovejas, 2017) studying research results provide insight into the maturity of research culture.

The culture of research and innovation also plays an important role in achieving higher education goals, as well as managing staff and all academic components in higher education. Research is one of the axes of higher education by determining the achievement of the goals of the existence of a university. On the part of human resource management, the relevance inherent in research also affects the management of human resources.

Conclusion

The era of 21st-century education plays an important role, especially in the world of higher education. In the 21st century era which has the characteristics of digitization and is known as the knowledge era, it contributes to the Tri Dharma of Higher Education, especially in the dharma of research and service. By implementing the dharma of research and service to universities, the Indonesian people are indirectly preparing for the success of the 21st century education era with the characteristics of the era of knowledge, where knowledge is obtained through research conducted by the academic community consisting of lecturers and students so that knowledge will growing rapidly and always being updated. One solution to the challenges faced is to implement a digital leadership strategy in universities to achieve research and innovation that will affect the quantity and quality of the academic community's research. From the implementation of this strategy, a research culture will be formed and research capacity improvement in universities will be formed. Optimizing the culture of research and innovation in higher education is also inseparable from the creation of a mental revolution for the nation's next generation that is characterized by an active, innovative, critical, and visionary future. The researcher suggests future research related to digital leadership, innovation culture and research culture in more depth with methods that can reveal the relationship between the three variables in more detail.

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