

Digital Leadership Strategies in the 21st Century Education Era: A Study in Indonesian Universities to Enhance a Culture of Research and Innovation

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Abstract

This article shows that the formation of a culture of research and innovation through digital leadership in higher education has an impact on the emergence of a critical and innovative mental revolution of the young generation in welcoming the 21st-century educational era with full readiness so that they can optimize the achievement of goals in the 21st-century educational era. The research method used is study cases, using library study data collection techniques from documents, reports, books, and scientific journals relevant to this research. The approach used in this research is qualitative, with research procedures that produce descriptive data in the form of written or spoken words from the informants observed. The next step was concluded by implementing digital leadership, encouraging the development of a culture of research and innovation in higher education to increase the quality of higher education as reflected in various achievements.

Keywords: *digital leadership; research culture; innovation culture.*

1. Introduction

In the 21st-century education era, which is often referred to as the era of openness to knowledge (knowledge era) or digitalization, technology and scientific developments play an important role (Prastiyono et al. 2021; Boholano 2017; Voogt et al. 2013). In the current digital era, organizational leaders must develop their leadership capacity to meet the needs and demands of society, especially on an educational basis (Cortellazzo, Bruni, and Zampieri 2019). In the era of 21st-century education, which is oriented towards dynamic and up-to-date scientific developments, the 21st-century learning paradigm intersects with the Tri Dharma of Higher Education, one of which is the dharma of research and development with the importance of establishing a research culture and paying attention to the research abilities that lecturers and lecturers must have (Sulistiyani 2022; Chairunnisa and Istaryatiningtias 2022).

Students are the academic community that carries out dynamic updates in science. LPPM, which plays an essential role as a research and service institution in higher education, has the task of developing research in higher education to achieve the Tri Dharma of Higher Education. This research aims to analyze digital leadership, which is expected to be one of the keys to developing a culture of research and innovation in higher education. The formation of a research culture will have an impact on the construction of a critical and

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innovative mental revolution in the younger generation (Anindhyta 2023). Apart from that, through the established research culture, it is hoped that Indonesia will be able to welcome the 21st-century education era with full readiness so that it can optimize the 21st-century education era.

Currently, research and innovation capacity is the core of higher education, which is an essential indication of every strong higher education institution; all tertiary institutions pay attention to growing and improving their capabilities, especially scientific research capabilities. For this reason, it is necessary to analyze the elements of research capability in higher education. Several studies have been conducted to analyze the competitive capabilities of research in higher education (Ngaruko 2014; Kireeva et al. 2018; Marulanda-Grisales and Vera-Acevedo 2023). To fill this gap, this article first investigates the elements of higher education research and innovation capabilities based on dynamic capabilities, then builds a model that aims to provide theoretical and empirical perspectives in developing research capabilities and research capabilities in higher education. The competitive advantage of universities comes from research capabilities. Research capability reflects the research capabilities of higher education institutions, which creates all the benefits of optimizing research capabilities in higher education institutions.

A culture of research and innovation also plays an important role in achieving higher education goals. Research is one of the axes of independent higher education, where culture will determine the achievement of the purposes of the university's existence. On the part of human resource management, the inherent relevance of research also influences human resource management; where a research culture benefits all staff, their management will produce positive outcomes (Ferdousi and Abedin 2023; Khatri N, Gupta V 2017). Research culture is an essential lens through which practitioners and policymakers view their practices and policies. Revealed by (M. M. J. Olvido 2021; Kaushik and Walsh 2019; Evans 2009) states that the existence of a research culture refers to shared values, assumptions, beliefs, habits, and other forms of behaviour that are directed at recognizing the value and significance of research practices and their results, where research efforts are considered essential and meaningful in the overall operation of the academic community, especially in the dynamics of higher education. Several authors have defined innovation culture as a multidimensional context and construct (Ramón Campos-Blázquez, Rubio-Andrada, and Soledad Celemín-Pedroche 2023; M.Hazem and Zehou 2019; Stock, Six, and Zacharias 2013), but it remains a frequently used concept. It is often considered a fairly self-explanatory phenomenon that a universal set of characteristics can explain. Innovation culture is an environment and culture (Xie, Wu, and Zeng 2016) that emphasizes participation and encourages growth and performance (Tian et al. 2018). However, consensus is still needed regarding its dimensions or determinants (Eynde et al. 2015; Yun et al. 2020; Jucevicius 2010). Some authors consider innovation culture as a dimension of organizational culture, referring specifically to attitudes towards innovation, technology, knowledge exchange, entrepreneurial activities and part of key innovation capabilities (Anderson, Harbi, and Amamou 2012; Alm and Jönsson 2014) and created from a technological vision, research culture, value system shared by those who take part in the innovation process (Jucevicius 2010).

This study argues that the productivity of higher education organizations is generally influenced by factors such as leadership, organizational capacity, external operating environment, internal environment, resources, and management. In fact, previous research links research and innovation culture to innovation outcomes and performance outcomes (Jin, Navare, and Lynch 2019; Dobni 2008). The latter emphasizes that organizations with a strong culture will positively and significantly impact performance outcomes (Xanthopoulou, Sahinidis, and Bakaki 2022; Tianingrum 2021). In this model, a culture that supports innovation involves digital leadership as a behaviour that values creativity, dynamic change, risk-taking, freedom, teamwork, seeking value and being solution-

oriented, communicative, instilling trust and respect, and quick to make decisions (Kozioł-Nadolna 2020). In addition, the results of research and innovation culture are influenced by several factors, such as individual technical skills and competencies, as well as an organizational culture conducive to innovation (V. Smith et al. 2011; Prajogo and Ahmed 2006). Conceptualized as facets of organizational culture, cognitive frameworks, progressive mindsets, conduct and ethical principles, technical foresight, customs, and as a collaborative undertaking among individuals engaged in the innovation process (Leron and Baconguis 2021; Tsait 2019; Lam et al. 2021), in line with the idea (Eynde et al. 2015; Espig et al. 2022) that the term "culture of innovation" is multidimensional which also correlates with digital leadership which optimizes the era of 21st-century education in higher education.

2. Materials and Methods

This research focuses on digital leadership strategies for improving research and innovation culture in higher education. The analysis of the implementation of digital leadership in this research is directed at seeing the extent to which the leadership organizational unit carries out its duties so that it is successful and achieves its main goal of improving the quality of higher education. In accordance with the research objective, namely providing answers and views by explaining a process and results related to the application of digital leadership in building a culture of research and innovation in improving the quality of higher education, this research uses a qualitative research approach with research procedures that produce descriptive data in the form of written words, or verbally from the observed informant (Moleong 2018; J. W. Creswell 2013). The place of this research is Sebelas Maret University.

This research uses a qualitative research approach with a case study method with the consideration that this research will explore and focus on certain objects. According to (J. D. Creswell 2017), case study research is a qualitative approach because the researcher explores the circumstances and position of an ongoing event. Furthermore, (Rahardjo 2017) states that there are five stages to conducting research using the case study method: a) Selection of themes, topics and cases; b) The case or several cases identified by the researcher. After the researcher obtains the case, the researcher collects literature; c) Finally, the researcher formulates the research problem. This is important because apart from the researcher focusing on an issue, other important information can also be extracted from the formula; d) data collection: in case study research, there are several data collection techniques, namely interviews, focus group discussions (FGD), and observations. e) In the final stage, the researcher processes the data and reports the research results as a form of research accountability.

Data collection in this research was carried out by reviewing documents and information. Apart from that, data observations were also carried out, identifying and examining various relevant reports, documentation studies and interviews with research objects, namely informants who were relevant in answering the formulation of this research problem. The informant is the Director of the UNS Innovation and Downstreaming Directorate, Chairman of LPPM UNS, Study Program Coordinator, Lecturer, ten students and alumni act as leaders, sub-leaders and members of the organization, with respondents taken using snowball random sampling. The parameters are the achievements of higher education rankings, research and leadership system innovation, infrastructure, and the process of developing digital competencies for the academic community. The analytical technique used in this research is analytical techniques data and SWOT analysis, which is also used in research, namely an in-depth discussion of the available data. With this analysis technique, data mapping of strengths and weaknesses will be carried out, representing internal role positions and opportunities for external challenges (Gurel, E., & Tat 2017; Namugenyi, Nimmagadda, and Reiners 2019).

The research was conducted in the period from January 2023 to August 2023. The technique for determining informants using purposive sampling, or judgment sampling, is a method for selecting informants determined by researchers with a background or assessment that the group of respondents is capable of providing information accurately and right on target (Campbell et al. 2020; Sekaran and Bougie 2013). In the purposive sampling method, the target respondents are not random, and the researcher considers and determines a list of target respondents/informants who are able and willing to provide information based on the knowledge and experience they have regarding the Implementation of Digital Leadership at Sebelas Maret University, Surakarta.

Analysis of the implementation of digital leadership at Sebelas Maret University, Surakarta, was carried out based on five indicators presented by (Zhu 2015), which consist of: (1) Thought leaders because competition is becoming tight and hyper due to the emergence of new competitors who threaten the existence of an organization, leaders are needed who have strong capabilities. (2) Creative leader, digital technology brings new business models and has a limitless impact on innovation. Innovation is the key to competitive advantage, so digital leaders must have creativity and an innovation mindset that can formulate future ideas into reality (3) Global Visionary Leader, digital leaders have the ability to provide direction and become an orchestrator in transforming business transformation digital. (4) Inquisitive Leader, with a complex and dynamic ecosystem due to VUCA factors, digital leaders must have the ability to learn and have the ability to implement learning and digital capabilities. (5) Deep/detailed leader (Profound Leader), a digital leader has in-depth knowledge and understanding of policies that adapt to the digital era, information is increasingly open, and everyone has the ability to access and analyze information comprehensively, using interpretation, assumptions and synthesis. Information can deepen knowledge to make decisions.

3. Result

3.1. Digital-based Thought Leaders in improving research and innovation culture at Sebelas Maret University, Indonesia

Based on the research results, information was obtained that digital-based thought leaders can improve research and innovation culture at Sebelas Maret University, Surakarta, which consists of the leader's perspective on a problem and the preparation of relationships between events consisting of institutional research policies and agenda; departmental culture and working conditions; budget for research; infrastructure; collaboration and access with other institutions; research benefits and incentives; research committee and publication. In line with Article 20 of Law Number 20 of 2003 concerning the National Education System, universities are obliged to carry out research and community service in addition to carrying out education. In line with this obligation, Article 45 of Law Number 12 of 2012 concerning Higher Education confirms that research in higher education is directed at developing science and technology and improving the welfare of society and the nation's competitiveness. This law is implemented by Sebelas Maret University (UNS) through UNS Vision.

The stages of achieving Sebelas Maret University's research performance as an academic institution require UNS to develop strategic steps that place superior research activities as the main driver of innovation, so that the main goal of realizing research as an economic development agent is not just a mere discourse. The stages of achieving UNS performance as the achievement of the UNS Strategic Plan for the 2020-2024 PTNBH era are the elaboration of the UNS Research Master Plan (RIP) 2012-2025, which includes the consequence that every research activity that then runs and develops at UNS must support the implementation of high quality and diverse teaching and learning processes a form of community service activity. The implementation of RIP UNS 2012-2025 is realized in steps to migrate views and strategies to strengthen research governance in the

framework of implementing the Tri Dharma of Higher Education, which has been implemented by LPPM UNS since 2014 by placing the Research Group as the spearhead of innovation growth. This migration was carried out based on an analysis of human resource strengths as described in each SWOT analysis in the Research and Service RSB Strategy Plan. They are strengthening UNS's strategic synergy as an impact of carrying out research and community service on the quality of teaching and strengthening the growth of innovation, which is the implementation of the strategic plan to reach UNS' level as a transfer agent for culture, science and technology which in the future will push UNS from a teaching university to a research university and as an economic development agent.

The migration process includes three main things: 1) a shift in the position of strategic research in the implementation of the Tridharma; 2) strategic funding scheme for focused research; and 3) a research quality assurance system and community service. At the activity implementation level, migration includes aspects of increasing participation, strengthening academic integrity, and determining the development domain and strategic research innovation targets.

The explanation through the work unit development strategy map shows the uniqueness of UNS in that the process stages rely on Research Groups, Study Centers, Research Centers and Study Programs as the main habitat for the existence of the university's academic potential. Each Research Group, Study Center, Research Center and Study Program must formulate a road map that is structured and directed towards the main goal of increasing the effectiveness of its performance. The unique characteristics of the UNS leadership's thinking on the UNS research innovation system also include systematic efforts to empower the Faculty and KPPMF in carrying out research at the University level, empowering input owned by UNS using appropriate process management so that output is obtained that makes a significant contribution to increasing achievement Key UNS Performance Indicators. Input, process and output (based on output performance and outcomes) as written in detail in the UNS Research Master Plan (RIP) 2012-2025, as stated in Figure 1.

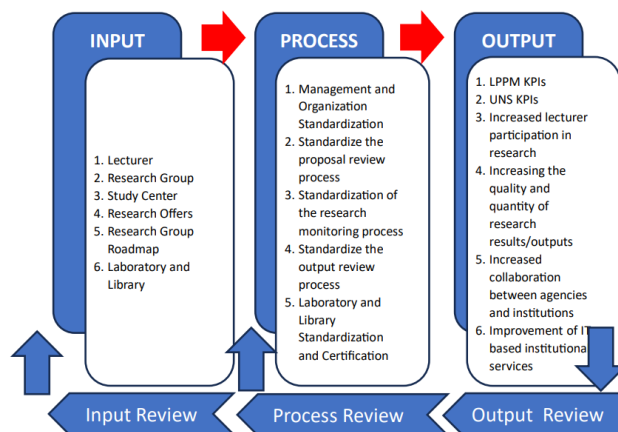


Figure 1. Work Unit Development Strategy Map According to the UNS Short Term Program Plan (RPJP) 2020-2038

Since 2014, UNS has determined that the Research Group is the spearhead of innovation in research and community service in accordance with UNS Chancellor's Regulation No. 33/ UN27/PN/2014 concerning Implementation of Research and Community Service at Sebelas Maret University based on Research Groups. The UNS Chancellor's regulations are implemented by establishing a Research Group by the Dean's Decree based on a proposal from the Study Program. The Dean's Decree regarding the formation of a Research Group is valid for two years so that every two years study programs and faculties can conduct evaluations to determine the next Research Group. The tiered

growth scheme, starting from researchers, Research Groups, Study/Research Centers to becoming Science and Technology Centers of Excellence (PUI), is always designed to encourage research implementers to excel, this is shown in the Figure 1.

This tiered growth strategy is in accordance with the Direction of Development and Governance of Higher Education, which is divided into three stages, namely the academic stage (Academic Research Institute/LPA), which is equivalent to the Research Group, the innovative development stage (Innovative Research Institute/LPI) which is equivalent to the Study Center, and ended as PUI-PT before being transformed together with the local government into a Science and Technology Campus, this is shown in the Figure 2.



Figure 2. The Relationship between Multilevel Growth of Research Groups, Research Grants, and Strategic Plans.

However, from a more in-depth study of the data, there is still a lot of homework (PR) at Sebelas Maret University that needs to be immediately resolved, such as the uneven publication performance in each faculty. Meanwhile, the Research Group still needs to be encouraged to improve overall research performance effectively because the Research Group performance index is uneven. Based on data from 2019, the average number of Research Group members is 7.3 people, limiting Research Group membership to between 5-10 people in 2020. In 2022, Research Group membership will begin to be relaxed by allowing you to become a second member in a cross-faculty or Study Center. In general, UNS' reputable publication performance in 2020 was only carried out by 387 people (21%) and increased to 430 people (23%) from all lecturers, but the number of publications produced by each Group's research has tended to increase over the last four years, as presented in Figure 2.

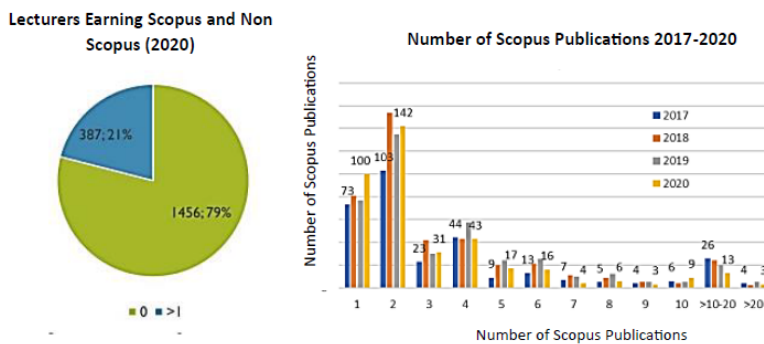


Figure 3. Distribution of Scopus Publications for UNS Teaching Staff and Research Group.

Appropriate and transparent measurements are needed to increase capacity and performance, starting from the bottom in the form of Research Groups up to PUI at the national level. These measurements are carried out every two years by UNS Chancellor's Regulation No. 558/ UN27/HK/2011 concerning Guidelines for Management of Study Centers in the LPPM UNS Environment. The Research Group is responsible for the obligations of its members (lecturers) in carrying out the Tri Darma of Higher Education activities and carrying out internal UNS collaboration. The Study Center has begun to carry out external collaborations which generate income for UNS, and the UNS Science and Technology Center of Excellence (PUI) also carries out external and international collaborations and income generating for UNS. Measurable and high output achievements from lecturers through research groups, Pusdi and PUI will always be encouraged and facilitated by LPPM to support UNS IKU achievements, which are demanded to be higher every year. Integration of various research activities through Non-APBN schemes, both Research Group Grants (HGR) and Community Partnership Programs (PKM), needs to be carried out. Community service carried out must focus on economic development and social change in the community by planning activities and measuring results appropriately and transparently. The Research Group is encouraged so that the integration process of various research activities can occur well.

The suitability of research themes in the Research Group with the Research Group's roadmap/road map and supported by various appropriate research and funding schemes is a strategy to improve UNS's research performance. Integration of all research processes is also essential, for example integration with external parties in developing a tool. All integration processes are carried out using the IRIS1103 system (<https://iris1103.uns.ac.id>) for the efficiency and effectiveness of tracking research dynamics at Sebelas Maret University, Surakarta. Apart from that, leaders have also developed the IRIS 1103 website which now allows it to be downloaded on the Playstore application on mobile phones to make it easier for the academic community to access research developments. Based on the results of interviews with Informant LW-WP-KLP-1-01, observation results LO-OP-WSP-01; LO-OP-SRK-01; LO-OP-RPT-01; and LO-OP-RPT-02 as well as the LD-DP-LKI-01 documentation shows that the leadership at UNS is responsive to the shortcomings that exist in the achievement of research results where the leader organizes relationships between events with solutions related to managing research results, namely with the application IRIS 1103 Web and on a micro level, leadership at the Faculty level is the development of Exfis Management Website Applications.

Based on the results of triangulation, both interviews, documentation and observations, it appears that leaders at UNS can see research dynamics in detail, supported by the statements of informants LW-WP-KLP-1-01 and LW-WP-DIH-1-01 that the informants see growth. The culture of research and innovation is quite good in this study program, supported by the results of the analysis of the LD-GT-DPS-2 document regarding the faculties that received the most UNS Master's scholarships where one of the conditions for getting the scholarship is through student publication achievements in reputable journals which indicate growth of a good research and innovation culture.

3.2. Digital-based creative leaders in improving research and innovation culture at Sebelas Maret University, Indonesia

In the realm of creativity of leaders at Sebelas Maret University, Surakarta, at the macro level, it can be seen from the statement of the informant, namely the Head of LPPM UNS, regarding the creativity of leaders who developed IRIS 1103 and also the establishment of the Research Group at Sebelas Maret University, Surakarta. Referring to Chancellor's Regulation No. 33/UN27/PN/2014, Research Group is a group of joint research activities of lecturers who have the same study interests and/or are related to each other. The main characteristic of the research group is the large number of scientific works in journals, both national and international, written by researchers at the institution. Based on data

recorded at <https://iris1103.uns.ac.id> it is known that the number of Research Groups has increased quite significantly from 156 in the 2014-2015 period to 388 in the 2016-2017 period, 2018-2019 to 296, in 2021 became 281 after changes to the provisions regarding the head of the Research Group. This increase in numbers could indicate an increase in research and service activities at UNS, but conversely it also indicates a tendency to reduce the number of members due to the tendency to return to the personal fighter system in conducting research.

In 2020, there are still 46 (15.5%) Research Groups that have not produced any Scopus-indexed publication output at all and 169 (57.1%) Research Groups that have not met the UNS target of one person one publication per year out of 296 registered Research Groups. In 2021, there are still 71 (25.1%) Research Groups that have not produced any Scopus-indexed publication output at all and 143 (50.7%) Research Groups that have not met the UNS target of one person one publication per year out of 281 registered Research Groups. To further improve the performance of the Research Group, starting in 2022, Research Group membership will be reorganized so that lecturers can focus more on improving the performance of themselves and their respective Research Groups to meet the targets of UNS and the Research Group. To support the increase in research group performance to PUSDI and PUI, in 2023 the research group will be divided into several categories according to performance in 2021, namely: (1) Category A, namely more fulfilled (Scopus publications > 6); (2) Category B, namely the minimum has been met (Scopus publications 1-5), and (3) Category C, namely not meeting the publication target (Scopus publications = 0). Research Group membership can be cross-department, faculty, university, and even cross-country. The existence of a Research Group is determined based on the Decree of the Dean/Director with a validity period of 2 years, in accordance with Chancellor's Regulation No. 558/UN27/HK/2011.

LPPM formulates an index that represents the performance of the Study/Research Center as a university revenue generator, namely the Business Index and Branding Index. These two indexes are quantities to measure promotional efforts to achieve a higher business index level. The Study/Research Center accreditation system is regulated by the Study/Research Center Accreditation Guidelines published by LPPM UNS. The Study Center or Innovative Research Institute (LPI) based on the Ristekdikti criteria has had research works that are fundamental, evidentiary, developing new methods, and are cross and multidisciplinary in nature, have begun to be implemented through prototypes on a laboratory scale, and have begun to be tested in more than a different condition. The main characteristics of the Study Center or LPI are the large number of scientific works in journals, both national and international, managing specific national scale journals in accordance with the institution's expertise and knowledge, and starting to manage symposiums/seminars/conferences in their fields on a regular and scheduled basis.

In terms of governance, open information in the institution can be accessed easily and updated with new information. Study centers based on Chancellor's Regulation number 558/UN27/HK/2011 can take the form of research centers, development centers, service centers that meet the requirements of being multidisciplinary, with different names from the study program/department/faculty at UNS, supported by a minimum of 6 (six) experts with minimum Master's qualifications with specific skills/expertise and scope of work that does not overlap or be the same as other Pusdi within the LPPM UNS environment.

The Research Group Roadmap needs to be adjusted to Presidential Regulation No. 38 of 2018 concerning the National Research Master Plan (RIRN) 2017-2045 and Permeristekdikti No. 38 of 2019 concerning National Research Priorities (PRN) 2020-2024. The formulated main goal is expected to participate in the development of 16 (sixteen) UNS research themes which are adapted to the research themes formulated by RISTEK and the National Innovation System. (SINAS) and supports the University's Vision, namely: (1) Poverty eradication; (2) Climate change and biodiversity; (3) New and renewable energy; (4) Food security and security; (5) Health, tropical diseases,

nutrition, and medicine; (6) Disaster management and mitigation; (7) National integration and social harmony; (8) Regional autonomy and decentralization; (9) Arts and culture/creative industry; (10) Infrastructure, transportation and defense technology; (11) Information and communication technology; (12) Human development and national competitiveness; (13) Javanology; (14) Finance and Banking; (15) Pancasila and National Values and (16) Health Facility Technology.

Based on the 2020-2024 LPPM Strategic Plan, the Priority Programs were further summarized into 5 UNS Flagship Programs, namely climate change and biodiversity; new and renewable energy; food security; arts, culture, and creative industries; as well as human development and national competitiveness. In order to support the UNS Flagship Program "Green Campus", the content of the Priority Program is prioritized for those containing Green and Sustainability. Apart from that, the Priority Program is also expected to support and be integrated with the UI Green Matric Criteria, which is the basic content of the UNS Green Campus, namely related to Setting and Infrastructure, Energy and Climate Change, Waste, Water, Transportation, and Research and Education. Apart from that, Sebelas Maret University also encourages the creation of a teaching university with various research policies so that research results that have reached Technology Readiness Level (TKT) 9 become various business units that develop, such as the Pradipta Dirgantara laboratory school as a collaboration between UNS and the Indonesian Air Force, the Angkasa laboratory school, lithium batteries, Bromo Forest KHDTK, and natural dyes.

At the micro level, one of the Study Programs mentioned by the informant, the Head of LPPM UNS, and the Director of Innovation and Downstreaming at UNS was that in this Study Program, there is quite a strong digitalization characterizes the Study Program because the leader is oriented towards Digital Leadership, where the dynamics of research and innovation are built into the Program. The study of Physics Education is already quite good with the Research Team program, which is packaged in EksFisII (Physics Experiment II). In Exhibit II, one lecturer and one student formed a research team, which was used as a requirement for students to graduate to obtain a bachelor's degree. Leaders within the study program also directed the implementation of digitalization in research development. If observed as a whole, the research attention of Sebelas Maret University, Surakarta, is quite densely dominated by digitalization at both the macro, meso and micro levels.

The creativity of leaders can also be seen in the existence of several policies that were born at Sebelas Maret University, Surakarta, where if a student has just one article published in a Scopus-indexed journal, the student is entitled to a full scholarship at the next level, in accordance with the code document LD-GT-DPS- 2 related to the Decree of Research Path Achievement Scholarship Recipients and also interviews conducted with respondents who were alumni of Masters and Doctoral students at Sebelas Maret University who received full Masters and Doctoral scholarships because they successfully passed Scopus indexed articles.

3.3. Digital-based global visionary leaders in improving research and innovation culture at Sebelas Maret University, Indonesia

The achievement of the Vision and Mission of Sebelas Maret University based on the results of triangulation of the code document LD-DP-BPP-01 is described in more detail in the Vision of the UNS Research and Community Service Institute (LPPM), which is determined to become a superior, trusted and independent institution in the field of research and community service society, especially in the development and utilization of science, technology, and culture. To become a superior, trusted, and independent institution, based on the Minister of Research, Technology and Higher Education Regulation Number 44 of 2015 concerning National Higher Education Standards (SNPT), the implementation of LPPM institutions must meet the National Standards for Research

and Community Service which include minimum criteria regarding the system. research and community service at Higher Education Institutions (PT) which applies throughout the jurisdiction of the Unitary State of the Republic of Indonesia which consists of research and community service standards: a) results; b) content; c) process; d) assessment; e) researcher/servant; f) facilities and infrastructure; g) management; and h) funding and financing. The performance of LPPM UNS is directly related to the management process, planning, mechanism for selecting/determining activity implementers, implementation and monitoring of activity implementation, as well as follow-up to research results and community service as a technical manager and coordinator of activities. Based on the ranking results of the Higher Education Research Performance and Community Service cluster, LPPM UNS has been designated as an independent PT group for research activities. The PT Research Performance ranking process is an overall and comprehensive system for measuring PT Research Performance in terms of resource strength, management, and measuring research output. The research performance measurement process is generally projected into four (4) elements, namely Resources (SD), Research Management (MP), Research Output (LP), and Revenue Generating (RG). Apart from that, to improve the research performance of higher education institutions, monitoring and evaluation (monev) of the performance of research institutions (LP/LPPM) of higher education institutions is carried out as part of the activities mandated by Permenristekdikti Number 69 of 2016 concerning Guidelines.

Formation of an Assessment Committee or Reviewers and Procedures for Implementing Research Assessments Using Output Cost Standards. This provision regulates the stages of research management, including announcement, proposal, selection/appointment, determination, implementation, supervision/Monev, reporting, and output assessment, which is then modified to the mechanism for managing P2M activities at UNS. All types of funding in the UNS Research Innovation System are directed at achieving a level of excellence in the following impact categories: (a) Excellence in achieving world-class university performance indicators in the implementation of research results in teaching and their implementation to society, in performance achievements which are research university indicators ; (b) Excellence in strengthening the noble values of national culture and local wisdom to advance civilization through a variety of focused research and community service schemes; (c) Excellence in research-based revenue generating capabilities and standard professional service capabilities. Funding targets include the implementation of a focused research scheme, which is designed in an integrated manner through creative activity planning at the Research Group and Study/Research Center levels. All these advantages and targets are designed to be achieved in stages in accordance with the long-term development plan as presented in the UNS RIP.

Apart from that, UNS is very strongly committed to upholding academic ethics in every aspect of life and the academic culture of the academic community. All types of behavior that are categorized as scientific misconduct are unacceptable forms of crime and will be subject to severe sanctions in accordance with applicable regulations.

By definition, scientific misconduct is a violation of the standard code of scholarly conduct and ethical behavior in scientific research. Scientific misconduct can take the form of plagiarism, fabrication, and falsification. Research and service quality assurance ensures that planning, implementation, and reporting (which includes publication and submission of IPR) fulfills correct research ethics rules. The Research Group's initial planning method through the coordination of the RG chairman is the initial stage of anticipating scientific misconduct. The implementation carried out by LPPM refers to the research and service ethics regulatory tools contained in the UNS Chancellor's Regulation No. 182/UN27/PP/2014 in article 4 paragraphs 6 and 7, stating that: (1) Researchers/devotees are obliged to respect researchers' Intellectual Property Rights / other servants; (2) Researchers/devotees are prohibited from plagiarizing in the preparation of proposals, implementation and publication of research and community

service results and declare that proposals, activities and publications of research and community service results are the original work of researchers/devotees.

If traced from the results of triangulation, both documentation, observation, and interviews, digital-based global visionary leaders in improving research and innovation culture at Sebelas Maret University, Surakarta can be seen from the existence of policies related to scholarships provided for students and lecturers to continue their studies at Master's and Doctoral levels if the academic community can pass Scopus indexed articles. In line with the results of extracting information in the LD-DP-BRT-02 document regarding leaders' attention to providing incentives in the competition for holding International Seminars at Sebelas Maret University, Surakarta. In facilitating research, innovation, and publication at UNS, every year LPPM UNS holds an Incentive Proposal Competition for Organizing an International Conference where financing will be provided to incentive recipients to have an International Seminar.

3.4. Digital-based Inquisitive Leader curiosity in improving research and innovation culture at Sebelas Maret University, Indonesia

In the realm of digital-based Inquisitive Leaders in improving research and innovation culture at Sebelas Maret University, Surakarta, through the LPPM, the LPPM has established an award mechanism for every achievement in the field of research and development and community activities as part of efforts to improve the quality of achievements globally system. At the same time, sanctions are also applied to researchers, service providers, Research Groups and Study Centers who are proven to be unable to meet the activity implementation targets as agreed in the contract. Apart from that, as stated in the formulation of the third point regarding the Global Visionary Leader, severe sanctions will be imposed on anyone who is proven to have actually and deliberately committed any form of dishonorable action, which is categorized as academic misconduct. If the proposer is unable to fulfill the obligation in the form of a report with its completeness and output in a particular research or service scheme whose funding comes from UNS, then the head of the proposer as the person responsible for P2M activities is deprived of the right to participate in all competitive schemes with the same funding until his obligations are fulfilled.

Research Groups or Study Centers and all their members are obliged to comply with research administration procedures and deadlines set by LPPM UNS regarding reporting progress, reporting the use of research funds, and reporting research results. Researchers who do not comply with their obligations will be subject to sanctions as stipulated in the research contract between the researcher and LPPM UNS. If there are differences of opinion and disputes relating to all aspects of the implementation of research and development activities or disputes relating to ethics in activities involving any party, then the case or dispute in question will be resolved in accordance with applicable legal provisions. Sebelas Maret University, through the LPPM, can form an Expert and Ethics Committee whose task is to carry out critical and in-depth reviews in a fair manner regarding disputes or cases that occur. The results of the work of the Expert and Ethics Committee then become recommendations from the Head of LPPM to the Chancellor of Sebelas Maret University as a basis for making decisions by applicable legal provisions.

One way to assess the quality of research is to see whether the research is sustainable and used as a reference by other researchers. Publication in reputable international journals has now become a necessity, because through these journals research output can be disseminated widely and is not limited by time and space. Scopus is the largest journal database in the world, containing more than 43 thousand journals, which according to Scopus' assessment are internationally reputable journals. Seeing the many journals included in the Scopus list, of course not all of them are top-tier journals in their respective fields. In general, the references for researchers throughout the world are journals that are ranked/category/quartile 1 (Q1) and 2 (Q2) according to the ScimagoJR

page (<https://www.scimagojr.com>). Journals in these two quartiles generally have a very strict and not easy review process, so that every article published in these journals is generally of very good quality and gets many submissions. One indicator of higher education performance is the number of publications in Scopus-indexed publication media and the number of citations resulting from each article publication affiliated with Sebelas Maret University. Sebelas Maret University, through the LPPM International Publication Implementation Unit (UPPI), motivates lecturers and researchers to publish their research work in journals in the Q1 and Q2 categories. Based on this, LPPM provides attention to grants to increase publications in top-tier journals in the form of publication fees (article processing charge/APC) for articles written by UNS lecturers with specific criteria. The aim is to improve the quality and quantity of lecturers' publications within UNS in top-tier journals; increasing UNS's international research network, and increasing UNS's reputation at national and international levels. Assistance for increasing publications in top-tier journals is provided at a maximum of IDR 15,000,000.00 per article, where the financing component is in the form of publication fees (publication fee or article processing charge/APC) with an invoice for publication costs for publications in 2023 and does not receive double funding for components proposed fee (the proposer must attach a statement letter with a wet signature on a stamp).

The policy created by the leader is to pay attention to the leader's sense of curiosity to improve the quality of research management, which is carried out with five (5) activities, namely increasing the qualifications or competence of educational staff, increasing the effectiveness of institutional operational management, improving the quality of financial governance, improving the quality of asset management and improving the quality of information systems.

3.5. Digital-based deep leadership (Profound Leader) in improving research and innovation culture at Sebelas Maret University, Indonesia

The deep leadership at Sebelas Maret University Surakarta in the realm of persuasion in achieving goals is characterized by the presence of scientific publications in reputable international journals, which are a means of disseminating research results and ideas which in aggregate are one measure of innovation and research capacity as well as the competitiveness of a country, especially campuses. in the context of Sebelas Maret University, Surakarta. Lecturers or researchers from Indonesia, if they can publish their articles in reputable international journals, will get recognition from international scholars so that it can also become a means of collaboration with universities abroad. This certainly supports Sebelas Maret University's vision to become a World Class University, with a lot of research carried out with professors from abroad. UNS already has an MoU with reputable universities abroad. However, the realization of the follow-up to the MoU, especially in terms of research, is still very small. In general, collaboration with foreign parties in the field of research is still individual in nature, so the equality of collaboration is not equal, which has the implication that ownership rights to research data are mostly owned by partners from abroad. Limited matching funds from the Indonesian government to facilitate lecturers to carry out collaborative research with foreign parties is one of the main factors in the difficulty of establishing equal international collaboration. Therefore, it is hoped that the research scheme that supports collaboration between researchers initiated by UNS and researchers abroad can be one solution to improve the quality of research results and increase publications in reputable international scientific journals.

The objectives of the International Collaborative Research scheme are: (a) Accelerating the increase in the number and quality of UNS scientific publications in reputable international scientific journals; (b) Expanding and strengthening the network of UNS lecturers with researchers abroad with equal and sustainable collaboration; (c) This collaboration is also expected to increase UNS' international recognition.

Digital-based in-depth leadership (Profound Leader) in improving research and innovation culture at Sebelas Maret University Surakarta in the aspect of collaboration with many parties is supported by Presidential Regulation number 38 of 2018 concerning the 2017-2045 National Research Master Plan and Minister of Research, Technology and Higher Education Regulation number 38 of 2019 concerning National Research Priority (PRN) 2020-2024, UNS encourages research collaboration between universities in the country. Through PPKI, researchers at UNS can collaborate with researchers at other universities in a more comprehensive manner so as to improve the quality of research by sharing resources between universities. In the realm of order and order within Sebelas Maret University, Surakarta, research and innovation were carried out by leaders through the creation of the IRIS 1103 WebApp and also Eksfis. Supported by observation results code LO-OP-AWI-01; LO-OP-OLF-01 and documentation results for codes LD-DP-PSC-01 and LD-DP-LEF-01. The collaboration with many parties carried out by leaders at Sebelas Maret University is through activities on the LD-DP-BRT-03 code documentation as well as alumni gathering activities. Apart from that, preparing a book of UNS innovation works for the world as a form of research publication can introduce UNS research output to society, industry, and government so that it can be adopted by the wider community and become a solution to societal problems. The aim of this activity is to introduce UNS research outputs to the community, industry, and government, increase cooperation between LPPM UNS and industry, government, and society in the field of research, and increase revenue-generating UNS.

In accordance with Presidential Regulation number 38 of 2018 concerning the National Research Master Plan for 2017-2045 and Minister of Research, Technology and Higher Education Regulation number 38 of 2019 concerning National Research Priorities (PRN) 2020-2024, UNS encourages research collaboration between universities in the country. Collaborative research between domestic universities (PKPTDN-UNS) 2021 is a collaborative research program with domestic universities outside the PTN World Class University/WCU Program. Collaborative research between institutions and universities outside of PTN. The WCU Program is not only intended to improve UNS research performance through increasing the number of scientific publications, citations and other research outputs, but is also intended to foster institutional development of domestic universities that are research partners. This research is also intended to improve the performance of the Research Group so that it can act as a research hub in a particular field (center of excellence) by involving several universities as partners.

4. Discussion

The low quality of student research is influenced by knowledge gaps, low self-confidence and motivation (Gebremariam and Gadisa 2021; Indah 2022) and is also influenced by the quality of the lecturer's research (Cadez, Dimovski, and Zaman Groff 2017; Sumarni and Sunarsih 2016). Most lecturers still do not understand the importance of researching to improve their competence and career as professional lecturers, to build the academic reputation of their educational institutions, and also for the development of science and technology (van Dijk et al. 2020). The emergence of the policy of requiring undergraduate, master's and doctoral students to publish their scientific work was apparently motivated by the still weak research culture in higher education, both among lecturers and students (Iqbal, Jalal, and Khalid Mahmood 2018). The Head of LPPM UNS stated that the main problem in research started because the research culture was not yet strong. To produce innovative research, a research culture must first be developed in universities (M. M. Olvido 2022; Tucker and Tilt 2019). One of the first steps to foster a research culture is to require students and lecturers to produce written work (Defazio et al. 2010). It is also said that research can only be expected to produce results of high value, if the research is carried out by people who choose research as a profession (Am 2011; F. Berman 2011). A person's career usually grows from their life experiences and the work

culture in their workplace (Nurmasari 2015). Working according to your career is usually felt to be exciting. People who make research their profession usually: a) have a habit of asking and questioning what they see and hear, b) are never attached to facts, but try to find out the causal system that produces these facts, c) prefer to follow their intuition rather than just believe in logic, and d) Always try to understand the problem to its roots (the root cause of the problem). Research becomes a profession capable of creating high value, if the researcher is able to: a) Understand and appreciate what society needs while also understanding what he can do to help society meet its needs without having to be tied to conventional methods, b) Organize practical issues into concepts and research models that are worthy of scientific study.

Digital leadership in digital transformation focuses not only on the technology itself but on the strategy, structure, culture, and capabilities of the organization (Tagscherer and Carbon 2023; AlNuaimi et al. 2022). Digital leaders don't absolutely need to understand how digital technology works, but rather understand how this technology can help the organization grow and develop (Arsyad, Giatman, and Maksum 2023; Turyadi et al. 2023). Digital leadership is not only something for digital startups and technology-based organizations or companies, but can be applied in various industries (Purnomo, Tejasukmana, and Juniarti 2021). Leaders from this point of view do not necessarily have to use robots and automation in factories or the Internet of Things, but using artificial intelligence technology and data analysis to understand market behavior is also part of digital leadership (Alahi et al. 2023; Perifanis and Kitsios 2023; Harahap et al. 2017).

As a leader in the research field occupied by the Chair of LPPM UNS, the dean, and the Study Program Coordinator, it is important to have a point of view in terms of encouraging the progress of research and innovation at Sebelas Maret University, Surakarta. Reinforced with (Hanover Research 2014), which publishes research findings about research culture such as: (1) Research culture requires both institutional and unit-based leaders to have clear research objectives and communicate effectively. Goals must be accompanied by a defined plan, an evaluation of the success of the research, and compensation for any accompanying changes. Administrators should also adjust job descriptions to include research reports and lessons learned to build hope for the future; (2) Institutions that wish to develop a research culture allocate significant resources for training and support. The faculty provides scholarships, which is in line with the leadership at March University, which supports its students by providing full scholarships for students who can complete research by having articles in Scopus-indexed journals.

Furthermore, researchers with minimal experience need training and personal support to become proficient. Institutions can develop continuing education and training followed by support services in research practices, grant writing, and grant management. These programs can be located either at LPPM or at research centers; (3) A culture of developing research requires an open and collaborative personality; (4) A pleasant relationship between faculties will support the faculties in mentoring each other's research. Personal relationships among faculty also tend to encourage collaborative research efforts, which is a hallmark of a successful research culture; (4) To implement cultural change, administrators are prepared to adjust resource allocation based on research members' current motivations to improve their capabilities. Those with high motivation despite low ability tend to make the best use of educational and training resources. Those with low motivation are the ones who benefit most from developing personal relationships both within their unit and within the larger academic community; (5) A research culture takes years to develop and, once established, requires regular maintenance. New policies relating to research must be enforced with regularity over time before they are accepted. Once policy changes are accepted, administrators must be prepared to meet continuing challenges, such as maintaining research funding, developing partnerships with outside institutions to expand research opportunities, and confronting institutional changes; (6) Plans for a research culture should include consideration of

student involvement. Students both undergraduate, postgraduate, and doctoral are required to carry out research as a final assignment. Research Institutes can develop students' research skills through research assistantships.

When referring to leader creativity at Sebelas Maret University, Surakarta, it can be seen that the creative ideas of leaders at UNS are in line with research results from (Hanover Research 2014) Related plans for a research culture should include consideration of student involvement. Students at March University have a high level of participation in research activities. Students both undergraduate, postgraduate and doctoral are required to carry out research as a final assignment. Research Institutes have also developed students' research skills through research assistants.

Leadership in the digital age refers to “leadership in any institution or sector embedded in the broader transition to a more knowledge-intensive society” through the use of ICT (Haleem et al. 2022; Al-Walai and Liang 2021; Wilson III, E.J., Goethals, G.R., Sorenson, G., Burns 2004). This transition brings new constraints and opportunities to traditional understandings and practices of leadership in organizations. To understand leadership in the digital era, it is important to pay attention to the influence of digitalization on leadership in virtual spaces. (K. S 2016) distinguish six characteristics of digitalization. The first is related to connectedness through digital communications and interactions that enable organizational members to share knowledge and practices for structured environments while “unleashing creativity, innovation, dynamic networking, and participation in unstructured environments” (Yaqub and Al-Sabban 2023; Nachira F, Nicolai A, Dini P, Le Louarn M 2016). This is in line with the statement of informant LW-WP-KLF-5-01; LW-WP-MLF-7-01, and LW-WP-APB-8-01 stated that the creativity of the leaders of Sebelas Maret University, Surakarta, can be seen from the creation of a digital website that supports the research and innovation sector of Sebelas Maret University, Surakarta. Supported by field notes research documentation code LD-DP-PED-01 related to the creation of the UNS Education Podcast which describes the creativity of leaders in spurring the growth of research and innovation at Sebelas Maret University, Surakarta.

The second characteristic is reducing time lag and abundance of information by shortening decision making time and increasing the speed of information and forms of interaction, which is in line with the results of triangulation carried out by researchers in research documentation field notes with code LD-DP-SIP-01 related to the creation of a digital web that carries out tracking. The achievement of the academic community at FKIP UNS is one form of increasing the speed of information and flexible forms of interaction. Strengthened by the third characteristic, namely increased transparency and complexity. As organizational structures become more complex and interconnected, virtual spaces require increased transparency. This is illustrated in the research documentation field notes LD-DP-PSC-01 related to Scopus FKIP UNS Indexed Publication Achievement Data as of June 2022. All research and publications at Sebelas Maret University, especially the Faculty of Teacher Training and Education, are supported by creative leaders who leaders support the creation of a virtual space that increases transparency, especially in the context of innovation research by updating the web application so that transparency is built where the entire academic community can monitor it anytime and anywhere.

The fourth characteristic is in line with what was expressed (K. S 2016) and is related to the elimination of hierarchies and the removal of personal barriers as a result of organizations and relationships becoming more fluid. For example, “reverse mentoring program” (Westerman, G., Bonnet, D., & McAfee 2014) breaking down organizational position boundaries for top managers and senior executives, where they learn from anywhere and with anyone regardless of position in an organization, as supported by the results of triangulation in interviews with informant codes LW-WP-APB-8-01 and LW-WP-APB-8-02 who acted as one of the informants and the results of LO-OP-WSP-03's

observations during alumni gathering activities in sharing, exchanging experiences related to research development and also opportunities for collaboration with external parties at Sebelas Maret University, Surakarta.

The fifth characteristic is decision making and increased integrity. Digitalization enables faster leadership decision making and fosters personal integrity to maintain trust between participants, in line with the results of triangulation in extracting information on the LO-OP-AWI-01 code related to IRIS 1103 data access where the website was developed by leaders to accelerate research activity trends in Sebelas Maret University. Furthermore, the code documentation LD-DP-PSC-01 contains updated Scopus FKIP UNS Indexed Publication Achievement Data which is always updated regularly, which supports the acceleration of research at Sebelas Maret University because the academic community can use FKIP UNS Scopus Indexed Publication Achievement Data as a reference, when carrying out publications or finding novelty research positioning that will be designed in future research.

The sixth characteristic is the humanizing effect. Digitalization allows virtual collaborators to freely interact and connect via virtual platforms and tools in a symbiotic way “where almost everyone and everything is interdependent” (S. Berman and Marshall 2014; Camarinha-Matos et al. 2019). In line with the results of triangulation in extracting information on the LO-OP-AWI-01 code related to IRIS 1103 data access, the website was developed by leaders to accelerate research activity trends at Sebelas Maret University. Strengthened by the results of LO-OP-OLF-01 observations regarding Access to Digital Product Research Results for Undergraduate Physics Education at UNS. The literature clearly shows that all four characteristics of digital leadership are leader-centric, while little or no mention is made of the role of digital followers in the digital era. However, what is interesting is that the digital environment, as a new organizational structure, eliminates the traditional hierarchical structure and the static and positional leader-follower relationship by transforming it into a fluid leader-follower and authentic human being. In addition, the definition and concept of digital leadership appear to also apply to those who lead and follow virtual organizations. For example, to address the challenges and paradoxes of e-leadership, such as individual vs. individual perspectives community, speed vs. attention, top-down perspective vs. grassroots, and micro vs. micro perspectives macro, Pulley and Sessa suggest that people in organizations should participate in leadership at all levels (Lynn Pulley and Sessa 2001). This means that digital leadership (and followership) is not just a matter for the actual leaders in the organizational structure, but should also be a matter for everyone, not just the leaders of the organization's positions (Kouzes JM 2018; G. Malakyan 2020). Even farther, (A. S. 2011) advocates intergenerational collaboration between e-leaders among the Baby Boomers, Generation X, and Generation Y. As seen above, digitalization has created a common platform for intergenerational collaboration because digital immigrants (structural leaders) will always need support from digital natives (organizational members) to collaborate in order to transform the organization to face the challenges of the digital era.

The digital era requires a team approach to complex leadership problems that often involve multiple organizations, communities, cultures, and countries sharing knowledge, skills, and expertise. No single leader has the knowledge, skills, and dispositions necessary to address today's global leadership challenges in cyberspace. Thus, the digital leadership implemented by March University with the figure of creative leaders allows the distribution of leading and following responsibilities not only among team members but also with other teams. For example, team members with certain specialized skills may engage in leadership behavior in one domain and adopt follower roles in another domain (Meuser et al. 2016; Manz CC, S. B., & Pearce CL 2015). Therefore, (DeRue 2011) revealed that digital leadership can fulfill the leading and following needs for digital natives in virtual organizations, as they thrive in a shared environment where knowledge,

experience, perspectives, and electronic files are collected. Distributed freely for learning and business at universities in cities, islands, and even continents, so a creative leader is needed (Palfrey J 2018).

The development of the INTELLIGENCHYTA Model in Improving Research and Innovation Culture in Higher Education Based on Digital Leadership is as follows:

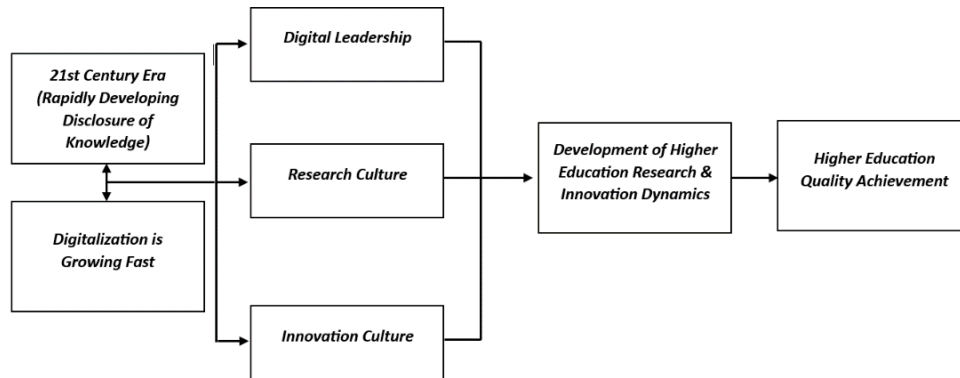


Figure 4. Intelligenchyta Model

The INTELLIGENCHYTA model here provides the characteristics that:

a) Innovation

Digital leadership at Sebelas Maret University, Surakarta, is characterized by a touch of innovation that dominates. Capacity building directly leads to a stronger innovation culture (A. Smith et al. 2011; Brix 2019). This is related to the conceptual framework of (Choi and Lim 2017), which highlights internal and external innovation factors that moderate the relationship between innovation capacity and leadership. In addition, the innovation capacity model also highlights the role of culture as an important factor in innovation. (Hilmarrsson, Oskarsson, and Gudlaugsson 2013), in their innovation performance model, relate that innovation performance is the overall result of the influence of innovation culture and market orientation on front-end and back-end aspects in the generation and conversion of ideas into innovative products. In line with the innovation journey at Sebelas Maret University, Surakarta, where leaders generate existing innovations to be further developed into innovative products.

b) Technology

The leadership strategy at Seblas Maret University, Surakarta, applies the function and nature of technological progress in the development of research and innovation in higher education, especially Sebelas Maret University, Surakarta.

c) Leadership

Leadership at Sebelas Maret University, Surakarta, which adapts to the digital era is a progress that must be followed in the organizational environment, especially higher education, in order to survive, where leadership is one of the keys to running an organization. The progress that has occurred at Sebelas Maret University, Surakarta, is supported by leaders who are able to behave adaptively and anticipate various forms of change that will occur in the future. A leader is considered capable of transforming visionaries in facing various forms of change and is also able to realize a vision that can be turned into reality. Where leaders at Sebelas Maret University Surakarta can take steps and attitudes that are influenced by very rapid technological developments and changes from traditional leadership to digital leadership. Such leaders are able to inspire organizational members to innovate and defend their ideas. By making leadership at Sebelas Maret University a role model, it is hoped that a leader in the digital era will be able to transform, and be able to have credibility, integrity, perseverance, and the

enthusiasm to serve and contribute in catalyzing change in achieving the organization's vision which can realize leadership success in the digital era namely the era of industrial revolution 4.0.

d) Digital Environment

Creation of a digital environment for leadership at Sebelas Maret University, Surakarta. Today, this context is greatly influenced by digitalization. On the one hand, this leads to a more complex and rapidly changing environment in which leaders need to navigate their organizations and they need to adapt their leadership. On the other hand, it also offers new ways of working and leadership. For example, the use of digital technology combined with modern leadership styles such as entrepreneurial leadership allows lower-level employees to enjoy greater freedom and even some level of self-leadership as long as they contribute to organizational goals. For leaders, digital technology means new forms of communication and organizing where the digital environment is the driving force for future organizational success.

e) Culture Formation

The formation of culture, especially in the realm of research and innovation, which was successfully built by digital leaders at Sebelas Maret University, Surakarta, has brought UNS into the ranks of higher education institutions that are quite taken into account regarding the dynamics of research and innovation.

f) Hyta (re: Sanskrit)

Hyta or Chyta, which means the achievements or hopes of higher education institutions, especially Sebelas Maret University, Surakarta, related to the optimization of achievements achieved by March University with the formation of a Research Culture and Innovation Culture that has been developed and the realization of the achievements of Sebelas Maret University, Surakarta, which is in the top 10 in the ranking of universities. Being high in various types of national rankings shows the quality of Sebelas Maret University, Surakarta

5. Conclusions

Based on the results of research and discussion of Digital Leadership Strategy in Improving Research and Innovation Culture (Case Study at Sebelas Maret University, Surakarta), it can be concluded that by strengthening UNS's strategic synergy as an impact of implementing strategic research to achieve UNS's status as a transfer agent for culture, science and technology. In the future, we will encourage UNS from being a teaching university to becoming a research university and becoming an economic development agent. The creativity of the digital leader who developed IRIS 1103 and also founded the Research Group at Sebelas Maret University, Surakarta.

Apart from that, the strong digitalization that characterizes the UNS Study Program, where leaders are focused on Digital Leadership by focusing on the dynamics of research and innovation built into the Physics Education Study Program, is already quite good with the existence of the Research Team program which is packaged in EksFisII (Physics Experiment II). The creativity of leaders can also be seen in the existence of several policies that were born at Sebelas Maret University, Surakarta, where if a student has just one article published in a Scopus-indexed journal, the student is entitled to a full scholarship at the next level. Global Visionary Leader is reflected in the achievement of the Vision and Mission of Sebelas Maret University, which is determined to become a superior, trusted and independent institution in the fields of research and community service, especially in the development and utilization of science, technology and culture. Leaders' attention to providing incentives in the International Seminar competition at Sebelas Maret University, Surakarta. In facilitating research, innovation and publication at

UNS, every year LPPM UNS holds a Proposal Competition for Organizing an International Conference where funding will be provided to incentive recipients to hold an International Seminar related to UNS's big vision to always increase the quantity of its publications.

Furthermore, LPPM determines a mechanism for giving awards for each achievement in the field of research and development and community activities as part of efforts to improve the quality of achievements on a systemic basis. At the same time, sanctions are also applied to researchers, servants, Research Groups and Study Centers who are proven to be unable to meet the activity implementation targets as agreed in the contract. The policy created by the leader is to pay attention to the leader's sense of curiosity to improve the quality of research management, which is carried out with five activities, namely increasing the qualifications or competence of educational staff, increasing the effectiveness of institutional operational management, improving the quality of financial governance, improving the quality of asset management and improving the quality of information systems. At the level of persuasion in achieving goals, it is characterized by the presence of scientific publications in reputable international journals, which are a means of disseminating research results and ideas which in the aggregate are a measure of innovation and research capacity as well as the competitiveness of a country, especially campuses in the context of Sebelas Maret University, Surakarta.

Collaboration between Sebelas Maret University and overseas universities is comprehensive so as to improve the quality of research by sharing resources between universities. The INTELLIGENCHYTA model developed by researchers in improving the Research and Innovation Culture of Higher Education based on Digital Leadership is illustrated by the success of Sebelas Maret University in achieving its achievements, which cannot be separated from the role of leaders with digital strategies so that it can cultivate research and innovation, which is one of the benchmarks for ranking Higher Education. It is through the dynamics of research that all indicators of Digital Leadership in Improving Research and Innovation Culture are packaged in one model, namely INTELLIGENCHYTA.

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