

INTEGRATION OF DIGITAL INNOVATION IN HIGHER EDUCATION MANAGEMENT TO SUPPORT THE ACHIEVEMENT OF SDGs 4 (QUALITY EDUCATION): A STUDY OF THE DEVELOPMENT OF A MODEL TO IMPROVE ACADEMIC COMPETITIVENESS IN THE ERA OF SOCIETY 5.0

Asrul^{1*}

Halu Oleo University, Southeast Sulawesi, Indonesia
asrul@akba.ac.id

Muh. Amir²

Halu Oleo University, Southeast Sulawesi, Indonesia

La Ode Agus Said³

Halu Oleo University, Southeast Sulawesi, Indonesia

Muh. Rijal⁴

Halu Oleo University, Southeast Sulawesi, Indonesia

Sarinah⁵

Halu Oleo University, Southeast Sulawesi, Indonesia

ABSTRACT

The development of digital technology has driven significant changes in various sectors, including higher education. Universities are required to adapt to technological developments to improve the quality of governance, learning processes, and academic competitiveness at the national and global levels. In the context of the Society 5.0 era, the integration of digital innovation in higher education management is a crucial strategy for creating a more adaptive, efficient, and community-oriented education system. This study aims to analyze the integration of digital innovation in higher education management and develop a management transformation model capable of enhancing the academic competitiveness of universities. This research is also directed at supporting the achievement of the Sustainable Development Goals (SDGs), specifically SDG 4 on quality education, which emphasizes the importance of improving the quality of education through innovation and technology. The research method used is a mixed methods approach, namely a combination of quantitative and qualitative methods. The quantitative approach is used to examine the relationship between the variables of digital innovation integration in management and increased academic competitiveness through surveys of lecturers, education staff, and university leaders. Meanwhile, the qualitative approach is carried out through in-depth interviews and document analysis to gain a more comprehensive understanding of the practice of digital innovation-based higher education management transformation. The expected outcome of this research is the identification of key factors influencing the successful

integration of digital innovation into higher education management and the development of a conceptual model that can be used as a reference for improving the academic competitiveness of higher education institutions in the Society 5.0 era. In addition to providing theoretical contributions to the development of higher education management science, this research is also expected to provide strategic recommendations for policymakers in designing more innovative, adaptive, and sustainable higher education governance.

Keywords: Digital Innovation, Higher Education Management

INTRODUCTION

transformation has become a global phenomenon that is changing how organizations operate, interact, and create value. Technological developments such as intelligence artificial intelligence, big data, and computing cloud push change fundamental in various sectors, including education high. According to the OECD (2021), digitalization education is not only related to the use of technology, but also includes change system management, governance, and institutional strategies to improve quality learning and innovation. This shows that digital transformation is a multidimensional process that requires a comprehensive managerial approach. In a global context, the concept of Society 5.0 emphasizes integration of technology with human needs to create human -centered society. UNESCO (2021) emphasized that education in the digital era must capable develop an inclusive, adaptive, and innovation-based system for answer future challenges. College high as an institution Strategic human resource development requires integrating digital technology into the system. management to be able to increase quality service education and strengthening competitiveness academic.

Competitiveness academic is important indicators in assessing success college high in running function education, research, and community service society. According to the World Bank (2020), increasing competitiveness education high is greatly influenced by governance reform, capacity managerial, as well as utilization of digital technology in the decision-making process decision. This shows that the transformation management digital innovation- based has a strategic role in improving quality and relevance education tall.

On the other hand, the development of digital technology also encourages changes in patterns learning and interaction academic. Learning technology -based enabling greater flexibility as well as wider access to resources learning. However, as as stated by Brynjolfsson and McAfee (2017), the success of digital transformation in an organization is highly dependent on the ability management in managing change, building an innovative culture, and develop competence human resources. Thus, digital transformation in education height cannot be released from change system organizational management in general comprehensive. Besides technological factors,

leadership and institutional strategy are also important determinants of success. transformation education high. Marginson (2016) emphasized that competitiveness education height is not only determined by the resources owned, but also by the ability institutions in formulating adaptive strategies to global environmental changes. This shows that the transformation management education high needs to be directed at strengthening governance strategic capable encourage innovation and improvement performance academic.

Furthermore, Altbach , Reisberg, and de Wit (2018) explain that globalization education tall demand institutions to improve quality and differentiation academically to be able to compete at the international level . Digital transformation is one of the main strategies in improving organizational efficiency, quality learning, as well as collaboration academic. However Thus, the implementation digital transformation often faces challenges such as limitations infrastructure, gaps digital competence, as well as resistance to organizational change. College tall has a strategic role in development national through implementation tridharma, namely education, research, and community service society. To carry out this role optimally, universities tall must have competitiveness strong academics. Competitiveness academics are not only measured from amount publication scientific or ranking institutions, but also from quality learning, research innovation, international collaboration, and contribution to social and economic development. In the context of globalization education high competitiveness Academics are an important determining factor reputation and sustainability institutions education high. However thus, various studies show that many colleges tall Still face challenges in increasing competitiveness academic, especially related to limitations technology integration in the system management and governance.

Digitalization is carried out often nature partial, for example only on aspects online learning or administration academic, without followed by transformation comprehensive on the system management strategic. As a result, the potential of digital technology has not been fully realized. used to improve organizational performance in general significant. Transformation management education tall digital innovation - based approaches are becoming increasingly relevant to answer the challenge. Transformation this includes changes in planning strategic data- based, adaptive human resource management to technology, implementation system information management integrated, as well as the development of an innovative organizational culture. College high level that is able to integrate digital innovation into the system its management tend own level higher efficiency, retrieval faster and more accurate decisions, and ability better adapt to environmental changes. In addition, the development of digital technology also encourages changes in patterns learning and interaction academic. Learning digital- based, use of e-learning platforms, as well as utilization of analytical data in evaluation learning has become an integral part of system

education modern height. This transformation not only improves flexibility learning, but also opening up opportunities to improve quality education through a more personal and customer-based approach student need. However, success implementation of learning technology is highly dependent on readiness management institutions in managing organizational change in effective. From a governance perspective, digital transformation demands existence system More transparent, accountable, and data-driven management. Utilization of information technology allows college high to manage academic and administrative processes more efficiently as well as increase quality service to students and stakeholders interest However, the implementation of digital governance also faces various challenges, such as limitations infrastructure, gaps digital competence, as well as resistance to organizational change. Therefore, a comprehensive management approach is needed to ensure that digital transformation can run smoothly. in a way effective and sustainable.

Previous research shows that digital transformation has significant relationship with increased organizational performance and innovation. Studies conducted by the OECD show that institutions education that adopts digital strategies integrated tend own better performance in terms of innovation and quality learning. Likewise, reports from UNESCO emphasizes the importance of digital governance in improving quality education and expanding access learning in the digital era. On the other hand, research on competitiveness education tall highlight importance factor management strategic and leadership in determining success institutions in facing global competition. According to the World Bank, governance reform and improvement capacity managerial is factor key to improving quality and relevance education high in developing countries. This shows that digital transformation needs to be accompanied by changes in the system. management and policy institutions in order to provide optimal impact. Although various studies have discussed digital transformation and organizational performance, a study that specifically specifically integrating transformation management education high, digital innovation, and competitiveness academic Still relatively limited, especially in the context of developing a comprehensive conceptual model. Most of the research is still focuses on the technological or digital learning aspect, while the dimensions management strategic and governance is not much reviewed in a way in-depth. The research gap shows the need for studies that can provide understanding holistic about how to transform management digital innovation-based can increase competitiveness academic college high. This kind of research is not only important to enrich literature academic, but also has implications practical in formulating educational development strategies more adaptive and sustainable height. In addition, contribution theoretically, this research also has relevance high practicality, especially for college high in developing countries that are face demands modernization system education. Development of transformation models' management education tall based on digital innovation is expected to be a guide for taker policies in designing

improvement strategies quality education and competitiveness institutions in a sustainable manner. Thus, research on transformation management education tall digital innovation- based development is very important to carry out, especially in the context of the Society 5.0 era which demands integration of technology and innovation throughout aspects of educational organization.

This research is expected to contribute to the development of governance theory. education tall as well as produce a conceptual model that can be used as a reference in increasing competitiveness academic college tall in a sustainable manner.

RESEARCH METHOD

This research uses a mixed *methods* approach with a design sequential explanatory, namely combining quantitative and qualitative approaches in a way step by step. A quantitative approach is used to test connection intervariable in a way statistic, while the qualitative approach is used to deepen understanding the results of quantitative analysis. The following the stages of this research can be seen in the image below;



Gambar 1. Tahapan Penelitian

The research was conducted at the university state and private universities as research objects that have implemented system management digital- based. The research time is planned for 1 year (12 months) which includes stage preparation, data collection, analysis, and reporting. Population, all lecturers, staff education and leadership college high level involved in system management academic digital- based. Sample, Determination sample use purposive sampling technique, with the following criteria:

1. College high has implemented digital systems (LMS, SIAKAD, or e-governance)
2. Respondents own minimum 2 years' experience Total sample quantitative planned \pm 150–250 respondents.

RESULTS AND DISCUSSION

This study aims to analyze influence integration of digital innovation in management education high towards increasing competitiveness academic achievement and achievement of SDGs 4 (Quality Education) in the Society 5.0 era. The study was conducted on 100 respondents consisting of for students, lecturers and staff education using instrument questionnaire-based Likert scale.

The variables used in this study include:

1. Digital Governance (X₁)
2. Innovative Learning Ecosystem (X₂)
3. Human-Centered Education (X₃)
4. Academic Competitiveness (Y)
5. SDGs 4 – Quality Education (Z)

Data analysis was performed using validity tests, reliability, multiple linear regression, and mediation analysis.

Characteristics Respondents

Based on results distribution questionnaire to 100 respondents, obtained the following characteristics:

| Characteristics | Amount | Percentage |
|-------------------|--------|------------|
| Man | 48 | 48% |
| Woman | 52 | 52% |
| Student | 70 | 70% |
| Lecturer | 20 | 20% |
| Educational staff | 10 | 10% |

Majority respondents is a student, so more research results represent perception users' main system education tall.

Validity and Reliability Test Results

Validity Test

Validity test results shows that all statement items own the corrected item-total correlation value is greater from the r table (0.197). Thus, all items are declared valid and suitable for use in research.

| Variables | Range r Calculate | Information |
|--------------------------|-------------------|-------------|
| Digital Governance | 0.68–0.75 | Valid |
| Innovative Learning | 0.65–0.78 | Valid |
| Human-Centered Education | 0.66–0.74 | Valid |
| Academic Competitiveness | 0.72–0.80 | Valid |
| SDGs 4 | 0.70–0.79 | Valid |

Reliability Test

Reliability test results shows that all variables own Cronbach's Alpha value above 0.70.

| Variables | Cronbach Alpha | Information |
|-----------|----------------|-------------|
| X1 | 0.821 | Reliable |
| X2 | 0.845 | Reliable |
| X3 | 0.812 | Reliable |
| Y | 0.870 | Reliable |
| Z | 0.834 | Reliable |

This shows that the research instrument has level good consistency.

Descriptive Analysis Results

Statistical results descriptive shows that all variables own high average value.

| Variables | Mean | Category |
|--------------------------|------|----------|
| Digital Governance | 4.11 | Tall |
| Innovative Learning | 4.19 | Tall |
| Human-Centered Education | 4.06 | Tall |
| Academic Competitiveness | 4.17 | Tall |
| SDGs 4 | 4.21 | Tall |

This value shows that respondents gave a perception positive towards the implementation of digital innovation in education tall.

Regression Analysis Results

Following regression analysis results based on variables



Figure 2. Results of Regression Analysis

a. Influence Variable X on Academic Competitiveness (Y)

| Variables | Beta | Sig | Information |
|-----------|------|-------|-------------|
| X1 → Y | 0.29 | 0.002 | Significant |
| X2 → Y | 0.36 | 0.000 | Significant |
| X3 → Y | 0.26 | 0.005 | Significant |

The R² value of 0.62 indicates that 62% of the variation in Academic Competitiveness can be explained by the three variables. variables independent.

b. Influence Variables towards SDGs 4 (Z)

| Variables | Beta | Sig | Information |
|-----------|------|-------|-------------|
| X1 → Z | 0.21 | 0.010 | Significant |

| Variables | Beta | Sig | Information |
|--------------------|------|-------|-------------|
| X ₂ → Z | 0.28 | 0.001 | Significant |
| X ₃ → Z | 0.23 | 0.008 | Significant |
| Y → Z | 0.41 | 0.000 | Significant |

The R² value of 0.68 indicates that 68% of the achievement of SDGs 4 is influenced by the variables in the research model.



Figure 3. R² value

Mediation Test Results

The results of the Sobel test show that Academic Competitiveness is able to mediate connection between digital innovation variables with SDGs 4.

| Mediation Path | Results |
|------------------------|-------------|
| X ₁ → Y → Z | Significant |
| X ₂ → Y → Z | Significant |
| X ₃ → Y → Z | Significant |

The Influence of Digital Governance on Academic Competitiveness

The results of the study show that Digital Governance has an influence positive and significant impact on Academic Competitiveness. This shows that digital governance in education tall capable increase efficiency system academic and quality service education.

Implementation system information academic integrated services digital administration, and retrieval decision data- based has an impact on improving effectiveness learning as well as access information academic.

This finding is in line with the smart campus concept which emphasizes the use of digital technology to improve quality education and competitiveness institutions.

The Influence of Innovative Learning Ecosystem on Academic Competitiveness

The Innovative Learning Ecosystem variable has the most dominant influence on Academic Competitiveness. This shows that learning innovation technology- based factors key to improving quality student academics. Usage:

1. Learning Management System (LMS)
2. Blended learning
3. Artificial Intelligence (AI)
4. Virtual classroom

capable increase student involvement in the learning process. In addition, the learning approach Innovative learning also encourages students to be more active, creative, and independent in learning. These findings indicate that the transformation digital learning is need important in facing the Society 5.0 era.

The Influence of Human-Centered Education on Academic Competitiveness

Human-Centered Education is also proven own influence significant to competitiveness academic. This shows that education is not only oriented towards technology, but also towards the development of human aspects. Strengthening:

1. soft skills
2. digital ethics
3. creativity
4. ability communication
5. collaboration

become an important factor in building student competencies in the global era. These findings show that the human-centered approach is capable of create balance between mastery of technology and values humanity.

The Influence of Academic Competitiveness on SDGs 4

Academic Competitiveness has the greatest influence on the achievement of SDGs 4 (Quality Education). This shows that the increase quality education tall will impact directly to the creation inclusive, quality, and sustainable education. Students who are competitive academic tall tend to:

1. more adaptive to technology,
2. own ability thinks critically,
3. more innovative,
4. as well as capable compete at a global level.

Thus, increasing competitiveness academics are the main strategy in supporting development continuing education.

Mediating Role of Academic Competitiveness

The research results show that Academic Competitiveness plays a significant role as a mediator. This means that the integration of digital innovation will be more effective in supporting SDGs 4 if capable increase competitiveness academic moreover before. This finding confirms that technology is not the goal end, but rather tool strategic to improve quality human Resources.

Implications, this research provides implications that universities height required:

1. strengthening digital governance,
2. build ecosystem learning innovative,
3. implementing human-centered education,
4. as well as increase digital competence of the community academics.

In addition, the results of this study can be a basis for compiling policy digital transformation of education high in the era of Society 5.0.

Developed Learning Model

Based on research results, developed learning model:



Figure 5. IDEL-C (Integrated Digital Education Learning for Competitiveness)

This model integrates:

1. Digital Governance
2. Innovative Learning
3. Human-Centered Education

to produce:

1. Academic Competitiveness
2. SDGs 4 (Quality Education)

This model is designed as a learning approach adaptive, technology-based, and human development-oriented.

CONCLUSION

Based on research results regarding *Integration of Digital Innovation in Higher Education Management to Support the Achievement of SDGs 4 (Quality Education): A Study on the Development of a Competitiveness Enhancement Model Academics in the Era*

of Society 5.0, it can be concluded that the integration of digital innovation has significant influence on increasing competitiveness academic and quality education tall.

The results of the study show that the variables Digital Governance, Innovative Learning Ecosystem, and Human-Centered Education simultaneous and partial influential positive and significant impact on Academic Competitiveness. This shows that digital governance, learning innovation technology- based, and human- centered educational approaches are capable of increase quality of the learning process, effectiveness academic, as well as student readiness to face global challenges in the era of Society 5.0. Among all over variable, Innovative Learning Ecosystem is the most dominant factor in increasing competitiveness academic. These findings indicate that the use of learning technologies such as Learning Management System (LMS), blended learning, artificial intelligence, and interactive learning interactive own contribution big on the increase quality education high. This study also proves that Academic Competitiveness has influence positive and significant impact on achieving SDGs 4 (Quality Education). Thus, increasing competitiveness academic is the main strategy in realizing quality, inclusive, adaptive, and sustainable education. In addition, the research results show that Academic Competitiveness plays a role as a variable strengthening mediation connection between integration of digital innovation and achievement of SDGs 4.

This confirms that digital transformation in education tall will provide optimal impact if capable increase competence academic, ability think critical thinking, creativity, and digital literacy of students.

Based on Based on the results of the research, a learning model was developed IDEL-C (Integrated Digital Education Learning for Competitiveness) as a model learning innovative that integrates:

1. Digital Governance,
 2. Innovative Learning,
 3. Human-Centered Education,
- to produce:
1. Academic Competitiveness,
 2. and support the achievement of SDGs 4.

This model is designed as a learning approach adaptive and relevant to needs education high in the era of Society 5.0.

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