Leadership Strategy in University Quality Control in the Digital Era Industry 4.0

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ABSTRACT

The rapid growth of digital technology in the Industry 4.0 era has brought about significant changes in various aspects of society, including the education sector. As universities strive to improve the quality of education, effective leadership strategies are essential in implementing quality control measures. This article aims to examine leadership strategies in university quality control in the digital era of Industry 4.0. This study employs a qualitative approach using a case study method. The data was collected through interviews with university leaders and staff quality control, as well as through document analysis. The findings reveal that effective leadership strategies in university quality control in the digital era of Industry 4.0 involve the use of technology to monitor and evaluate educational processes, a collaboration between academic and administrative staff, and the implementation of a continuous improvement culture. Furthermore, this article highlights the challenges faced by university leaders in implementing effective measures of quality control in the digital era, including the need for continuous training of staff and the proper use of digital technology. This study provides valuable insights for university leaders and staff quality control in developing effective leadership strategies to ensure the delivery of quality education in the digital era of Industry 4.0.

Keywords: industry 4.0, leadership strategy, quality control, university

INTRODUCTION

The digital era of Industry 4.0 brings a significant change in various aspects of life, incl sector education. Universities in Indonesia also face a significant challenge in increasing quality education in this digital era. Universities must capably face fast change in an increasingly technological and

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environmental complex to can fulfill growing stakeholder expectations tall to the quality of education. An effective leadership strategy is essential in education quality control in a university in the digital era of Industry 4.0. Strong leadership can help the university in developing a strategy and implementing quality control for effective education.

However, the challenges faced by universities high in Indonesia in developing a leadership strategy for education quality control in the digital era of Industry 4.0 is still very large. Several challenges cover the changing paradigm in education, the lack of human resources quality, and limitations in infrastructure. Besides that, one of the challenges and problems in education quality control in a university in the digital era of Industry 4.0 in Indonesia is the changing paradigm in education: The development of information technology has changed the way people learn and search for information. Paradigm education has also changed from the traditional method to become more open and inclusive. Universities in Indonesia necessary face challenges in developing a leadership strategy that can speed up adaptation to the changing paradigm. The next problem is the lack of human resources qualified: Universities still high in Indonesia face the problem of a lack of human resources good quality from facet educators nor power education. Lack of human resources quality can affect the effectiveness of leadership strategy in education quality controlling in the digital era of Industry 4.0 in Indonesia. Another problem that can be identified from limitations in infrastructure: Universities in Indonesia also face a challenge in matter infrastructure. Several areas in Indonesia still experience limitations in matters of limited internet access, bad quality network, and limitations in device adequate hardness. This can affect the effectiveness of leadership strategy in education quality control in the digital era of Industry 4.0. besides it, lack of digital understanding and skills: Leaders and human resources education in a university in Indonesia also must understand information technology and digital skills to can develop an effective leadership strategy in education quality control in the digital era of Industry 4.0. any other problems that can be identified from stakeholder demands are increasing height: Universities in Indonesia are also faced with growing stakeholder demands tall to education quality. Demands this requires an effective leadership strategy in education quality control to fulfill stakeholder expectations.

Several solutions can help in quality control of universities in the digital era of Industry 4.0 such as applying the right information technology: University must ensure that they use the right technology to support quality control. This is possible including the use of management software quality or system database management to collect and analyze data effectively. Besides, that's the solution next is to adopt an effective leadership strategy: University must own strong and effective leadership to ensure that quality control is done. This includes skilled leaders in motivating, inspiring, and directing staff and students. The next solution is involving all stakeholders' interests: quality control is not only not quite enough to answer leadership, but also everyone involved in the educational process, including lecturers, staff, and students. University must push participation active from all stakeholder's interests to ensure high quality. Another solution is to develop a system of effective evaluation: University must have a system of effective evaluation to monitor and evaluate performance in fulfilling specified standard quality. This can cover evaluation periodic, surveys of students, and measurements of performance. The final solution is to apply development staff and training: University must ensure that staff is on the skills and knowledge required to ensure control and effective quality. This can achieve through the training and development of regular staff. However, all solutions can help

universities with quality control with more both in the digital era of Industry 4.0. However, each university must adapt solutions with context and needs alone.

Novelty research emphasis on leadership strategy: The article can give more emphasis on leadership roles and strategies in universities' quality control in the digital era of Industry 4.0, which can give a new contribution to understanding factors influencing key quality universities. Focus on the digital era Industry 4.0: The article can highlight the influence of the digital era Industry 4.0 on university quality control and explore appropriate leadership strategies with condition information technology and business environment moment. A combination of leadership and strategies quality control: the article can unite two field important namely leadership and strategies quality control, which is possibly not yet too focused in the existing literature. In matter this, an article can show how effective quality control can be achieved through the use of appropriate leadership strategies. Implementation studies case: the article can provide new insights with show studies and concrete cases about how a university tall implement an effective leadership strategy in quality control in the digital era of Industry 4.0. This can become contribution important for practitioners and academics in understanding how discussed concepts can be implemented in the field. All factors This can be a deep novelty article and can give a mark plus for readers and develop more knowledge and understanding good about leadership strategy in university quality control in the digital era of Industry 4.0. because that is, research about leadership strategy in education quality control in universities in the digital era of Industry 4.0 in Indonesia is very relevant and important. Study This can give insights and recommendations for universities and holders interested other in developing an effective leadership strategy in education quality control in the digital era of Industry 4.0 in Indonesia.

METHODS

The method used in the study qualitative approach with the use case studies method. Following are several steps in doing a study with approach qualitative and methods studies case:

1. Determine the case to be researched: The author can choose a university height that has relevant characteristics to the topic discussed. University-selected heights should own experience success in implementing an effective leadership strategy to control quality in the digital era of Industry 4.0.

2. Collection: Authors can collect data through interviews with university leaders, lecturers, and staff administration related. Besides it, an author can do observation straight to the university for obtaining more understanding deep about work method quality control in the university.

3. Analysis: After the data is collected, the author can analyze the data with the use qualitative approach like content analysis or thematic analysis. The analysis can help the writer understand the influencing factors of quality control at the university and how the leadership strategy can influence the results of quality control.

4. Interpretation result: The author can use results analysis to build a strong argument about the connection between leadership and strategies of quality control in universities high in the digital era of Industry 4.0. Matter of this, an author can show what is the right leadership strategy that can help universities tall reach control more quality in the digital era of Industry 4.0.

With the use qualitative approach and case study methods, an author can provide new insights into what the leadership strategy can apply in university quality control in the digital era of Industry 4.0. Besides that, the approach can help the writer obtain more understanding deep about factors influencing key high-quality universities.

RESULTS AND DISCUSSION

Higher education or university in Indonesia is being faced with lots of challenges in the digital era and industry 4.0. Guarantee Quality Higher Education (PMPT) becomes very important in ensuring that education in Indonesia can produce qualified and capable graduates to compete in the global market. In the digital and industrial era 4.0, PMPT is a must consider several factor main like digital technology, relevant curriculum with demands of industry, capabilities of lecturers and staff educators for use technology, as well use technology for increase learning and assessment. Several efforts have been done for improving PMPT in Indonesia, among others:

1. Accreditation Universities: The accreditation process this aim to ensure quality education provided by the university high. University has been accredited own a good reputation and is recognized by society broadly.
2. Certification Lecturer: Certification lecturers aim to increase teaching quality and research in universities. With certification, This is expected by the lecturers can develop skills and competencies in the field of teaching, research, and service to society.
3. Implementation of e-learning: Utilization of information technology and communication in learning can increase the effectiveness and efficiency of the learning process. In the PMPT context, e-learning can help increase the quality and effectiveness of learning, as well as give access to more learning broad and flexible.
4. Collaboration Industry and Higher Education: Collaboration between industry and university tall can help develop relevant curricula with need industry, facilitating research and development products, as well give chance apprenticeships or work for a student.

PMPT is very important for increasing the quality of education in Indonesia in the digital era and industry 4.0. Increasing PMPT, necessary done includes efforts accreditation universities, lecturers certification, implementation of e-learning, as well collaboration between industry and university.

SWOT analysis

SWOT analysis was conducted on research to analyze the leadership strategy in the university in framework enhancement quality guarantee university quality. Strategy analysis is carried out with deep analysis to Guarantee Quality Higher Education in the Digital Era of Industry 4.0. Analysis was done by doing qualitative analysis using SWOT analysis (Strength, Weakness, Opportunity, Threat). This method was chosen because it's so good for analyzing with considering internal and external aspects so that can produce a good and relevant strategy following context Guarantee Quality Higher Education in the Digital Era of Industry 4.0. The results of the strategy obtained will be arranged based on good priority analysis using SWOT and the McFarlan Grid method

The resulting strategy analysis is arranged according to the factors that are analyzed and built implementation following factors. Through priority analysis this every initiation will give the following labels:

- **_STRATEGIC (S)._** The strategic label means initiation this is very important for doing because related to much-needed service moments this is also for preparation.
- **_KEY OPERATIONAL (K)._** This operational key label looked like initiation was important for done but not urgent. It will be very much needed in the future come.
- **_HIGH POTENTIAL (H)._** The high potential label is given to important initiation however Still Far from being implemented/can be postponed.
- **_SUPPORT (U)._** this support label is given to characteristic initiation not too important for service but enough help if done. Following this implementation strategy results in higher Education Quality in the Digital Era Industry 4.0,

Underwriting strategy analysis Higher Education Quality in the Digital Era Industry 4.0, carried out with pay attention to the SWOT analysis table in table 1.

Table 1. SWOT Analysis on Underwriting Higher Education Quality in the Digital Era of Industry 4.0

SWOT	STRENGTH	WEAKNESS
	1. Human Resources quality with title high academic and experience broad academic.	1. Lack of use of information technology and communication (ICT) in several universities in Indonesia, especially those in the regions isolated or outside big cities.
	2. The ability to access human resources great information on and on growing, like journal scientific, e-books, and online databases.	2. Limitations on access to human resources information technology latest Because of constrained cost and lack of understanding about the technology.
	3. Partnership with companies and other organizations where possible university tall for getting access to new technology and trending industry latest.	3. Lack of participation and support from the internal university, like staff academic and administrative, in adopting and using new technology to increase quality guarantee.
	4. Availability information technology infrastructure and communication (ICT), eg device hardware and software, internet connection, and systems data management.	4. Limitations budget and resources power others for developing a guarantee program integrated and comprehensive quality.
	5. Regulation supportive government development university high and guaranteed quality in Indonesia.	5. The low ability in English among students and staff can

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1. The adoption of digital technology and development system guarantee integrated quality for increased efficiency and effectiveness university.
2. Possibility for developing learning programs distance far and a hybrid that utilizes digital technology to reach students in an isolated area or abroad.
3. Opportunity for work the same with a company or other organizations within developing training and development programs related to skills with Industry 4.0.
4. The potency for increased visibility and image university through the use of social media and digital marketing.
5. Possibility for access funds or support from the government or international institution to guarantee program development quality and use of digital technology.

1. Utilise source Power man quality heights and partnerships with companies and other organizations to access technology latest and trending industry latest. University can do cooperation with companies operating in the field of Industry 4.0 to develop guarantee program quality focused on digital technology. Besides that universities too utilize strong human resources quality to develop and provide up-to-date and relevant curricula with Industry 4.0.
2. Adopt digital technology and development system guarantee integrated quality to increase the efficiency and effectiveness university. Universities can adopt digital technology such as e-learning, e-library, and e-learning management system to increase efficiency and effectiveness in learning and assurance quality. Besides that, a development system that guarantees integrated quality can help the university monitor and evaluate the performance of students, staff, and programs individually more effectively.
3. Increase the visibility and image of the university through the use of social media and digital marketing. Universities can be leveraging social media and digital marketing to promote and guarantee program quality that has developed as well as image the university in a

limit access to source power language information technology.

1. Optimizing the use of digital technology opportunities in the digital era can be utilized with the use of digital technology to increase teaching and research quality. Universities can increase teaching quality with provides an online learning platform, providing sources for online learning, and taking advantage of social media as a means of university promotion. In research, universities can use digital technology to increase the efficiency and accuracy of research conducted.
2. Increase cooperation between higher education (university) and industry, University can increase cooperation with industry through apprenticeship and development programs career. With cooperation with industry, universities can obtain access to source power and experience valuable industry for repairing curriculum and improving quality teaching. Industry can too give input about the need for the power necessary work so that universities can develop appropriate educational programs.
3. Develop a suitable study program with job market needs. University can develop a suitable program of study with job market needs. In developing study programs, the university can-do job market survey, but

manner whole. With increased visibility and image university, the university can interest more lots candidate students and earn support from internal and external parties.

4. Develop learning programs distance remote and hybrid that utilizes digital technology to reach students in an isolated area or outside the country. Universities can utilize digital technology for developing learning programs distance remote and hybrid that can reach students in the area isolated or abroad. this can increase accessibility to education and expansion the reach of the university.

5. Looking for funding or support from the government or international institution to guarantee the program development quality and use digital technology. Universities can look for support from the government or international institutions in form of funds or source power other for developing a guaranteed program quality and using digital technology. Support from the government or international institutions can help universities guarantee program development of more quality and digital technology comprehensive and integrated.

for now, need power industry required. With develop a suitable program of study with job market needs, graduates' university will own appropriate competence with need industrial and be capable compete in the job market.

4. Increase quality research and scientific publications. Universities can increase research quality and scientific publications with an increase in Invest in research and determining high-quality standards for scientific publication. University to expand network cooperation with universities and researchers at home and abroad to increase access to knowledge and resources to power more research broadly.

THREATS

1. Fierce competition between universities in interesting students and developing appropriate programs with Industry 4.0.

1. Utilise Strength: Increase Education Quality. University in Indonesia has strength in increasing education quality. The strategy that can be done is to develop an appropriate

1. Increase Investment in Infrastructure Technology. Universities in Indonesia necessary increase investment in infrastructure technology to ensure that they can operate

2. Change regulation government can influence the development of higher education

curriculum with the demands of the times and adopted the latest technology in the learning process. University high to increase lecturers' quality and educator staff with give training and development professional in a manner periodically.

2. Utilise Strengths: Connect Partnership. University also has strength in intertwining partnerships with various parties like industry, government, and international institutions. With intertwined partnerships, a university can obtain the source power required to guarantee education quality and develop relevant research with the needed industry.

3. Reduce Threats: Provide System Integrated Information. The threat in guarantee university quality in the digital age is the lack of integration of information systems. To reduce the threat, universities need to provide integrated information systems to make it easy management of academic and administrative data. University to adopt blockchain technology to strengthen the safety and reliability of information systems.

4. Reduce Threats: Adopt AI and Big Data Technology. Another threat in guarantee high-quality universities in the digital era is the lack of relevant and real-time information. To reduce that

operation they with efficiently in the digital era. this can cover procurement equipment advanced technology, development strong network, and improved capacity use technology on staff and students.

2. intertwine Partnerships with Companies and Industries. Universities in Indonesia can intertwine partnerships with companies and industries to help them understand more good challenges faced in the digital era of industry 4.0 and adjust curriculum and teaching following industry needs.

3. Increase Quality Teaching. Universities need to increase teaching quality to ensure that graduates the Ready to face challenges in the digital era. Universities can renew their curriculum, improve teaching and training lecturers, and make sure that student's own access to source Power supporters like laboratory complete technology.

4. Strengthen the Involvement of Students in Learning. University needs to strengthen the involvement of the student in learning in the digital era of industry 4.0. This can do through the development of attractive and interactive programs, such as engaging digital learning platforms or through supporting activities to experience study outside class.

5. Adopt International Standards in Guarantee Quality University. Universities need to adopt the international standard

threat, universities can adopt AI and big data technology to obtain accurate and real-time information. With more information, appropriate time, and relevance, a university can take more decisions good and improve education quality.

to guarantee university quality to ensure that they fulfill standard global quality. this can help increase the reputation of the university in Indonesia and increase Power competitiveness at the global level.

Priority Strategy

After the SWOT analysis, the researcher continues with positioning. this is intended to measure whether the strategic position is can be prioritized or not. this is because the influence of guaranteeing the University's Quality in the Digital Era of Industry 4.0 is different, so positioning is needed to determine the scale of the priority. The method determines priority this can be done with give weight to aspects certain. The researcher starts with determining factors important from internal conditions the Guarantee Quality Higher Education in the Era of Digital Industry 4.0. The researcher group in strengths and weaknesses. The weight column is the level of interest for each factor, weighting 0.20 as very important, 0.1 as important, 0.05 as sufficiently important, 0.01 as not important, and if summed up well worth 1.00. While ratings mark any internal conditions organization. Score 4 for very good condition, value 3 for condition good, value 2 for condition normal only, and a value of 1 for condition bad. The factors are worth 3 and 4 only for the strengths group, meanwhile worth 2 and 1 for the weaknesses group. Then Value each factor is intermediate product weights and ratings. If the whole mark summed, then can is known mark SWOT results of the strategy. See table 2.

Table 2. calculation in determination Guarantee strategy priority Quality Higher Education in the Era of Digital Industry 4.0

STRATEGY FACTOR	WEIGHT	SCORE	TOTAL (WEIGHT x RATING)
STRENGTHS (S)			
1. Source Power quality human tall with title high academic and experience broad academic.	0.20	4	0.8
2. Ability to access source Power great information on and on growing, like journal scientific, e-books, and online databases.	0.1	3	0.3
3. Partnership with companies and other organizations where possible university tall for getting access to technology new and trending industry latest.	0.1	4	0.4
4. Availability infrastructure technology adequate information and communication (ICT), eg device hardware and software, internet connection, and systems data management.	0.05	3	0.15

5. Regulation supportive government development universities high and guaranteed quality in Indonesia.	0.05	3	0.15
TOTAL	**0.50**		**1,8**

WEAKNESS (W)

1. Lack of use of information technology and communication (ICT) in several universities in Indonesia, especially those in the regions isolated or outside big cities.	0.1	3	0.3
2. Limited access to source Power information and technology latest Because of constrained cost and lack of understanding about the technology.	0.2	2	0.4
3. Lack of participation and support from the internal university, like staff academic and administrative, in adopting and using new technology to increase guarantee quality.	0.1	4	0.4
4. Limited budget and resources power other for developing a guarantee program integrated and comprehensive quality.	0.05	3	0.15
5. Low ability in English among students and staff, who can limit access to source Power language information and technology.	0.05	3	0.15
TOTAL	**0.5**		**1.5**

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technology adoption and development system guarantee integrated quality for increased efficiency and effectiveness university.	0.2	4	0.8
2. Possibility of developing learning programs distance remote and hybrid that utilize digital technology to reach students in the area isolated or abroad.	0.2	3	0.6
3. Opportunity to Work The same with a company or other organizations within develop training and development programs related to skills with Industry 4.0.	0.1	4	0.4
4. Potential for increased visibility and image university through the use of social media and digital marketing.	0.05	3	0.15
5. Possibility to access funds or support from the government or international institution to guarantee program development quality and use of digital technology.	0.05	3	0.15
TOTAL	**0.6**		**2,2**

THREATS (T)

1. Intense competition between universities in interesting students and developing appropriate programs with Industry 4.0.	0.2	2	0.4
2. Regulatory changes in government can influence the development of higher education	0.2	4	0.8
TOTAL	0.4		1,2

From the results above calculations, we get results analysis as follows:

The total score of factor strengths = 1.8

The total weakness factor score = 1.5

So that determination coordinates for internal factors is used the formula:

coordinates (internal factor strategy) = Total factor strengths score - Total factor weakness score

IFAS = 1.8 – 1.5 = **0.3**

With thereby obtained the actual internal factor coordinate is 0.3.

Furthermore, done analysis for get coordinate external, as follows:

The total opportunity factor score = 2.2

Threats factor total score = 0.4

Coordinate external EFAS (external factor strategy) = total score of opportunity factor - total score of factor threats

EFAS = 2.2 – 1.2 = **1.0**

Thereby obtaining external factor coordinates 1.0.

After get coordinating each factor, namely internal and external factors, then the next step is to define internal strategy from the determination position quadrant in the SWOT analysis diagram. Determination of this SWOT diagram function to determine the positioning strategy to be implemented. That strategy is located in quadrants I, II, III, or IV. This Quadrant function defines and identifies what is that strategy characteristic aggressive, diversified, turn-around, or defensive. The determination quadrant can see in figure 1.
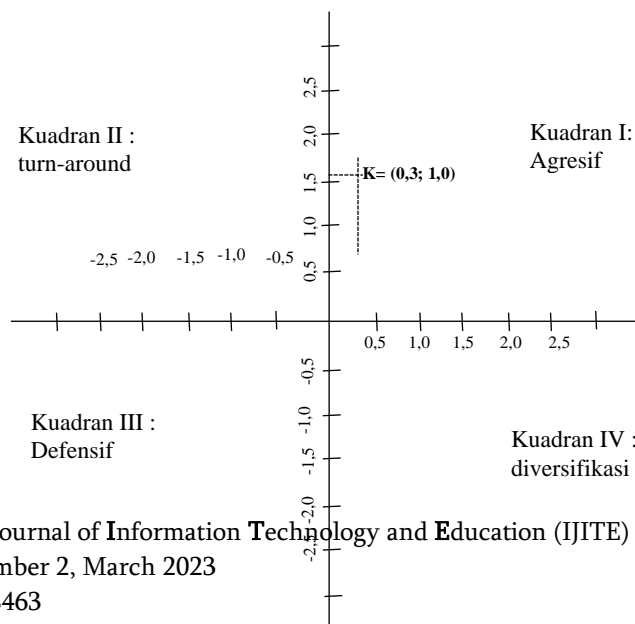

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Figure 1. Determination quadrants on the SWOT analysis

For a sequencing strategy to Guarantee Higher Education Quality in the Digital era of Industry 4.0 real thing that can be implemented, researchers use the McFarlan Grid method. With method this, the researcher deriving based strategy strategic value (S), Key performance (K), High potential (H), and Support (U). more can see in table 3.

Table 3. Priority Strategy Analysis on Guarantee Higher Education Quality in the Digital Era of Industry 4.0

No	Strategy	Priority
1.	Utilise human resources quality heights and partnerships with companies and other organizations to access technology latest and trending industry latest.	S
2.	Adopt digital technology and development system guarantee integrated quality for increased efficiency and effectiveness university	K
3.	Increase the visibility and image of the university through the use of social media and digital marketing	S
4.	Develop learning programs distance remote and hybrid that utilizes digital technology to reach students in the area isolated or abroad.	H
5.	Looking for funding or support from the government or international institution to guarantee the program development quality and use digital technology.	K
6.	Intertwine Partnership. University also has strength in intertwining partnerships with various parties like industry, government, and international institutions.	U
7.	Increase Education Quality	S
8.	Adopt Standard International to Guarantee University Quality.	S

In the formulation of the strategy in table 3, it is obtained that the Guarantee Quality Higher Education in the Digital era of Industry 4.0, 4 strategies are strategic and be priority main for quick

done and not can be postponed, 2 strategies are key performance become key that strategy important for done but not yet urgent. There is also an important high potential strategy for done but still can be postponed for held in time close. The last strategy that can be generated is a support strategy. on analysis priority is made there is 1 strategy that is supported, meaning that strategy characteristic is not too important but would be very helpful if done.

This study gives results study about what an effective leadership strategy can apply in university high-quality control in the digital era of Industry 4.0. Research results can cover identification factors important to influence quality control in universities, including challenges and opportunities faced in the digital era of Industry 4.0. Besides that, research gives example concrete about how a university that implements effective leadership strategies in quality control in the digital era of Industry 4.0 reach more results good. Examples can help prove the effectiveness of leadership strategy and give guide practical for university leaders to implement it in institutions alone. Research results This is expected to cover model development or framework work that can help guide universities leader in developing and implementing effective leadership strategies in quality control in the digital era of Industry 4.0. The results of this study can give views and suggestions for development furthermore in the field, like studying more carry on about what the leadership strategy can apply in a university context at different heights and how development technology can influence quality control in the future.

CONCLUSION

This study concludes that effective leadership is essential for ensuring good quality education at university. this required university can fulfill the increasing demands of the industrial 4.0 complex and dynamic. Universities need to adopt an appropriate leadership strategy in the digital era. Effective leadership in the digital era requires the use of advanced information technology and communication and a well good understanding of dynamics changing business fast. factors like development Skills leadership, effective communication, and monitoring proper performance can contribute to controlling more goods quality in university. Quality control in university must be considered an ongoing process, and leadership must keep going continuously and adapt to changes that occur in the digital era.

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