The Challenges of Implementing ICT in The Indonesia National Education System of The Industrial Revolution Era 4.0

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Abstract. The Industrial Revolution since the era of 1.0 to 4.0 has facilitated almost all orders of life to change according to the novelty it presents, including the management of education. The management trend of the national education system has made various efforts to change, which among other things are to answer the challenges of the industrial revolution. However, it is good for ICT charged change programs to be approved. This paper discusses some of the basic challenges of the application of ICT in the trend of national education development that supports the challenges of the industrial revolution era 4.0. The method used is a comparison between the target programs in the strategic plan with the results. ICT is constrained by the still weak socialization and the low level of IT literacy among the main managers of education, especially at the level of the education unit management.

Keywords: Information and Communication Technology, Industrial Revolution, Global Leadership

1. Introduction
Efforts to organize education are always faced with new challenges in accordance with the changing desires that accompany it. Among the phenomenal changes is the impact of the industrial revolution which is currently in the midst of the shift of the era of 4.0. If in the era of the Industrial Revolution Era 3.0 responding to education at targets on linked data sets, then in the era of 4.0 more on the web will be read-write concurrency web [22]. What is the basis for Indonesia's national education is always being late in meeting the needs of the Industrial Revolution at each stage? Therefore, it is very important to note that it is important to look for a breakthrough so that in the Industrial Revolution 4.0 stage, in addition, it can be immediately carried out with its sequential characteristics which can be stored in accordance with Industrial Revolution 3.0 and even era 2.0. This is still happening considering the diversity of regions or regions that spread in the Archipelago. There is still consideration of inter-regional ICT literacy on the one hand and the development of the internet which also brings negativity to community values and norms [12]. It is very ironic if in some places the area that is relatively close to the national capital is still unknown among teachers, principals, and supervisors for access to learning resources that have been provided for dozens of years on the relevant ministry Web. Apart from other sources. It seems that there is still a difference between the policies of education managers at the central level and the implementation at the front row level in schools.

2. Method of Study
The study of thinking about information and communication technology and the era of the educational revolution, which addresses the challenges of its application, was developed using the "comparative"
and "advocacy-discovery" methods. This is done by considering the problems of the challenges that require basic foundations and values in addition to disclosing the value of future people's lives, as well as fulfilling their conformity with the concept of global leadership. A comparative method is carried out for the implementation of the target program and its realization. While the second method is adapted from a method known as exploration attributes [5]. Exploration attributes are a very common method of acquiring knowledge, valid for all types and not limited to mathematical questions. What we expect from this method helps with classification procedures. The basic task is very simple: for a specific list of attributes, we find all combinations of attributes found. The original concept must be simplified as possible, avoided everything needed and allowed the computer to do technical. In this case, the application is not a computer, but a consideration of the mind.

3. Historical Perspective of ICT Policy Related to Education in Indonesia
The policy of the Indonesian government in the effort to implement ICT [4] if it departs from 1969 is the establishment of the State-“Bakotan” Administration Automation Cooperation Agency [8]. Twenty years later, Indonesian Government concerning the Development Team and Utilization of the National Management Information System. Towards the next 10 years, there was a Presidential Decree 186 of 1998 concerning the Indonesian Telematics Coordination Team. Two years later the Presidential Decree has issued again on the same matter, number 50 of 2000 and also issued the same Presidential Decree number 9 of 2003. It was only in 2006 that Presidential Decree number 20 came out on the National Communication Information Technology Council. In its journey various strategies were developed in which there was recorded “Simnas” (National Management Information System) in the 1980s, Nusantara-21 in 1997, 1998 National Information Technology Framework, IIDP (Indonesia Infrastructure Development Program) in 1998, “Sifonas” (Information System National) in 2002, and e-Indonesia in 2006.

Its implementation in the field of education is reflected starting from UUSPN article 35, paragraph 1 which states that “the standards of educational facilities and infrastructure include the classroom ..., other learning resources needed to support the learning process including the use of ICTs". A comprehensive strategy has been designed and outlined in the framework as follows:

![Figure 1. Application ICT in Education](image-url)
It appears that seven strategic roles for the application of ICT in the implementation of education in Indonesia. Overview of Achievements of Policy Implementation in The Last 10 Years. In the first five years (2010-2014), the Ministry of Education and Culture on its strategic plan (page 75) stipulates that the use of ICT for e-learning, e-management, and services will be strengthened through the following policies [12]:

- Provision of ICT facilities and infrastructure and ICT-based learning content for strengthening and expanding e-learning at all levels of education
- E-management development, e-reporting, and e-services to improve the effectiveness of governance and public services.
- Development of knowledge management systems to facilitate information and knowledge sharing between students and educators
- Development of ICT-based learning resource centers in primary and secondary education; and
- Increasing the capacity of human resources to support the utilization of ICT in the central and regional levels.

The Program Target and Program Performance Indicators of Management Support Program and Implementation of Other Technical Tasks are shown in the following table.

Table 1. Program Objectives and Program Performance Indicators for Management and Implementation of Other Technical Tasks in 2010-2014.

| Key Performance Indicators                                           | Condition 2009 | Target |
|----------------------------------------------------------------------|----------------|--------|
| Percentage of Education Units Connected Online                       | 9,10           | 13,40  |
| The percentage of Working Units / Work Units in the Ministry Environment is connected online | 89,29          | 95,00  |
| Percentage of Working Units / Work Units within the Ministry can apply E-Administration | 63,15          | 65,00  |
| Percentage of Education Unit that applies E-Learning                 | 11,80          | 12,00  |

Source: Strategic Planning of Mone 2010-2014

The achievement of targets in the first five-year period that can be traced from the Performance Report has only obtained the following information:

In 2010 [14], the level of implementation of E-Administration in the Ministry of Environment reached 77.18% of the target of 65% that was set, meaning it reached 118.74%. The percentage of Formal Education Units and Connected Work Units to the Online Learning System reaches 26.96% of the 12% target set, meaning it reaches 224.67%. The percentage of Formal Education Units and Connected Work Units to the Online Learning System is realized 100%. Means reaching 224.67%.

The percentage of Ministry of Work Units / Work Units Connected Online reached 80.03% of the target of 95% that was set, meaning the achievement of 84.24%.

The achievement in 2011 [15] showed that the percentage of Ministry of Work Units/Work Units connected online (online) realized 94.6% of the target of 95%, meaning that the achievement was 99.58%. The level of E-Administration Implementation in the Ministry Environment is 100% realizable. The percentage of Formal Education Units and Connected Work Units to the Online Learning System is realized 9.9% of the target of 15%, which means the achievement of 66%. For the
implementation of e-Learning (in elementary school), 21.6% of the target was 22% (achievement of 98%). The implementation of e-Learning in SMP is realized 34% of the target 30% (achievement 115%). The implementation of e-Learning in SMA/SMK/ SMLB was realized 25.82% of the target of 27.35% (achievement of 98.1%).

The achievement in 2012 [16] showed only the percentage of the implementation of e-Learning 29.20% of the target 28% (in primary school), 64.41% of the target 40% (in junior high school), and 36.79% of the target 31.40% (in senior high school).

In the next five years the Development Priority Agenda 2 (Nawacita 2) has been established: Building Clean, Effective, Democratic and Reliable Governance. In Subagenda 1 (Building Ministry of Education and Culture's Transparency and Accountability), policies and strategies are established which include "strengthening ICT-based filing systems" (Ministry of Education and Culture Renstra). In Sub-agenda 2 (Improvement and Improvement of the Quality of National Bureaucratic Reform) policies and strategies are established "implementation of transparent, competitive and merit-based employee recruitment and selection systems and information and communication technology (ICT)". The Program Target and Program Performance Indicators Program Management Support and Implementation of Other Technical Tasks are shown in the following table:

Table 2. Program Objectives and Program Performance Indicators for Management and Implementation of Other Technical Tasks in 2015-2019.

| Program Performance Indicators | Condition 2014 | Target 2015 | Target 2016 | Target 2017 | Target 2018 | Target 2019 |
|--------------------------------|----------------|-------------|-------------|-------------|-------------|-------------|
| Percentage of Development, Development and Utilization of ICT in Education | 47,60 | 52,10 | 56,60 | 61,40 | 66,70 | 70,60 |
| Number of ICT Based Learning Materials / Media | 9.000 | 10.200 | 11.400 | 12.600 | 13.800 | 15.000 |
| Percentage of Ministry E-Services in Accordance with ICT Governance | 20,00 | 40,00 | 60,00 | 80,00 | 90,00 | 100,00 |
| Percentage of Education Unit that applies E-Learning | 55.603 | 65.811 | 76.558 | 87.305 | 98.053 | 108.800 |

Source: Strategic Planning of Mone 2015-2019

Information on the achievements of the targets in the 2015-2019 Strategic Plan was not immediately indicated in The Performance Report in the years concerned [13]. However, as an illustration, information on achievement levels is based on the absorption of the budget for the program. The data shows that 2014 [17] absorbed 94.09%, absorbed 60.05% in 2015 [19], absorbed 90.96% in 2016 [20], and absorbed 95.47% in 2017 [21].

4. Fundamental Problems

Some of the problems that are revealed explicitly in a number of years are:

High commitment has been demonstrated at the central leadership level but has not been followed by the ranks below, especially in independent work units in implementing performance management in their respective work units [19];
Development of e-performance applications as a monitoring tool for performance achievement has been carried out, but it is still limited and places more emphasis on program and budget achievements [19];

In addition, the unpreparedness of “UKG” (Test of Teacher Competencies) participant teachers to use computers is because the ICT literacy that teachers have is still low [18];

Seeing some of the obstacles and constraints faced above, some anticipatory steps that will be taken in the future are by extending the implementation of the Information and Communication Technology (ICT) system in the context of channeling scholarship funds and providing tuition fees in a timely manner, on target, and in exact amounts [18];

In addition to the description of the problems presented at Performance Repost of Government Institution, it was found that the basic problem was found in the case of personal experience during the training related to the utilization of ICT learning in one of the districts closest to the State Capital. Experience as a training instructor for no less than 10 years (since 2006 until now, 2019) ago, both the training of teachers (elementary, junior high, high school), principals and supervisors of elementary and junior high schools, reflected that about 99% of participants (more than 2,500) have not been able to access various learning resources for ICT bases programmed by the Ministry of Education and Culture (TV education, Voice of Educational Radio, Learning Houses, Electronic School Books etc.). In general, they said they only found out when they attended the training. The most common use of ICT is limited to the use of stand-alone PCs for administration purposes, even in the more advantaged schools. The use of ICT to facilitate learning and e-learning at basic education levels remains more as a seminar topic rather than an implemented programme [1].

The fundamental problem of efforts to implement ICT in education in Indonesia seems to be more on very little socialization in addition to the inadequacy of ICT that is almost at every level of the education executive at the regional and district level.

5. Discussion

There are two things that should be highlighted in discussing the issue of the challenges of the application of ICT in education in Indonesia in this era of the Industrial Revolution Era 4.0. First is an alternative breakthrough strategy to face the Era and second is the global leadership role of educational bureaucrats. Related to the first thing, it should be considered a policy like OLPC (One Laptop Per Child), that have mission is to empower the world's poorest children through education [10]. The program like that was initiated by the Ministry of Education and Culture (MOEC) in collaboration with PT Telekomunikasi Indonesia Tbk (Telkom). In August 2011 there was an introduction to the "SabakMoe" program (Sabak Ministry of Education). It was published that "SabakMoE is the strategic thinking of the Minister of National Education that standardization of education and dissemination of education can only be achieved through the use of educational ICTs," said Telkom Head of Corporate Communication and Affair Eddy Kurnia on Wednesday (08/17/2011) in Jakarta [11]. It was a very brilliant initiation, but unfortunately, it was not clear. Hopefully, the legislature at that time did not provide full support, on the contrary, there were among the members who did it.

Considering the challenge of the Industrial Revolution 4.0 is so strong towards the educational strategy, it should have been promoted by the 4.0 educational revolution movement. For this reason, a global leadership role is demanded from educational bureaucrats. Adhering to global leadership roles are three main roles, namely change leadership, digital leadership, and institutional leadership [9]. Among the main components of digital leadership are "digital organization" and "drive and integrate technology trends" [2]. It is clear that global leaders have a high sense and literacy about ICT. Only with the presence of challenges, Industrial Revolution 4.0 will be overcome with Educational Revolutions 4.0.

Educational Revolution 4.0 is present with characteristics of future teaching and learning must be turned into opportunites for change [6]. Because that's full of changes. And therefore, there must also
be change leadership, leadership that plays a key role in successful change efforts [3]. The combination of the presence of digital leadership and leadership in contextual change is needed in conditions of impact from Industrial Revolution 4.0. But, not enough for the Educational Revolution 4.0 movement, institutional leadership is needed. Institutional leadership is leadership that opens up some essential aspects of organizational leadership capability that could be defined as the collective ability of leadership to detect and cope with changes in the external environment by maintaining the primary goals of the organization [7]. So the three leadership competencies (change, digital, and institutional) become "leadership qualities" for global leadership [9].

6. Conclusion

That the impact of the Industrial Revolution 4.0 must be answered by the movement of Educational Revolution 4.0. However, the more directed policies on the application of ICTs in education in Indonesia are not yet reliable enough to fend off the impact of Industrial Revolution 4.0. The main reason lies in the still shallow level at the level of implementation, especially at the forefront of education actors. Not only because of the weak socialization of educational ICT implementation programs but also especially constrained by the low level of ICT literacy among educational bureaucrats, especially those in the regions. So, it should be put forward the presence of a breakthrough strategy to ensure that the use of ICT for all students is accompanied by the presence of global leadership in educational bureaucrats.

7. References

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Acknowledgments
The author is very grateful, especially to the Bogor Regency Government, especially BKPP, which has provided the opportunity to participate in training teachers, principals and supervisors for more than 10 years without interruption (reaching 5 to 10 batches per year, 30-40 participants) until now. From the experience of dealing directly with the foremost education actors, the author has received a number of inspirations, one of which found the fundamental answers to the obstacles to the application of ICT in Indonesia which are the focus of this paper.