University 4.0 in Developing Countries:
A Case of Indonesia

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ABSTRACT

The barriers to adopting new emerging technologies are the parts of the transformation process of the university which are willing to change to the future environment which is triggered by the Industrial Revolution 4.0. This research aims to identify whether and how Emerging Technologies 4.0 can be established in universities of developing countries. Besides the literature review method, the research was conducted in two stages: qualitative and quantitative. The samples were 250 universities. The findings of this research may help higher education and top-management-level universities and the ministry of education to initiate future strategies: first, finding the mechanism to solve the financial problem (the highest obstacles) faced by the university, such as public-private partnerships, foreign investment, joint ventures, or other industrial relationships; second, working closely with technology and infrastructure providers (the third-highest obstacles) by implementing the technical approach such as cloud computing, on-demand technology, sharing resources, and virtualization.

KEYWORDS

Adoption Rate, Developing Country, Education 4.0, Emerging Technologies, Implementation, Indonesia, Industry 4.0, Knowledge Exploration Strategy, Obstacles, University 4.0

INTRODUCTION

In achieving organizational performance and business goals, numerous companies adopted the emerging technologies (ET) and industry 4.0 strategy (Ghobakhloo, 2018; Lins and Oliveira, 2020; Raj et al., 2019; Veile et al., 2019; Xu et al., 2018). The Industry 4.0 is a name given to the current technology automation trend in almost every single sector in the digital era which includes cloud computing, cyber-physical systems, big data, machine learning, radio-frequency identification (RFID), robotics, artificial intelligence (AI), augmented reality, and the internet of things (IoT), and other internet-based (Lee et al., 2015; Lins & Oliveira, 2020; Mourtzis et al., 2018; Xia et al., 2018; Xia & Xi, 2019). The technology tools present both new opportunities and challenges for profit and non-profit organizations (Al Omari et al., 2019; B. Chen et al., 2017; McLeod, 2019; Zhou et al., 2016). In shortly, due to the rapid growth of IT emerging and business process digitalization, the profit and non-profit organizations are facing the new industrial-technology revolution.

Like the industrial revolutions and emerging technologies, new educational platforms will have to be developed to meet changing demands in learning environment as well (Ellahi et al., 2019; Shahroom & Hussin, 2018; Sharma, 2019). The transformation in the teaching system and higher education in the Industry 4.0 is also known as Higher Education 4.0 (called as an Education or Edu 4.0). Education 4.0 is defined as the adopting ET in the teaching and learning environments where teaching systems now being transformed (Antonelli et al., 2019). For instance, teaching should pay attention to the emerging technologies such as using massive open online courses (MOOC), online learning systems, using the device that can support teaching and learning, and development of lecturer and staff skills (Abbasy & Quesada, 2017; Sivathanu & Pillai, 2019). Due to these reason, the higher education institution should begin to set its learning strategy to follow the digital transformation of education.

Besides the benefits of emerging technologies tools, however, most researchers agree that the investigation of barriers related to ET implementation remains largely unexplored in the extant literature and merits further study (Kamble et al., 2018) especially in the education sector (Cassidy et al., 2014; Shahroom & Hussin, 2018). The learning environment will resort to industry professionals and online-based learning schema for the delivery of learning by 2025 (Shuck, 2016). An in-depth prediction, the researcher suggests that as the tendency of education systems will be online environments and will require a quality enhancement in physical learning sceneries. The changing views and strategies required in the institution demand change to the teaching system. However, not all higher education able to implement these learning technologies tools due to the limitation of resources and capabilities.

In the context of the education sector, the adoption of emerging technology is a complex process and many institutions across different countries are facing issues due to different barriers (Liu et al., 2013; Muwardi et al., 2020; Ngware, 2016). Higher education institution cannot enter in this ever-changing environment without proper capability, knowledge, lack of employee's capacity, and well preparation for this challenging technology. Few scholars have conducted scientific research on barriers to the adoption of emerging technologies and Industry 4.0 in the context of education systems (Chea et al., 2019; Zhou et al., 2016). On one side, stakeholders have to manage the institution in such a manner that the members will change their vision, ideas, and attitudes in long term. Therefore, there is a need for educational institutions to identify the gap, barriers, and their correlation that could help in developing a future strategy that may lead to smoother adoption of emerging technologies and industry 4.0 (Kamble et al., 2018).

Educationists and researchers suggested that Education 4.0 should start to adopt ET and industry 4.0 schema into teaching and learning systems to have a higher success (Lopez-Garcia et al., 2019; Shahroom & Hussin, 2018). Thus, there is a required a new blueprint strategy and a new direction in the education institution to the higher education level. To create and develop the strategy of Education 4.0, the institutions should know their existing technology features in their institutions. On one side, they also need to understand the current problems or obstacles of these emerging technology. However, it is unclear whether the universities are preparing enough to handle and adopt these requirements situations. Thus, to deal with Education 4.0 transformation challenges, the institutions must have a successful strategy.

Researchers suggest that since ET policies in developed and developing countries are different, the adoption of ET in developing economies needs further exploration (Horváth & Szabó, 2019; Kamble et al., 2018). The debate of ET in a developing country is still in progress and more investigation is needed before a consensus can be reached (Kamble et al., 2018). Hence, it is crucial to investigate the different barriers and geographical that hinder the adoption of ET. In addition, the Ministry Education of Indonesian instructs the higher education to adopt the education system 4.0. Indonesian universities are facing many obstacles in the journey of ET transformation. Failing to accelerate the process will bring a new risk to the local institutions especially in the era where other foreign universities can operate freely within the nation. Therefore, our analysis study of the barriers and obstacles in different

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