Digital transformation of the higher education sector in maldives

Fathimath Ula Amir
School of Computing
Asia Pacific University of Technology and Innovation (APU)
Kuala Lumpur, Malaysia
TP031979@mail.apu. edu.my

Shounak Ghosh
School of Computing
Asia Pacific University of Technology and Innovation (APU)
Kuala Lumpur, Malaysia
shounakg@staffemail.apu.edu.my

Chandra Reka Ramachandiran
School of Computing
Asia Pacific University of Technology and Innovation (APU)
Kuala Lumpur, Malaysia
chandra.reka@apu.edu.my

Abstract*— Due to the massive developments in information technology, the world as we know it has been massively changing and evolving. This revolution has been named Industrial Revolution 4.0. IR4.0 shrinks the gap between the digital, more technical world and the physical world. The higher education institutes are now being forced to move into a more digital form of education because if they are not, they are found institutes that are too stubborn to move on from the traditional method of education. The more modern technologies such as data analysis, artificial intelligence and other technologies such as cloud computing need to be concentrated on while going through digital transformation. This paper includes an outlook on digitization, benefits of digital transformation, challenges of implementation, how to have a smooth transition to a more digital environment and the different mechanisms that are in place, that could be improved. Because of the fact that as the generations pass, more and more of the students are getting tech savvy, so, if there is any time to implement digital transformation, it is now. This study will be focused on the Maldives and as it is a small island nation, it comes with a set of challenges that other countries most probably do not have.

Keywords—Digital Transformation, IR4.0, Challenges, Benefits, Implementation, Strategy

I. INTRODUCTION

As the world is constantly moving towards a technologically advanced era, it is inevitable for companies to modify their traditional methods of doing business. According to Morakanyane, digitization is holistically known as the alterations that come with association to the implementation of digital technologies in different positions of how the world works. [1] Digital transformation affects many sections of society and companies now have the capability to bring extreme changes to business models including the usage of big data, social networking, internet of things, and added new and improved innovations that are being developed daily [2]. Because of the fast traction of digital transformation, companies are currently facing a lot of pressure in order to digitize their workforce before others do and to gain the competitive advantage [3].

Digitization is widely being discussed these days, however, there was a point in time where digital products were not properly understood in the 1990s and 2000s [4]. Nowadays, the user data is being taken advantage of by businesses by personalizing information and being able to tailor their products, customer service and communication. This is because the world is constantly evolving technology wise and the way business is done is also being reformed.

Digital transformation allows companies to take advantage of the new digital technologies and the new markets that are offered by digital platforms. Yet, implementing technology is only a minor part in the process of transformation. Technologies are required to create some sort of additional value and convenience to the current system [4]. This paper focuses on the higher education sector in the Maldives. The Maldives being an island nation, already comes with different challenges than other countries. Institutional difficulties come with how open the people who are working there are to change [2]. With this being said, it is very important to look into how the benefits could outweigh the drawbacks of the transformation.

II. BENEFITS OF DIGITIZATION

Some of the companies that belong to industries such as the music industry or the high-tech companies already have already massively shifted the business landscape to a more digital one. It may be tempting to feel like the larger companies with a more traditional industry should just let business continue as it used to over the years [5]. Going to a digitally transformed environment can give the company a massive competitive advantage. First off, it allows more a more personalized service for students, lecturers and admin as well. This enables a fast response to varying needs and preferences. When this data is compiled it will give out an improved overview of the necessary steps that would be taken in order to improve the company [6].

Digitization will also help with the automation of some of the common activities that go on a daily basis. For example, it will assist the students to use their time more efficiently and keep up with schedules when there is a constant reminder on their commonly used handphone, rather than having a printed-out plan that is not going to be with them all the time. This will not only aid them in time management, but it will also help them to hold themselves accountable for their personal goals [7]. When the tasks generally become more convenient, it will enhance the employee productivity and creativity as well. These improvements usually come from faster decision making and response [6]. This in turn gives out advanced levels of communication as there is space for everyone to do their own data management and give out a better-informed report.

When data is digitized, there so many conclusions that could be made by a data analyst which can make business so much faster and easier to make decisions for the company.

With the use of different tools to analyse the data, the company will in turn be given a detailed report on different instances. Whether it be student data, employee data or lecturer data. Once these details are properly studied, it will be very easy to come up with a conclusion as to what the following steps should be [8]. That is a major advantage when it comes to digitization, because looking at different data in its raw form is going to be almost impossible to come up with a conclusion.

Data analysis can be used by both students and educators because of the vast variety of possibilities. According to a research done by Agasisti Rogge [9], every step the student takes can be traced and analysed which is a better way to improve the learning process of students. This study also points out that different governments across the world are announcing future plans and roadmaps in support of big data to further enhance the education system and understand both the students and lecturers needs [9]. Data analysis can be targeted to focus on three main areas. One is student feedback on the learning experience. Second is to facilitate the lecturers and help them to combine comprehensive data to cater to a better final result. Thirdly, the data can also be used to analyse and measure the performance of the lecturers [8].

III. The Process Of Implementation

Due to the fast change in pace of digital transformation, there have been many changes in the economy [10]. Digital transformation has been fundamentally altering the business process of many industries. Because of this, organizations have the need to essentially alter the way they do business and even go as far as to change the employee's mindsets over the change in dynamic in order to survive [11]. Any external or internal prompts for the reason why organizations normally involve themselves in digital transformation is known as a driver. It has come to the point that the organizations have the need to keep up with the different digital alterations in the industry that modify the competitive landscape [12].

There are several key points to be considered when embracing digital transformation. Organization culture is one of the things that amount to it because it can have an influence on the process and the outcome [13]. In order to have a successful digital transformation, Muller [13] has found that the organization as a whole should be able to adopt an encouraging work culture whereby the IT department can flourish. This way it will be easier for the admin side to fit more into the digital work as well as the students and the lecturers. According to a Delphi study conducted by Eva Hartl [11], it was concluded that a supportive culture is absolutely necessary so as to successfully carry out digital transformation. This would in turn benefit the institute and garner more value into the system because of it. There has to be an openness to learn new things, acceptance of failure, risk management, innovativeness and an entrepreneurial outlook when it comes to the assessment of organization values [10]. According to these findings, it has been concluded that a more agile culture, rather than a controlling one which supports digital transformation works better to fit into the narrative that is being made. It will make it easier for the employees and also the students to adjust to it.

A handful of researchers have also found out that there is a major role being played by leveraging internal and external knowledge, by obtaining, incorporating and commercializing knowledge, there were organizations who were better prepared for the change to happen [14]. When trying to minimize the gaps, it was found that the key issues were designing a new business model, forming new digital worth and enabling a seamless transfer for the end users [15]. This is because at the end of the day, the people who are going to be using the system, i.e., students, lecturers and the administrative representatives need to be able to fit into this transformation with no disruption to their work. It has also been found that internal knowledge is vital in digital transformation. Helping the end users leverage these technologies to be more innovative and open minded to change is a main task for internally focused digital transformation. It is essential to highlight the importance of communication so that they can give open feedback on the things that need altering [13].

Another very important detail to fully incorporate digital transformation with any institute is to align the changes with the institution's strategies [10]. A digital business strategy is known as a mix of the information system strategy with the organizational strategy. In this case, fusing education with technology. A digital business strategy can be formulated and when the time is right, executed by using different digital resources to create a differential value to the company [16]. When the institution shows that they have got aspects to them that the other institutes do not, they are given an upper hand competition wise. A proper digital strategy allows an organization to achieve the envisioned objectives of digital transformation by emphasizing the leadership in the organization, going through with the agile and scalable digital operations, a digitally enabled experience for the end user and other innovations [16]. According to a study done in 2017 by Yeow [17], the businesses that started off as technical businesses, have a digital business strategy that aligns with customer needs.

However, business strategies and end user needs are merely aligned to the internal organization and the information system. This implies that the processes that get carried out internally in the organization that this research was carried in was not equipped to meet the strains that come with digital transformation, which in turn causes tension in the organizations digital agenda [18]. With efforts to reduce the alignment gaps and give a response to the tension and changes in the environment, organizations should be allowed to actively pursue suitable supporting actions to reconfigure the resources in the organization and to redefine the original strategy [17].

IV. Digital Methods Being Used

Due to the heavy advancement of Information Communication Technology (ICT), and the expanding access to the internet, it has encouraged a lot of management to put into consider all the new faces that are joining higher education institutes. While institutions do have a specific number of students in an intake, the traditional lecture room based educating just is not working out for this generation [19]. Since this is a very tech savvy time of age, it is important to use the given tools to their maximum potential. Below are some of these technologies.

Mobile learning is known as another method of educating themselves via mobile devices. This could include mobile phones, laptops, or even tablets [21]. According to a study done in 2018 by Helen Crompton [20], out of 72 studies, were analysed and out of that 23 had the purpose of the research

focuses on investigating the use of mobile learning and student achievement.

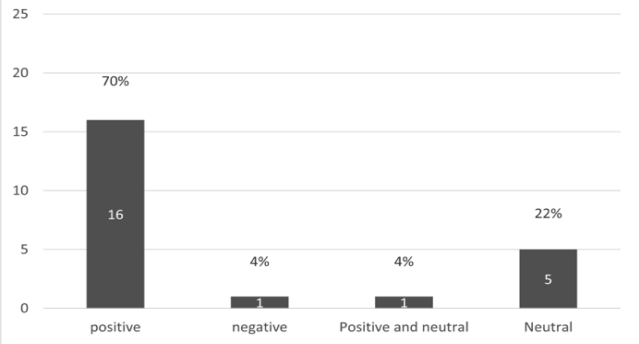

Fig. 1. Outcome of the research done on mobile learning[20]

The outcomes highlighted that 70% of the studies reported positive outcomes and 4% had negative outcomes while 22% reported neutral outcomes. This research shows that more than the majority has a positive outcome with this method. Mobile learning specifically targets students from age 18-29 as they happen to be age group where there is the most users of mobile devices.

MOOCs, otherwise known as Massive Open Online Courses is a means where several students from all across the world can access an online course [21]. The usual characteristics of MOOCs include the courses having a beginning date and an ending date while also being free of charge and not having a certain limit whereby a student can enrol in [22]. When not having enough money to travel to a different location to further the higher education, this is a good alternative that is given. However, it does come with its challenges, including language barrier, a proper and good access to the internet and understanding the perks of finishing the course.

Another method being used is the implementation of games to fully achieve the learning outcomes. Students normally would phase out during a 2 hour lecture so having some interactivity and involvement is good for both the students and the lecturers. The students can compete in the class while it gives the lecturer a good perspective on how much the students have been paying attention. If they had not listened in class, the lecturer can take note and focus on those students more [23].

If the institution is lacking the usage of Industry 4.0 technologies, it will lead to a lack of the education, knowledge and skill [24]. In order to enable a proper implementation of these technologies, there needs to be full corporation from different departments including human resources department, administrative services, financial management department and research and development department. If they all manage to work together it can be implemented into the infrastructure of the institution.

TABLE I. LITERATURE REVIEW MATRIX

References	Scope	Outcomes	Limitations
R. Morakanyane, A. Grace and P. O'Reilly, "Conceptualizing Digital Transformation in Business Organizations: A Systematic Review of Literature," 2017.	The abstract idea of digital transformation and giving a common understanding of the concept. Paper gives a more comprehensible approach for better understanding.	Researcher found that there is a lack of definition of what digital transformation really is and how it would be harder to transform without a proper systematic literature review.	Insufficient information on the literature of transformational effects of digitization.
Z. Sayabek and S. Suieubayeva, "Digital Transformation in Business," 2020.	Clearly identifying the description of digital transformation and giving a more structural foundation with different stages, activities and results.	Paper comes up with different potentials of digitization and what the best suited method to get a business digitized is.	Despite the topic digital transformation being well known, it does lack in the procedure of a systematic transformation of a business model.
C. Ebert and Carlos Duarte, "Requirements Engineering for the Digital Transformation: Industry Panel," 2016.	Purpose of IT department i and how changing value chains and production processes can have an effect on the whole process of digital transformation.	Discusses the critical success factors of implementing this strategy.	-
C. Ebert and Carlos Duarte, "Requirements Engineering for the Digital Transformation: Industry Panel," 2016.	History of digital transformation and the difference between digitization and digitalization.	Coming up with a good strategy and plan for the organization is a good method of moving on through the digital era.	Only focuses on businesses and not how customers get effected.
G. Westerman and D. Bonnet, "Revamping Your Business through Digital Transformation," 2015.	Discusses the different assumptions made about digital transformation and analyses whether these assumptions are true or false.	Clearer view of the digital environment and how companies should not stop looking for opportunities because it might become and inconvenience.	Only discussed four assumptions.
W. Afandi, "The Role of Strategic Leadership in Digital Transformation Process," 2017	Discusses on how the managerial side can guide the rest on how to swiftly transition into the digital side.	Importance of explicit and tactic knowledge management and how it can be implemented to the change.	Focuses on businesses in Saudi Arabia.
S. K. Opoku and S. Appiah, "Automating Students' Activities in Higher Educational Institutions," 2016.	Focuses on the higher educational institutes in Africa and how automation has been implemented.	Researcher came up with a system designed to help schedule students time and make good use of time.	More to the statistical and technical side.
J. Vanthienen and K. D. Witte, "Data Analytics Applications	Discusses how data analysis can be used to better improve the	List of contributions include improving the learning	Focused on big data, which is only a small part of the

in Education," 2017.	learning environment.	environment, measuring performance and the challenges ahead.	scope for the paper.
N. Rogge, T. Agasisti and K. D. Witte, "Big data and the measurement of public organizations ' performance and efficiency: The state-of-the-art," 2017.	Different models and strategies that can be used to optimize the performance and efficiency of how big data can be used to analyze organizational performance.	Researcher found that there has been a big increase in using big data for research.	Only focuses on big data.
K. Osmundsen, J. Iden and B. Bygstad, "Digital Transformation Drivers, Success Factors and Implications," 2018.	The different drivers, what the success factors are and how it can be implemented.	Analysis on different articles that after examination have been ruled out that the theoretical concepts may not be enough to implement digital transformation.	Less information on what the drivers are.
E. Hartl and T. Hess, "The Role of Cultural Values for Digital Transformation: Insights from a Delphi Study.," 2017.	A value centric approach to the culture of an organization and how it can be altered to go ahead with digitization.	The researcher came up with an organizational culture that can be intertwined with digital transformation.	The study was based in Germany and might not be applicable to other nations. There was also a low level of consensus which does not give an accurate reading.
S. Berghaus and A. Back, "Disentangling the Fuzzy Front End of Digital Transformation: Activities and Approaches," 2017.	Discusses the challenges in introducing digital transformations and different frameworks with analysis on how it can be a smooth transition.	The researcher mentions that they cannot conclude one framework to work because it all depends on how the organization works.	The study includes award application documents which can be biased because only successful cases were analyzed.
B. Mueller, "Helping employees to be digital transformers, " 2017.	Case study on Olympus Europa was conducted. Paper also researches on how to make employees innovators.	Concluded that Olympus.connect case has played an important role in setting a path to figure out how employees can become innovators.	One of the authors is directly connected to the field because of lack of available interviewees .
B. Hildebrandt, A. Hanelt, S. Firk and L. M. Kolbe, "Entering the Digital Era - The Impact of Digital Technology-related M&As on Business Model Innovations of Automobile OEMs," 2015.	The affect digital transformation has on business models.	Digital innovation is valuable as it pushes people to diversify their fields.	Scope was restricted to the automobile industry.
E. Piccinini, A. Hanelt, R. W. Gregory and L. Kolbe, "Transforming Industrial Business: The Impact of Digital Transformation on Automotive Organizations," 2015.	Discusses the digital transformation in automotive organizations.	This paper discusses the managerial challenges and how to overcome them. It has been found that in order for the organization to survive, they need to be able to resolve the new innovations and the many potentials of innovations.	Only research done in automotive industry.
A. Leischnig, S. Wölfl, B. Ivens and D. Hein, "From Digital Business Strategy to Market Performance: Insights into Key Concepts and Processes," 2017.	This paper includes the strategies to implement digital transformation and the key concepts and different processes that is being implemented.	The perspective of dynamic capabilities were adopted while also discussing the different roles that come with being on the technical side.	-
A. Yeow, C. Soh and R. Hansen, "Aligning with new digital strategy: A dynamic capabilities approach," 2018.	The alignment of digital strategy with the current work environment. A study was conducted on a European sports fashion company to find out how they implemented internet based B2C.	Digital strategy as a competitive advantage and it was proven in this study.	This paper focuses too much on the business side of things rather than balancing it with the digital world.
J. Schmidt, P. Drews and I. Schirmer, "Digitalization of the Banking Industry: A Multiple Stakeholder Analysis on Strategic Alignment," 2017.	Strategic alignment of digitization in the industry of banking which people use every single day. Research was also done on how the customers interact with banks and how the business models can be changed.	The gaps were analyzed, and stakeholder perspectives were also discussed.	Research is limited because it only focuses on the banking industry.
A. Telukdarie and M. Munsamy, "Digitization of Higher Education Institutions," *IEEE* 2019.	This paper gives a better look into the different ways that technology can be used in classrooms. It also discusses the higher education	It is evident from this paper that higher education institutes are being confronted with the changing of the technological	-

	institute architecture and looks to the different limitations and challenges that come along with it.	world. A digitized model was also proposed.	
H. Crompton and D. Burke, "The use of mobile learning in higher education: A systematic review," 2018.	The usage of using mobile devices in learning environments was discussed in this paper.	Different methods of diffusion of innovation was discussed and how it can be implemented in an education sector was also discussed.	Lack of literature reviews on the higher education industry specifically.
W. Al-Rahmi, A. Aldraiweesh, N. Yahaya, Y. B. Kamin and A. M. Zeki, "Massive Open Online Courses (MOOCs): Data on higher education," 2019.	Analysis of data based on 219 studies regarding the usage of MOOCs in higher education institutes.	Researcher found that there are several methods to be incorporated to handle the involvement of MOOCs in higher education institutes.	-
J. Weinhardt and T. Sitzmann, "Revolutionizing training and education? Three questions regarding massive open online courses (MOOCs)," 2018.	Discusses three questions including who the people are that go into MOOCs, whether students are aware enough to be able to handle mostly self-learning on their own. Paper also discusses on whether MOOCs are effective and how it can be used to its potential.	It was concluded that MOOCs come with great opportunities for the researchers who are in training from around the world.	MOOCs do not have a guaranteed efficacy.
S. Subhash and E. A. Cudney, "Gamified learning in higher education: A systematic review of the literature," 2018.	A systematic review of how games can be an addition in a digital learning environment in a higher education institute.	This paper found that there has been support for the gamification of learning in higher education institutes. Spain is one of the countries that use this method to teach.	Lack of research in this area. Grey literature and books were also not used which contributes to the limitations of this study.
R. M. Ellahi, M. U. A. Khan and A. Shahab, "Redesigning Curriculum in line with Industry 4.0," 2019.	This paper focuses on the different challenges that come with digital transformation based on a qualitative research and a matrix was also proposed with the technological capabilities that come with the rise of IR4.0	A suggested curriculum matrix was proposed which could help in reaching the full potential of the IR4.0.	Lack of research done between IR4.0 and the academic management field. Limitation of literature was also mentioned in the paper as a drawback.
L. S. Rodrigues, "Challenges of Digital Transformation in Higher Education Institutions: A brief discussion," 2017.	Paper discusses on the different challenges that come along with transforming traditional teaching to a more digitized environment.	It was found that any of the modern organizations need a digital strategy to achieve its business opportunities.	-

V. CONCLUSION

Higher education institutes are currently facing a lot of pressure from the global competition as the demographic keeps changing, financial restrictions abide, altering demands of labour market and due the growing expectations of the students to come up with more innovative methods to learn and be educated [25]. To tackle this issue, institutions are trying to implement digital transformation strategies as a method of implementing improvements on how they currently execute their teaching. Digital transformation, if properly will be a game changer because of the benefits that come along with it. Students get different methods of learning and lecturers get to engage the class more while the administrative side also get their perks with more convenience.

While this paper has mentioned a lot about the benefits and the methods on how to ease into it, there is a restricted amount of research done to fully be able to understand how well these methods would hold up in a real situation. A lot of the research that was looked into did not have proof that a certain method worked. This is why this topic should be researched more. These are a few of the limitations that are included in this research. In the future there should be research done on how to find a proper strategy to infiltrate this era and be successful with the implementation without it being a failure.

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