

Digital Human Resource Development in the Context of Digital Transformation and International Integration: A Case Study of Vietnam's Open and Distance Education

Nguyen Thi Thuy Hong^{1*} • Nguyen Mai Huong²

^{1&2} Hanoi Open University, B101 Nguyen Hien Str., Hai Ba Trung Dist., Hanoi, Vietnam

*Corresponding author. Email: huongnm@hou.edu.vn

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Abstract

International integration and digital transformation have brought both opportunities and challenges to Vietnam's tertiary education and open and distance education towards producing a well-qualified, digital, creative, socially and ethically responsible workforce to satisfy the requirements of the digital economy. In fact, the development of the digital economy on the foundation of information and communication technology demands for underlying changes in the human resource training system. To adapt to the highly digitalised working environment, Vietnam's open universities have paid much attention to reform governance models and pedagogies to provide students with not only professional knowledge, soft skills, and career qualities but also the capacity to operate digital technologies. The current study focuses on identifying the most important groups of careers and the top three career-related skills required by the digital economy. The questionnaire survey administered in the study determined the most important groups of careers as those categorised as high tech and engineering; computer and technology with the top three career-related skills of digital skills, innovative and entrepreneurial thinking. Based on the findings, some recommendations are made for training digital human resources in terms of training programmes, Technical, Vocational Education and Training and building a learning ecosystem to meet the digital economy's requirements in Vietnam. The findings will be useful for Vietnam's open universities to enhance the quality of higher education quality towards producing a digital workforce equipped for a sustainable digital economy in the context of digital transformation and international integration.

Keywords: digital human resource development, digital transformation, international integration, open and distance education, Vietnam

1. Introduction

The quality and effectiveness of open and distance education are measured through the quality, skills and competences of human resources that are produced by the institutions. In fact, improving the quality of human resources is a critical factor for strengthening open universities' competitiveness and performance. In the context of the digital economy, along with foundation skills, professional competencies, personal attributes, and organisational skills, open universities should equip students with technological competencies to enable them to develop career sustainably. In other words, the quality of education and training is demonstrated via graduates' adaptability and suitability to the labour market and through the rate of students getting jobs in the right profession straight after university, working effectively and studying at higher levels to develop their careers.

However, Vietnam is currently facing a shortage of high-quality human resources needed to implement digital transformation and international integration. In fact, many graduates from traditional universities in general and from open universities cannot find jobs in the fields related to their training because they do not meet the needs of employers. This creates an imbalance in the country's labour supply and demand and wastes time and money for families and the society as well. The emergence of new industries and services along with the spread of digital technologies requires universities to develop flexible training programmes to enhance the training quality and equip students with the qualities, skills and competences in accordance with the requirements of the employers.

This study aims to achieve the following objectives:

- i. To identify the most important groups of careers and the top three career-related skills required by the digital economy;
- ii. To propose some recommendations for improving open and distance education quality to meet the digital economy's requirements in Vietnam.

In order to operate technology platforms effectively, organisations have to recruit and retain high-quality human resources with the core values obtained from the training process. In fact, traditional teaching methods with much focus on equipping students with knowledge will no longer be suitable. Enterprises need a workforce equipped with not only professional qualifications but also digital skills and competencies to adapt to technology's changes and development. In other words, students should be capable of adapting constantly and quickly to new knowledge and digital skills, while demonstrating high levels of autonomy and self-responsibility to the community. The roles of open and distance education in producing human resources for the digital economy are elaborated upon in the next section.

2. Literature Review of Open and Distance Education for Digital Human Resources

2.1. Roles of Open and Distance Education in Producing Human Resources for the Digital Economy

The high demand for digital human resources with personal values, qualities and professional competences requires universities to ensure certain conditions not only in terms of modern facilities and well-qualified teaching staff but also the priority of digital transformation. In fact, digital transformation is the inevitable tendency for open universities to achieve high competitiveness and be the leader of change. Suppose open universities want to catch up with this transformation as a key element in time. In that case, they should evolve integrally through exploiting all the opportunities and potentialities opened up by digital technologies (Hang, 2021).

It has been proven that training cooperation activities between open universities and enterprises in different aspects are crucial for open universities to provide students with necessary knowledge, skills and competences to get a good job in the future. The cooperation with enterprises helps open universities to build flexible training programmes close to reality and to innovate training goals and methods in the direction of digital competency (Mitive, 2009, cited from Nguyen, 2021). The link between research institutions within open universities and enterprises supports technology transfer, promotes start-up support activities and improves innovation and creativity at enterprises (Koschatzky & Stahlecker, 2010).

In fact, many Vietnam enterprises have difficulties in recruiting well-qualified workers to meet the requirements of the digital economy. The increasing demand for digital human resources in the labour market requires graduates to accumulate digital competencies along with professional knowledge, soft skills and technical competences. In fact, the top students still need to be retrained and fostered for a while to be able to meet the requirements of jobs in the digital economy. This is a waste of time, effort and finance of individuals and businesses; at the same time inhibiting the development of the country (Nguyen et al., 2020).

Therefore, innovation in training curriculums and pedagogies in open and distance education to enhance training quality and effectiveness is essential to provide graduates with authentic knowledge, soft skills, ethical qualities, professional capacity and dynamism to participate successfully in the digital economy.

2.2. Roles of Digitally-Skilled Workforce in the Digital Economy

According to the World Bank (2020), the digital economy consists of five foundation pillars namely digital skills, digital infrastructure, digital platforms, digital financial services and digital entrepreneurship. The digital economy's sustainability depends on the development of the five foundations in which training digital skills for human resources plays an essential role. A digitally competent workforce strengthens the installation of the digital infrastructure, the growth of digital entrepreneurship and the development and use of digital platforms and digital financial services. Digital skills enable the workforce to take advantage of the digital society via accessing better and safer information from e-government services and commercial products and engaging with the wider community.

A digitally-competent workforce possessing basic digital skills can stimulate the application of digital tools and processes in the economy. In fact, a digitally competent workforce involves skills in information and communication technology (ICT) professions and a broad range of occupations. Citizens lacking digital skills and knowledge may fall into the digital economy's traps known as financial fraud and other forms of abuse and exploitation (World Bank, 2020). Therefore, in order to develop the digital economy sustainably, higher education should equip human resources with sufficient digital skills.

In the digital economy, new business' appearance and digital technology's extension in traditional manufacturing sectors lead to the requirements for digital occupations. As far as the ICT sector is concerned, the emergence of ICT intensive sectors known as e-commerce, bioengineering, internet-enabled offshoring and working online requires a digitally competent workforce at different levels. Besides, the demand for using digital technologies is increasingly emerging from traditional sectors namely agriculture, construction, transportation and logistics, manufacturing, banking and finance, and health and government sectors (World Bank, 2020).

2.3. Open and Distance Education for Digital Human Resource Development

Tertiary digital education, which is increasingly implemented for continuous professional development brings about training alternation based on the assisted digital database systems and technologies. In fact, digital education at universities offers the digital economy with digital human resources via a flexible, accessible and affordable training system. Digital Human Resources basically refers to a workforce who can apply the internet, electronic media, analytics and information technology (IT) to work and develop their careers more effectively.

The rapid working conditions with technological advancements have changed the current labour market, resulting in new forms of work and labour relations (OECD, 2019a). Nowadays, employers are looking for employees equipped with competences such as risk-taking, being active and innovative, networking, and exploiting opportunities (Neessen et al., 2019). In the context of digital transformation and the fourth industrial revolution, universities play critical role in providing skills and competences for students to perform skilled jobs. However, open and distance education for human resource development has reached little improvement in the desired digital workforce with higher professional and technical capacities. Many universities' training programmes seem unsuitable in terms of creating high-quality human resources.

From Deloitte's viewpoint (2016), the digitalisation revolution puts pressure on open universities and their products, that is, graduates, to adapt to the rapidly changing world and the increasing of digital technology. Digitalisation has become an inevitable tendency open university must embrace in order to develop sustainably in the digital economy. In other words, open universities should produce human resources according to the labour market's needs in order to improve their reputation (OECD, 2017; Stuckey & Munro, 2013).

Therefore, building strategies to innovate training quality and produce a workforce equipped with professional knowledge, soft skills and technological capacities is essential for a business to obtain competitive advantages. In the context of the digital economy, human resources must have fundamental knowledge and competences to master digital approaches and instruments in order to operate successfully.

2.4. Digital Skills under Open and Distance Education for the Digital Economy

Digitalisation encompasses all things which can be digitised, impacting the way open and distance education organises and implements its training operations. Application of assisted technologies with smart computer programmes, namely Artificial Intelligence (AI), Big Data, and the Internet of Things, enable universities to develop flexible training curriculums to train students to access a bigger amount of information and use digital tools to connect to the internet. In fact, relating workplace skills to the skills trained at universities strengthens the development of a high-skilled labour force, creates future suitable educational programmes, and enables employers to enhance potential human resources skills.

According to Kay and Greenhill (2011), the framework for 21st-century skills includes three categories known as learning and innovation skills; information, media, and technology skills and life and career skills. The first category of learning and innovation skills include creativity, innovation, critical thinking, problem-solving, communication, and collaboration. The second category information, media, and technology skills involve information literacy, media literacy and ICT literacy and the third one life and career skills includes flexibility, adaptability, initiative and self-direction, social and cross-cultural skills; productivity and accountability, leadership and responsibility.

Scholars, experts and policy-makers have regarded open and distance education as a central provider of skills acquisition for training students to achieve the required 21st-century skills for the working environment. Levy (2010) emphasises the importance of teaching content-or knowledge-related skills with integrated digital components. According to Van and Voogt, (2018), the digital economy is characterized by globalisation, technological advancements, and accelerated knowledge accumulation. Instead of acting as passive consumers of information, people have the chance to become online knowledge creators. At work, manual and routine work are readily automated or done by robots, while intellectual and interactive tasks increasingly require high-quality human resources.

The digital economy requires employees to adapt to using digital platforms or online tools for social interaction (International Labour Organization, 2020). Employees are now asked to successfully integrate into work and life after university (Kay & Greenhill, 2011; Lauder & Mayhew, 2020). They should have cross-cultural and social skills to communicate effectively with people of diverse backgrounds (Kivunja, 2015). From the viewpoint of Van and Voogt (2018), the concept of 21st-century digital skills is associated with the knowledge worker. In the digital contexts, the generic skills known as information, communication, collaboration, critical-thinking, creativity, and problem-solving skills are identified to fulfil a variety of occupational tasks. Information communication technologies (ICTs) are increasingly used at work to access and deal with information, to communicate with learning communities, to interact and consult with experts and to enter the career world.

The World Bank (2016) identified the most important skills students should obtain to meet the requirements of the digital economy as digital literacy, innovative and entrepreneurial thinking. Basic digital literacy skills will provide students the opportunity to apply for good jobs and develop their careers sustainably. These skills are considered to stimulate students' employability after graduating into the continuously changing workplace and enable them to develop their careers sustainably in the future (Habets et al., 2020; Lawrence et al., 2015).

According to Carretero et al. (2017), digital skills involve six areas. These are information and data literacy (physical and software operations of digital devices), communication and collaboration (browsing, evaluating, and managing digital content), digital content creation (communicating, collaborating, and engaging in citizenship through digital technologies as well as netiquette and digital identity management), safety (protecting devices, personal data, privacy, and health as well as the environment), problem-solving (resolving digital issues, creatively using digital technologies, bridging personal gaps in digital skills as well as computational thinking) and career-related competences (operating specialized digital technologies as well as working with digital content for specific career-related fields).

2.5. Open and Distance Education for Vietnam's Digital Human Resource Development

In the context of the Industrial Revolution 4.0 with new business forms via communication channels and social networks, enterprises in Vietnam have to take advantage of digital platforms as a new technology to create higher added value in order to compete successfully. The development of digital economy on the basis of achievements of science and technology requires qualitative changes in the human resource training system provided to Vietnam's labour market. Vietnam's Decision No. 749/QĐ-TTg declared the "National Digital Transformation Program to 2025, with orientation to 2030", emphasizing the strategies to actively participate in the Fourth Industrial Revolution. This decision has confirmed Vietnam's demand for 10,000 digital transformation human resources by 2025. Currently, there are more than 325,000 organisations and enterprises operating in Vietnam, including corporations, economic groups, large enterprises and banks. With the current application of information technology, Vietnam is predicted to be short of at least 3,000 experts to operate information systems in digital transformation.

The Vietnam Government has set the goal to reach the top 50 e-government countries, with the digital economy accounting for 20% of the total GDP by 2025 and 30% envisioned by 2030. The determination to develop the digital workforce in Vietnam is reflected in the 13th Resolution of the Vietnam Party Congress, which was approved in 2021, specifying research promotion, scientific and technology transfer, innovation, digital transformation, digital economy's development, economy efficiency and competitiveness enhancement.

Digital competencies are provided through formal education and training institutions for students and on-the-job formal training and informal training for learners in the workforce. Obviously, e-learning and blended learning have the potential to enhance access to digital competencies alongside traditional training methods. All undergraduate students in Vietnam's open universities should acquire intermediate digital skills to use digital technology tools to integrate across language, mathematics and science subjects. For students in non-ICT and ICT professions, advanced digital skills involve applying new digital technologies and evaluating content in complex situations. The theoretical content concerning advanced digital skills is provided in relevant undergraduate courses in universities and other tertiary-level courses.

In recent years, Vietnam's open universities have tried their best to innovate training quality and effectiveness of open and distance education. In the period of educational innovation, training quality and effectiveness will be reflected in the knowledge, skills, qualities, professional capacity and dynamism of graduates. High-quality human resources, in other words, a digitally competent workforce, has become the most competitive advantage of Vietnam's organisations in the digital transformation. Building a strategy for digital human resource development in open and distance education to provide students with professional knowledge and technological skills is inevitable in the digital age.

In fact, many of Vietnam's open universities have opened a digital economy training major to meet society's requirements for digital human resources to participate and operate in the digital economy. Vietnam's open universities known as Hanoi Open University and Ho Chi Minh City Open one has implemented bachelor's degree in Digital Business, aiming at training digital human resources equipped with fundamental knowledge and skills in applying digital approaches and tools in the management of business organizations in the context of the industrial revolution 4.0. However, in the context of rapid development of advanced technologies, Vietnam's open universities should upgrade their training models and teaching methods to enhance students' employability skills in terms of digital skills, innovative and entrepreneurial thinking.

2.6. Conceptual Framework

As mentioned in section 2.4, the framework for 21st-century skills comprises three categories: learning and innovation skills; information, media, and technology skills, and life and career skills (Kay & Greenhill, 2011). This helps increase revenues to reinvest in open university operations, which in turn creates more opportunities for students to access practical work and the professional world. The interaction creates a dynamic and practical working and learning environment to help teachers and students catch up with new technology. Along with the association in vocational skills training, open

universities need to cooperate with businesses to improve professional ethics; foster knowledge of rights, responsibilities and labour discipline; and equip students with soft skills and digital competences.

This study was prompted by the World Bank's confirmation that basic information and communication technology (ICT) and coding training help prepare students for the opportunities and challenges of the digital workforce (World Bank, 2016). Open and distance education's responsibilities and roles provide graduates with the field-specific knowledge and skills throughout their study programmes to transition between jobs throughout their careers or even move between careers over their working life (Humburg & van der Velden, 2013; The British Academy, 2017). In other words, important career-related skills required by the digital economy result from Priorities in Training Programmes for Digital Skilling and/or digital up-skilling, Technical, Vocational Education and Training (TVET)'s Engagement with the Digital Economy and Building a Learning Ecosystem to provide opportunities for interaction between and among universities, factories and students.

Figure 1 below shows the research paradigm of the study, which presents the Modified Input-Process-Output (IPO) model on digital human resource development in the context of digital transformation and international integration in Vietnam.

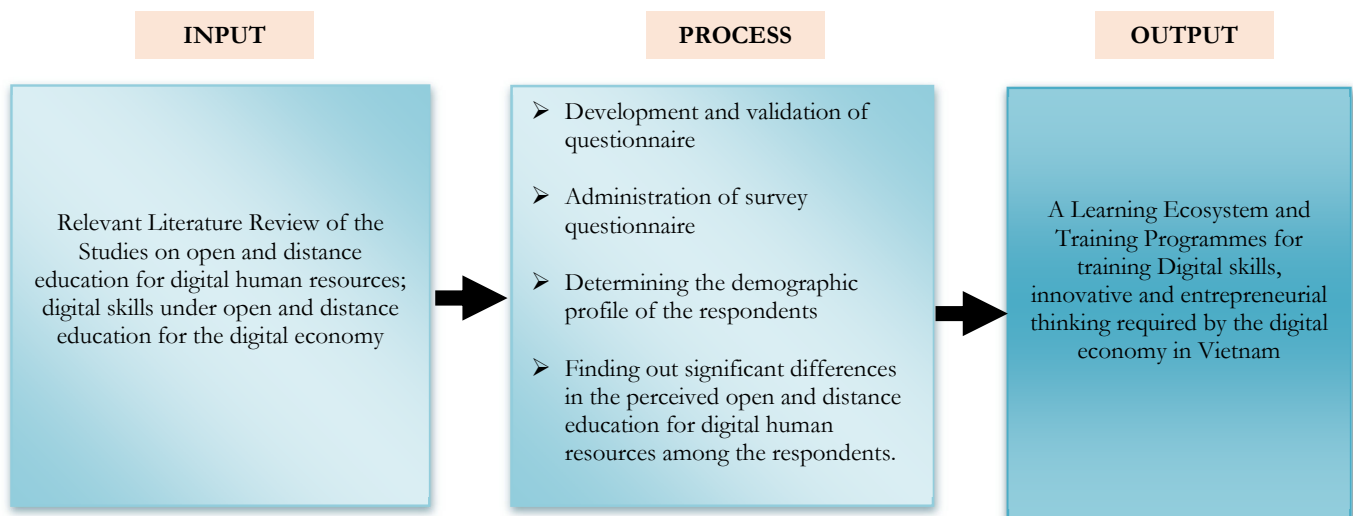


Figure 1. The Modified Input-Process-Output (IPO) Model on Open and Distance Education for Digital Human Resources

3. Methodology

The study used a survey questionnaire to identify employers' opinions towards higher education for digital human resource development in Vietnam. The employers' viewpoints on the most important groups of careers and the top three career-related skills were used as a foundation to make some recommendations for developing digital human resources in Vietnam. The study's target respondents were 225 employers from 10 industrial cities in the North of Vietnam, contacted by email. After a month, 212 valid responses were received.

The survey questionnaire was conducted and regarded reliable to gather the data. There were two parts in the survey questionnaire related to the study's objectives. The first part was to collect the respondents' demographic profile. The second part aimed at identifying the most important groups of careers and the top three career-related skills; and the training programmes' priorities to meet the digital economy's needs, TVET's engagement with the digital economy and open and distance education's specific programme to train digital human resources for sustainable development.

The respondents were provided with statements, to which they could indicate their agreement or disagreement by selecting responses from a five-point Likert scale, from 1 = strongly disagree, 2 = disagree, 3 = neutral (neither agree nor disagree), 4 = agree and 5 = strongly agree. The responses were processed to measure the agreement level in terms of means and standard deviations. The five-point Likert scale with its descriptive ratings was used in the survey as presented in Table 1.

Table 1. Five-point Likert scale for measurement of agreement level

Scale	Range Scale	Descriptive Rating
1	1.00– 1.79	Strongly Disagree (SD)
2	1.80 – 2.59	Disagree (D)
3	2.60 – 3.39	Neutral (N)
4	3.40 – 4.19	Agree (A)
5	4.20 – 5.00	Strongly Agree (SA)

3.1. Reliability of Instrument

The research instrument namely the survey questionnaire was regarded as a reliable instrument to gather the data. The checklist questionnaire was distributed to the respondents after examination and careful review of five (5) experts on human resource development.

3.2. Validation of Instrument

The questionnaire was tested and validated by the experts. Several questions were removed or changed if they were deemed difficult to understand, not necessary or not suitable. Initially, there were seven (7) statements for each of the parameters yet after the validation, an average of four to five statements were retained in each parameter, except for the provisions for employers which had eight (8). The final questionnaires were made up of four (4) parts concerning the respondents’ realisation of at identifying the most important groups of careers and the top three career-related skills; the training programmes’ priorities to meet the digital economy’s needs, TVET’s engagement with the digital economy and open and distance education’s specific programmes to train digital human resources for sustainable development in accordance with the parameters of the study.

4. Findings and Discussion

The survey questionnaire was carried out to collect data on employers’ opinions towards open and distance education for digital human resource development. The respondents were asked to which extent they agreed or disagreed with the proposition on a 5-point Likert scale. The respondents’ opinions on digital human resource development in Vietnam are summarized in the following tables.

Table 2. Employers’ views on the most important group of careers

The most important group of careers are...	Descriptive Statistics		
	Weighted mean	Standard deviation	Descriptive rating
Q1. high tech and engineering; computer and technology.	3.94	0.78	A
Q2. arts, design, entertainment, sports and media.	2.73	0.79	N
Q3. accounting and auditing professions.	2.56	0.75	D
Q4. administrative and clerical.	2.51	0.72	D

Table 2 presents the employers’ opinions on the most important group of careers required by the digital economy. The respondents agreed that the most important group of careers are high tech and engineering, computer and technology with a weighted mean of 3.94. The respondents had neutral views

(weighted mean of 2.73) on arts, design, entertainment, sports and media as the most important group of careers. However, they tended to disagree that two groups of careers, accounting and auditing professions, and administrative and clerical, with weighted means of 2.56 and 2.51 respectively were the most important group of careers.

Table 3. Employers' views on the top three career-related skills

The top three career-related skills are...	Descriptive Statistics		
	Weighted mean	Standard deviation	Descriptive rating
Q5. critical thinking, emotional intelligence, cooperation.	3.36	0.86	N
Q6. complex problem solving, critical thinking and creativity.	3.51	0.82	A
Q7. digital skills, innovative and entrepreneurial thinking.	3.95	0.78	A
Q8. ICT literacy, judgement and decision making and cognitive flexibility.	3.69	0.81	A

Table 3 presents the employers' opinions on the top three career-related skills required by the digital economy. Digital skills, innovative and entrepreneurial thinking were ranked the highest with a weighted mean of 3.95 while ICT literacy, judgement and decision making and cognitive flexibility and complex problem solving, critical thinking and creativity were ranked second and third with weighted means of 3.69 and 3.51 respectively. The respondents had neutral views critical thinking, emotional intelligence, and cooperation with a weighted mean of 3.36.

Table 4. Employers' views on priorities in training Programmes for digital skilling and/or digital up-skilling

Priorities in training programmes for digital skilling and/or digital up-skilling are ...	Descriptive Statistics		
	Weighted mean	Standard deviation	Descriptive rating
Q9. linking and matching programmes of study distribution and local area needs.	3.63	0.84	A
Q10. developing training curriculums to meet the digital economy needs.	3.62	0.89	A
Q11. building quality standard of learning delivery and experts availability in certain areas.	3.60	0.88	A
Q12. scaling up and improving the quality of public courses (MOOCs).	3.61	0.86	A
Overall weighted mean	3.61	0.86	A

Table 4 presents the respondents' viewpoints on priorities in training programmes to meet the needs for digital skilling and/or digital up-skilling with a weighted mean of 3.61 and a standard deviation of 0.86. The respondents ranked linking and matching programmes of study distribution and local area needs and developing training curriculums to meet the digital economy needs the first and second with a weighted mean of 3.63 and 3.62, respectively. The respondents evaluate scaling up and improving the quality of public courses (MOOCs) and building quality standards of learning delivery and expert availability in certain areas. The third and the fourth the weighted mean of 3.61 and 3.60, accordingly. The results of table 3 show that universities should give priority to training programmes to meet the needs for digital skilling and/or digital up-skilling in terms of linking study programmes, developing training curriculums, building quality standards and improving public courses' quality.

Table 5. Employers' views on TVET's engagement with the digital economy

TVET's engagement with the digital economy by	Descriptive Statistics		
	Weighted mean	Standard deviation	Descriptive rating
Q13. providing certified instructors relevant to the economy's needs.	3.60	0.79	A
Q14. developing TVET curriculum to suit the economy's needs in accordance with Industrial Revolution 4.0.	3.81	0.79	A
Q15. improving admission system into TVET programmes to recruit skilful prospective students.	3.83	0.83	A
Q16. using the digital platform for learning and providing information in the labour market.	3.87	0.84	A
Q17. linking TVET education providers with industry collaboration through internships.	3.51	0.86	A
Q18. strengthening Associations and industry engagement in TVET programmes including the teaching factory system.	3.83	0.88	A
Q19. providing tools and practical equipment suited to the economy's needs.	3.87	0.85	A
Overall weighted mean	3.76	0.83	A

Table 5 shows the respondents' viewpoints on TVET's engagement with the digital economy, with a weighted mean of 3.76 and a standard deviation of 0.83. The respondents evaluated two activities, using the digital platform for learning and providing information in the labour market and providing tools and practical equipment suited to the economy's needs, the highest, with weighted means of 3.87. Similarly, the two activities, Improving the admission system into TVET programmes to recruit skilful prospective students and strengthening Associations and industry engagement in TVET programmes, including the teaching factory system, came second, with a weighted mean of 3.83. The last three activities namely Developing the TVET curriculum to suit the economy's needs in accordance with the Industrial Revolution 4.0, providing certified instructors relevant to the economy's needs and linking TVET education providers with Industry collaboration through internships ranked third, fourth and fifth, with the weighted means of 3.81, 3.60 and 3.51 respectively. The results presented in Table 4, illustrate that TVET should engage with the digital economy to meet the needs for digital skilling of the labour markets, in terms of providing certified instructors, developing the TVET curriculum, improving admission systems, using digital platforms, linking TVET education providers, strengthening Associations and industry engagement and providing tools and practical equipment.

Table 6. Employers' views on building a learning ecosystem

Building learning ecosystem to create a learning culture through ...	Descriptive Statistics		
	Weighted mean	Standard deviation	Descriptive rating
Q20. Building quality and quantity of financial management association.	3.85	0.80	A
Q21. Developing a digital platform and offline activities to connect people.	3.94	0.79	A
Q22. Implementing digital learning on learning platform continuously.	3.94	0.79	A
Q23. Applying a blended learning approach to support macro and micro strategies.	3.69	0.79	A
Q24. Building innovation programmes.	3.77	0.81	A
Overall weighted mean	3.83	0.79	A

Table 6 demonstrates the respondents' evaluations on building a learning ecosystem to create a learning culture, with an overall weighted mean of 3.83 and standard deviation of 0.79. The respondents valued developing a digital platform and offline activities to connect people and implementing digital learning on learning platform continuously the most, with a weighted mean of 3.94 for both statements. The respondents ranked building quality and quantity of financial management association the second, with a weighted mean of 3.85. The activities building innovation programmes and applying blended learning approach to support macro and micro strategies came third and fourth, with a weighted mean of 3.77 and 3.69, respectively. It can be inferred from the Table 6 that higher education institutions should to build a learning ecosystem to create a learning culture by applying blended learning approach to support macro and micro strategies and building innovation programmes.

5. Recommendations and Conclusions

5.1. Recommendations

Based on the study's findings and conclusions, the researcher has proposed some recommendations for better training of digital human resources through open and distance education in Vietnam as discussed in the following sections.

5.1.1. Recommendations for policymakers

- i. Issue a policy that establishes a top-priority national goal that all graduates should possess sufficient digital skills to develop their careers sustainably;
- ii. Train digital human resources in terms of developing teachers' competences to teach digital skills, and engaging organisations to supply learning opportunities for students at the workplace;
- iii. Enforce a law requiring all universities to conduct training programmes teaching digital skills;
- iv. Enforce a policy to encourage and support diverse training digital programmes involving universities, employers and young entrepreneurs;
- v. Pass a law permitting educational institutions to establish a national assessment centre to certify students' digital competency levels;
- vi. Enforce the policy to foster students' digital skills through formal and informal training.

5.1.2. Recommendations for administrators of open and distance universities

5.1.2.1. In terms of training programmes

- i. Compile a curriculum that is in line with the needs of the digital economy and the development of the Industrial Revolution 4.0a;
- ii. Utilise digital platforms for teaching, learning and providing information to promote the labour market information processes;
- iii. Strengthen training programme development focusing on the link among university associations, industry and society.

5.1.2.2. In terms of Technical, Vocational Education and Training (TVET)

- i. Improve skilling (through TVET/Technical Education, Vocational Education and Training), up-skilling and re-skilling (both via micro credential/MOOCs);
- ii. Bridge the skills gap between TVET providers and the digital economy through dynamic and practical working and learning environments to help teachers and students catch up with new technologies;
- iii. Expand collaboration between vocational education institutions and the business world through apprenticeship in the digital economy;
- iv. Enhance the quality of university and vocational teaching staff, especially in terms of their digital skills and competences;
- v. Provide facilities and practical equipment infrastructure in accordance with the needs of the digital economy.

5.1.2.3. *In terms of building a learning ecosystem*

- i. Enhance the quality and quantity of the Financial Management Association (FMA) to provide opportunities for interaction among universities, factories and students;
- ii. Build digital platforms and offline activities to connect students with social networks, provide high engagement values and strengthen students' relationships;
- iii. Direct digital learning as Always on Learning platform to keep up with any technological changes and encourage people to seek knowledge by themselves from digital media and social media;
- iv. Apply blended learning approaches to support Macro and Micro strategies to achieve better training results;
- v. Conduct innovation programmes to support and promote entrepreneurship and innovation.

The above-mentioned recommendations are essential for open and distance education in Vietnam to develop digital human resources to meet the requirements of the digital economy. This requires proper policies, intensive strategies and sufficient investment in all aspects of the Government, relating to organisations and universities. Open and distance education institutions should play a core role in undertaking comprehensive and effective measures to develop well-qualified human resources for digital transformation and international integration in order to achieve sustainable development goals.

5.2. Conclusions

Based on the findings of the study, some conclusions concerning Vietnam's open and distance education for digital human resources are drawn. Digital HRD practices in higher education institutions need certain improvements to equip students with sufficient skills and competences to work effectively in the digital economy. The study has identified the most important groups of careers and the top three career-related skills required by the digital economy, the training programmes' priorities to meet the digital economy's needs, TVET's engagement with the digital economy and open and distance education's specific programmes to train digital human resources. As far as the most important group of careers is concerned, the employers determined high tech and engineering; computer and technology. Regarding the top three career-related skills, digital skills and innovative and entrepreneurial thinking were selected. Regarding training programmes' priorities, the employers indicated that open and distance education providers should link training programmes with local area needs, develop training curriculums, build quality learning centres in certain areas and improve the quality of public courses. Referring to the need for digital skills in the labour markets, the employers' responses indicated their view that Technical, Vocational Education and Training (TVET) should provide certified instructors who are relevant to the economy's needs, develop TVET curriculums in accordance with the Industrial Revolution 4.0, improve TVET programmes, use digital platforms for learning and providing information, link TVET education providers with industry collaborators, strengthen associations and industry engagement in TVET programmes and provide tools and practical equipment suitable to the economy's needs. In terms of building a learning ecosystem to create a learning culture, the employers highly appreciated building quality and quantity of Financial Management Association (FMA), developing a digital platform and offline activities, implementing digital learning on learning platforms, applying blended learning approaches and building innovation programmes.

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APPENDIX
Research Instrument

SURVEY FORM FOR EMPLOYEES

TITLE: Open and Distance Education for Digital Human Resources Development in the Digital Economy

THE MOST IMPORTANT GROUP OF CAREERS REQUIRED BY THE DIGITAL ECONOMY

Please use the scale below to evaluate the most important group of careers required by the industry in Vietnam.

PART I: DEMOGRAPHIC AND WORKING PROFILE OF RESPONDENTS

Please fill-up all the items in this questionnaire and kindly tick the space that corresponds to your answer.

1. Name: _____ 5. Gender: _____
 2. Age: _____ 6. Position: _____
 3. Profession: _____ 7. Department: _____
 4. Highest Educational Attainment: 8. Length of Work Experience:
- | | | | |
|-----------------|--------------------------|-----------------------------------|--------------------------|
| Elementary | <input type="checkbox"/> | Less than one year | <input type="checkbox"/> |
| High University | <input type="checkbox"/> | One year to less than two years | <input type="checkbox"/> |
| College | <input type="checkbox"/> | Two years to less than five years | <input type="checkbox"/> |
| Masters Degree | <input type="checkbox"/> | Five years to less than ten years | <input type="checkbox"/> |
| Doctoral Degree | <input type="checkbox"/> | Ten years or more | <input type="checkbox"/> |
- Other Training, please specify: _____

PART II: SURVEY QUESTIONNAIRE

Please use the scale below to evaluate the most important group of careers required by the digital economy in Vietnam.

SCALE	DESCRIPTIVE INTERPRETATION									
5	Strongly Agree (SA)									
4	Agree (A)									
3	Neither Agree nor Disagree (N)									
2	Disagree (D)									
1	Strongly Disagree (SD)									
Open and Distance Education for Digital Human Resource Development					5	4	3	2	1	Results
A. The most important group of careers and career related skills required by the digital economy in Vietnam are...										
<i>The most important group of careers are...</i>										
Q1. High tech and Engineering; Computer and Technology										
Q2. Arts, Design, Entertainment, Sports and Media.										
Q3. Accounting and Auditing Professions.										
Q4. Administrative and Clerical.										
<i>The top three career-related skills required by the digital economy in Vietnam are...</i>										
Q5. Critical thinking, emotional intelligence, cooperation.										
Q6. Complex problem solving, critical thinking and creativity.										
Q7. Digital skills, innovative and entrepreneurial thinking.										

Q8. ICT literacy, judgement and decision making and cognitive flexibility.						
B. The priorities in training programmes to meet the needs for skilling and/or up-skilling through open and distance education are...						
Q9. Linking and matching programmes of study distribution and local area needs.						
Q10. Developing training curriculums to meet the digital economy needs.						
Q11. Building quality standard of learning delivery and experts availability in certain areas.						
Q12. Scaling up and improving the quality of public courses (MOOCs).						
C. In order to meet the needs for digital skilling of the labour markets required by the digital economy, TVET should engage education with the economy by...						
Q13. Providing certified instructors relevance to the economy needs						
Q14. Developing TVET curriculum to suit the economy's needs in accordance with the Intelligence Quotient Framework and Industrial Revolution 4.0.						
Q15. Improving admission systems into TVET programmes to recruit skilful prospective students.						
Q16. Using digital platforms for learning and providing information in labour market.						
Q17. Linking TVET education providers with Industry collaboration through internships.						
Q18. Strengthening Associations and industry engagement in TVET program including the teaching factory system.						
Q19. Providing tools and practical equipment suited to the economy's needs.						
D. Open and Distance education's specific program in Vietnam can be developed to answer Industry 4.0's demands and achieve sustainable development goals through building learning ecosystem to create a learning culture through						
Q20. Building quality and quantity of Financial Management Association (FMA) to provide opportunities for interaction between and among universities, factories and students.						
Q21. Developing a digital platform and offline activities to connect people.						
Q22. Implementing digital learning on learning platforms continuously.						
Q23. Applying blended learning approach to support macro and micro strategies.						
Q24. Building innovation programmes.						