

Developing high-quality human resources in Information Technology - Where are the solutions for Vietnam?

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ABSTRACT: Information Technology (IT) human resource development has been put on the top agenda for all countries' development in the fourth industrial revolution. In this movement, Vietnam also has to deal with a huge gap between the demand and supply of high-quality IT human resources. The paper puts forward five major solutions for the inadequate IT human resources in Vietnam including (i) developing an optimum strategy for high-quality IT human resources; (ii) enhancing the cooperation and networking among different parties including Government, training institutions, businesses; (iii) updating and diversifying the training programs; (iv) regenerating the good model/practice of connecting business - university - technology providers in integrated efforts of IT human resource development; (v) developing an information connecting portal.

KEYWORDS: High-quality human resources; IT; training institutions; businesses; Vietnam.

→ Received 14/4/2020 → Revised manuscript received 22/5/2020 → Published 25/6/2020.

1. Introduction

Information Technology (IT) has been becoming an important area for the development of a nation in the fourth industrial revolution. The IT field covers information security, cloud computing, mobility, IoT (Internet of Things), AI (Artificial Intelligence), Big Data and Robot. As such, all the countries have made a great investment in training high quality IT human resource served for their economic development over the past decades. However, many countries have still been dealing with a considerable shortage of personnel in this field. For example, the Ministry of Economy, Trade and Industry of Japan (2018) estimated that the country is going to lack 369,000 IT engineers in 2020 and 789,000 by 2030.

Meanwhile, the study of Cisco and Oxford Economics (2018) claimed that despite more jobs created owing to the economic growth with improved technology in light of the fourth industrial revolution, around 400-800 million people lost their jobs. As such, the training to transfer vocational and skills in which IT plays an important role has been adopted as the strategic solution for optimum job displacement of current redundant human resources. This study also revealed the number of job displacement by 2028 in Singapore (500,000) (equivalently 21% of workforce), Indonesia (9.5 million) (8%) and Vietnam (7.5 million) (14%) (Figure 1). Unfortunately, it is also

noted that the ASEAN displacement workforce has not been ready to fill in these new roles. Markedly, 41% of that 6.6 million cohort are 'acutely lacking' the IT skills new jobs will be demanding. Almost 30 % lack 'interactive skills' that will be required by future vacancies.

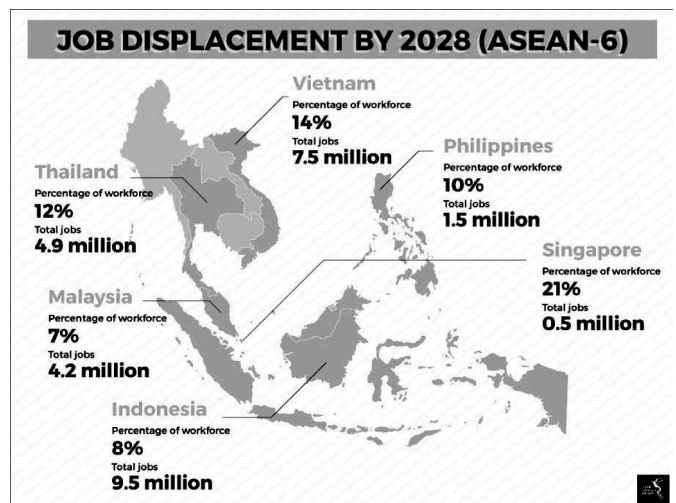


Figure 1: Job displacement by 2028 (ASEAN-6) (Source: Cisco and Oxford Economics, 2018)

According to the General Statistic Office's report (2018), Vietnam's workforce increased from 48.7 million people in 2010 to 54.4 million in 2016. The proportion of trained workforce accounted for 40% in 2010, scaled up to 53% in 2016. However, Vietnam remains to be

the country with the highest percentage of low-skilled workforce(41%) and quite low proportion of high-skilled labourers (only 10%) in comparison with other ASEAN countries, for example, Singapore (8% and 55%) and in Malaysia (13% and 25%) accordingly (Figure 2).

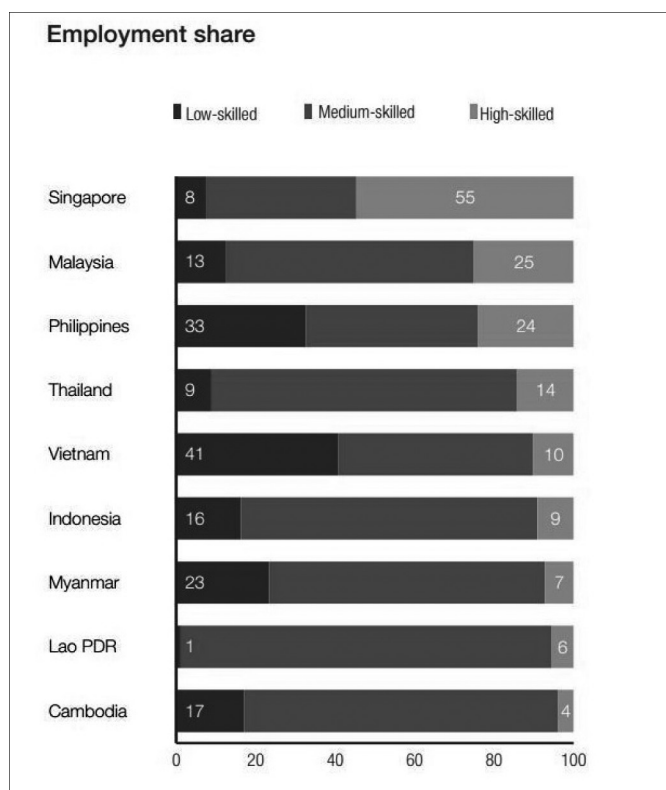


Figure 2: ASEAN employment shares by skill levels (Source: OECD/ERIA, 2018)

2. Demand for high-quality IT human resources

In this situation, Vietnam has been putting high priority on developing high-quality human resources in general

and in IT sector in particular. In its Resolution No.02/NQ-CP dated 1st January 2020, Government of Vietnam emphasizes the improvement of business, investment environment and national competitiveness, in which the development of high-quality human resources is put on the top agenda. Additionally, Instruction No. 01/CT-TTg dated 14th January 2020 on the development of digital businesses and Instruction No.01/BTTTT on 3rd January 2020 on the development orientations in Information and Communication sector lay foundation for the development strategy of digital business and the ultimate goal of “National Digital Transformation in the year 2020” and by 2030, the achievement of one digital business per 1,000 people. In this spirit, a great demand for high-quality IT human resources will be seen in many sectors.

Table 1 shows that the average growth rate of all businesses is nearly 8.6% while it is more than twice of that for IT producers (approximately 18.7%) and more than 10% for the IT related businesses.

Likewise, a remarkable growth in workforce in IT related business (over 15%) compared with that of total workforce of all business (around 4.2%). Notably, the growth rate of nearly 24% is observed for the IT producers (Table 2).

According to the survey of Vietnamworks (2019), 53% IT companies will recruit 10-30% workforce in 2019, while 26% businesses need 30-50% of their workforce to fill their vacant IT jobs. Remarkably, nearly 9% of companies recruit more than 50% workforce in IT jobs in 2019.

According to Topdev’s forecast (2019), Vietnam needs

Table 1: Total number of Vietnam’s businesses and IT related ones (Source: Business Survey of VNIES, 2018)

	Total number of businesses	Of which			Total
		IT producers	IT Business	IT related trade, distribution	
2012	341,925	525	6,601	6,360	13,486
2013	358,493	604	7,284	6,675	14,563
2014	380,005	696	7,917	7,051	15,664
2015	415,640	944	8,622	8,073	17,639
2016	455,298	997	9,477	9,003	19,477
2017	517,695	1,211	10,513	10,156	21,880
Growth rate (%)	8.58	18.66	9.58	10.12	10.24

Table 2: Total number of workforce in IT related business (Source: Business Survey of VNIES, 2018)

	Total number of workforce	Of which			Total
		IT producers	IT Business	IT related trade, distribution	
2012	10,261,453	170,401	65,203	102,841	338,445
2013	10,839,619	210,380	68,975	157,536	436,891
2014	10,993,729	272,279	73,399	157,164	502,842
2015	11,362,701	310,769	75,870	159,776	546,415
2016	12,091,809	411,660	77,116	127,914	616,690
2017	12,749,247	494,528	81,926	148,051	724,505
Growth rate (%)	4.22	23.80	4.41	3.53	15.10

a large number of IT personnel and will consequently encounter a serious shortage in the coming years. It is predicted that in 2019 Vietnam still have a shortage of 90,000 IT personnel. This number is soaring to 190,000 by 2021 (Figure 3).



Figure 3: Vietnam IT personnel Forecast in 2019-2021 (Source: Topdev, 2019)

Figure 4 discloses a sharp increase in recruitment demand for IT workforce from 12,550 jobs in 2015 to 62,829 ones in 2019 (over 400%). The average growth is nearly 50% annually for the past 5 years. Meanwhile, only 50,000 graduates from IT major every year on average. As a result, a huge demand and supply surplus of IT human resources is now a great concern for the policy makers and training institutions.

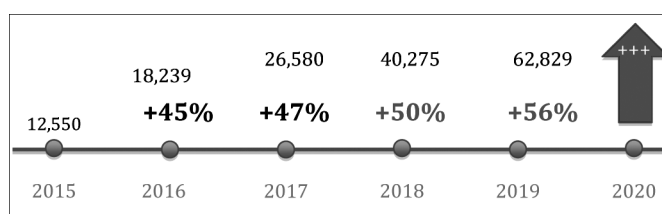


Figure 4: Demand for IT human resource recruitment by year (Source: TopDev, 2019)

3. Supply of high-quality IT human resources

Currently, among more than 400 universities and colleges in Vietnam, there are 153 Information Technology training institutions (37.5%), about 50,000 Information Technology students graduate from schools

each year (Topdev, 2019). According to statistics from the Information and Communication Strategy Institute (Ministry of Information and Communications), 72% of IT graduates have no practical experience; 42% lack of teamwork skills, 80% of programmers have to serve additional trainings. As such, the provision of adequate IT human resources has been becoming a main point for Education sector and Information Technology businesses in order to meet the jobs demand in this field.

Vietnamworks (2019) reveals that nearly 80,000 IT staff will be graduating in 2017 and 2018, but less than 70,000 ones by the end of 2018. The growth of supplying IT human resources is only 8% per year. "The Ministry of Information and Communications said the total number of people in the IT industry is over 600,000, of which about 300,000 are employed in the hardware and electronics industries. The rest belong to the software industry and the digital content industry. Thus, Vietnam needs about 1.2 million IT staff by 2020". This challenges Vietnam to supply sufficient IT workforce for its economic development under the context of fourth industrial revolution as noted.

Notably, the training programs in IT major of almost all IT training institutions have been assessed not to meet the development needs of the society, particularly the requirements for high-quality IT workforce. From the survey of VNIES (2018), there are some following challenges for the provision of good training programs of high-quality IT graduates:

(i) Primarily theoretical oriented training program with out-of-date contents. The programs have not yet met the development dynamics of the society and learners.

The limited practicing time for IT students has been reported by the teaching staff and students owing to the poor cooperation between businesses/companies and training institutions; and very few opportunities for

students to develop their initiatives on IT innovations. The poor trust between businesses and training institutions in terms of training & research capacity, investment capacity, quality of management, property rights, has been recognized to be a big barrier for their cooperation. Additionally, some difficulties from businesses hindering their active cooperation include constraint of budget, unclear commitments, inadequate technological capital, cumbersome system against innovation, short-term investment preference in the purpose of purchasing “technology” and “human resource” served their immediate development. Meanwhile, some obstacles for training institutions are ineffective management system, traditional habit of teaching available program and doing some government research for improving income, unavailability of IT products for know-how transfers.

(ii) Inadequate learning conditions such as modern equipment and materials, etc.

The constraint of budget for upgrading infrastructure and facilities (such as laboratories, materials, computing system, demonstration models, etc.) challenges the provision of quality training program and research in the IT training institutions.

(iii) Poor capacity of lecturers in IT major (only 27% of lecturers with PhD degrees): the current salary and incentive policies cannot attract the qualified teachers, particularly under the context of high incomes offered for IT experts in response to the huge demand for high-quality IT human resources from businesses. In practice, the salary range for IT jobs is from 18 to 25 million VND per month (40-50 million VND per month for DS&AI experts). Moreover, the current IT lecturers have very few in-service training courses to improve their capacity and/or do their own research in this area owing to the constraint of budget.

As a consequence, the IT graduates fail to meet the fundamental requirements for jobs as below:

(i) Poor core knowledge about IoT, Big Data, AI, Block chain, etc.

(ii) Independent research skills, self-learning capability in order to access to updated technologies;

(iii) Entrepreneurship and innovation skills;

(iv) Teamwork skills and English language capability;

4. Solutions for developing high-quality IT human resources

In response to the current dilemma, the paper puts forward 5 major proposed solutions in order to narrow the gap between “supply” and “demand” for high-quality IT human resources in Vietnam. The following solutions should be adopted in an integrated and holistic approach

for all concerned stakeholders including Government agencies, training institutions, businesses, civil society organizations and community.

4.1. Developing an optimum strategy for high-quality IT human resources

The strategy for high-quality IT human resource development should be prepared on the basis of employment and labour market forecasts that are provided by the national forecast centers. The different reliable sources of data should be explored and made use of during this process. The important sources of data can be taken into consideration such as survey of businesses, reports of concerned educational/training institutions, employment information databases and/or reports provided employment service centers such as Vietnamworks, employment service centers of provinces. Although the statistical data can be used, several shortcomings of this source need to be cautious: (i) inadequate and unspecific data on sectors, training majors, recruitment demands by majors, required skills; (ii) out-of-date information owing to a shortage of timely updated data system, absence of monthly, quarterly and seasonal surveys. The data those are usually extracted from and used for the forecast belong to the 3- 5 year surveys; (iii) low reliability of data due to the inadequate quality of surveys and methodologies. The surveys on labour market and employments conducted by many organizations and agencies provide the different findings and data. The inconsistency of the data sources among ministries and agencies like the percentage of trained labourers/workforce... challenges the forecast work.

4.2. Enhancing the cooperation and networking among different stakeholders in order to improve the quality of high-quality IT human resources

The cooperation between Government, businesses and training institutions plays an important role in improving the quality of IT human resource development. Importantly, the roles of these stakeholders need to be clarified in order to ensure its effectiveness and efficiency of the research – training – application cycle.

The government can make changes in the management system and operating mechanism on IT human resource development by reinforcing the monitoring and inspection roles of Ministry of Education and Training, holding the training institutions to be accountable for the training quality, promoting commitments and engagement of businesses in IT training programs and their accountability of recruitment plans. Additionally, the government also ensures the improvement in policies in order to strengthen the flexibility and creativity for IT

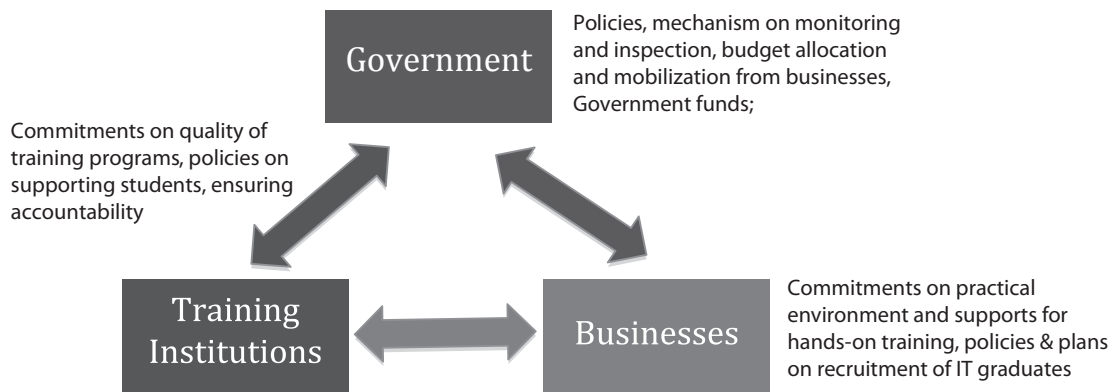


Figure 5: Roles of key stakeholders in high-quality IT human resource development

human resource development (Figure 5). Particularly, the Government supports the policies on enhancing the cooperation between training institutions and businesses by issuing regulations on joint training mechanism, budget allocation mechanism under the technology law, privileges supporting mechanism for businesses that provide supports on training and research for IT training institutions, focused investments in some effective training institutions.

The training institutions conduct research and facilitate the engagement of whole society in supporting IT training programs. They are also responsible for updating the training program with core and state-of-the-art technologies and promoting the international cooperation with relevant partners in order to build capacity for teachers and students through possible joint-training programs and academic exchanges. They make strong commitments on the quality of training programs with students and their parents and also businesses; and take the high accountability of their quality.

The businesses make strong commitments on creating practical environment and providing supports for hands-on training modules. They also share with the training institutions about the requirements for IT human resources in the future and support them to develop the updated and relevant training programs. Particularly, the businesses are willing to put the research results achieved by the training institutions into their operation and regenerate these results. In some cases, the businesses actively support certain budget for upgrading the teaching & learning conditions and research in the IT training institutions, scholarship grants for excellent students and build capacity for teachers with the in-service training courses. Ideally, the research and development division of businesses can involve in supporting the training institutions in teaching and research process. This can create opportunities for narrowing the gap between

the demand and supply in terms of the quality of IT graduates.

The cooperation between Government, training institutions and businesses starts from the development of the strategy of IT human resources to the design of training programs, students selection, training delivery, know-how transfer and graduates' transition into labour market.

Additionally, the networking between training institutions and research institutes and within training institutions themselves also make a significant contribution to solving the difficult question of big gap between supply and demand for high-quality IT workforce of Vietnam. Some models proves to be successful in the joint efforts for high-quality IT human resource training. For example, Vingroup signed the cooperation contracts with 54 universities in IT sector in which it has made strong commitments on receiving around 100,000 IT graduates within 10 years and funding 100 postgraduate scholarships by VINIF. The Samsung Mobile Research and Development Center in Vietnam launched the Samsung Talent Support Program in 2012 that has been providing the scholarships for final-year students and the short training courses. Besides, it also signed contracts with nine universities with total funding of 8.5 billion VND. Some big companies including IBM, Microsoft, VNPT, FPT, BKAV, etc. also actively support the IT training universities and colleges in their training programs in terms of materials, scholarships, facilities (computers, softwares, etc.).

4.3. Updating and diversifying the training programs on the frequent basis in order to satisfy the demands of labour market

As noted, the inadequate and out-of-date training program is one of the main reasons for the poor capacity of IT workforce. The typical features of IT sector include the fast development of technologies such as AI, IoT, block chain, etc.; necessary skills of workforce adapted

to global labour division; start-up skills new to students. Therefore, the training programs need to flexibly be redesigned and updated to labour market demands. The contents of new curriculum should focus on Big data, AI, IT security, media technologist, data analyst, mechatronics, etc. and develop the 21st century skills. The competency based teaching and assessment method and experimental pedagogy should be adopted in the training program so as to meet the newly emerging requirements of labour markets for IT employments.

The training programs need to be diversified with the emphasis on online practice system, collaboration projects and experience in research and development environment through the practicum, internship programs and Open Day. University of Sciences and Technology provides a wide range of training programs for students' options such as talent education program, advanced program, engineers of excellence program, international professional English program, Vietnamese-Japanese information technology program. These training programs aim at training the high-quality IT graduates who can satisfy the requirements of labour market in the fourth industrial revolution.

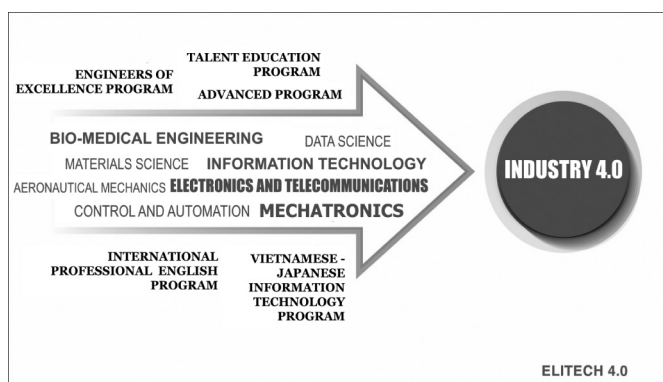


Figure 6: IT Training Programs of University of Sciences and Technology

The training programs have been improved in the directions of increasing the number of students of the advanced and integrated training programs and the joint training ones with international universities.

4.4. Regenerating the good model of connecting business - university - technology provider in efforts of IT human resource development

“Roadshow” is known as a good model developed by the Ho Chi Minh Computer Association (HCA) of connecting business – university – association. The roadshow is initiated with an aim of bridging the gap on high-quality IT human resources and huge costs of “retraining” for IT graduates from the training institutions

and involving the association in improving the quality of IT human resource training.

HCA (2019) discloses the key interventions of this model as follows:

*The organization of around 100 exchange meetings in more than 50 universities and colleges in Ho Chi minh city and other provinces (including Binh Duong, Khanh Hoa, Can Tho and Lam Dong) with the participation of approximately 50,000 students, businesses leaders, IT experts and university/college representatives. Speakers for these meetings are CEO of businesses, IT experts.

* The development of transformative training program: After 10 years, the training program has been finalized in response to needs of students and businesses. It has been designed with the focus on three main dimensions: (i) international visions, start-up from ideas to reality, intellectual properties and ethical professional standards; (ii) new technologies (AI, IoT, Block chain, third platform, information management systems like ERP, SCM, CRM, Securities, etc.) and emerging needs of businesses and new development tendencies in Vietnam and the world; (iii) soft skills in IT sector (i.e. teamwork skills, self-learning skills, foreign language, interviewing skills) and business culture (Figure 7).

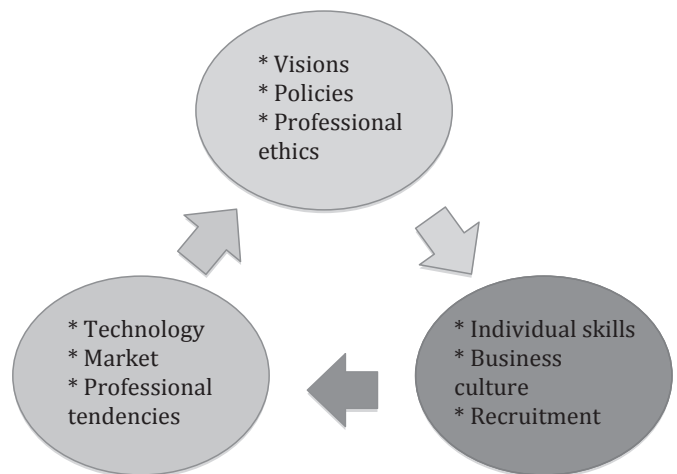


Figure 7: Dimensions of Transformative Training Program (HCA, 2019)

* The establishment of a Learning and Sharing Network among the universities and colleges in IT sector:

HCA connects and promotes the exchanges among the universities and colleges such as Ho Chi Minh Industry University, Information Technology University, Telecommunication Institute, Van Lang University, Ton Duc Thang University, Ho Chi Minh University of Technology and Education, Hufit University; Ho Chi Minh college of Information Technology, Nguyen Tat Thanh University, International University – Ho Chi

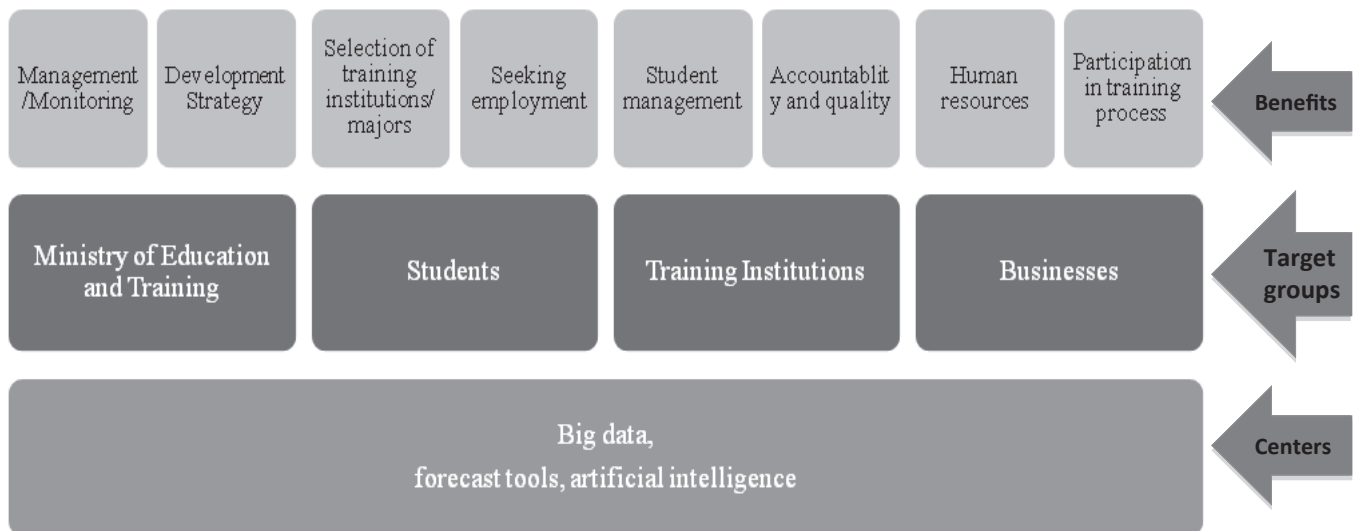


Figure 8: The development of an information connecting portal (VNIES, 2018)

Minh National University, HUTECH, Vietnam-German University, Van Lang University, Can Tho University, University of Sciences and Technology, Greenwich University, Economics University, Open University, etc.

The assessment of this model receives the positive feedback and good results from different stakeholders. For students, Roadshow is a useful program for students with practical contents, strong dynamics, open-mindedness and self-confidence through a series of its events. For training institutions, this model enables them to accommodate the new technology tendencies, to deliver effective training on practical knowledge and soft-skills for students, to adapt the training program to needs of businesses and particularly to link their training program with businesses' working environment through a series of practicum/internship programs. For businesses, this model creates opportunities for them to access to potential young workforce, to transmit their professional messages, technology trends and recruitment demands to the youth, to take their responsibility for community and make significant contributions to the training programs. As such, with the Roadshow model, HCA has effectively supported the IT human resource development in line with the development directions of "IT human resource training and development program of Ho Chi Minh city for the period of 2017-2020"; the proposal on Vietnam's sustainable intelligent urban development for the period 2018-2025 and towards 2030 as stated in Decision No.950/QĐ-TTg 2018; and the proposal on "Developing Ho Chi Minh City to become an intelligent city from 2017-2020 with vision towards 2025". This model shows a successful practice in connecting businesses with training institutions and vice versa.

4.5. Developing an information connecting portal

An information connecting portal for big data, forecast and artificial intelligence centers needs to be developed for the access of different target groups including but not limited to Ministry of Education and Training, training institutions, businesses and students in order to secure the achievement of the sustainable and optimum IT human resource development. This brings about lots of benefits for IT human resource development such as effective management and monitoring of the IT workforce training and utilization, development strategy, optimum selection of training institutions and majors for students and businesses, easier seeking employment, effective student management, improved accountability and quality of training programs, diversified choices of human resources, and active participation in training process (Figure 8).

Four resources (including technology, data, finance, and experts) will be needed for the development of this portal with the participation of the mentioned key stakeholders.

5. Conclusions

The context of integration and the trend of the fourth industrial revolution are opening up many opportunities and challenges for Vietnamese businesses, training institutions and graduates in IT sector. Vietnam can only seize the opportunities if the human resources meet the demands and requirements of labour market and development tendencies. The low percentage of high-skilled jobs (only 10%) compared to the global average for upper-middle-income countries (20 percent) reduces Vietnam's attractiveness to businesses. In fact, Vietnamese workforce remains limited in terms of

soft skills, foreign language skills, teamwork skills, information technology skills and creativity. In face of the current inadequacies in the quality and quantity of IT human resources, an integrated effort from all parties will be needed. This includes government agencies, businesses, training institutions and technology providers that will have to work collectively to provide the quality of training and effective utilization of IT human resources. Notably, the adoption of 4.0 technology solutions to the

training programs will quickly improve the quality of human resources. On this journey, a dynamic and active environment rather than conventional one will ensure the success of sustainable high-quality IT human resource development. In this spirit, the radical reforms in training structure, management and cooperation mechanism, and massive policy changes within education systems and training program are required so as to achieve the transformation of digital manpower.

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**** This article uses the results of the research project, code KHGD/16-20.DT.001, under the National Science and Technology Program for the period 2016-2020.**