



Malaysian Industrial Collaborations for Skills Development in 4th Industrial Revolution

Sohimi, N. E.¹, Affandi, H.M.^{2*}, Rasul, M.S.³, Yasin, R. M.⁴, Nordin, N.⁵ & Adam, S.⁶

^{1,2} Centre for Engineering and Built Environment Education Research, Faculty of Engineering and Built Environment, The National University of Malaysia, Bangi, 43600, MALAYSIA

^{3,4,5,6} Department of Teaching and Learning Innovation, Faculty of Education, The National University of Malaysia, 43000 UKM, Bangi, Selangor, MALAYSIA

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Abstract: The fourth industrial revolution (4IR) is a new revolution with a combination of communication, IT data and physical system, also known as a cyber-physical system. The arrival of 4IR in Malaysia needs collaboration from industry player and institutions in developing the skills that merge in 4IR because through this collaboration the competency of the workforces can be increased. This study is conducted to identify the strategic plan that can use as a guideline by Department of Skills Development in collaboration with the industry and institutions for skills development in 4IR. A qualitative survey research design within a focus group was adopted in this study. The focus group discussion has been done involving members of the Department of Skills Development Malaysia, an academician from the different institutions in Malaysia and industrial players from a various industry in Malaysia. The findings show ten strategic plan that can be used as a guideline by the Department of Skills Development in order to develop a skill for 4IR which are designing assessment of industrial training with employers, strengthens industry involvement in curriculum development, identify industries that have the interest/needs of the institutions and create industry requirements for the institutions. Next, the education and training provider must be open and create platform to accept industry opinions, appoint suitable experts from 4IR industries for NOSS development, penetrate international standard (dual certification) and emphasis industry collaboration with training providers to employed workers. Moreover, industry and institutions have to collaborate to sharing resources (skills, knowledge, facilities and funding), reskilling and upskilling workers using train the trainer approach collaborate with industry expert and lastly is collaboration or partnership with industry.

Keywords: Fourth industrial revolution (4IR), industrial collaboration, skills development, industry player, institutions.

1. Introduction

The fourth industrial revolution (4IR) or Industry 4.0 is a technology system that introduces the latest advances in line with smart technology in the future (Periera & Romero, 2017). The 4IR will bring together the digital and physical worlds through the Cyber-Physical Systems (CPS technology), embracing a set of future industrial developments that will allow the improvement of productivity and efficiency among the companies that are adopting this new manufacturing paradigm (Schmidt, Möhring, Härting, Reichstein, Neumaier, & Jozinović, 2015). Industry 4.0 holds huge potential, and it will provide a set of economic and social opportunities through the paradigm shift regarding work organisation, business models and production technology (Carvalho, Chaim, Cazarini, & Gerolama 2018). However, skills development is one of the areas that will be impacts and influence by 4IR (Periera & Romero, 2017). Skills development, is one of the most important key factors for successful adoption and implementation of 4IR. The development of workforces for 4IR shows

*Corresponding author: haryantima@ukm.edu.my

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the important of TVET system to prepare the Malaysian student towards 4IR because in the future, 80% of the businesses will establish global networks that incorporate their machinery, warehousing systems and production facilities in the shape of Cyber-Physical Systems (CPS) capable of autonomously exchanging information, triggering actions and controlling each other independently (Kagermann, Lukas, & Wahlster, 2011). The future work vision will demand new competencies, and it is necessary to create opportunities for the acquisition of the required skills through high-quality training (Erol, Jäger, Hold, Ott, & Sihm, 2016). Thus, the industry and institutions collaboration much more urgent in addressing the skills development for the 4th Industrial Revolution. Therefore, this study has been done to produce a strategic plan in collaboration with the industry for skill development in 4IR. The objective of this study is to identify industry collaboration in the implementation of skills training and the requirements and use of standard skills for the industry.

1.1 Industrial Collaboration Between Industry and Institutions

Collaboration between institutions and industries for skills development is very important through education and training, adoption of knowledge (innovation and technology transfer) and the promotion of entrepreneurship (start-ups and spin-offs) (Guimón, 2013). Also, through a collaboration between firms can strengthen their networks, helping in promote the capabilities necessary to successfully translate market opportunities and managing the human capital (Roshani, Lehoux, & Frayret, 2015). Collaboration may be formal or informal, from formal equity partnerships, contracts, research projects, patent licensing, and so on, to human capital mobility, publications, and interactions in conferences and expert groups, among others (Hagedoorn, Link, and Vonortas 2000).

2. Methods

A qualitative survey research design within a focus group was used to collect the data for this study. The qualitative type of survey does not aim at establishing frequencies, means or other parameters but at determining the diversity of some topic of interest within a given population (Jansen, 2010). A focus group discussion is a form of group interviewing in which a small group – usually 10 to 12 people – is led by a moderator (interviewer) in a loosely structured discussion of various topics of interest (Mishra, 2016). In this study, the focus groups assisted in identifying the most relevant issues to be discussed during the discussion session. A total of 24 individuals participated in these focus groups session consist of 3 members from Department of Skills Development Malaysia, three academicians from the different institution in Malaysia and 18 industrial players from a various industry such as construction, marine, agriculture, etc. This focus group discussion was conducted by a moderator from The National University of Malaysia. The moderator is responsible for facilitating the discussion, prompting members to speak, requesting overly talkative members to let others talk, and encouraging all the members to participate (Krueger, 1994).

The qualitative instrument of this study was developed through literature reviews analysis. The instrument of this study was a set of questions consist of seven questions based on the objectives of this study. All the questions in the focus group discussion were checked and confirmed by the expert from the Department of Skills Development Malaysia. The questions are: (1) Are you aware of 4IR? (2) Do you think that 4IR and skills training collaboration are important? Why? (3) What are the factors that influence the involvement of the industry to engage in skills training? (4) How does the large industry help the small industry in the development of skills training? (5) How does the industry improve the competencies of trainees after undergoing skill training in both hard skill and soft skill? (6) How does the existing standard skills meet the needs of the current industry? (7) What are the recommendations by the industry for skills training collaboration and development of standard skills? The data from the focus group session was collected using recording audio. The entire audio transcribed and the data were analysed using thematic analysis to identify the code and the theme. The thematic analysis has been done using a computer-aided qualitative data analysis software which is ATLAS.ti.

3. Results

3.1 Focus Group Analysis

Based on the thematic analysis using ATLAS.ti software, the focus group result show there are ten themes. These themes were identified by the experts as the strategic plan that needs to consider by the Department of Skills Development, Ministry of Human Resources in collaboration with the industry and institutions for skills development in 4IR which are:

- i) Designing assessment of industrial training with employers
 The result from the Atlas.ti shows the respondents view in designing assessment of industrial training with employee

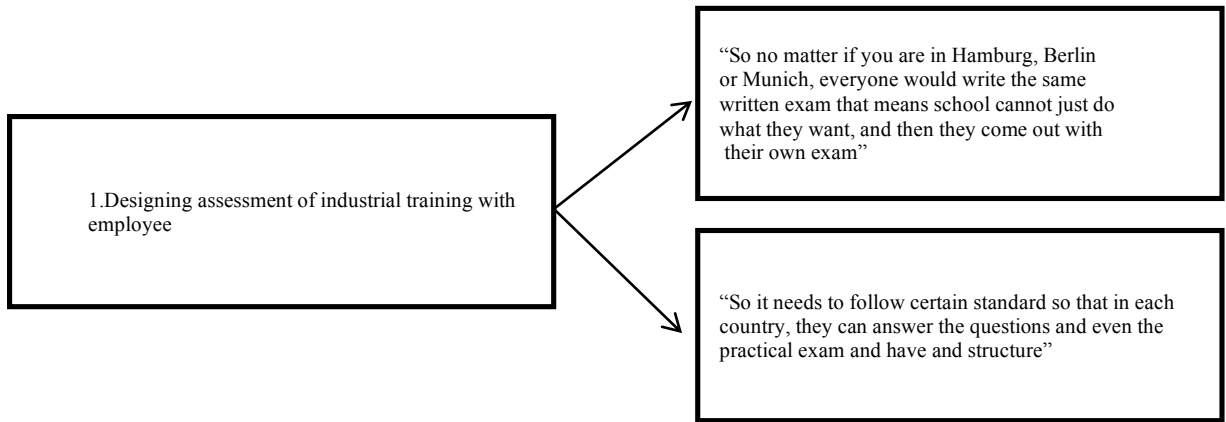


Fig. 1 – Result of theme 1 based on the Atlas.ti network result

- ii) Strengthens industry involvement in curriculum development, teaching, and learning
 The result from the Atlas.ti shows the respondents suggestion in strengthens industry involvement in curriculum development teaching and material.

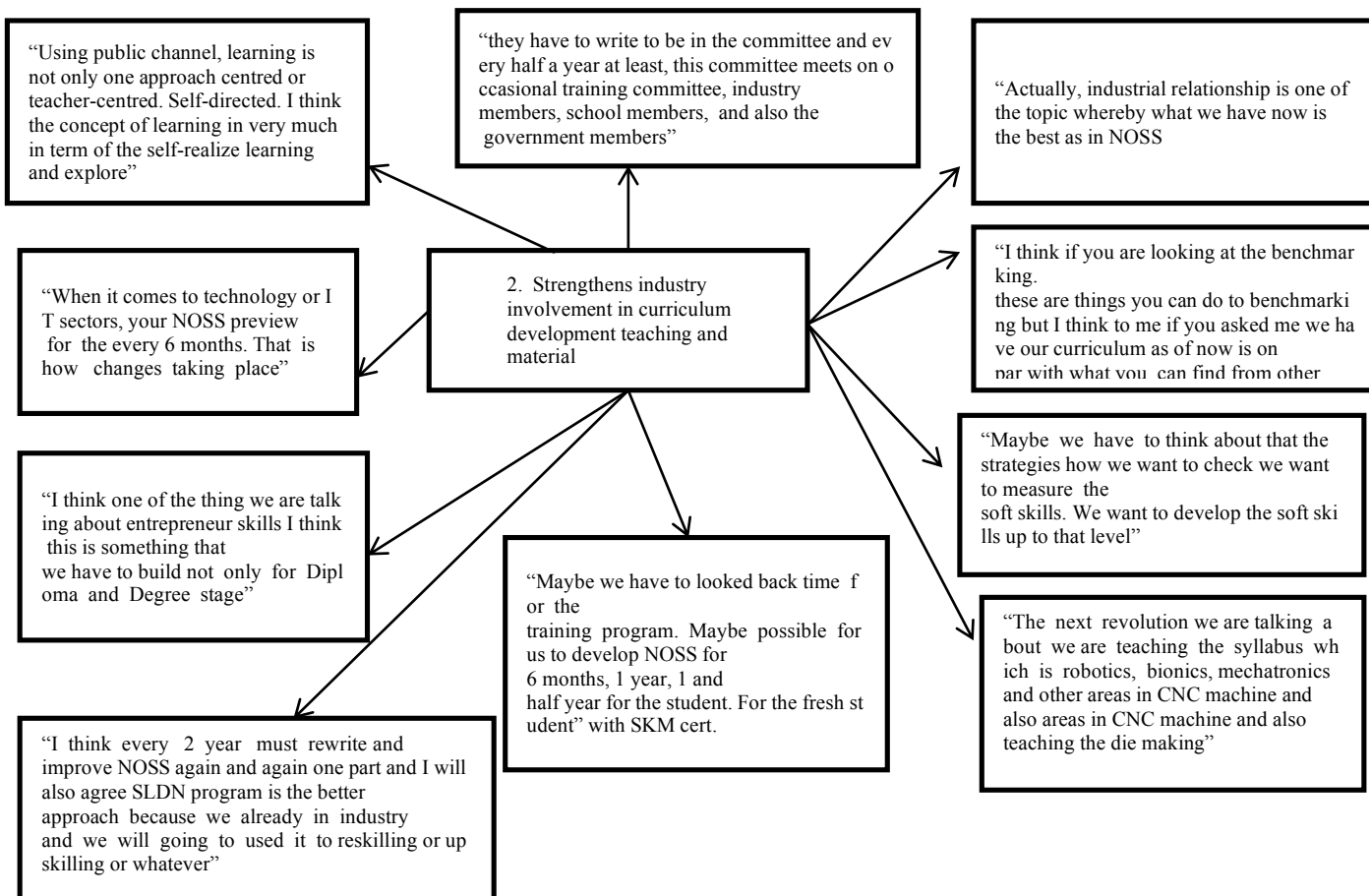


Fig. 2 – Result of theme 2 based on the Atlas.ti network result

- iii) Identify industries that have the interest/needs of the institutions and create industry requirements for the institutions
 The result from the Atlas.ti shows the respondents view in identify industries that have the interest / needs of the institutions and create industry requirements for the institution.

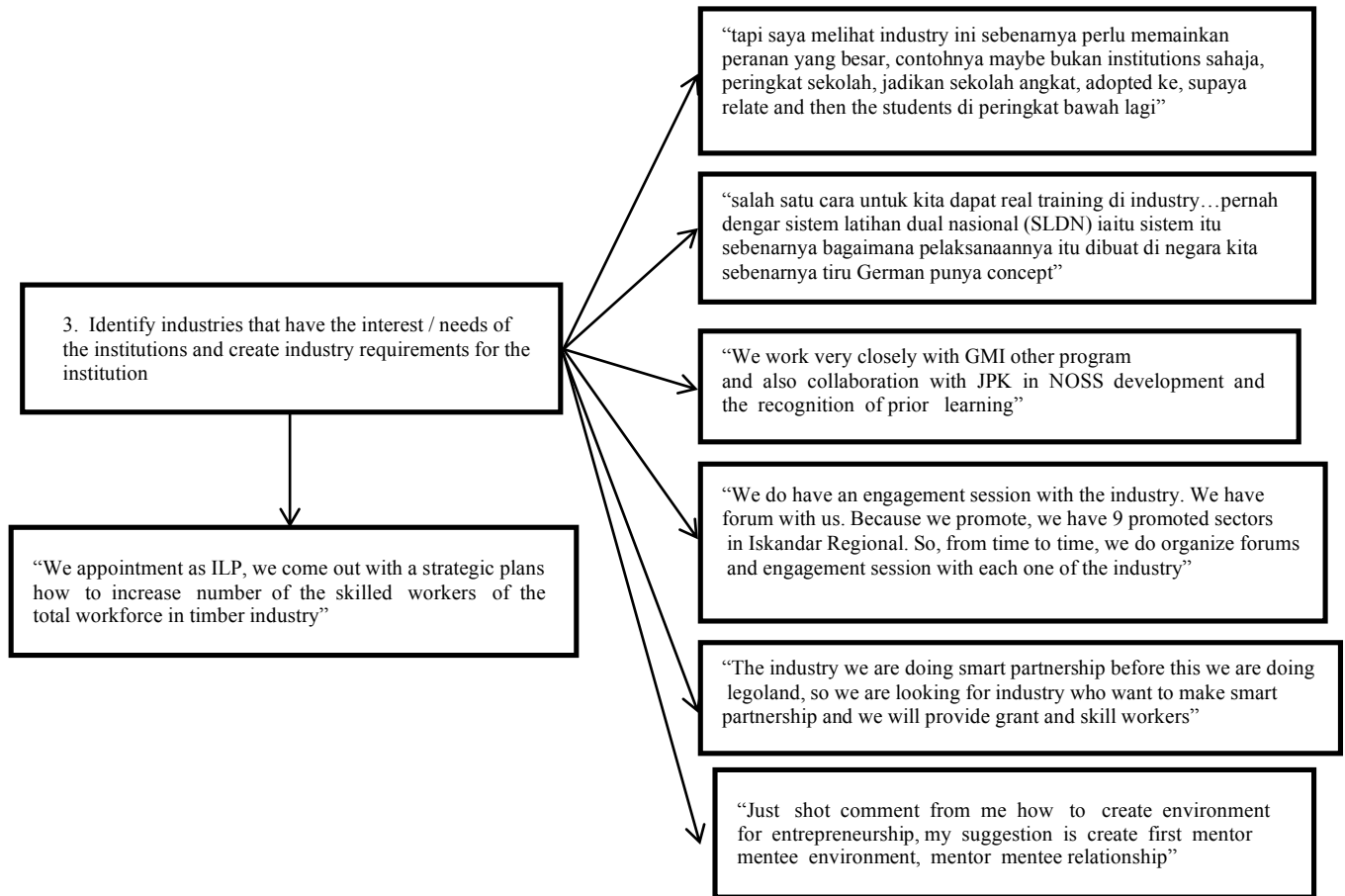


Fig. 3 – Result of theme 3 based on the Atlas.ti network result

- iv) Education and training provider must be open and create a platform to accept industry opinions
 The result from the Atlas.ti shows the respondents suggest to establish a collaboration between education and training provider and industry.

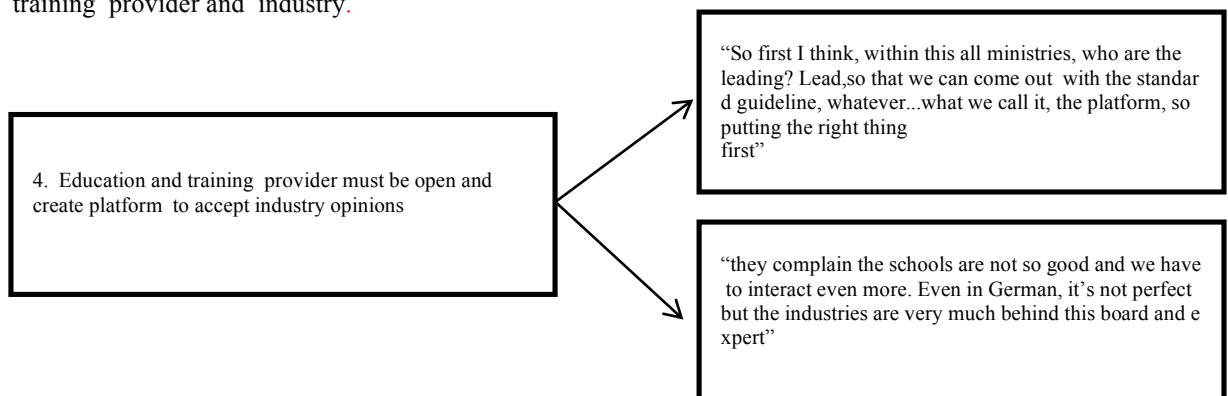


Fig. 4 – Result of theme 4 based on the Atlas.ti network result

- v) Appoint suitable experts from 4IR industries for NOSS development
 The result from the Atlas.ti shows the respondents suggest to appoint a suitable experts from 4IR industries in developing NOSS standard.

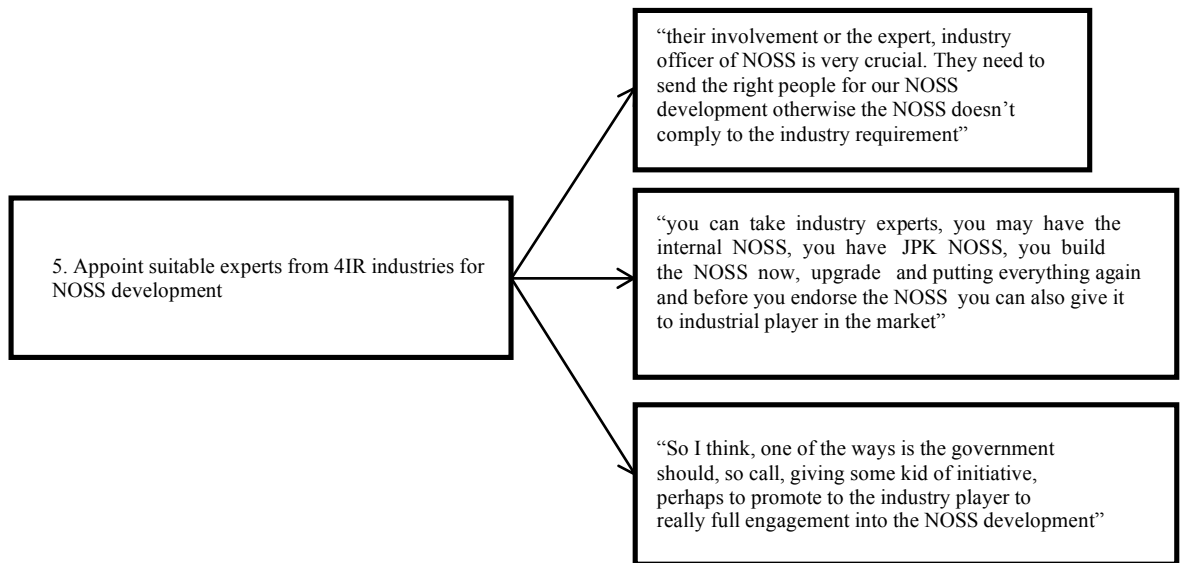


Fig. 5 – Result of theme 5 based on the Atlas.ti network result

- vi) Penetrate international standard (dual certification)
 The result from the Atlas.ti shows the respondents suggest to adapt a dual certification in Malaysia.

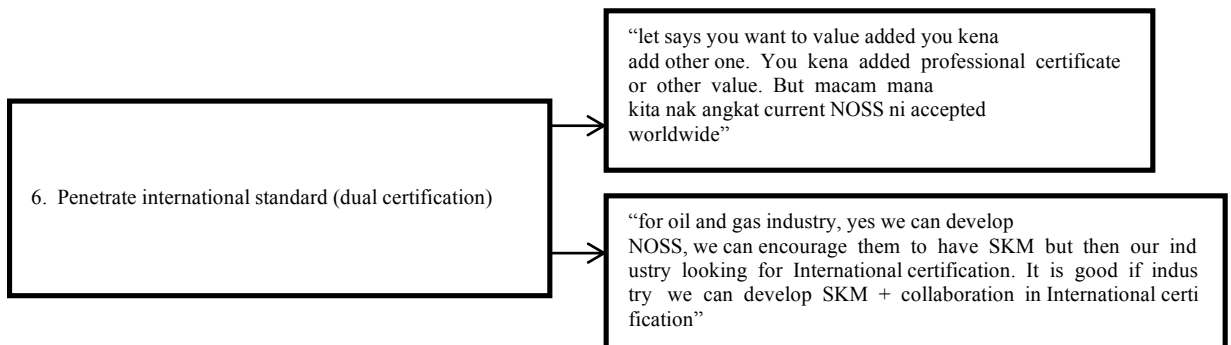


Fig. 6 – Result of theme 6 based on the Atlas.ti network result

- vii) Sharing resources (skills, knowledge, facilities, and funding)
 The result from the Atlas.ti shows the respondents suggestion in sharing resources between institution and industry.

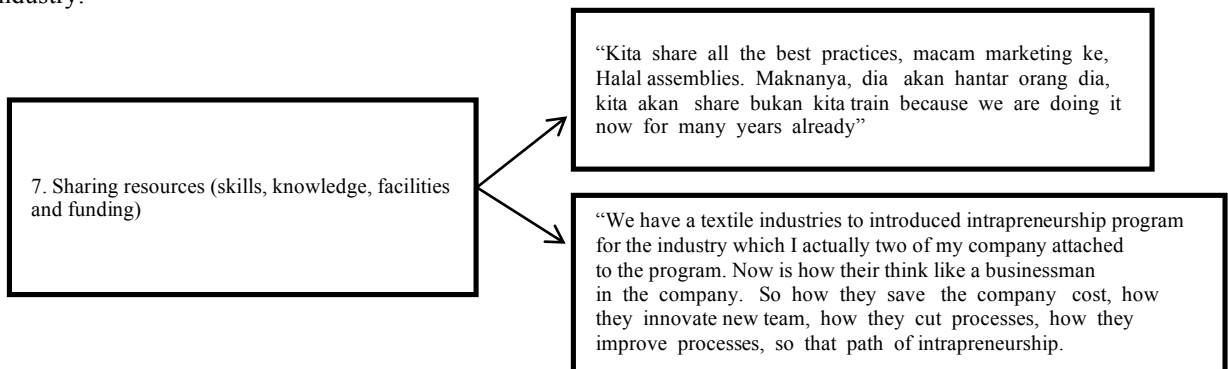


Fig. 7 – Result of theme 7 based on the Atlas.ti network result

- viii) **Emphasis industry collaboration with training providers to employed workers**
 The result from the Atlas.ti shows the respondents view to emphasis industry collaboration with training providers to employed workers.

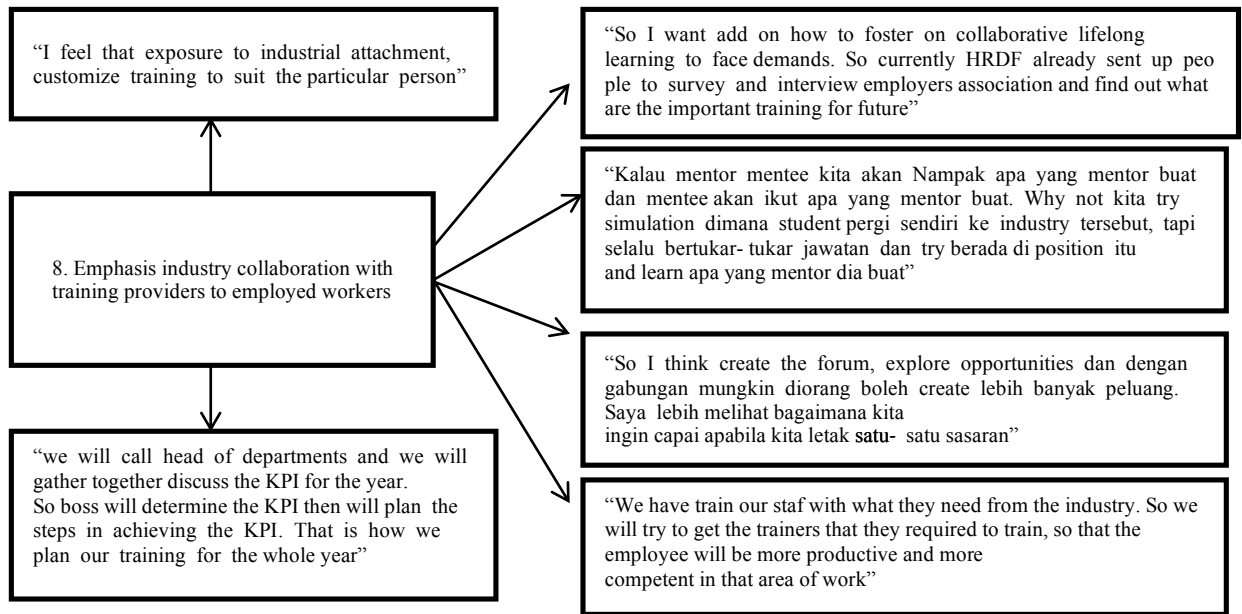


Fig. 8 – Result of theme 8 based on the Atlas.ti network result

- ix) **Reskilling and upskilling workers using the train the trainer approach collaborate with industry expert**
 The result from the Atlas.ti shows the respondents suggestion to reskilling and upskilling workers using the train the trainer approach collaborate with industry expert.

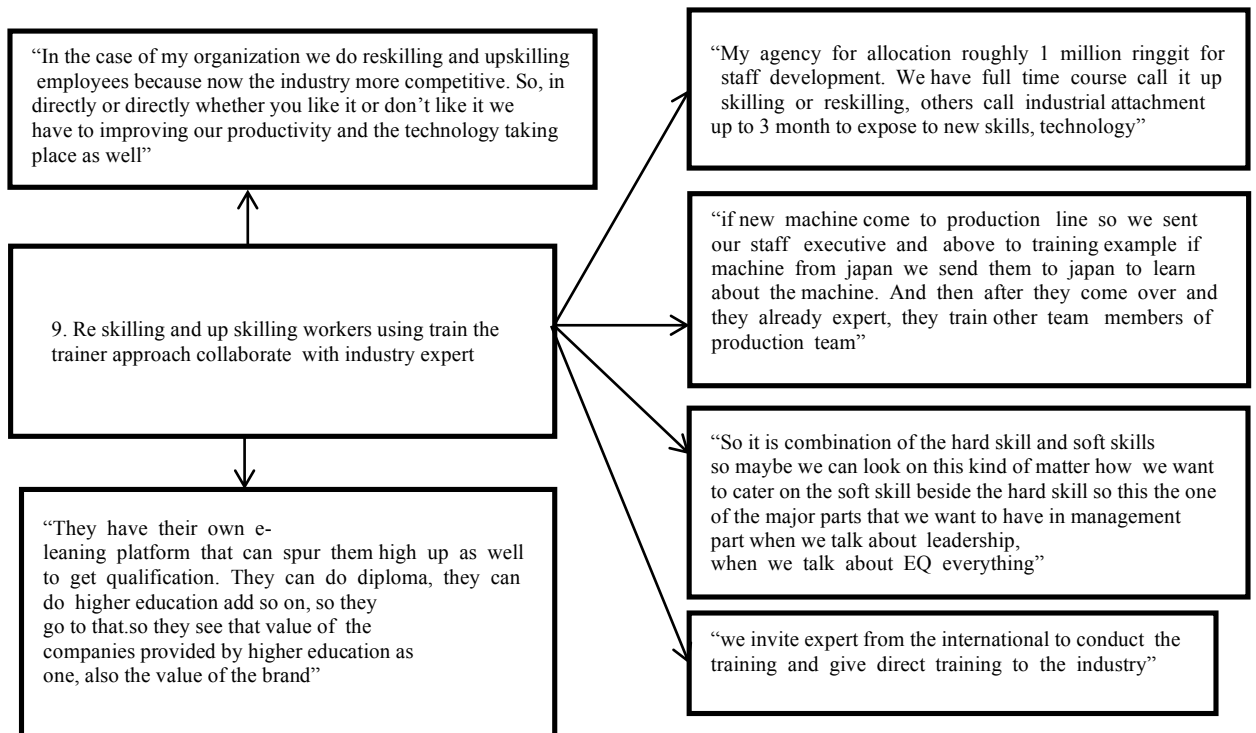


Fig. 9 – Result of theme 9 based on the Atlas.ti network result

- x) Collaboration or partnership with industry.
The result from the Atlas.ti shows the respondents suggestion in make a collaboration or partnership with industry.

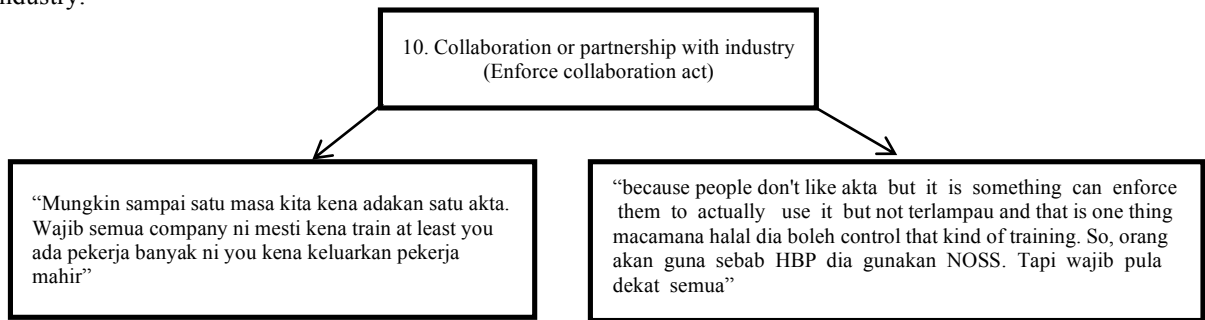


Fig. 10 – Result of theme 10 based on the Atlas.ti network result

4. Discussions

According to the data analysis, there is ten strategic plan for the Department of Skills Development use as a guideline by Department of Skills Development in collaboration with the industry and institutions for skills development in 4IR and empowering the quality of skilled workers in the brink of the 4IR. The ten strategic plan was discussed as below:

(a) Designing assessment of industrial training with employers

Industrial training is an important strategy used to expose students to the real working environment and to equip them with the necessary skills after graduate (Yusuf, Mohd Fauzi, Zainul Abidin, & Awang, 2013). Thus, in Malaysian the requirement makes industrial training becomes fundamental in higher learning institutions (Saat and Ahmad, 2009). The industrial training is successful in improving student's soft skills attributes such as lifetime learning capacity, critical thinking, communication and behavioral skills (Lai, Karim, and Johl, 2011). Thus, by designing a standardised industrial training assessment and provide a complete assessment structure for industrial training especially for 4IR in the industry is one of the initiatives that can develop a new industrial training standard that can merge in 4IR skill development.

(b) Strengthens industry involvement in curriculum development, teaching, and learning

Designing an appropriate curriculum is important for providing such skills and knowledge (Mohammad Ayub Khan & Laurie Smith Law, 2015). Based on the result, Department of Skills Development Malaysia has to strengthens industry involvement in curriculum development by encourage industry to use multiple and innovative approach in teaching and learning and organise regular committee meeting to discuss about industry needs in curriculum development and upgrade the content of curriculum development matching with the latest technology (Ex robotics, bionics, mechatronics etc) . Furthermore, the factors such as society, industry, and the role of government needs to be a concern while developing a curriculum (Mohammad Ayub Khan & Laurie Smith Law, 2015). Besides that, curriculum development for the National Occupational Skills Standard (NOSS) needs to be reviewed to be compatible with 4IR skill development and comparable with other countries. The other suggestion is to develop a separate training duration between fresh graduates and existing workers in the industry to avoid interruption while working and industry also encouraged JPK to add an entrepreneur skills element in NOSS.

3. Identify industries that have the interest/needs of the institutions and create industry requirements for the institutions

Workforce development strategies must based on knowledge and skill needs of the employees in a region (Department of Labor, Employment and Training Administration (ETA), 2015). Thus, it is important for industry and institutions to highlight the emerging skill needs within industries requirements and incentives to industries involved in training collaboration for encouragement. In producing proficient graduates ready for the industry, it is necessary to know the requirements of the industries through industry-institute interaction (Padma & Sridhar, 2014). Besides that, there is an opinion to organise a forum or engagement session with industry to identify the issues on industry needs and empowering National Dual Training System (NDTS) or *Sistem Latihan Dual Nasional* (SLDN) programs. JPK is also recommended to provide training collaboration and entrepreneurship program (mentor-mentee) between industries and institutions.

4. Education and training provider must be open and create a platform to accept industry opinions

Education providers have to apply product development strategy by modifying the product to meet with the expectations of industry (Kok Yaw Wong, 2017). Thus, Department of Skills Development should create a platform for industry give opinion and response to industry opinions for skill or curriculum improvement. This platform should be one of the

medium that connects industry, JPK and institutions to discuss and give an opinion in development or improvement in developing a curriculum standard especially for 4IR.

5. Appoint suitable experts from 4IR industries for NOSS development

Malaysia National Occupational Skills Standard (NOSS) is a document that underlines and specifies competencies needed by a skilled worker who is gainfully employed in Malaysia for an occupational area and level, and a pathway to achieve the competencies (Hussein, Zainal Abidin & Hamzah, 2016). Thus, to develop the 4IR skill development, JPK should request for the expert nomination from the industry before NOSS development session and provide a copy of new NOSS to industrial players to validate the new NOSS improvement before endorsing the NOSS. Also, JPK should provide incentives to encourage the presence of more experts to engage in NOSS development.

6. Penetrate international standard (dual certification)

Dual certification programs are one of the methods for improving professional skills to complement workers qualifications and technical skills and improve their job-readiness for careers in industry, government, non-governmental organisations, and academia (Duncombe & Amour, 2004). Thus, JPK is suggested to establish Collaboration in training for value added in the professional certificate and identify institutions and industries that offer international certificates to collaborate in the skills training.

7. Sharing resources (skills, knowledge, facilities, and funding)

The association between universities and industries may play a vital role in the area of knowledge sharing (Yadav & Shrivastava, 2015). The need for sharing knowledge between research institutions and industry has become increasingly evident (Janez & Gunter, 2007). The institutions need a motivation to collaborate with industries to improve teaching, access to funding, reputation enhancement, and access to empirical data from industry. Meanwhile, the motivations for industries to collaborate with universities or institutions may embrace the gaining access to complementary technological knowledge and providing training to existing or future employees (Guimon, 2013). Thus, JPK can promote smart partnerships in training collaboration and establish a cooperative relationship in a win-win situation.

8. Emphasis industry collaboration with training providers to employed workers

The partnership itself becomes an initiative in developing new skills for a next-generation workforce and a channel for future workforce recruitment (Edmondson, Valigra, Kenward, Hudson, & Belfield, 2012). Thus, it was important to provide training according to the employee job scope and industry needs. JPK also could organise forums between industry and training provider to explore opportunities together and mentor-mentee program to develop an industrial relationship within training provider and industry. Industry and training providers also should plan their training programme schedule together for the whole year. Next plan was organised a study in identifying required training for lifelong learning.

9. Reskilling and upskilling workers using the train the trainer approach collaborate with industry expert

Industry can provide in-house training to increase productivity or send staff for attachment to expose new skills and technology. Besides that, JPK or institutions can provide training program trained by seniors' workers or invite an international expert to conduct direct training in the industry. Also, combine soft skills and technical skills training using technology to providing e-learning as a platform for training. In 4IR, training is an important method in skills development. Thus, to meet the current demand with the latest skill set, continuous training and development have become an essential and integral part of the industry (Udhayakumar & Karthikeyan, 2014).

10. Collaboration or partnership with industry

The collaboration between universities and industry can give a benefit to Malaysia in developing new skills for 4IR. The study by Yadav & Shrivastava (2015) shows this collaboration will facilitate the formation of knowledge with the support of experts and experienced persons in the industry that can give a right direction to the enthusiastic, intelligent students and making them experts of future. The benefits of university-industry collaboration are also evident in developing countries (Gulmon, 2013). These collaborations also give an advantage to the institution to organise MOU agreement to ensure the students are in-line with industry needs and extend OJT duration for the student to get to know industry environment. The industry also can collaborate with the institutions by providing training to the employees to produce skilled workers. Also, synchronize human capital, infra, technology, skills and demands in partnership to ensure that the collaboration works smoothly.

5. Conclusions

The collaborations between universities and industry show there are positive implication to the development of new skills in 4IR for Malaysia. The industrial collaboration in developing new skills for 4IR is one of the initiatives to succeed the

4IR. Based on the results, this ten-strategic plan can be used as a guideline by the Department of Skills Development in collaboration with the industry and institutions to develop skills for 4IR. Thus, the further study is suggested to identify the methods that the Department of Skills Development uses to accomplish this guideline to increase the skills workforce for Malaysian Fourth Industrial Revolution.

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