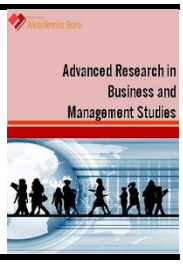
Penerbit Akademia Baru

Journal of Advanced Research in Business and Management Studies

Journal homepage: www.akademiabaru.com/arbms.html
ISSN: 2462-1935



The Collaboration of University and Industry towards Engineering Employability Skill: A Conceptual Framework of Value Co-creation in Service-Dominant Logic

Open Access

Nurul Aqila Hasbullah[1,*], Norani Nordin[1]

[1] School of Technology and Management, Universiti Utara Malaysia, 06010 Sintok Kedah, Malaysia

ARTICLE INFO

Article history:
Received 25 August 2019
Received in revised form 25 August 2019
Accepted 9 November 2019
Available online 28 November 2019

ABSTRACT

Generating future engineers is recognized as part of the role of the university and the flexibility for the current fit is needed to change over time. With today's globalization, university and industry collaboration are a must for further activities in promoting value co-creation to inspire both perspectives to stimulate common goals in enhancing future engineering employability skills. Service Dominant Logic known as SD Logic is the foundation used in this research in co-creation between the university and industry as two key stakeholders in enhancing these skills. However, there are several literature studies that have research university and industry collaboration based on SD Logic in Malaysia. Therefore, this paper proposes a conceptual framework based on SD Logic as the foundation consist three elements: resource, interaction and value of university and industry collaboration for co-creation to enhance the value of engineering collaboration skills among engineers. The researcher aims to do multiple cases analysis from both perspectives of stakeholders via qualitative research methodology. Interview methods will be used to collect data from respondents across universities and industries.

Keywords:
service-dominant logic, value co-creation, engineering employability skill, collaboration university and industry

1. Introduction

With the increasing number of graduates over the years to compete for job prospects among new graduates, this issue has been contributing to the unemployment problem in the country. According to Wong [8], the number of unemployed graduates in Malaysia has increased over the years and is a worrying issue in Malaysia with an average of 60,000 unemployed graduates. One of the reasons for unemployment issues is mismatch of employability skill between two stakeholders which are university and industry [6,44]. In a recent report of National Graduate Employability Blueprint 2012-2017 has declared that mismatch skill is the fourth place problem among employers face in hiring graduates [24]. The industry is complaining that universities are failing to provide the necessary skills

* *Corresponding author.*
E-mail address: nurul_aqila_hasbullah@yahoo.com (Nurul Aqila Hasbullah)

for graduate to get employed [7]. Meanwhile, universities feel that industry do not clearly tell the requirement skills need to universities and that makes industry has to train graduate by their own as what they want [7].

The issue of employability skills is not a new issue [53]. In Malaysia, the study in improving the employability skill among engineering graduate was limited to find but there are various studies in general graduate employability skill [29,46,52]. Engineering scope is chosen because this field frequently related to improve economic growth in the developed nation [17,31] however, there is still an issue about the expected gap between market demand among the majority of Malaysian industries towards existing engineering graduates [54]. The industry expects competent students update their skills depending on the job market [27] however graduates are still lacking in social skills and development to face future problems in the workplace [43]. Thus, this study aims to study the field of engineering to improve employability among engineering graduates.

OECD [32] has disclosed one of the ways to enhance graduate skills is to increase the university's collaboration with the industry to deliver job-ready graduates, and it also needs to prevent skills mismatch. Furthermore, government encourage universities to have an effective linkage with industry so that Malaysia can generate competitive workforce in the global market to be a high-technology based country. In the last twenty years, the university's efforts to collaborate with the industry have gradually increased [34].

Even there are expanding of studies in university-industry collaboration but Mansora *et al*., [22] still claimed that the university industry collaboration in Malaysia is pretty low and falling behind compared to other developed countries. In understand university-industry collaboration, Julia *et al*., [16] pointed out there are still many gaps. Previous researcher's intensely focus to explore the relationship of university interacts with industry through forms of research and development (R&D) in innovation [5]; commercialization [37] and technology [38]. Even though there are growing of attention between academics and policymakers to widen the benefits of university industry collaboration, the potential of university industry collaboration in context of employability skills has been ignores [48,49]. Therefore, this research proposes a lens of approach in value of use of service view between university and industry. Service centred system view is important since the collaboration not only can see for product development but also as service view in co-creation, innovation and exchange of knowledge [11].

Service Dominant Logic (SDL) used in this study as the fundamental service research using concept of value co-creation on UIC for integration of resources and sharing of competencies between university and industry stakeholders for mutual benefit is embedded in the true value of knowledge and skills [50]. Different stakeholders have different requirement for collaboration. To better understand the different each requirement has, this study aims take a closer look mutual requirement of types resources skill needed, the type of interaction of collaboration both stakeholders and obstacle in minimizing the issue of engineering employability skill.

2. Literature Review

The literature review consists of two part. The first part discussed the conceptual of co-creation of university industry collaboration (UIC) by building framework based on Service Dominant Logic as conceptual framework used. The second part explain on the three element that listed in the framework of UIC.

2.1 Value Co-creation in University Industry Collaboration (UIC)

Generally, co-creation is defined as a process by two or more stakeholders contribute or collaborate in creating value for themselves or others which are used in this study [10]. Values are created together by the benefits among both stakeholders and mutually beneficial relationships in the offerings exchange for example knowledge sharing, equity, interaction, experience, personal, and relationships.

In identifying the gap, academics have recognized several studies of co-creation systems areas in innovation [10], knowledge process [11], research and development [4], research and innovation [9,19] but there are insufficient studies of value co-creation of UIC towards students' employability specifically in Malaysia.

The theory of co-creation had been enriched by the Service Dominant Logic (S-D logic) [50]. The S-D logic is the extended of Dominant Logic Service (G-D logic) where the endpoint of a transaction is conceptualized as the value. In S-D logic the exchange of intangibles focused on specialized skills, knowledge and the interaction that been shift from the traditional G-D Logic focus on exchange in tangible goods.

The S-D logic is a judgment in which value is not created solely by the stakeholders and passed on to the customer. Service-Dominant Logic is fundamental that offers an another approach to value creation based on the value of use relative to exchange value in the context of knowledge and skill [50]. Stakeholders cannot generate value one-sidedly unless it is a view on the part of the customer and co-created.

According to Hughes [10], understanding of the interaction and exchange between the stakeholders related to the linkage or collaboration are important to see in several different of areas. In this study, the co-creation of S-D Logic fit to be applied in university industry collaboration since it involves two stakeholders in collaborative by investigate the mutual beneficial of relationship in exchange a few elements (knowledge and skills) and sharing interaction based on their own experience.

S-D Logic has inspired much discussion in three elements consist of resources, interaction and value outcome [4,10]. These three elements are all related in considering the co-creation within the collaboration in SD Logic with university and industry collaboration will be discussed in more detail.

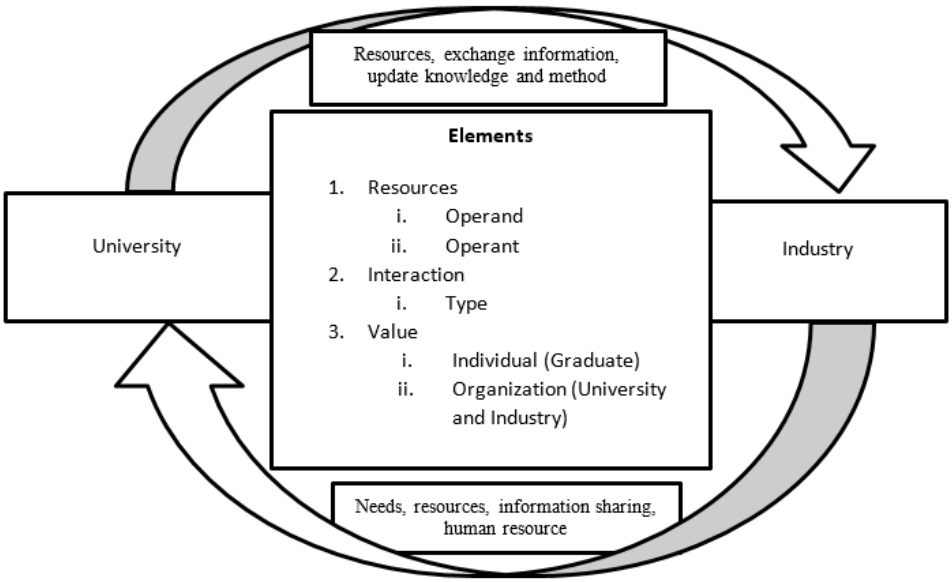


Fig. 1. Framework of co-creation in University-Industry collaboration

Figure 1 shows S-D Logic applied in conceptual framework for co-creation of consist of the resources, interaction and value among two parties for mutual benefits. Universities need resources for information sharing, updating modules and lessons, knowledge and methods from industry meanwhile industry also needs exchange in resource and information sharing to university as well.

The first element relates to understanding of the S-D Logic is the resources provided in both stakeholders involved. The second element is the interaction. The third element relates to how the value is apparent by different parties. This framework may give a picture of how both party work in improving the graduate employability skill as an individual (graduate) also for the organization (industry and university). An explanation of conceptual framework based on three elements will be discussed in the next section.

2.2 The Elements of S-D Logic in University-Industry Collaboration (UIC)

This section divided into three part which are the resources, interaction and value that listed of element in the conceptual framework.

2.2.1 Resource

The co-creation need resource as part of the process through shared the values or shared the involvement to create the value creation [10]. A valuable idea in S-D logic is made up of two different type of sources that show value. These resources are classified into two termed: operant and operand [50]. **Operand resources** are typically recognized as tangible such as raw material and need to use for generate value. The previous literature discusses the example of operand resources can be building, technological, infrastructure, the equipment and the educational materials that help in education for the student in university [23]. There also study that clarify that operand resource can be material of the technology in material of computer or smartphone [9]. According to Golooba and Ahlan [9], operand can be explain as the resource from financial management and material from library as resource for students used. As conclude, the operand resource can recognize as tangible and physical products.

In contrast, the second source, known as the **operant resource** that draw value co- creation and the operant resource produces the main competitive advantage. The strong tendency to develop the subject is to consider the sources of the operative to be synonymous, broadly, with knowledge and skills [23]. Collaborating in the interests of stakeholders should bring knowledge and skills that complement each other. The area of the knowledge base is important with some indication showing that narrow knowledge-based initiatives are most likely to succeed.

The scope of the knowledge base is also important with some evidence showing that narrow knowledge-based initiatives are most likely to succeed [4].

In this research, the skill has been specified fit to recognize essential engineering employability skill as a resource in improving future engineers. There are five essential engineering employability skill from previous research in different country [1,2,14,25,45]. Those skills are communication skill, teamwork skill, problem-solving skill, interpersonal skill and ICT skill.

Communication skill very important since engineers need to have communicated clearly and credibly in both in writing and speaking with other engineers, scientist, system analyst and managers [41]. This is also crucial to prevent misunderstanding when working in an organization. Next, the teamwork skill needed to be developed and highlight as a vital skill for engineers. Engineering by nature was a cooperative enterprise, they do in a team of people with different capabilities, responsibilities and background [26]. The potential skills will be attributed to successful teamwork

by listening and understanding view front others without overcoming predictable interpersonal struggles [41]. Other than that**,** problem-solving skill as main of skill needed to point out. To become an effective problem solver, engineering students must able to take a broad approach to evaluate, synthetic and analytical decision-making approach and thinking tools [41].

Other than that, engineering students need to be helped to extend from independent to interdependent learning [55]. It is better to recognize that knowledge and attitude should be seen in the context of obtaining information from diversity resource. It is the best way to lead to success rather than relying on a narrow view. Nowadays in acquiring new skills, knowledge and technologies the use of information communication, computing and technology are essential in the knowledge-based era to continue to learn independently. Engineering students need to know how to create, select and use modern engineering techniques, resources and techniques and IT tools. They need to know predictions and modelling, for complex engineering activities, with limitations of understanding [13,56].

The need to integrate resources from the context of application process research indicates that it is important to ponder how the two resources can be integrated into this context of research context, so this study proposes: to find out what resources are used between the two parties - to create knowledge and recognise how these resources can be integrated to develop graduates in engineering work skills.

2.2.2 Interaction

The interactions and relationships between stakeholder are essential in co-creation. The interaction in S-D Logic between two stakeholders is important in creating value the customers. Value cannot be created one-sidedly by one stakeholder but need a joint sphere of the interaction to involve customer's (graduate) process of co-creation [51]. Interaction are valued that allow stakeholder to enter into new networks, save time, knowledge generation, innovation, and share ownership of revenue. All of these values are co-created through relationships based on the quality interaction and experience of the interaction so the value creation is the result of successful interaction [28].

The relationship between S-D Logic and customer orientation has been identified since formative work [51]. Both stakeholders of the university and industry have been specified in this study influenced by their individual's previous experience in collaboration program or project. The conceptual link between S-D Logic customer-centricity of graduate lies in the relational view of resource exchanges in whereby relationships are established and maintained through information exchange between university and industry.

The types of interaction play an important role in facilitating the interaction. A few studies called type of interaction as types [40, 49], modes [22] or mechanism [38]. Even there are have a different name but there are still with the same meaning. The literature of collaboration of university-industry summarised in Table 2 below.

Table 1
Collaboration of university-industry

Arthur	Year	Type of collaboration									
		Joint research	Contract research	Consultancy/mentor	Training	Career talk	Student Placement	Commercialization	Licensing	Shared facilities	Curriculum
Mansora	2015	x	x	x				x			
(Joshua & Olanrewaju, 2015)	2015										x
Rufai	2015			x	x		x			x	x
M.S Salleh	2013			x				x	x		x
Rast	2012	x	x	x					x	x	
Bruneel, Este & Salter	2011	x	x	x	x		x				
Ramli N.	2013		x	x	x		x		x	x	
Kinash, Shelley	2015					x					

From Table 1, previous research discusses the wide variety of channels in collaboration. There are ten type of collaboration stated in the table. Most of the previous study highlight consultants can function as most of the pro-active role for collaboration in university and industry [3,37,38,40,42]. This type of collaboration is where the members in both stakeholders can get advice, technical experts and consultants related to industry and education in the same research program to strengthen and enrich their teaching in the field of consultation. This is an informal contact form between industrial and university researchers can have discussed and provided technical advice, information on both stakeholders.

Despite that, the second highest interaction is industrial training activity that recognizes as the most popular collaborations between university and industry. This activity offering student attachment is known as the internship or practicum to students earlier before entering labour market [8,20,30,33]. Industrial training defines as a bridge from theory in the classroom to practice in the workplace, industry or firm. This is to test the students' skills to learn real-life situations and be the first opportunity for students to learn and develop new skills and experiences.

Other than that, the curriculum design in teaching-learning has become one of the kinds of collaboration that gets a lot of attention [15,40]. The education learning teaching of engineering must be changed from time to time. In addition, engineering students are preferable to do activity with industry rather than untraditional method of teaching. There are plentiful empirical studies recommend other type of collaboration such as patent and spin sections, personal mobility, consulting relationships, informal relations and joint research projects show a part in the process [35,39].

Other scholars showed that university researchers choose to collaborate with the industry for a variety of reasons. The reasons include to access the usability of research, up-to-date industry issues access to industry skills and facilities and additional research findings [15,21,34,47].

To ensure a good collaboration among university and industry, this research suggests in explore the current and active interaction on both stakeholder university and industry towards graduate

employability. Therefore, the second objective: To explore current interaction between university and industry collaboration in enhancing the co-creation of engineering employability skill.

2.2.3 Value

The final element in S-D Logic listed in framework is the value. The concept of value is constantly shared and determined at the point of use, usage or service experience [50]. The value depends on what both parties gain from their collaboration. Values are unique and perceptions are determined by the beneficiaries [51]. The value of these discoveries and perceptions will be partially determined by the dealings between societies involved in the production and use of knowledge.

The effect of value will be specified by the perspectives of two stakeholders. For this study, the finding determined by the interaction between universities and industries that involved in the production and use of knowledge. Specific projects, programs or activities, organizations that organize or use them have a broader context, such as an industry or academic university that may have different features and outcomes.

The type of realization of values will relate to the different context of areas for example in the context of adaption new technology transfer collaboration [10] and research and development collaboration [4]. There are several benefits from UIC been studies in previous research. One of the benefit is the economic and financial gains for example in savings or cost reduction are the most main benefit that organization want. At the university level, they can reduce the cost of identifying alternative sources of funding from the industry meanwhile, in industry level they able to cut cost by hire the expertise from another vendor that may charge higher price compare do collaboration with university.

In addition, individual may pursue benefit in knowledge transfer in sharing the expertise and experience as well. There is many research value of university-industry collaboration towards knowledge transfer and innovation and R&D collaboration [4,5,36]. Meanwhile, this research wants to focus on the value of university and industry collaboration on more attention gear up toward a relationship strategy for current graduate value for market demand through their employability skill [48].

However, several authors have noted there are few university-industry interaction embraces of benefit of values of UIC for graduate employability especially in Malaysia [48]: To ensure a good collaboration among university and industry, this research suggests in explore the value of UIC could gain. Therefore, the third objective: to understand how the value can be obtained through co-creation.

3. Research Design

A qualitative approach will be used in this study to clarify, understand and deepen issues. The ongoing issues and types of graduate employability issues are compatible with the characteristics of choosing a qualitative approach for adoption. To minimize the issue, the researcher wants to reach respondent in both stakeholders of university and industry to understand their role in helping to improve the graduate employability issue. Therefore, qualitative approach is more suitable since it needed to understand in provide a deep understanding of a case or case, case study is the best-suited qualitative approach.

Moreover, most of the collaboration research in [7,18,34,47] used qualitative as research method which involve two stakeholders and few respondents. This is meet with criteria of qualitative

research that focus on various perceptions of the respondents and the processes for researchers understanding.

The justification in using qualitative method also because of the limited studies of UIC in Malaysia towards graduate employability and the purpose to get more information and opinion from both stakeholders. The quantitative data may limit the information and data. It is important in this study to comprised the investigated and documenting in detail of opinion and information of the situation in each individual.

There are five designs or approaches in Qualitative, which are Narrative Research, Ethnography, Grounded Theory, Phenomenology and Case Study. Case study is conducted to obtain an in-depth understanding of an issue in a case or multiple cases (such as event, program, or activity) which can be obtained using multiple forms of data collection (interview, observation, document review).

Case study design was selected from the other qualitative design as it emphasis on the interpretation of certain issue in regarding to improve the graduate employability skill. The case study is related to the issue of society and significantly contributed to the better understanding of the root cause of problems for investigation. Since this study explores on how the collaboration of two stakeholders towards graduate employability skill, the study is a qualitative research using the case study approach. The use of case study approach will provide an in depth understanding on the collaboration between both and to know the necessary skills needed for current demand, understanding the type of collaboration and the obstacles that they need to encounter during the collaboration to improve the graduate employability problem in Malaysia. As summarize, qualitative approach and case study design was applied in this research study because of the related to social issue in the context for improving human social concern.

4. Conclusion

Collaboration on university and industry needed to have a good motivation for a good impact and implication. Previous researchers by [34,38,40,42] stated universities that collaborate with companies are always higher in productivity than non-collaborating universities. In Malaysia context, a number of studies have encouraged University-Industry collaboration and none of the researchers have explored this relationship from a value creation perspective that points to the need to study this phenomenon to enrich the literature. Consequently, this paper aim to recommend a conceptual model aimed to discover value co-creation through university-industry collaboration in Malaysia towards graduate employability.

In this paper, the researcher proposes a conceptual model incorporating three elements in the development of value creation into the S-D Logic conceptual services that can be used in universities and industries. It involves three elements which are the resource, the interaction and the value that both stakeholders could get the benefit. In the framework, the research aims to focus study on both perspectives on the relationship between two important stakeholders in hoping to improve future engineer through their engineering employability skill.

The collection data is still needed. It will be made by providing opportunities for stakeholders to view their opinion and better finding for wider the literature. Therefore, future research will concentrate on collecting data for the proposed framework. A multiple case study will be conducted for this purpose. This model will be tested and can be a starting point for its replication in other countries which allows the construction of a contrasting framework.

References

[1] ABET. (2019). *CRITERIA FOR ACCREDITING ENGINEERING PROGRAMS*.
[2] Board of Engineers Malaysia. (2017). *Engineering Accrediatation Council*.
[3] Bruneel, Johan, Pablo d'Este, and Ammon Salter. "Investigating the factors that diminish the barriers to university–industry collaboration." *Research policy* 39, no. 7 (2010): 858-868.
[4] Canhoto, Ana Isabel, Sarah Quinton, Paul Jackson, and Sally Dibb. "The co-production of value in digital, university–industry R&D collaborative projects." *Industrial Marketing Management* 56 (2016): 86-96.
[5] Chandran, V. G. R., Veera Pandiyan Kaliani Sundram, and Sinnappan Santhidran. "Innovation systems in Malaysia: a perspective of university—industry R&D collaboration." *AI & society* 29, no. 3 (2014): 435-444.
[6] Cheong, Kee-Cheok, Christopher Hill, Rozilini Fernandez-Chung, and Yin-Ching Leong. "Employing the 'unemployable': employer perceptions of Malaysian graduates." *Studies in Higher Education* 41, no. 12 (2016): 2253-2270.
[7] Collet, Chris, Damian Hine, and Karen Du Plessis. "Employability skills: perspectives from a knowledge-intensive industry." *Education+ Training* 57, no. 5 (2015): 532-559.
[8] Woon, Lai Fong, Z. A. Abd Karim, and Satirenjit Kaur Johl. "Examining a successful industrial training program model: inter-relationship among the three main stakeholders: student, university and host company." In *the Proceeding of the 2nd Regional Conference on Engineering Education (RCEE), December*, pp. 3-5. 2007.
[9] Golooba, Moses, and Abd Rahman Ahlan. "Service value Co-creation in research & innovation practices in higher education institutions in Malaysia." *Procedia Technology* 11 (2013): 342-347.
[10] Hughes, Tim. "Co-creation: moving towards a framework for creating innovation in the Triple Helix." *Prometheus* 32, no. 4 (2014): 337-350.
[11] Huhtelin, Mervi, and Suvi Nenonen. "A Co-creation Centre for university–industry collaboration–a framework for concept development." *Procedia Economics and Finance* 21 (2015): 137-145.
[12] Ishengoma, Esther, and Terje I. Vaaland. "Can university-industry linkages stimulate student employability?." *Education+ Training* 58, no. 1 (2016): 18-44.
[13] Ismail, Noor Azina. "Graduates' characteristics and unemployment: A study among Malaysian graduates." *International journal of business and social science* 2, no. 16 (2011).
[14] JABEE, Computing. "IT-Related Programs Leading to Bachelor's Degree Accredited by Japan Accreditation Board for Engineering Education (JABEE)."
[15] Joshua, Segun, Dominic E. Azuh, and Faith Osasumnen Olanrewaju. "University-industry collaboration: A panacea to graduate unemployment in Nigeria." *Joumal of Management Research* 7, no. 1 (2015): 17-25.
[16] Julia Vauterin, Johanna, Lassi Linnanen, and Esa Marttila. "Value creation in international higher education: The role of boundary spanning in university-industry collaboration." *International Journal of Quality and Service Sciences* 4, no. 3 (2012): 283-298.
[17] Kaushal, Urvashi. "Empowering Engineering Students through Employability Skills." *Higher Learning Research Communications* 6, no. 4 (2016): n4.
[18] Chong, Aik Lee. "Performance Measures of Strategic University-Industry Collaborations in Malaysia: Dyadic Multicases Approach." PhD diss., Universiti Utara Malaysia, 2012.
[19] Lella, Giovanna, Antonio Fischetto, Vittorio Cesarotti, James C. Spohrer, G. Ren, and YingTat Leung. "Universities as complex service systems: External and Internal perspectives." In *Proceedings of 2012 IEEE International Conference on Service Operations and Logistics, and Informatics*, pp. 422-427. IEEE, 2012.
[20] Lim, Hock-Eam, and Muszafarshah Mohd Mustafa. "EFFECTIVENESS OF INDUSTRIAL TRAINING IN IMPROVING STUDENTS'GENERIC SKILLS." *International Journal of Business and Society* 14, no. 3 (2013): 368.
[21] Lind, Frida, Alexander Styhre, and Lise Aaboen. "Exploring university-industry collaboration in research centres." *European Journal of Innovation Management* 16, no. 1 (2013): 70-91.
[22] Mansor, Nur Naha Abu, Azlan Abdul Rahman, Tayebeh Khademi, and Arezou Shafaghat. "The Status and Characteristics of University-Industry Collaboration in a Research University." *Jurnal Teknologi* 74, no. 4 (2015).
[23] Tsourela, M., F. Garifallos, P. Dimitrios, and K. Tarabanis. "Value co-creation in education: scope, methods and insights." *International Journal of Advance Research and Innovative Ideas in Education* 1, no. 2 (2015): 2395-4396.
[24] MOHE. "The National Graduate Employability Blueprint 2012–2017." (2012).
[25] Mishar, Dipalwalee Santosh. "Engineering employability skills required by employers in India." *International Research Journal of Engineering and Technology* 3, no. 2 (2016): 961-963.
[26] Mohd-Yusof, Khairiyah, F. A. Phang, A. N. Sadikin, S. A. Helmi, and M. J. Kamaruddin. "Determining the effect of an engineering overview assignment on first year students." *age* 24 (2014): 1.
[27] Mohd-Yusof, Khairiyah, Syed Ahmad Helmi, Fatin Aliah Phang, and Shahrin Mohammad. "Future directions in engineering education: Educating engineers of the 21st century." *ASEAN Journal of Engineering Education* 2, no. 1

(2015): 8-13.
[28] Moreno, Blanca Astrid, Haydeé Calderón, and Teresa Fayos. "UNIVERSITY-INDUSTRY VALUE CO-CREATION THROUGH RELATIONSHIP MARKETING."
[29] Munohsamy, Thulasimani. "Malaysian Employers' Perspective on Engineering Graduates' Employability Skills: Evidence from 10 years of Studies." *PALGO JOURNAL OF EDUCATION RESEARCH* 3, no. 2 (2015): 150-159.
[30] Munyoro, G. E. R. A. L. D., ZIVANAYI FRANCIS Nyandoro, and M. U. N. Y. A. R. A. D. Z. I. Musekiwa. "An Evaluation of the student industrial attachment programme in Zimbabwe: A case study of Chinhoyi University of Technology." *International Journal of Research in Business Management (IMPACT: IJRBM)* 4, no. 8 (2016): 1-16.
[31] Nor, Norhayati M., Noraini Rajab, and K. M. Ismail. "Educating the engineer of 2020: Malaysian scenario." In *International Conference on Engineering Education (ICEE2008), Budapest, Hungary*, pp. 1-4. 2008.
[32] OECD. (2016). *OECD Economic Surveys*.
[33] Phang, Fatin Aliah, Khairiyah Mohd Yusof, Maisarah Mat Saat, and Norazah Mohd Yusof. "Perceptions of engineering students on industrial training in Malaysia." In *Engineering Leaders World Congress on Engineering Education 2013*, vol. 2014, no. 3, p. 20. Hamad bin Khalifa University Press (HBKU Press), 2014.
[34] Plewa, Carolin, Nisha Korff, Claire Johnson, Gregory Macpherson, Thomas Baaken, and Giselle Camille Rampersad. "The evolution of university–industry linkages—A framework." *Journal of Engineering and Technology Management* 30, no. 1 (2013): 21-44.
[35] Rasiah, Rajah, and Chandran VGR Govindaraju. "University-industry R&D collaboration in the automotive, biotechnology and electronics firms in Malaysia." Georgia Institute of Technology, 2009.
[36] Ramli, Faizal, Woei Yu Lim, and Aslan Amat Senin. "Proposing a Conceptual Framework on Factors to Develop Successful University Industry R&D Collaboration in Malaysia." *Sains Humanika* 64, no. 2 (2013).
[37] Ramli, Nasiibah, and Zinatul Ashiqin Zainol. "University-industry collaboration: A catalyst towards entrepreneurial university." In *Proceedings of the 8th National Conference on Economic Malaysia, Volume*, vol. 3, pp. 7-9. 2013.
[38] Rast, Sadegh, Navid Khabiri, and Aslan Amat Senin. "Evaluation framework for assessing university-industry collaborative research and technological initiative." *Procedia-Social and Behavioral Sciences* 40 (2012): 410-416.
[39] Rossi, Federica. "The governance of university-industry knowledge transfer." *European Journal of Innovation Management* 13, no. 2 (2010): 155-171.
[40] Rufai, Ahmed Umar, and Abdullah Mat Rashid. "Business, Industry and Higher Education Collaboration: A Panacea in Developing Professional Work-Ready Graduates." *Mediterranean Journal of Social Sciences* 6, no. 6 (2015): 512.
[41] Rugarcia, Armando, Richard M. Felder, Donald R. Woods, and James E. Stice. "The future of engineering education I. A vision for a new century." *Chemical Engineering Education* 34, no. 1 (2000): 16-25.
[42] Salleh, M. S., and M. Z. Omar. "University-industry collaboration models in Malaysia." *Procedia-Social and Behavioral Sciences* 102 (2013): 654-664.
[43] Selvadurai, Sivapalan, Er Ah Choy, and Marlyna Maros. "Generic skills of prospective graduates from the employers' perspectives." *Asian Social Science* 8, no. 12 (2012): 295-303.
[44] Shafie, Latisha Asmaak, and Surina Nayan. "Employability awareness among Malaysian undergraduates." *International Journal of Business and Management* 5, no. 8 (2010): 119.
[45] Bound, Helen, and Magdalene Lin. "Singapore workforce skills qualifications (WSQ), workplace learning and assessment (stage I)." *Institute of Adult Learning, Singapore* (2010): 25.
[46] Singh, Gurvinder Kaur Gurcharan, and Sharan Kaur Garib Singh. "Malaysian graduates' employability skills." *UNITAR e-Journal* 4, no. 1 (2008): 15-45.
[47] Striukova, Ludmila, and Thierry Rayna. "University-industry knowledge exchange: An exploratory study of Open Innovation in UK universities." *European Journal of Innovation Management* 18, no. 4 (2015): 471-492.
[48] Tran, Thi Tuyet. "Enhancing graduate employability and the need for university-enterprise collaboration." *Journal of Teaching and Learning for Graduate Employability* 7, no. 1 (2016): 58-71.
[49] Ashraf, Rana Umair, Fujun Hou, Syed Ali Ashiq Kirmani, Muhammad Ilyas, Syed Anees Haider Zaidi, and Muhammad Saeed Ashraf. "Student employability via university-industry linkages." *Human Systems Management* 37, no. 2 (2018): 219-232.
[50] Vargo, Stephen L., and Robert F. Lusch. "Evolving to a new dominant logic for marketing." In *The Service-Dominant Logic of Marketing*, pp. 21-46. Routledge, 2014.
[51] Vargo, Stephen L., and Robert F. Lusch. "Service-dominant logic: continuing the evolution." *Journal of the Academy of marketing Science* 36, no. 1 (2008): 1-10.
[52] Yusof, Nooriah, and Zakiyah Jamaluddin. "Graduate employability and preparedness: A case study of University of Malaysia Perlis (UNIMAP), Malaysia." *Geografia-Malaysian Journal of Society and Space* 11, no. 11 (2017).
[53] Yusoff, Y. M., A. Z. A. M. I. Zaharim, MOHD ZAIDI Omar, A. Z. A. H. Mohamed, N. O. R. H. A. M. I. D. I. Muhamad, R. A. M. L. E. E. Mustapha, and R. A. A. Rahmat. "Engineering employability skills for Malaysian industry: Framework development." In *Proceedings of the 8th WSEAS International Conference on Educational Technologies*, pp. 36-47.

2012.

[54] Zaharim, Azami, MOHD ZAIDI Omar, H. A. S. S. A. N. Basri, N. O. R. H. A. M. I. D. I. Muhamad, and FARAH LIZA MOHD Isa. "A gap study between employers' perception and expectation of engineering graduates in Malaysia." *Education* 6, no. 11 (2009): 409-419.

[55] Zaharim, Azami, Y. Yusoff, Mohd Zaidi Omar, Azah Mohamed, and Norhamidi Muhamad. "Engineering employability skills required by employers in Asia." In *Proceedings of the 6th WSEAS international conference on Engineering education*, pp. 195-201. 2009.

[56] Zaharim, Azami, Yuzainee MD Yusoff, Mohd Zaidi Omar, and Hasan Basri. "Employability skills framework for engineering graduate in Malaysia." In *8th WSEAS International Conference on Education and Educational Technology*, pp. 264-272. 2010.