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Dynamics and Challenges: How Firm Should Evaluate Knowledge Management System

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Article Info
Volume 82
Page Number: 11017 - 11033
Publication Issue:
January-February 2020

Article History
Article Received*: 18 May 2019*
Revised*: 14 July 2019*
Accepted*: 22 December 2019*
Publication*: 20 February 2020*

Abstract:The concept of Triple Helix as an innovation strategy based on participation and collaboration of government, university, and industry. The importance of the role of universities as institutions of science and technology that have the human resources capable of generating innovation in various fields that can be applied in industry and administration. The problem is the decision-making mechanism to overcome the level of alignment between the knowledge possessed by the knowledge management system to be adopted and the difficulty in sharing knowledge or effective knowledge transfer between multi-disciplinary organization.

Keywords:*Knowledge Transfer, University, Industry, Triple Helix, Model Innovation.*

I. Introduction

Type Triple Helix related to the study of the relationship network of university-industry-government (Leydesdorff and Meyer, 2013), the importance of the role of universities as institutions of science and technology that have the human resources capable of generating innovation in various fields that can be applied in industry and government (Ardito et al., 2018). Collaboration between government, universities and industry based on participation used as an innovation strategy is the main concept of Triple Helix. The coordination between the three entities is expected to be a form of successful interaction, but this is not done during the process of daily work. In this study, we will discuss the collaboration between industry-oriented knowledge-oriented businesses and universities. University-industry relationships have been studied for a time longer than the setting of Triple Helix.

The evaluation of the university-industry collaboration projects found that universal factors such as trust and commitment is essential (Barnes, Pashby and Gibbons, 2002)(Hansen and Mork, 2017). Another study identified two main obstacles to university-industry collaboration: the difference in orientation and administration of intellectual property (Bruneel, Este and Salter, 2010). Here, trust is recognized as critical to reducing the barriers. Belief in turn increases the long-term interaction. Areas requiring further research have been identified as well. Individual initiative for university-industry collaboration poorly studied, which is different from the institutional initiatives. Was found in one study that supports private setting many university-industry interaction (Maria et al., 2013). To improve competitiveness and

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performance in organizations, collaboration is needed between universities and organizations in creating new knowledge that suits the needs of the entity (Hansen and Mork, 2017). Reasons and results of the collaboration are very diverse. There are some recurring themes about the differences inherent in each sector and the importance of trust. In a cross-sector collaboration, there are advantages and disadvantages. One can also assume that complexity increases when more partners put on more sectors, such as the difference between university-industry collaboration and collaboration Triple Helix.

University-Industry Collaboration (UIC) is another form of technology transfer. The application of new knowledge can be done by developing internal innovations using external knowledge (Lazonick, 2005). Knowledge is the core competence of the organization to maintain a competitive advantage (Hu, Hou and Chien, 2018), Knowledge as information that has been conceived and implanted in the brain, making it difficult to transfer between individuals because it is oriented individual (Osterloh and Frey, 2000). Creating knowledge to understand the information in a particular situation. The process of creating knowledge based on personal beliefs and perceptions about the world (Hansen and Mork, 2017). Knowledge has been regarded as a valuable strategic asset that can provide a competitive advantage (Choi and Lee, 2002), while universities conducting research and creating knowledge (Hu, Hou and Chien, 2018)(Xu et al., 2018), without the constant knowledge creation, a business cursed with poor performance (Choi and Lee, 2002). Universities have a fundamental component of any national innovation system, providing human resources and knowledge needed, so that the industry and the production system can innovate and become more competitive (Xu et al., 2018)(Mendoza and Sanchez, 2018). On the other side of technology transfer is the relationship between universities and businesses, to be able to access resources, modern equipment, to encourage research, knowledge, and update business problems (Toole, Czarnitzki and Rammer, 2014)(Thurner and Zaichenko, 2015).

While business enterprises can access staff, research, and development of highly qualified with public resources (Toole, Czarnitzki and Rammer, 2014)(Thurner and Zaichenko, 2015), the importance of collaboration undertaken by industry and University, in addition to the stakeholders in this industry, universities and government (triple helix theory) as well as the innovation and collaboration that exists intermediary between industry and universities. But in that case, should the harmony between knowledge management and collaboration system as to create good. The problem in this study is the complexity of the problems that occur in the industrial world as well as the rapidly growing innovation growth and the importance of developing the right organizational structure in creating success in being innovative. The importance of balancing the progress of innovation in solving problems that occur due to obstacles in sharing knowledge between industry and universities. Because universities as suppliers of resources needed by industry.

In this study, there are two main issues that will be done. The first issue is a decision-making mechanism of multiple sources of information and to solve problems in an organization to transfer knowledge from types of stakeholders. Because of the difficulty in overcoming the level of alignment between the knowledge possessed by the knowledge management system to be adopted. The second problem is the difficulty in sharing knowledge or effective knowledge transfer between multi-disciplinary organization. According to Hu et al (2018), the use of KM (Knowledge Model) is used to improve the performance that exists between university and industry and strengthening the efficiency and operational excellence for universities that serve a variety of social responsibility (Hu, Hou and Chien, 2018), Knowledge Model industry-university-industry collaboration and propose perspectives relevant

knowledge to stimulate results (Hansen and Mork, 2017), Application of innovation management concepts for University-Industry-Research (UIR) Collaboration using software engineering theory and information technology. Make improvements and innovations in the acquisition of knowledge, exchange, integration, application, and promote the optimization process in UIR collaborative innovation (Xu et al., 2018). Improve knowledge management by implementing blogs and RSS as a knowledge management platform. The following are aspects of knowledge management, including: identification of knowledge, acquisition, development, sharing, application and assessment (Li, Yang and Zhao, 2008). Implementing models to encourage interaction between universities and industry requires more than the expected model resolution and operational programming. The strategies offered in participation and collaboration with various objectives, shared goal setting are considered as a means to align Differences. Creation and dissemination of knowledge that typically utilize existing open environment. To achieve the necessary innovation successes seamless interaction between knowledge and innovation management. Gaps in this research is the presence of stakeholders in the UIC which is associated Triple Helix network studies the relationship of university-industry-government (Leydesdorff and Meyer, 2013), the University of Industrial Technology (UI) plays a central role in the development of scientific and technological innovation systems. The knowledge management process in collaborative UI collaborative innovation as a starting point. Based on knowledge chain theory, builds collaborative knowledge management processes in UI collaborative innovation, and uses the theory of process reengineering and modern information technology to apply collaborative UI management collaboration concepts (Xu et al., 2018).

As well Centobelli et al (2018), the issue of alignment between the nature of the company's knowledge and management systems knowledge which is used to support the process of knowledge management is crucial (Centobelli, Cerchione and Esposito, 2018), based subject to the problems and issues that happened before, that the creation of a mechanism to capture knowledge from a number of sources of information useful for decision-making is a major problem. However, the same knowledge representation of a thing can be different for each individual and different applications. In this research to find ways to facilitate collaborative university-industry taking into account the perspective of the stakeholders involved at various levels through the build lenses theoretical support in proposing a new framework that is able to gather knowledge and thus creating a harmony of advance of the stakeholders and the creation of intermediary innovation.

Thus the problem is to the first is to establish decision-making mechanisms from several large sources of information and to overcome the problem of knowledge transfer between organizations (University-Industry Collaboration) among stakeholders and the use of innovation in supporting collaboration. Then the second problem is the difficulty in sharing knowledge or transferring knowledge effectively between multi-disciplinary organizations so it is necessary to harmonize knowledge management and knowledge management systems.

This paper is organized as follows. In section 2, it contains an explanation of the problem definition. Section 3, is used for related work. Section 3, is used for literature surveys. Section 5 contains result and discussion. Finally contains conclusions and future work. While, the final section will summarize the overall results of the study.

II. RELATED WORK AND BACKGROUND

Integration and collaboration has become a common theme in environmental management. More holistic advice is issued on management results for expanded jurisdiction and one issue. To achieve this in practice, stakeholders representing interest groups, government agencies, and

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individuals must work together to develop more effective management plans (Margerum, 2001). Collaboration can be improved if knowledge continue to be distributed among workers in a culture that encourages knowledge sharing activities. Thus, collaboration and communication tends to be enhanced when sharing knowledge exists to encourage the exchange of knowledge among employees in the organization (Sabeeh, Syed and Roshayu, 2018). The recommendations proposed for university-industry collaboration (UIC) are based on the process / policy of transfer of knowledge developed and obtained by two actors to enhance the implications, be obtained, and be improved on social / economic development in the local / regional (Draghici et al., 2015). Approval of work will be represented as an ontology of the type of potential collaboration, channel opportunities for knowledge / conversation transfer and transfer which discuss to facilitate the process of drafting complex agreements between universities and companies. To support companies and universities to share research and development resources (knowledge, ideas, expertise, patents, etc.) (Draghici et al., 2015). University-industry knowledge transfer is completed in one group, usually academics. That motif corresponding universities and industry players despite their different working environments. Actor highlighting the results of the benefits gained by each organization rather than social benefits. The intermediary between the two groups will have a clear view of the motives of the two groups of actors and appear to be successful in facilitating successful collaboration (Ankrah et al., 2013).

Collaborative innovation through exchange, sharing and feedback between all parties, not including university education knowledge redundancy, increasing innovation and efficiency in the utilization of knowledge, and then building strong guarantees for collaborative innovation in University-Industry-Research (Xu et al., 2018). Study Siegel et al (2013) emphasize the importance of university-level organizational abilities and emphasized the importance of industry-university technology transfer at UIC. But in this case many who experience barriers identified, including a clash of cultures, bureaucratic inflexibility, reward systems that are poorly designed and ineffective management (Siegel et al., 2003), the company's environment is constantly changing and the product life cycle is reduced, most organizations are no longer able to innovate. Therefore, they open their process to include knowledge about external sources and to increase their innovation potential (Sabiölla et al., 2017).

III. THE REVIEW

3.1. University Perspective Collaborative

The role of the university has changed, in principle not only basic academic research, but the application of technology. Most research institutes and universities, Research and Development (R&D) Laboratories have collected various research resources that can be offered to players in the industry for practical applications. The government is also involved in matters relating to various interventions and policies to encourage interaction between industry and universities (Ho, Liu and Kuan, 2016). University-Industry Collaboration (UIC) in terms of academic research is an important factor for universities, because most researchers strive to improve research results in solving problems that occur. The university encourages researchers to support in university-industry (UI) projects that have differences, including providing technical support, resources, research, or commercial consulting services for industrial demand. Through UIC contracts or technology transfer contracts as a basis for industry players can collaborate with academic researchers (Ho, Liu and Kuan, 2016). As a result of the lack of funding, universities have to think, in addition to producing scientific results, as well as to capture the economic value of the results (Collier, Gray and Ahn, 2011), the importance of differences among industries in

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the relationship between universities and industry innovation. Because advances in university research drive the industry more significantly and directly in this field than other sectors (Mowery and Sampat, 2005). Although the technology of Small and Medium Enterprises (SMEs) faces many challenges, effective collaboration with universities to provide access to ideas and resources can be an important determinant of company performance and growth (Collier, Gray and Ahn, 2011). The company seems to choose the partner universities based on the skills and social capital. The main barrier to increasing research partnerships between universities and SMEs is related to differences in organizational culture (Collier, Gray and Ahn, 2011), related to the decision-making process of SMEs, the following types of decisions are identified: 1) the decision to internationalize; 2) the selection of entry mode; 3) selection of foreign markets; 4) The decision to change the market or entry mode; 5) the decision of strategic collaborations; 6) selection of partners for collaboration; 7) commitment decision. The decision to begin the process of internationalization of SMEs is influenced by internal factors (decision makers entrepreneurial orientation) and external factors (networks and relationships) (Costa, Soares and De Sousa, 2016).

Triple helix model of analysis called the forces that drive change in the configuration of the university-industry-government relations and their consequences. Triple Helix and Entrepreneurship University may be different in different countries with different economic systems (Etzkowitz, 2003). Triple helix framework focuses on measuring results and indicators of academic entrepreneurship-related issues, and finally activities are focused on specific indicators that track the relationship between science-technology (Meyer et al., 2014), The preferred form of research is to reduce and challenge the way knowledge is framed and agreed upon by stakeholders and shareholders of 'entrepreneurial universities' of academic entrepreneurship (Smith, Ward and House, 2013). Most of the policy debates and empirical analyzes are against the economic output and impact of university entrepreneurship (such as patents, licenses and startups), or the transfer and transfer of technology (Tijssen, 2006), the university's perspective as a major contributor to advertising and economic development. Between industry and universities is an important key in technological change in many industries (Mansfield and Lee, 1996), however, with the growing importance of universities in economic development, the university-community ideology accepted in Mode 1 has provided a way for a Mode 2 perspective from research universities related to interaction and closer alignment between academic and industrial support. Mode 2 University is "a mixture of research and research, applied and basic research, entrepreneurship and scholasticism" (Etzkowitz and Leydesdorff, 2000), University-industry broad interactions can be translated into four categories: (1) supporting research; (2) technology transfer; (3) transferring knowledge; and (4) cooperative research (Santoro, 2000). To foster university-industry collaboration by transferring knowledge / competition / innovation in the development process with the development of entrepreneurship education within the university. The proposed discusses the university-industry collaboration (UIC) based on the transfer of knowledge developed and obtained by the second actor to enhance the implications, contributions, and improvements to social and economic development. Regarding work agreements will be represented as ontologies of potential collaboration types, transfer of knowledge transfer / conversion opportunities and transfer of innovations outlined to facilitate the decision making process when establishing specific types of contracts between universities and companies (Draghici et al., 2015).

3.2. **Industry Perspective Collaborative**

To reach the top ranking, universities must be able to achieve high performance in academic publications (Ho, Liu and Kuan, 2016),

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collaboration between universities and industry increasingly perceived as a vehicle to boost innovation through knowledge exchange (Ankrah and AL-Tabbaa, 2015), Collaboration between universities and business, it offers little explanation on how to reduce barriers in this collaboration (Bruneel, Este and Salter, 2010), According Radziwon et al (2017), said that Small and Medium Enterprises (SMEs) could be involved in the development of the business model in a regional innovation ecosystem by working a number of external partners. Transferring Knowledge aims to develop an appreciation of interactions that facilitate industry-university collaboration by exploring the micro dimension of the Partnership (Gertner, Roberts and Charles, 2011). The aspects of the company's innovation strategy must be framed with the concept of open innovation. The open innovation paradigm can assume companies must use external ideas as well as internal ideas, and internal and external paths to the market, compiling companies trying to advance technology (Chesbrough and Crowther, 2006).

3.3. Toward Knowledge Transfer Perspective Collaborative

University-business cooperation is still an area of research that is fragmented and unclear, and understanding of university-business is still inadequate because most of the research carried out around a certain element, not as a system which includes, thorough, and interrelated (Galan-Muros and Davey, 2017). So that the transfer of knowledge between universities and the organization is very important, not only for organizations involved but for broader innovation systems (Galán-Muros and Plewa, 2016), Potential platform as technology for communication, knowledge sharing and exchange of information, when it expanded across organizational boundaries. Understanding what factors are driving organizations to share knowledge are important determinants of a Knowledge Management (KM) strategy (Grant and Preston, 2018), Application of IT in construction, Building Information Modeling (BIM) to assist KM. BIM has several distinctive features, such as parametric modeling, visualization, virtual format, and centralization. A framework was developed to describe the current status and future direction for KM in IT-generic and BIM-specific. IT-based KM transformation will be able to become KM supported by BIM (Wang and Meng, 2019). Based on previous studies, that the intermediary function in general has been a lot of innovation in meticulous in previous studies. Regarding the context of university-industry collaboration in this research will explain about the role of innovation as an intermediary function of knowledge transfer. Which is used to determine the gaps in this study (see Table 1).

Table 1: **The functional Typologies of Knowledge Transfer**

Authors	Knowledge Transfer Functions	
	Innovation intermediaries	Key Indicator
(Draghici *et al.*, 2015)	knowledge/ wisdom transfer opportunities and innovation transfer	1. Patents and licensing 2. Spin-offs and enterprise creation 3. University-industry networks 4. International cooperation 5. European affairs 6. Continuous professional development 7. Alumni affairs 8. National subsidies 9. regional subsidies 10. Grants
(Schoen, van	the university	1. IP management

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Authors	Knowledge Transfer Functions	
	Innovation intermediaries	Key Indicator
Pottelsberghe de la Potterie and Henkel, 2014)	Technology Transfer Office (TTO)	and spin-out services 2. Research funding services
(Hazeyama, Umino and Yoshii, 2013)	knowledge transfer support of server administration using historical operations	1. Serious mis-operations that should be avoided by novice server administrators are clarified by the server administrators. 2. When novice server administrators to create a task record, they Investigate the history and extract effective operations operations
(Hugo *et al.*, 2014)	Micro, small, and mid-sized enterprises (MSMEs) through simulated enterprises	1. Knowledge creation process through the dynamic relationships among individuals. 2. The MSMEs from the production sector, the which will benefit from the knowledge transfer through advisory sessions and consultancies. 3. entrepreneurial sector
(Dushnitsky and Klueter, 2017)	Online marketplaces for technological inventions	1. Marketplaces use information technology and the Inter-net to Facilitate the listing, search, and exchange of inventions between inventors and technology owners or sellers
(Li, 2012)	Suppliers to original equipment manufacturers (OEM)	1. Buyers transfer key knowledge and timely information to suppliers to improve product quality. 2. According provide manufacturing services to OEM buyers' specification or component requirements 3. Order to provide timely information and product designs to suppliers, knowledge sharing activities between

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Authors	Knowledge Transfer Functions	
	Innovation intermediaries	Key Indicator
		suppliers and buyers are Increased

3.4.**Stakeholder Perspective Towards UIC**

Regional and economic development based on stimulation of economic growth has caused a change in the role of the University and its interaction with the business community through technology transfer from academia to industry (McAdam *et al.*, 2012). According to (Galán-Muros and Plewa, 2016), the literature review has provided some important insights on the factors that facilitate or hinder university and industry collaboration. Relations with stakeholders have developed through changes resulting in content, structure and governance. In addition, conflicting goals between each stakeholder group (ie academics, industrial liaison staff, technology transfer office staff and representatives of government support bodies) have led to the growth of the university business model not as a joint creation process (Miller, Mcadam and Mcadam, 2014). Use of construction stakeholders to describe the impact of the strength of various stakeholders and influence on business model innovation (Miller, Mcadam and Mcadam, 2014).

3.5. **Barrier And Driver Of The UIC**

Several factors have different effects in each University-Business Cooperation (UBC). Policy makers and university managers to take an approach to UBC are important factors. Policy makers can focus, program and fund these factors with a greater impact on knowledge transfer, through their specific environmental diagnostics to develop coordinated evidence-based policies (Galán-Muros and Plewa, 2016).The use of dynamic perspective, which may be a discrepancy is that the relationship between the actual dimensions change over time. The role of social capital in alleviating the growing challenges in the UIC for the transfer of technology on stage preformation and postformation (Al-Tabbaa and Ankrah, 2016). As well as generate through the relationship between universities and industry players. Informant experiences regarding the impact of the structural dimension, relational and cognitive effectiveness of the relationship between actors in Faraday Partnership, and the development of this relationship is useful in reducing the effects of barriers embodied in the partnership (Al-Tabbaa and Ankrah, 2016), Or the challenges arising from university and industry collaboration relationship (Galán-Muros and Plewa, 2016). The challenge in performance management is to determine the steps that somehow estimate the value of intangible outputs (Perkmann, Neely and Walsh, 2011).According Perkmann et al (2011), there are several kinds of challenges confronted in advance of university and industry collaborations such as: intangibles, multiple objectives, long-term nature, and measurement norms (Perkmann, Neely and Walsh, 2011). Stakeholders choose to not take any risks when challenged with conflicting regulations on the application of collaboration (Moeliodihardjo, Soemardi and Brodjonegoro, 2012). Factors that drive or hinder this process are very important priorities in realizing UIC (Galán-Muros and Plewa, 2016). Regarding the relevant big factors appear, brought to the transfer associated with the connection, financing, organization of cultural differences and characteristics of internal organization, as well as the driver related to the availability of resources and relationships. In this case, according to Galán-Muros and Plewa (2016), states that there exist three main core of the UIC, namely: education, research and assessment (Galán-Muros and Plewa, 2016). Can be described that educational activities can be in the form of skills and training (Perkmann, Neely and Walsh, 2011); bias also in the form of meetings, seminars, and workshops (Seppo and Lilles, 2010)(Albats, Fiegenbaum and Cunningham, 2018); postdoctoral or doctoral (Perkmann, Neely and Walsh, 2011);

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work placements to students (Al-ashaab et al., 2011); and mobility of staff (Polter and Scherer, 2017). There are various ways in which universities can collaborate with other sectors. Some of these include collaborative research, contract research and consulting, as well as commercialization activities. The engagement levels can be associated with individual and organizational factors. There are studies showing positive results or neutral for research and publications (Perkmann et al., 2013). Research activities that are used as university industry collaboration include: R & D, and grants (Perkmann, Neely and Walsh, 2011)(Albats, Fiegenbaum and Cunningham, 2018); publications and research (Albats, Fiegenbaum and Cunningham, 2018)(Xu et al., 2018)(Polter and Scherer, 2017); the amount of research and Intellectual Property Rights (IPR) (Seppo and Lilles, 2010) Publications and IPR policy must be defined (Bruneel, Este and Salter, 2010)(Lee, 2000) (Polter and Scherer, 2017); Commitment and cooperation (Albats, Fiegenbaum and Cunningham, 2018)(Polter and Scherer, 2017); Collaborative innovation UIR (Xu et al., 2018); contract research and consulting (Polter and Scherer, 2017); UIR technology collaborative innovation (Xu et al., 2018); License number of universities and university licensing revenue (Albats, Fiegenbaum and Cunningham, 2018). While these types of activities requiring assessment Patents and spin-offs (Seppo and Lilles, 2010)(Albats, Fiegenbaum and Cunningham, 2018); GDP per capita, productivity, turnover growth, export growth, or growth of employment (Seppo and Lilles, 2010); income (Seppo and Lilles, 2010); government sponsorship (Ankrah et al., 2013); The ability to assess performance, reduce variation and may negatively affect the amount and quality of knowledge transfer that occurs (Rossi and Rosli, 2013). Different reasons to collaborate to create a challenge to maintain such collaboration (Ruuska and Teigland, 2009). For the purpose and value may differ depending on the sector or type of partner. Stability, efficiency and necessity have been found to be an important factor in university-industry collaboration. These include the environment of the future that can be predicted to secure financial gain, funding and business opportunities (Ankrah et al., 2013), Cross-sector collaboration, including collaboration among government, business, nonprofit organizations, community and public, is another research field. While Galán-Muros and Plewa (2016), the relevance of less formal events, they have proposed a framework which mainly incorporates forms of knowledge transfer between universities and the real bit industry (Galán-Muros and Plewa, 2016). There are four kinds of obstacles in the UIC, namely: 1) a connection problem; 2) lack of funding for the collaboration; 3) differences in organizational culture - the difference in motivation; and 4) the difference in the internal characteristics (Galán-Muros and Plewa, 2016). Some of the obstacles that occur in the UIC, such as cultural barriers (Siegel et al., 2003)(Alavi and Leidner, 2001); motivation (Siegel et al., 2003); social capital construction (Al-Tabbaa and Ankrah, 2016); The weakening of the regional and technical capabilities (Hsieh et al., 2014); employees do not know what knowledge should be shared (Mearns, 2012); institutional type of higher education institution concerned, the origin and the time, the format of the organization, stakeholders, funding sources and the relationship with government (Ranga et al., 2013); industry and university orientation differences, which we describe as 'constraints due to orientation', and constraints associated with conflict over IP, and dealing with the university administration, what we call 'transaction-related barriers; communication (Bruneel, Este and Salter, 2010); differences in the internal characteristics (Perkmann, Neely and Walsh, 2011). Furthermore Galán Muros and Plewa there are two key types of drivers, namely: 1) the availability of complementary resources; and 2) the relationship between organizations (Galán-Muros and Plewa, 2016).

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IV. RESULT AND DISCUSSION

4.1.Measurement System For UIC

Initial assessment of university-industry collaboration (UIC) by focusing on what is actually gained by the participants, faculty members, and the company, from their collaboration (Lee, 2000). Measure the concept of industry-university collaboration can become a sustainable element in the innovation system of the country, and the underlying conditions that may occur for ongoing collaboration between university faculty members and industry companies (Lee, 2000). Universities with industries related to high-quality academic rankings, imply the best researchers from their departments who intensively collaborate with industry (O'Shea et al., 2007). UIC project must use different resources to strengthen the personal academic performance (Ho, Liu and Kuan, 2016) The development of knowledge in terms of intellectual capital, knowledge transfer and innovation capacity, which is essential for improving organizational performance results. Social capital to generate value in reducing barriers intensity UIC (Al-Tabbaa and Ankrah, 2016). The process approach allows the construction of a relatively holistic overview of the life cycle of UIC and KPI (key performance indicators) that are relevant to each stakeholder at each stage of the process UIC. In the following subsections, the perspective of stakeholders on assessment success of the UIC (university, industrial or multi-stakeholder perspective: both academia and industry and all stakeholders Quadruple/ Quintuple Helix) (Albats, Fiegenbaum and Cunningham, 2018). KPI developed in each study can serve all the perspective of stakeholder groups to a certain extent, is the basis for classification of samples approached or primary and secondary data is used (Albats, Fiegenbaum and Cunningham, 2018). The measurement system for the university-industry alliance, in addressing all these aspects (Perkmann, Neely and Walsh, 2011), includes: 1) Intangible: Output and results of intangible agreements; 2) Various goals: Targets differ between partners and may have different times; 3) Long-term nature: Benefits can only be realized in the medium and long term; and 4) Norms of measurement: what should be compared with actions

4.2.Input

Input is the first process in the process. An important element that has been used successfully for alliances is the mobilization of adequate resources. Establish cooperation with universities that enable companies to achieve economies of scale, which are intended for other partners involved (multi-stakeholder) (Perkmann, Neely and Walsh, 2011). It is easier to use indicators to measure the input and output of university-industry cooperation, the focus should be on economic impact (Seppo and Lilles, 2010). While these indicators show economic capacity to attract and develop a number of human resources is greater than the population, the higher levels are also likely to reduce the level of average productivity, with an increase in the proportion of jobs with low wages and low productivity in places with a relatively high level of activity (Huggins et al., 2014). Training and development are important components for companies to contribute to organizational success. Given the high official fixed costs at research and development institutions (R & D), as well as the proximity of university research to internal R & D, encouraging some companies to share costs with universities and other companies (Perkmann, Neely and Walsh, 2011). As well as engaging in the production, learning and research (Xu et al., 2018)(Polter and Scherer, 2017). Rate collaboration capabilities with the use of sources of funding / financing, ISO quality, the number of contracts and the involvement, the resources, the amount of research and intellectual property rights (IPR) (Seppo and Lilles, 2010). While the use of resources of both parties, motivation of both parties, the amount of research and publications, the choice of partners to be traced by the parties and the geographical proximity (Albats, Fiegenbaum and Cunningham, 2018).

4.3.**In Process**

Measure the concept of industry-university collaboration continued between university faculty members and industry companies (Lee, 2000). Regarding universities with high quality industry correlated rankings (O'Shea et al., 2007), clear policies regarding publication and intellectual property rights (IPR) (Bruneel, Este and Salter, 2010)(Polter and Scherer, 2017)(Lee, 2000). Commitment of both parties to the cooperation also supports the development of trust, and this commitment is very important, when it comes to the management board of the organization, as management determines strategic priorities and thus, influence the perception of other staff of the UIC (Albats, Fiegenbaum and Cunningham, 2018). UIR collaborative innovation to meet the knowledge needs of all parties, the need for a lot of knowledge from all parties, increase the efficiency of transformation of scientific and technological achievements, maximize the benefits of all parties in production, and learning and research (Xu et al., 2018), while the transfer of knowledge and industry-university collaboration in research; collaborative research; contract research and consulting related technologies; mobility of staff between companies and public science institutions; cooperation in the education of graduate students; vocational training for employees; and intellectual property rights (IPR) (Polter and Scherer, 2017). Because the main purpose of the collaboration is education (Albats, Fiegenbaum and Cunningham, 2018). Placement of the number position is offered as a result of collaboration (Perkmann, Neely and Walsh, 2011). Collaboration that exists by doing work placements to students (Al-ashaab et al., 2011). Feedback for university partners so that the industry can help users of their expertise to ensure that it is relevant to the industry is a very important element. The use of high-quality resources must be able to produce high-quality research (Perkmann, Neely and Walsh, 2011), encouraging in producing high-quality research is undoubtedly in the implementation of the initial process, namely training and learning opportunities for academic and industrial participants through doctoral / post-doctoral and industrial training (Perkmann, Neely and Walsh, 2011).

4.4.**Output**

Measuring the output can be a number of products, services or new technologies developed (Albats, Fiegenbaum and Cunningham, 2018). Outcomes resulting from the collaboration are patents, publications, spin-offs, meetings, seminars, and workshops (Seppo and Lilles, 2010)(Albats, Fiegenbaum and Cunningham, 2018), Indicators to measure output in terms of creation of new knowledge is the publication (Albats, Fiegenbaum and Cunningham, 2018) (Al-ashaab et al., 2011)(Perkmann, Neely and Walsh, 2011). Development of redesign management concepts, organizational structure and collaborative management to support modern UIR management and information technology, in realizing enhancements and innovations to acquire knowledge, share knowledge, link knowledge and application of knowledge, and develop processes for optimizing UIR collaboration innovation [11]. The wide availability of knowledge to engineers and management system that is safe and use of intellectual property is still unresolved (Grimm and Anderl, 2013), Total license revenue of universities and university license allows to evaluate how the entrepreneurial university (Albats, Fiegenbaum and Cunningham, 2018). Outcomes of the first university-industry collaboration, patent or patent application; secondly, publication in a journal; and third, in terms of skills and training of staff to assess the success of (Perkmann, Neely and Walsh, 2011). Exclusively oriented output, and primarily related to income from the transfer of knowledge into college (Rossi and Rosli, 2013).

4.5.**Impact**

Measure the impact of industry-university collaboration output must show the collaboration reaches its destination (Pertuzé et al., 2010). So that

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whatever the results of which have influence on the parties to collaborate (Albats, Fiegenbaum and Cunningham, 2018). The impact of collaboration towards the economy, such as GDP per capita, productivity, turnover growth, export growth, or growth of employment, to measure the impact of university-industry cooperation on a more general level. So it can increase revenue (Seppo and Lilles, 2010). By exploring various options for integrating industry-specific applications using this new business model that enables potential benefits and business opportunities for various users. Actors who Support the search as determinants of actors release favorable results obtained by individuals for social benefit organizations which are often referred to as justification of government sponsors. The intermediary has a clear view of the motives of the two groups of actors and supports success in facilitating successful collaboration between the two groups (Ankrah et al., 2013). The ability to consider more ways to assess performance composites. The use of a single formula to appreciate the performance of the transfer of knowledge may have the effect of performative strong, prompting the university to adapt to a single model of knowledge transfer (eg, leaning toward the commercialization of research and activities that generate income, ignoring the full spectrum of activities transfer of knowledge), reducing variation and possible negatively affect the quantity and quality of knowledge transfer that occurs (Rossi and Rosli, 2013) (see table 2).

Table 2: **University-Industry Collaboration Measurement Indicator**

Categories	Indicators
Input	R & D expenditures, revenues, grants and contracts, and researchers (Perkmann, Neely and Walsh, 2011)(Albats, Fiegenbaum and Cunningham, 2018);Production, learning and research publications (Albats, Fiegenbaum and Cunningham, 2018)(Xu *et al.*, 2018)(Polter and Scherer, 2017); Collaboration with the use of sources of funding / financing, ISO quality, the number of contracts and the involvement, the resources, the amount of research and intellectual property rights (IPR) (Seppo and Lilles, 2010); Choice of partners to be traced by the parties and the geographical proximity (Albats, Fiegenbaum and Cunningham, 2018); The amount of resources dedicated (Huggins *et al.*, 2014).
In-Process	The involvement of university faculty with industry (O'Shea *et al.*, 2007); Publications and IPR policy must be defined (Bruneel, Este and Salter, 2010)(Lee, 2000)(Polter and Scherer, 2017); Commitment and cooperation (Albats, Fiegenbaum and Cunningham, 2018)(Polter and Scherer, 2017); Collaborative innovation UIR (Xu *et al.*, 2018); contract research and consulting, staff mobility, training (Polter and Scherer, 2017); the number of postdoctoral or doctoral position (Perkmann, Neely and Walsh, 2011); work placements to students (Al-ashaab *et al.*, 2011).
Output	Patents, spin-offs, meetings, seminars, and workshops (Albats, Fiegenbaum and Cunningham, 2018); publication (Albats, Fiegenbaum and Cunningham, 2018)(Al-ashaab *et al.*, 2011)(Perkmann, Neely and Walsh, 2011)(Seppo and Lilles, 2010); UIR

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Categories	Indicators
	technology collaborative innovation (Xu *et al.*, 2018); License number of universities and university licensing revenue (Albats, Fiegenbaum and Cunningham, 2018); skills and training of staff to assess the success of (Perkmann, Neely and Walsh, 2011); income (Rossi and Rosli, 2013).
Impact	GDP per capita, productivity, turnover growth, export growth, or growth of employment; income (Seppo and Lilles, 2010); government sponsorship (Ankrah *et al.*, 2013); The ability to assess performance, reduce variation and may negatively affect the amount and quality of knowledge transfer that occurs (Rossi and Rosli, 2013).

4.6.**Sustainable Development**

It is important to develop collaboration for integrated knowledge management to improve management of the University Industry Collaboration (UIC) to improve improve management to prepare a more solid foundation for sustainable development (Hu, Hou and Chien, 2018). Designing and managing the knowledge management process, can change the knowledge, skills, and work flow quietly into procedures, standardization, and analysis of the context of documentation, and lays the foundation for creating competencies, competitive advantage, and sustainable development (Chang et al., 2009), Sustainable development to apply the concept of an integrated knowledge management in collaborative production contributing resources, complementary advantages of each (Xu et al., 2018). Maintain competitive advantage and achieve sustainable development, must manage resources effectively and intellectual ability, and the primary goal of management is to achieve the exchange and sharing of knowledge to accelerate the explicit and implicit knowledge sharing, create internal knowledge utilized in full and comprehensive (Tang and Wang, 2009). Sustainable development requires the integration and harmonization of the economic, environmental, and social aspects of the product and product system (Sanchez and Monod-ansaldi, 2017). This is often represented as a model of 'triple bottom line' or Russian doll models, with particular emphasis on the environmental aspects of primary school (Meese and Mcmahon, 2012). The power of knowledge can bring about change and improvement as organizations strive to maintain growth and sustainable development (Akhavan and Hosnavi, 2010).

V. CONCLUSION AND FUTURE WORKS

To express generalizations about the limited results of the literature study in the selection of topics based on UIC challenges, barriers, drivers, innovations and performance indicators are used to improve the generalization of the study. This study recognizes the limitations of generalizations that are not too complex and fully or focused. However, this research has focused on the context at UIC. Integration and collaboration can be created well, if there is collaboration between stakeholders. So that in order to increase UIC if knowledge is continuously distributed based on knowledge transfer processes/policies, because knowledge is an intellectual model. Determining the relevant approach process is very useful for assessing UIC performance. And the use of KPIs (key performance indicators) for each stakeholder for stakeholders about the success of the UIC assessment.

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