

The Importance of Collaboration between Government, University and Industry on Education for Developing Country

Julyeta Runtuwene, Audy Kenap

Jurusan Pendidikan Teknologi Informasi dan Komunikasi,
Fakultas Teknik
Kampus Maesa, Universitas Negeri Manado
Minahasa, Indonesia
gagaken@gmail.com

Rolly Oroh

Jurusan Teknik Mesin, Fakultas Teknik
Kampus Maesa, Universitas Negeri Manado
Minahasa, Indonesia

Abstract—Education is the primary key to develop country. Almost all country that pay attention in education, could improve the citizen welfare in common. Education in developing country, in most case priority the science (especially basic science) which is focus for theory development. Professor in developing country, mostly graduated from higher education at developed country, that mostly graduated from western country university. Somehow, the problem happened between science and its application, the gap between research center and industry application. Methodology Survey Database Index via Web 2.0 that could be a powerful lure for an organization while the interactively promises to bring more employees into daily contact at lower cost. Triple Helix proposed by Etzkowits to review the connection between Government, University (Research Centre) and Industry. Collaboration in Triple Helix could improve the research result to apply by industrial. The result of the education impact normally takes times, but to compare some country that happened in the past, the real impact of collaboration in Triple Helix is inevitable.

Keywords—web literacy; fragmentation; Vinnova; frugal innovation; clustering engine

I. INTRODUCTION

Every nation and its government want to make good welfare for all citizens. Government has their role to design, implement and even evaluate their program to community with their complex background. One department and important side is education. Education is one of the most effective ways to change human mind. When people want to live better, education is one of the best way in order to make people live together in harmony while there are many of various background in human mind that need to be control in society. In these days, the education not only in cognitive area, but also need to learn and improve skills in this digital era. Today we live in a world that has been affected by rapid advance in technology. The way we learn, work, communicate, think and even live has change dramatically. In order to cope with these rapid changes and to make sense of the world around us, we

need to not only develop our understanding of how technology work, but also develop skills and capabilities, that will help us to adapt to living in this new era [1]. This explanation could be understanding why education must be one of very important thing in society. Moreover, in this era, the company and its advertising sometime make the complexity of understand the internet and its contents, but usually the white book and “academician” as university educator come with the pure idea about the purpose of education. Interesting information comes from Mozilla on its Internet Health; even young people who grew with access to the Internet don’t automatically develop strong web literacy skills. Study show that many young people in the US and the UK cannot have distinguished promotional content from the news article or ads from the search result [2]. Internet support data and information exchange and user must understand that the apps on internet are one of its parts, include social media. Based on this information the development in this big data era could be in hard and difficult situation, especially in developing country. It is hard to compete with developed country in research and education, especially in basic science. Related to information gathering, the information that store and available on internet was too many (especially in Big Data era) and like or dislike, the media affect especially internet could be difficult in developing country related to education. For information, the amount of website was more that amount of people in the world, so the problem to find valid and well quality information on website would be difficult problem in this big data era, over loaded data that store on the internet. The amount of internet user was reach 3.366.261.256 user on November 30 2015 [3].

Triple Helix with its own characteristics, could be another difficulty in education development, for example from the cultural side, Government concern on politics, University concern on Scientific, Industry/business concern on economic even though all are need to collaborate ta make innovation. We could see on this following table.

TABLE I. GOVERNMENT UNIVERSITY INDUSTRY DIFFERENCE PERSPECTIVE

	Industry	Government	University	Suggestion
<i>Cultural</i>	Economical	Politics	Scientific	Innovation
<i>Perspective</i>	4 months	4-5 years	6-10 years	Conscious about time-quality
<i>Geographical</i>	Global	Regional	Global	"Glocalization"
<i>Award</i>	Profit	Re-election	Knowledge	Development

^a. Source: (J.L. de Magalhaes, Boechat & Antunes) adapted by (Etzkowitz & Zhou.) [4].

The difference perspective in Triple Helix seem difficult to find ideal solution in development, especially in this digital age, big data era which over loaded data available on internet. But government, as the actor in determined rule, the government has right to drive the society, include curriculum which is the core part of the education. Industrial, include internet industrial, also could be drive and control by government which its parts of their territory. The role of government in this topics seem could be dominant, so government must be well understanding in case the development could determine the dignity of most citizen. As we know that most graduated in developing country comes from developed country, in this case, most of the topic research, tend to imitates and follow the research done at developed country. The role of government in this case need to deep learning well related to the research priority in our territory. The stakeholders and situation in every country relatively different related to the education and research, moreover between developed and developing country.

A. Challenges of Developing Country

Triple Helix that proposed by Etzkowitz seem not easy to implemented while its difference perspective, more over its supplement with society which become Four Helix.

1) *Society and Human Being*: In development society, there is a good question about who know exactly the best development of territory in its society. It is easy to answer but would be difficult in implemented while the complex various in community background. The difference in culture, tribes, education level and background need deep analysis in development plan and implementation. According to Senge and Kofman, the human being like to Fragmentation, Reaction and Compete. These attitudes influence the processing of decision problem with their triangle [5]:

a) *Fragmentation*: is a natural tendency in human being to solve a seemingly complex problem by initially decomposing the problem into seemingly "simple" parts and thereafter studying each part separately. In an organization, fragmentation can manifest thorough departmental partitioning which contrast with one another (or make them ignore one another) once a problem surface or makes them to have a reflexes to quickly search for the guilty, even before together the competences that child solve the problem.

b) *Reaction*: is related to the fact, in most of the period in human history, man had always faced sudden threat such as wild animal, flood, earthquake and tribal attack. His nervous system has evolved based on these conditions. That is why

man is more "prepare" to react to sudden aggression that slowly evolving aggression, example determination of his environment. Peter Senge illustrates this phenomenon by using the "frog" metaphor. If a frog is immersed in boiling water, the heat will force the frog to try to jump out of the pan and save his life. However, if it is immerse in pan cold water and the water is gradually warmed, the frog will die scalded, because the slow and gradual evolution of the temperature does not allow it to define a tolerance and action threshold. This metaphor is often used to show importance of "timely" perception of weak signals emerging from within and outside of an organizing and proclaiming the need for implementing major changes. This tendency to react spontaneously as soon as problem occurs, could make the decision-maker prefer a solution approach (by trying to "quickly" get of this "bad situation") that he knows, rather than a more creative approach which demands interaction and a more profound reflection time;

c) *Competition*: according to Mathieu is the worst enemy of learning: "to learn, we must rely that there are something that we don't know and we must also try some activities that we have not "mastered" and allow others to help us. But in most of the organization, confessing one's inference is always considered a weakness; our value depends on what we know and not depend on what we are learning [6]. Another adverse effect of competitions that it makes the decision-maker more focused on short-term measurable objectives. Thus, when a decision problem surfaces, he could, under the influence of competition, be forced to act quickly, rather than take enough time to ponder which implies confessing that he does not have an immediate solution). The decision-maker may even adopt drastic measures (such as down-sizing, general "rationalization" of cost) while remaining in doubt as per the possibility of these steps attacking the understanding of the whole problem.

It is clear that not easy to drive the community in one way, even for the kindness and for the welfare for community itself while the characteristic of the own community. The strategy and government management for the Triple Helix perspective need a strong analysis and strong good will especially in various and different background.

B. University and Research Centre

As the center of research, the university could be the center of excellence to invent the new thing in science and also application of science. In its development, the industrial side somehow has their own research and development to apply science application that near to community needs. That is the reason why Etzkowitz proposed the Industrial and business side as one of its parts of his Triple Helix. The problem in university and its research center, somehow there is a gap between research invention and research result especially related to application. Professors as main actor in research in developing country mostly graduated from developed country, which is the concern about different needs. The concern of university in developed countries depend on the country needs, and in university research mostly focus on basic science that very different with the needed of developing country, that

commonly, need the proper technology that need for application. “Education program are also very difference of what the local industry needs. This is the case for the initial education but also for the continuing education. The link between theoretical knowledge and application is not established and these two “world” have their own trajectory and never get along together” [7]. With this information and opinion, there is a clear situation that there is serious concern which there is real gap between science and application. According to the work sponsored by the European Community [8] and the statement of E. Zerhouni [9] when he was the Director of the National Institute Health, US, the following mechanism is developed:

- The state finances the laboratories and research centre to develop various competences and knowledge. They build in fact the national intellectual capital
- These competence and knowledge must be transformed in product and services robust enough to reach the market and to be (at the best) exported.

Competence and knowledge that transformed to product and services that we called innovation, and the developing of various competence and knowledge that we called invention. In creating paper journal of its research, sometimes researcher do not pay attention on patent. In our opinion, patent is one of a good way to bridge between science and application.

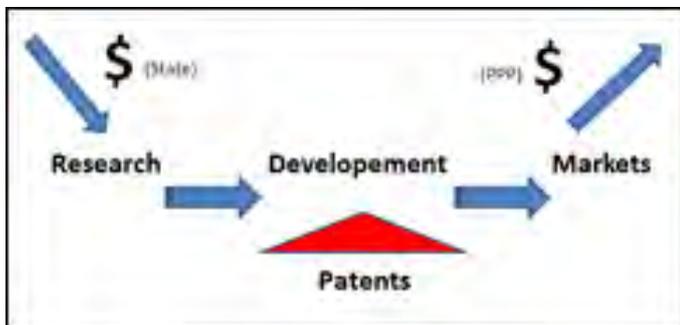


Fig. 1. Patent information is a link between research and market.

Patent is a seen by all people and has it essential information and also to protect people invention. There are many literatures that described link between innovation and patent analysis, but the use of patent analysis to open the way to create added value from natural resourced in developing countries is a starting area of applied research as well as the use of patent information to introduce technology development in theoretical educational program. Patent analysis as a vector of innovation in developing countries). Information that write on patent is important while is provide valid facts and information which is possible for organization and stake holders of an area of knowledge to make research [7].

C. Government and Industry

Government as the center of power and regulation, need to be a good and fair referee in this competition era. While all company need to compete, the fair regulation of the government also must be transparent and measurable in order to give equal opportunity for the company to compete. It is not

an easy job, while government need to control the fair competition, on the other side, government also need to compete with other country in this global competition context. Government has right to control the curriculum of Education/University research and also regulation of company. Industry, but sometimes with its different perspective, it would be really difficult. For example, from Award perspective, government target to be re-elected while industry and business focus on profit, which could be possible for “collaborated” in other way. Government also need to support the company to be innovated in order to make efficient and competitive company of the nation. Figure following is the result of consortium VINNOVA that funded by European community.

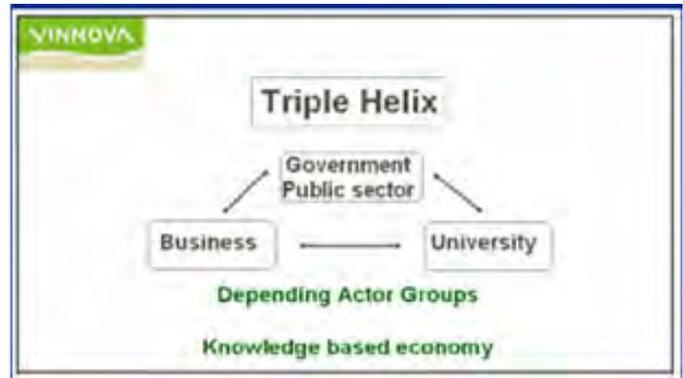


Fig. 2. Triple Helix, cluster development.

Triple Helix is an ideal way to design and implemented development in developing country. There is an interesting information that again come from Vinnova, a study that sponsored by European community, about the Research and Innovation. In Research, we are going to transform the money the knowledge and Competence that usually sponsored and funded by government, and on other side, Innovation, we are going to transform knowledge and competence to money. The following figure could help us to understand the difference between Innovation and Research.



Fig. 3. Research and innovation.

There is information about the concerning about research and not go deep and further learning, and Innovation on the other side, could be important in deliver good or better services to community. The problem in developing country could be complex related to develop the nation that would start from educational side. The gap between science and application urgently need solution. Is it enough by building link between science and application? Or does it need time to process and be suitable match? Is it also good to learn from country that involves government, university, industry and its society in developing the country?

II. METHOD

In this digital era, we need to find the efficient and powerful method to solve the problem. Methodology Survey Database Index via Web 2.0 could be one alternative to solve the problem, especially from low cost side. The method uses could be a powerful lure for an organization while interactively promises to bring more employees into daily contact at lower cost [10]. There are pros and cons about digital method, but to compare cost and benefits, this method with deep and proper analysis could bring good and more benefits impact for organization vision.

III. RESULTS

There are many success story of every nation in getting success in developing their country. Some to mention USA, England, Finland, Japan, Russia, Korea, Thailand, French, China, Australia and many other nations. The 15 competitiveness country 2018 that released by IMD (International Institute for Management and Development) put Unites States of America at the first place, following by Hong Kong, Singapore, Netherland, Switzerland in big five. The mission of IMD is remain to help countries achieve prosperity and higher quality of life. International Institute for Management and Development is an independent business school, with Swiss roots and global reach, expert in developing leaders and transforming organization to create ongoing impact. The 15 competitiveness country 2018, could being seen at the following figures [11].



Fig. 4. World competitiveness ranking 2018 by IMD.

There are several organizations that make competitiveness index; some of the following inform the strategy how to reach the competitiveness of a country. Some to mention, Research and Development (RAND) Corporation, Brookings, CableLabs, Mitre, etc. RAND Corporation is an American non-profit corporation that created in 1948 by Douglas Aircraft Company. RAND Corporation is an institution that helps improve policy and decision making through research and analysis [12].

Develop innovation is a must in the world of competition. As we know, that development of knowledge is one of the best ways to improve the community welfare. Almost all nations doing the innovation in facing the competition, but the effort and result could be fairly measure by time. "Innovation is a process that combines discovering an opportunity, blueprinting an idea to seize that opportunity, and implementing that idea to achieve results. Remember- no impact, no innovation" (Little Black Book notes, Harvard Business Review [13] Related to time of innovation and its impact, we could see the example of South Korea.

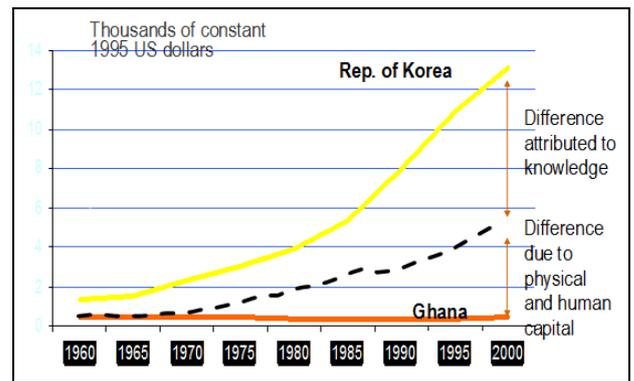


Fig. 5. Wealth development in South Korea.

During 40 years of Innovation and its impact, we could see the country that concern of knowledge, in this case we could say parts of education and others that not attribute to knowledge and education. In doing innovation, we could review from all factors, especially the cost efficient. As the situation in developing countries is different and other is the same, the frugal innovation is needed, which in process of reducing the complexity and cost of good and its production could be very important.

IV. DISCUSSION

In this digital era, almost all data and information that we need for organization, even to compete, are available on internet. The problems are to meet the required and needed data and information. Using clustering engine for optimization mining data on internet could be a good choice. For example, Carrot2, iBoogie, Yippy clustering engine that could minimized the searching result compare to standard result by search engine. For example, related to neglected disease, in public health, with normal and simple search, we found 723.000 webpage related to the subject, but with carrot2 clustering engine, we found 78 cluster related to subject [13].

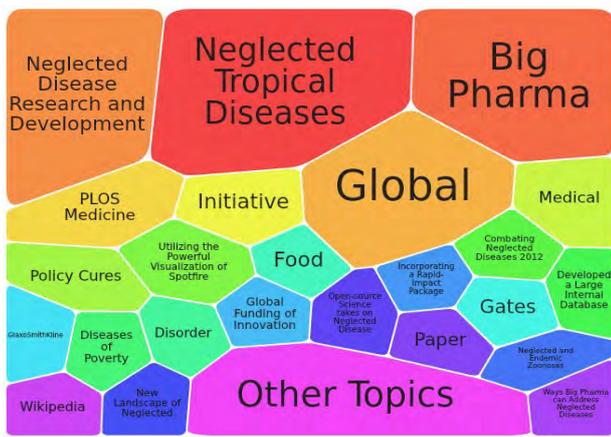


Fig. 6. Clustering Engine about neglected diseases extracted by the authors in Carrot2 (May/2013).

In many developing countries, education and research program are only remake of what the Professors and researcher learnt from exchange or postdoctoral work with western countries. Most of the time, these program if the researcher are good for the core of disciplines such as physics, chemistry, biology, are also in many points of view very far away of the needed of the developing countries, especially researcher did not aim to solve local problem or to valorize natural resourced. In our opinion, it is better to give some advices of what could be done to improve this situation and to provide some simple tools and information able to facilitate the development of an actionable knowledge. Most of the countries speak of innovation as a way to solve the crisis and to improve the local industries. But often there is a misunderstanding about the meaning of innovation.

The gap between SMEs (Small Medium Enterprises) and the research laboratories (scientific paper for instance), is very important. Educational program is also very different of what the local industry needs. This is the case for the initial education but also for the continuing education. The link between theoretical knowledge and application is not established and these two “world” have their own trajectory and never get along together. With this situation is very damageable for the development of developing countries.

What about patent? In our opinion, and because we have now many example available, we believe that patents are one of the best facilities to enable both academics and industrial to meet together. Patents even if they are not used enough in academic research can be understood by researcher and also industrialists. They are close from market, and patent provide a way to get large overview of a problem of a certain subject. EPO (European Patent Office) and USPTO (United States Patent and Trademark Office) is a free patent access that is useful for searching the valuable information available. Patent of coconut robust could give competitive advantage to company.

V. CONCLUSIONS AND SUGGESTION

The gap between science and application technology is urgently need to reinforce create a link between science and

technology application in developing country. For all stake holders in development of nation, Government, University, Industry and Society need to learn and reach strong web literacy in order to make efficient budget and work of stake holders. Patent learning are interesting because they could give opportunity to see what is done in the world with a certain knowledge, in a certain area s of technology with certain natural resources. Government with the money from taxes, provides funds to the universities or research laboratories to create knowledge and competence. This result could be put as the intellectual; capita; of the country. This step is important, innovation will consist to use these competencies and knowledge to create product and services able to be satisfied the customer and to be in the best reach could be exported. We believe this step is fundamental, and in most of the developing country, the first move of this step be consider very important.

REFERENCES

- [1] Codeweek E, Europe Code Week 2016 – Europe Code Week, [online], retrieved from <http://codeweek.eu/>.
- [2] S. Shellenbarger, Wall Strees Jurnal, [online], Retrieved from <http://www.wsj.com/articles/most-students-dont-kknoe-when-is-fake-standord-study-finds-1479752576>
- [3] Internet World Stats, [online], retrieved from www.internetworldstats.com/stats.com, access on November 22, 2018.
- [4] J. Magalhaes, L. Quoniam, N. Boechat and A. Kenap, Study of olanZapine, Problem of Management in the 21st Century, vol. 6, 2013.
- [5] F. Kofman and P.M. Senge, Communities of Commitment: The Heart of Learning Organizations," in Chawla & Renesch's. Learning Organizations: Developing Cultures for To Morrow Workplace, [online], Retrieved from http://leeds-faculty.colorado.edu/larsenk/learnorg/kof_sen.html, 1995.
- [6] A. Mathieu, "A. Encyclopédie de L'Agora | Organisation apprenante", [online], Retrieved from http://agora.qc.ca/dossiers/Organisation_apprenante, accessed on March 19, 2017.
- [7] H. Dou, S. Manullang, and A. Kenap, Patent Analysis as a Vector of Innovation in Developing Countries, 21st Century Academic Forum, Harvard, 2015.
- [8] P. Erikson, "The Swedish Experience," VINNOVA Brics-workshop, Aalborg 13th Feb 2006.
- [9] E. Zerhouni,, "The success of American scientific research depends on the existing implicit part nership between academic research" The Government and industry.
- [10] J. Bughin, M. Chui, and A. Miller, "How companies are benefiting from eb 2.0: McKinsey Global Survey| McKinsey & Company." [online] Retrieved from http://www.mckinsey.com/insight/business_technology/how_companies_are_benefiting_from_web_20_mckinseyglobal_survey_results, accessed on March 2014.
- [11] IMD, "IMD World Competitiveness Rankings 2018 Results", [online], retrieved from <https://www.imd.org/wcc/world-competitiveness-center-ranking/world0competitiveness-ranking-2018>, access on 12 November 2018, 11.19 WIT.
- [12] RAND Corporation, [online], retrieved from <https://www.rand.org/about/faq.html>, access on 12 November 2018, 11.47 WIT.
- [13] J. Magalhaes, L. Quoniam, N. Boechat and A.Kenap, "Neglected disease in social network? A blueprint of Dengue in twitter as a contribution of information science for public health.", [online], Retrieved from http://www.ijmra.us/project%20doc/Cover_Page/Cover_Page_IJMIE_October_2013.pdf.