Evolutionary Models for the Interaction of the Higher Education Labor Force and Higher Education Market

[1]Mark S. Borres, [2]Felix M. Diano Jr

Abstract

The higher education market portends to be a huge market in the future that traditional systems of delivery of services will be insufficient. This paper proposes a model that links two (2) global markets: the higher education market and the labor market, as dramatic changes are taking place in the 21st century. A modeling and simulation strategy has been employed in this paper predicting the impact of higher education market to the labor market. Results indicated that with the rapid expansion of the Higher Education(HE) market, the size of the higher education labor force will inevitably expand. The labor market tolerates a maximum expansion capacity for HE graduates beyond which the excess HE graduates will bifurcate into two (2) channels of productive sector, namely: (a) the creation of new economies or (b) the integration of HE graduates into the skilled labor force. This dynamics necessarily yields a highly fragmented labor force configuration. In essence, the evolution of the labor market is a replica of Darwin's Biological Theory of Evolution where only the fittest will survive, i.e. evolution through mutation and adaptation whose equivalent concepts in this setting are "innovation" and "adaptation" respectively. It is well-established in Evolutionary Biology that "mutation" is the shortest-route to evolution and so we posit that "innovation" is the shortest route to the labor market evolutionary ladder. Therefore, a good university must be able to produce graduates who are innovative and adaptive at the same time to survive in a competitive labor market.

Keywords: HEIs, Higher education graduates, global labor market, market configuration, Evolution

1.0 Introduction

Education, in particular, higher education is undergoing a dynamic change (Cranner, 2014). Two (2) key driving forces are the market and the product (Cheong, 2014). The UNESCO Statistics Unit (2014) estimates that there are currently between 100M-180M tertiary education students and that these numbers are expected to increase by 100% over the next ten years. Indeed, the higher education market portends to be a huge market in the future that traditional systems of delivery of services will be insufficient. Of course, the huge size of higher education market directly impacts on the labor market configuration as soon as students complete their higher education and training.

Upon joining the labor market, higher education products (graduates) disrupt the labor market configuration in two ways: their quality as perceived by the industries and their sheer number. Cranner (2014) averred that industries perceived the university graduates to be inadequately trained, hence, the rise of corporate industries at the turn

[1]University of San Jose-Recoletos
[2]University of the Visayas

of the century. Harvard's Vice President for strategy (2014) adds that their sheer number (graduates) disrupts the traditional labor market configuration in the sense that the number of knowledge generators may exceed the number of knowledge implementers (technologists/technicians). Cheong (2014) claims that on the issue of "quality" products of higher education, one may eventually redefine and reexamine the entire paradigm of higher education quality for the 21st century.

This paper proposes a model that links two (2) global markets: the higher education market and the labor market, as dramatic changes are taking place in the 21st century. The model can be used both to as descriptive model and a predictive model to aid educational policy matters.

2.0 Model Development

The basis for the model development is the statement of Harvard's Vice President for Strategies (2014) when she averred that "higher education is a key driver of the economy." How higher education drives the economy is something that requires deeper analysis of the link between labor force and national productivity.

Traditionally higher education produces knowledge- generators or researchers. These higher education graduates join the labor markets as researchers/innovators upon whose outputs the technicians/technologists/skilled workforce develop the technologies which eventually enhances productivity. Diagram 1 illustrates the traditional labor market configuration.
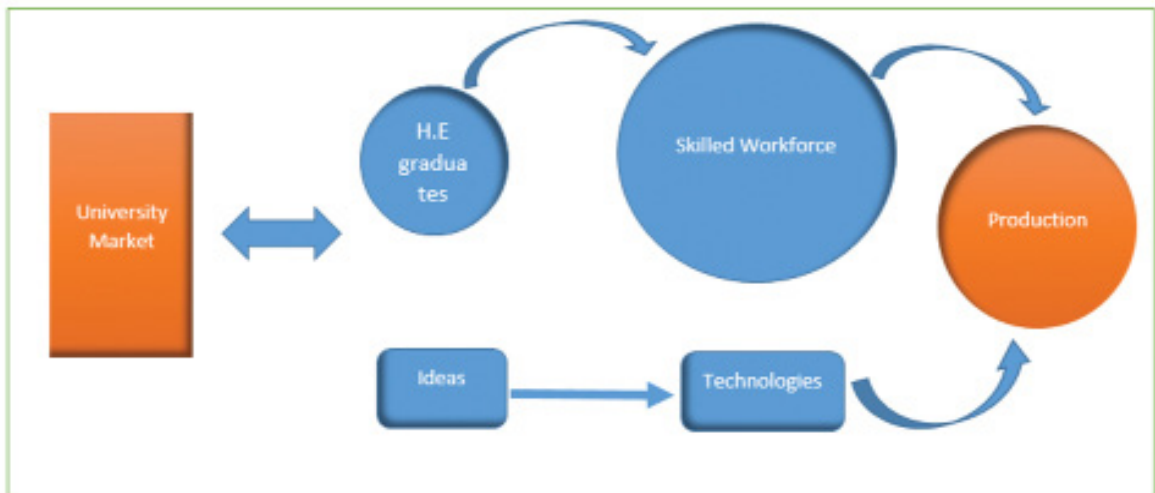

Figure 1. The Traditional Labor Force Configuration

With the rapid expansion of the higher education market, the size of the higher education labor force will inevitably expand. However, the labor market configuration acts as the natural ecosystem regulator and will not allow for a disproportionate expansion of any of the two (2) sectors. This dynamical regulation of the labor force is illustrated below:
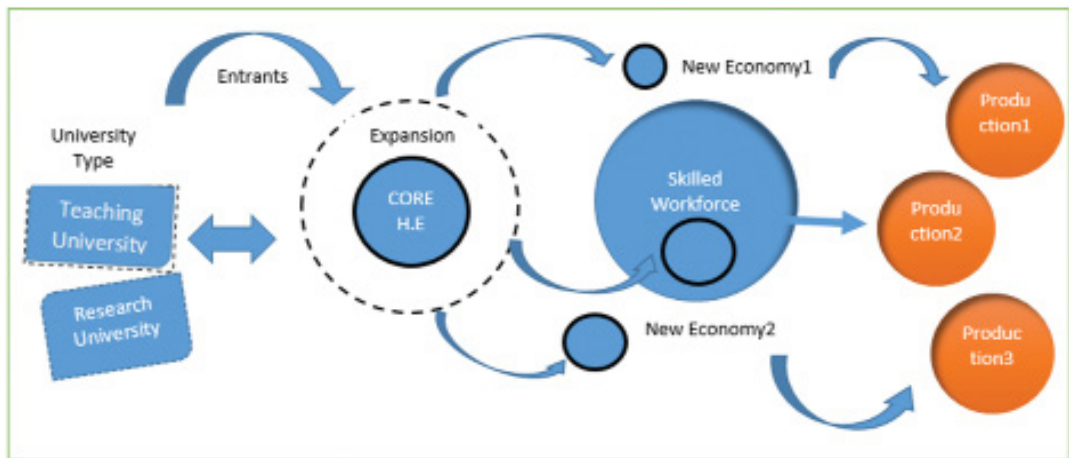

Figure 2. Impact of Higher Education Expansion on labor Market Configuration

The figure shows the impact of a rapid in the production of higher education graduates to the labor force configuration. The labor market tolerates a maximum expansion capacity for HE graduates beyond which the excess HE graduates will bifurcate into two (2) channels of productive sector, namely: (a) the creation of new economies or (b) the integration of HE graduates into the skilled labor force. This necessarily yields a highly fragmented labor force configuration.

When the excess HE graduates establish new economic niches, these niches compete in a rugged and fragmented market economic environment. Their long-term survival depends on their abilities to produce innovative products (new products/services) and to do (innovate and adapt) will survive while those who are not able will eventually perish. In essence, the evolution of

the labor market is a replica of Darwin's Biological Theory of Evolution where only the fittest will survive, i.e. evolution through natural selection. The key concepts in Darwin's Evolution Theory are "mutation" and "adaptation" whose equivalent concepts in this setting are "innovation" and "adaptation" respectively. It is well-established in Evolutionary Biology that "mutation" is the shortest-route to evolution and so we posit that "innovation" is the shortest route to the labor market evolutionary ladder.

On the other hand, those excess HE graduates who join the already huge pool of skilled workers will accumulate until a maximum carrying capacity limit is reached and that pool will split into specialized fragments as well. These specialized fragments consists of highly trained HE graduates who are "essentially" "underemployed" i.e. job

specifications are less than what the graduates possess. For example, BS Nursing graduates employed as midwives.

Consequently, the HE graduates who are immersed in the labor force feedback to the HEIs the relevant experiences they had while being "underemployed".   The HEIs then critically review its existing curriculum such that either the system is enriched or the system is completely changed. When the system is enriched (the adaptability feature of a good university), programs are ladderized to accommodate the only needed skills and competencies in the labor force. Meanwhile, if the system is completely changed (the mutation ability of a good University), an entirely new form of HEIs are placed e.g. the presence of Corporate Universities to address the labor market evolutionary needs. This fragmentation into new forms of HEIs bring about a significant expansion of the amount of knowledge and new ideas again to affect the labor market configuration. This cyclic give-and-take relationship fuels the proliferation of production boosting the economy.

To obtain important information of the elements of the model, we perform the simulation experiment. The simulation starts by using random numbers to represent the randomness of the real-life situation.

3.0 Enrolment Assumptions

The researchers also maintained the fact that there are relatively less enrollees in a Research University than that of a Teaching University. The object of a university of research, to paraphrase Nobel Prize winning physicist Leon Cooper, is an institution that discovers how the world works and what new knowledge can be added to this world. Because of this stringent scholastic requirement,

only a minimal of student enrollees is projected as compared to the traditional Teaching University setup.

At time zero (0), Teaching University has one hundred (100) students while there are fifty (50) students in Research University.

On the other hand, higher education market (knowledge generator) has one hundred (100) students as presumed maximum carrying capacity and one thousand (1000) workers presumed maximum carrying capacity for skilled workforce. The maximum number of individuals that can be supported sustainably by the academic institutions is known as its 'carrying capacity' (*Garrett-Hatfield, 2015)*.

The conditions are given: (a) if each working environment reaches its maximum carrying capacity, the excess graduates will go out in its original working environment some will form new economies and the rest will join to other field e.g. Research University graduates will go to skilled workforce, and (b) fragmentation will happen in each University if the sum of the feedback in Teaching University is less than or equal to negative ten (-10) while in Research University if sum is less than zero (0).

Completion Assumptions and Fragmentation of Labor Market

At time one (1), 12 %, as reflected in the Open Innovations Forum on Dynamics in Education New Players and Models of Disruption of the existing one hundred (100) students from the Teaching University will graduate and 10 % (smaller percentage to signify the nature of the research university setup)of the result will go to the higher education market while 90 % will go to skilled workforce. The excess of the Teaching University's

carrying capacity will create new economies in their field.

The 12 % of the fifty students (50) from the Research University will graduate and these graduates will go to the higher education market. The excess of the maximum carrying capacity will be scattered in which 60% of it will form new economies and the 40% will shift and join the skilled workforce.

Feedbacking and Fragmentation Assumptions of Higher Education

The gathering of systematic evidence about graduates' and employers' perceptions (in the form of feedbacks) about what is expected, and what is evidenced, in relation to the capabilities required of new graduates are very important as Oliver

(2015)points out from the Australian Government Office for Learning and Teaching.

The graduates now in the present work environment will go back to the schools where they graduated and give some feedbacks. The feedbacks might be positive or negative feedbacks. In Teaching University the feedback is positive if the graduates landed a job in the skilled workforce and/or in the higher education market and negative if the graduates create new economies which are not under their field and a negative response to them. On the other hand, feedback to Research University is positive if the graduates landed in a job and/or create new economies, creating new economy is positive in RU since this is part of its practices, and negative if the graduates join the skilled workforce.

4.0 Verification of the Model: Simulation

Verification is the process of determining that a model implementation and its associated data accurately represent the developer's conceptual description and specifications and determining the degree to which a simulation model and its associated data are an accurate representation of the real world from the perspective of the intended uses of the model (Law, 2007).

The simulation is run over a period of ten (10) years, twenty-five (25), and fifty (50) years to glance the extent of effects of the universities to the fragmentation of the economies in the labor market.

Within 10 years (simulated)
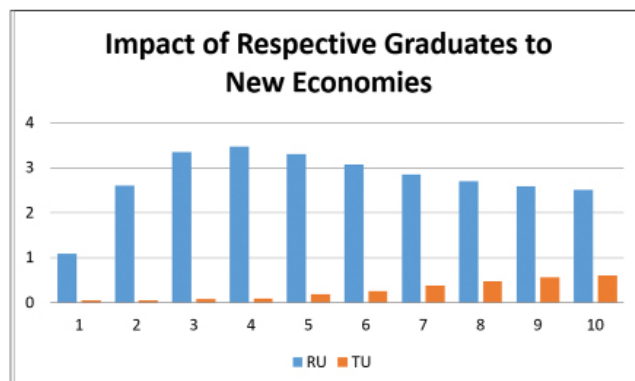
As seen in the simulation experiment on the impact of the respective graduates to new economies within ten (10) years, the graph of the RU contribution increases from first (1) year to fourth (4)year and slowly decreases with stabilizing afterwards. It is seen that the RUs highest point in the graph is in the fourth (4) year. On the other hand, the graph on the impact of the graduates from TU slowly increases from first year to the tenth year. Between universities, the impact of RU graduates is very much higher than the TU graduates to new economies.

Within 25 years (simulated)
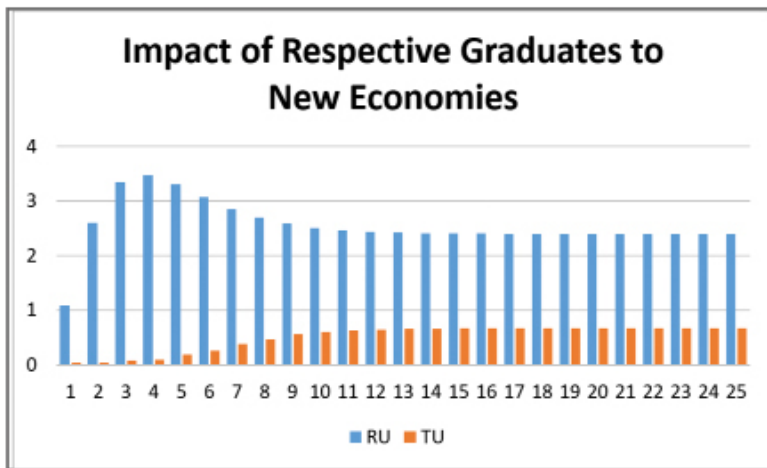
The researchers continue the simulation experiment on impact of graduates from the different universities within 25 years. After the tenth year, the graph of RU slowly stabilized up to the end of twenty-fifth year while the graph in TU starts to stabilize in the thirteenth year.

Within 50 years (simulated)
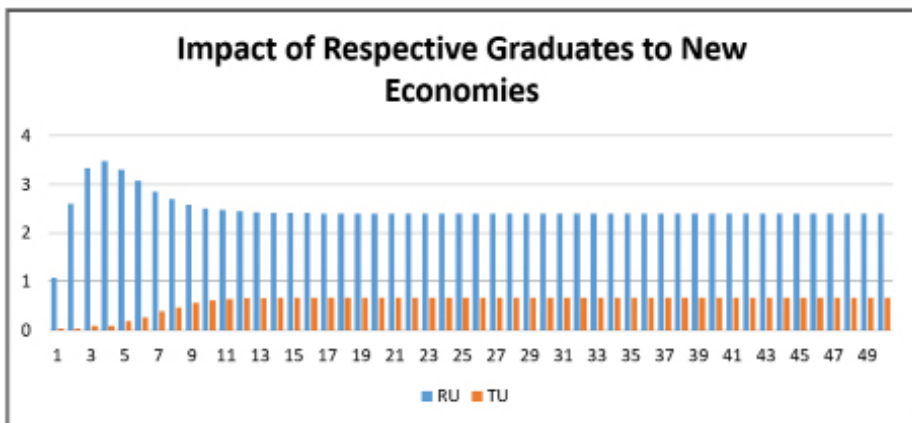
The graph within 50 years, show no changes on the impact of the respective graduates (from RU and TU) as the graphs continue to stabilize. There is no chances seen that a Teaching University can go with the impact of Research University for both graphs stabilized in a certain point far from each other. The researchers view that the Teaching University must mutate to a Modern Teaching University wherein some practices from Research University must be adapted or practiced.

5.0 Conclusion

The dynamic changes in the academic sector stir a significant pulse to the labor market. It is then imperative to Higher Education institutions that its graduates must be able to respond to this intricate dynamism caused by this interplay. A quality Higher Education Institution must be able craft a curriculum and an academic environment such to produce graduates who are innovative and adaptive at the same time to survive in a very competitive labor market.

6.0 References

Barshay, Jill (4 August 2014). "Reflections on the underemployment of college graduates". *Hechniger Report*. Teachers College at Columbia University. Retrieved30 March 2015.

Brennan, John (2004) The social role of the contemporary university: contradictions, boundaries and change, in Center for Higher Education Research and Information (ed.)

Cohen, Richard (2014-10-06). *"Richard Cohen: The actual value of a college education"*. The Washington Post (in en-US). *ISSN 0190-8286. Retrieved 2015-10-11*.

Cote, James; Allahar, Anton (2007), *Ivory Tower Blues: A University System in Crisis*, University of Toronto Press, p. 256, ISBN 978-0802091826

Frank, Robert H.; Microeconomics and Behavior. McGraw-Hill/Irwin, 6th Edition: 2006

Gustav Ranis (February 1997). "The Micro-Economics of Surplus Labour" (PDF). Yale University.

Hacker, R. Scott (2000). "The Impact of International Capital Mobility on the Volatility of Labour Income". Annals of Regional Science 34 (2): 157–172. doi:10.1007/s001689900005.

Verger, Jacques: "Patterns", in: Ridder-Symoens, Hilde de (ed.): *A History of the University in Europe. Vol. I: Universities in the Middle Ages*, Cambridge University Press, 2003, ISBN 978-0-521-54113-8, pp. 35–76 (35)

Paul L. Gaston (2010). *The Challenge of Bologna*. p. 18. *ISBN 1-57922-366-4*.

Trow, Martin (2007) [2005] Reflections on the transition from elite to mass to universal access: forms and phases of higher education in modern societies since WWII, Springer International Handbooks of Education volume 18, 2007, 243-280