A Review of Productivity In Education Sector

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ABSTRACT

This paper review on the engaging of theory and application of the productivity in education sector. The review will explain method on how the productivity in general education being measure and how the productivity can be improved. It is an initial review of the productivity measuring in education sector.

Keywords: *Productivity, Education, Measurement, Quality, Learning Analytic.*

I. INTRODUCTION

In measuring the productivity, the input and output must be first define. For most part, the focus of attention of productivity is simply to increase outcomes or quality without requiring much costs and resources. However, when education discussion turns to productivity, there are often confusion on how to define the productivity and interpretation of productivity changes over time. Thus, there are many ways to identify and measure changes in educational productivity if the quality of the products, which is students, considered constant. The methods include the pupil-teacher ratio, per-pupil spending, cumulative inputs, and output issues.

II. METHODS

Several methods utilized in measuring the productivity such as Malmquist Productivity Index and the Hicks-Moorsten Index, which those methods applied based on different cases and in different countries. In the service industry, it is difficult to determine a fixed input and output to determine the productivity especially in the education sector. However, there are several possible tools can be apply to study the productivity trends and the parameters.

S. Brennan, C. Haelermans and J. Ruggiero (2014) conducted a research, which analyses the productivity of 448 Dutch secondary schools in the year 2002-2007 with a focus on the environmental variables influence. This research utilized the Malmquist productivity index with non-discretionary inputs. This research defers from its predecessor by decomposing the index into technical, efficiency, scale and environmental change. As can be seen in Ta**ble 1**, the inputs are in terms of expenses spending in management personnel, teaching personnel, supporting personnel and material costs. Meanwhile the outputs are the average grade, average achievement and total number of student enrolment. S. Brennan, C. Haelermans and J. Ruggiero (2014) concluded that productivity index corresponds to environmental influences, in which moderate environments have higher productivity numbers compared to schools with worst environments.

Meanwhile J. Aparicio, L. Lopez-Torres and D. Santin (2018) focuses on identifying the change in productivity of vulnerable public schools in Spain during an economic crisis in the year 2010 to 2015. This research utilizes the Hicks-Moorsten index. The data sample is from 298 Catalan public primary schools the trend of the data analysed are from the year 2009 until 2013. The schools aforementioned are especially disadvantaged in terms of socio-economic and socio-cultural characteristics. The index used is a ratio of an aggregate output quantity over an aggregate input quality. This research utilizes the socioeconomic factor, number of teachers per 100 students and expenditure per student as the input while the average grade in 4 relevant subjects (Catalan, Spanish, English, Mathematics) are considered as the output. J. Aparicio, L. Lopez-Torres and D. Santin (2018), claims the index used offers more advantages compared to Malmquist Productivity Index. It is conclude that although lack of resources due to insufficient of budget, academic achievement can be excel. However, in terms of efficiency change the trend turned out to be negative.

It found that both journals share the similarities of studying the trend of the subject matter across a certain period. The inputs used in both journals are quantifiable matters and focuses on costs involved. The output however, is still questionable of its reliability in determining the relevance of the variable to determine the productivity. This is because a good output definition from the education sector differs between individuals. As can see from **Table 1**, the outputs seen in terms of grades but in the second journal, it is evaluate per subject while the first journal utilizes the average grade performance.

This leads to inability to conduct comparison between educational institutions. As a conclusion, in conducting an analysis and identifying the best practices to increase productivity in the education sector, it found that standardizing the input and output data is a challenge to researchers. Different schools belonging to different countries with different parameters, socioeconomics and educational structure would give researchers a challenge to obtain reliable results if we were to compare them with each other

Table 1. Comparison of method approach

Journal 1 S. Brennan, C. Haelermans and J. Ruggiero (2014)		**Journal 2** J. Aparicio, L. Lopez-Torres and D. Santin (2018)
Malmquist Productivity Index	**Method**	Hicks-Moorsten Index
448 Dutch secondary schools	**Sample**	298 Catalan primary schools
6 years	**Duration**	5 years
1) Management personnel 2) Teaching personnel 3) Supporting personnel 4) Material Costs	**Input**	1) Socioeconomic factor 2) Number of teachers per 100 students 3) Expenditure per student
1) The average student national examination grades per school 2) The average student achievement each year during secondary education, 3) Total number of students (enrolment)	**Output**	1) Average grade in Catalan 2) Average grade in Spanish 3) Average grade in English 4) Average grade in Mathematics
Ministry of Education, The Education Inspectorate and Statistics Netherlands.	**Data obtained from**	Evaluation Council, Standardized tests

III. IMPROVING THE QUALITY AND PRODUCTIVITY OF EDUCATION

Productivity is measure by the utilization of resource input to produce output. Besides, productivity is ratio of output over input. The purpose of this article is to present the main factors that affect behavioural and cognitive learning to achieve high productivity in education. The first factor is the language mastery, which is the fundamental and essential skill necessary to obtain good achievement in school. This skill will help them better in understanding all the subjects taught in school. Better understanding of knowledge leads to the greatest appreciation. The second factor is the intensity of practice. Just like the old saying, "practice makes perfect". It was found that, 88% out of 376 students give positive outcome from the high intensity of practice.

Next, motivation is one of the factor that behavioural and cognitive learning to achieve high productivity in education. Motivation can be tailored to productivity. Research has proven that good organization and healthy work environment will encourage and push higher motivation and productivity. Lastly, home environment is also important in achieving good productivity in education for student. School-parent programs is suggested by the researcher to help parents academically the children by reading to them, bring them to the library, discussing leisure television viewing, cooperating with home visitors and teachers and similar practice.

IV. LEARNING ANALYTIC

Learning analytic is the collection and analysis of data generated during learning process in order to improve the quality of learning and as well teaching methods. The systems itself was not a brand new systems, as it is comprised of and has evolved from multiple existing analytic domain and research discipline. Learning analytic is a step of gaining valuable input from the subject, which is the student and lecturer, and then the input is analyses to reflect the expected productivity outcome. The method of data collection comprised of many step and technic as below:

Evaluating Impact Driving Action

One of the methods of learning analytic is the Evaluating Impact Driving Action. The basis for this method is by evaluating the needs to link interventions to measurable outcomes of student success. The move start by introducing the drivers to student success and followed by the suitable governance and management plus intervention in the action. The product should be the student success. In the intervention part, one must always reflect whether the interventions had done the right thing or not.

Learning Analytic Task Force (LATF)

This approached being proposed by the University of Michigan (USA). It is a three years project aim to advise the university and senior management on how to use learning analytic to improve learning and increase the University's productivity. The task force consists of university-wide representation including faculty from different schools and college. This such arrangement done in order to magnify the circle of idea and range of

learning nationally and internationally. The outcome of the task force, up to this date was the task force successfully provided numerous institutional grants to promising research projects.

Organizational Learning Analytic

This approached performed by the University of Wisconsin, USA. The institution focusing on the building of organizational learning analytic capacity by focusing on the projects that are deliberate and thoughtful as well as sustainable and scalable. The outcomes from the projects collected to develop a systemic perspective. As the present time, the university has successfully launched several small scales and focused projects that target important strategy areas and emphasizes the use of existing technologies in the learning analytic processes.

V. CONCLUSION

Productivity are something that we can measured easily especially in manufacturing sector. However, it is a challenging task when it comes to the service sector such as education sector. Previous researcher shows a few set of parameter that their use in their investigation. There are many variables and parameter that possible to be used to measure the productivity in education sector. For example, some of the modelling presented would be modified to better account for time lags between inputs and outputs, same goes to adjusting the financial data for inflation over the time series studied. Such modifications would provide additional insights into productivity changes

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