

Measurement of Education Productivity Using Cohort Analysis for Headmaster of State Elementary School and State Junior High School

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Abstract This Research purpose is to know headmaster ability in measured education productivity using cohort analysis of student to realize the efficiency of education management especially for headmaster of State Elementary School and State Junior High School in East Jakarta. Research of education productivity measurement using cohort analysis was conducted with descriptive approach that based on finding explanation as things have panned out that exist in field of research result. Data Analysis was conducted in descriptive and interpretation in each research finding which is conducted in qualitative. Step interpretation in this research was conducted as follows: (1) Data Collection, (2) Data Reduction, (3) Data Display, and (4) Data Verification. Research result shows the readiness of school in delivery of student data and supporting information generally that already ready for importance of education productivity measurement. Nevertheless, there was still school headmaster that have not yet comprehended analysis in understanding cohort and how to compile and analysis it for the sake of efficient education management. Recommendation of this research shows there must be performed some training activity and technical partner intensively about cohort compilation and analysis to all headmasters especially in State Elementary School and State Junior High School in East Jakarta that conducted by partner related like College.

Keywords: *measurement, productivity, cohort analysis*

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1. Introduction

Education as a system entangles various input components, instrumental input, environmental input, process and output. As a system, various components are referred to each other related in a process of education management that conducted in school or the other education institution. Result in a process of education management will be related to formula by the way of processing input becomes expected output. Result like this can be considered as a productivity that conceptually contains efficiency meaning and effectivity. Productivity problem in education management entangle all education dimensions either output or input, and that is not only limited to quantitative size but also qualitative size. Sabrina W, M Lutz in (<http://www.ncrel.org/sdrs/pbriefs/97/97-Ipro.htm>), explained effort reaches education productivity claims attention at all systems, not only at one resources. In consequence, in system of usage education, various resources efficiently and effectively remain to be reckoned to produce an expected productivity. Edwin Dean (1984:20) explained that productivity can be interpreted as "total the output of an economy divided total by the inputs that contribute to producing that

output." This definition emphasizes that concept of productivity is a relation between output and input. In (<http://www.ncrel.org/sdrs/pbriefs/97/97-Ipro.htm.h.37>) Clune in article Sabrina explains, "Educational productivity usually is defined as the relationship between input (dollars spent in education) and output (student achievement or other defined goals)". Education productivity usually defined as the dependability between input (education expense that must be paid) and output (student ability or the objectives of other). In productivity measurement, there must be measured either its output or input. Relation between output and this input is usually expressed in ratio or index. John G. Belcher, Jr., (1987:51) in his explanation about productivity measurement tells that "if productivity is to be integrated into the organizational culture, a vehicle for monitoring progress, providing feedback, setting quantifiable objectives, managerial and evaluating performance is a sine qua non." From the explanation referred to show that if productivity is related to process in an organization, then productivity will concern managerial that executed by a commander function. To reach expected organization productivity, then main aspect that must be concerned in managerial activity at one particular organization will be with reference to planning, organizing, leadership (leading), and controlling.

As discussed earlier, managerial activity has been elaborated frequently entangle management resources at education institution. Human as the important resources in education have positive relation, for example between human and education productivity. This explanation emphasizes that the successfulness index of education institution will be determined by the way of processing input becomes output. Productivity can be limited at amount size and performance quality by considering resources utilization. According to Shrode Dan Voich in article Nanang Fattah (2001:15), explained that management main purpose is productivity and satisfaction.

At the common article, Allan Thomas (2001:16) explained that school productivity is determined by three main functions, in accordance with the list are as follows: 1) administrator function, 2) psychological function, and 3) economy function. The three of function are referred in linear to determine school productivity in high level or low level. This means considering factors related to human resource like headmaster role as the education leader is logical consideration.

For productivity of education system, needed graduation data as the output from system referred that proportionate with the main input that is student that enters education system. Muchdarsyah (2000:44) explained in productivity measurement that there are two approaches that can be used, there are total productivity approach and partial approach. Total productivity Approach or double factor, that is output which is confronted with all the inputs used ($5M + E + I$) and partial approach or single factor, that is output which is confronted with one input only (like labour productivity, capital, and organization). Tobing (1987/1988:69) explained that in the world of education, productivity measurement can be conducted by internal assessment of efficiency coefficient using student flow chart (cohort). This internal assessment of efficiency coefficient expresses productivity measurement with partial approach that calculate average index of total number academic year that must be given to produce a graduation by the average index of total number the academic year that experienced by a student since the first grade in education system divides by the proportion of graduation. Internal efficiency coefficient number shows the efficient level of an education process at one particular system of education level that obtained by assessment the current of student, which is by reviewing input and output.

According to Siagian (1987:2) efficiency is "positive comparison between output and input". The activity is considered as efficient if the input that used in certain activity management is smaller than the result obtained. On the other hand, F.X. Soedjadi (1990: 36) told that efficiency is "comparison is returned or rationality between result that obtained/got and activity that conducted and sources and time utilized." From efficiency understanding referred then can be concluded that efficiency relates to how resources are used to produce an expected output. To determine internal efficiency level in course of education as the index of education management successfulness used movement current from students that enter and exit. That Tool is named analysis diagram cohort. According to meaning he said, cohort means group or follower. In education term, S. Hidayat (1987/1988:1) interpret cohort as a group student that enter education

system in and certain education ladder till graduate from pertinent institute. Analysis cohort is a model of student current in an education system, that indigenous to roman language with the meaning "team in military". Nurdin (1987/1988:1) explain in the field of education, term cohort is interpreted as a group student that come into education system in and certain education ladder. Analysis cohort follows current from a group of student that enter class I in year in common and growth from all education processes. In student current referred will be known a success student group go ups class, repeat class, break school, pass and move school. To compile cohort student at one particular education institution needed new student data class I, student per class, student that go up class, break school and repeat per class, and a success student passes. There are some assumption bases for compiles analysis cohort: a) student numbers that repeat, that go up and broken school during period cohort is fixed; b) admissible student repeats two-time. If after repeat two-time, still not go up class or pass, then assumed exit; and c) at any given level, student numbers that repeat, that go up class, and broken school are counted either from those in go up class or pass directly or from them that ever delayed.

By assessment of student current from an education system will be obtained internal efficiency coefficient that express successfulness of index an institute in passes a student since entered in class I. According to Sitepu and Mukhlis Dasuki (1985:3), in internal efficiency analysis education system is used as three indicators, that is: First, grad proportion from system that enter since class I that obtained by comparing to input amount and output from an education system. Education can be told efficient if grad proportion that produced an education institution reaches number 1. That means, student that enter since class I is 100% can finish till final level. With other word, growing come near number 1, then growing efficient education system is referred. On the contrary, getting smaller from number one means growing inefficient. Secondly, the average of school year amount that experienced student that enter start class I. In determining the average of school year amount that experienced student that enter since class I, assumed that every student experience of a one year teaching in referred until cohort in class I average accepts a one year teaching and year next only that go up just class that accept a one year teaching. Third, the average of school year amount that must given to produce a grad are counted start enter class I. Calculation of the average of school year required just for will produce a grad starts class I got by compare to the average of school year amount that experienced student that will enter will start class I with grad proportion. Because level of grad proportion are obtained/got by assessment of student current pass by input ratio and output from one education system, then the average of school year amount required just for will produce a grad relates to efficiency of student current that influenced by number repeat class and break school. Number repeats class and will break school will lengthen time required just for will produce a grad are counted start class I. Education System will be becoming not efficient if happened number repeats class and break high school. That is education productivity is index or coefficient that show successfulness of education system in passing student.

With managerial activity a variety of forms that conducted by headmaster of work culture form with quality. Various managerial activities for example can be conducted by perceive work behavior, instruct it becomes preeminent performance, and bait return immediately to assessment result conducted. This means headmaster as the commander being responsible in empowerment various existing resources in system of education management to reach expected education productivity. With grad coefficient as high as 1, 00 or reach 100%, can be made as one of indicator that headmaster has succeeded in management of various resources that related in education system is referred.

From various descriptions that already can be explained that grad coefficient 1, 00 will be able to produced if headmaster executes its leadership function effectively. That is, managerial activity like planning, management and observation to various resources that conducted by headmaster in education management must conducted continuously, intertwined in synergy and have the character of well-balanced.

Efficiency Aspect is one of the main attentions in education management that caused limited resources situation. Existing sources must maximum empowerment to reach target education. From the other side that realized that to solve education problems is needed allocation limited sources is referred as efficiently. Aspect of evaluation effectivity at how far can planned goals be reached. Effectivity can be seen from alumna amount, alumna quality or achievement a success reached by. Efficiency Aspect is one of main attention in education management that caused limited resources situation. Existing sources must maximum empowerment to reach education target. Despitefully realized that to solve education problems is needed allocation limited sources is referred as efficiently. Aspect of evaluation effectivity at how far can planned goals be reached. Effectivity can be seen from alumna amount, alumna quality or achievement a success reached by. Come into question productivity actually entangles all education dimensions either out put or input that not only limited to quantitative but primary size is size qualitative.

Attention to productivity started since human starts think a matter of better as the effort form to repair a condition of industry business and economy. Much experts that develop various of definitions about productivity with elementary formula its that productivity is ratio between output with input. Robbins and Judge (2007: 27) define concept of productivity as "an organization is productive if it achieves its goals and does so by inputs to outputs at the lowest cost. Ace such, productivity implies a concern for both effectiveness and efficiency". Whereas Slocum & Hellriegel (2007: 233) told "productivity is the relationship between the inputs (labour hours, raw materials, money, machines, and the like and the outputs created quantity and quality of goods and services". Newstrom (2007:159) explained productivity as "productivity, at its simplest, is a ratio that compares units of output with units of input, often against a standard predetermined". In general productivity according to Muchdarsyah (2000: 12) interpreted as the relation between reality result and also physical (goods or service) with entry of that actually. For example, a comparison between output result and input or "output:

input". Furthermore, Muchdarsyah told that productivity is interacts integrated in compatible from three essential factors, namely: investment is entered the usage of cognate ability, management, and labour. According to Scott Sink in article Donnelly, Gibson, and Ivancevich (1987: 46), "productivity is the relationship between the outputs generated from a system and the inputs provided to create those outputs." Whereas Gilmore (1974: 4) said that productivity for example "... to be productive means: having the quality or power of producing: bringing or able to bring especially in abundance: creative, generative ... yielding or furnishing results or benefits". In the eyes of Gilmore, there is dependability between productivity and creativity. Thus one productive one who is one who has creativity. Joseph Prokopenko (1987: 3) wrote down public definition from productivity as "the relationship between the output generated by a production or service system and the input provided to create this output." Productivity is usage efficiently various resources in manage various goods and also services. Sutermeister (1976: 5) regarded productivity as "output per employee-hour, quality considered". Emphasis of organization productivity tries connection between input and output. That means, productivity improvement not only seen from amount facet, but also from quality facet. Explained furthermore by Sutermeister that productivity an organization is influenced by two fundamental variables, that is (1) sources that used and technology that exploited in job, and (2) execution or materialization of personnel job/activity.

Productivity according to Drucker (1964: 62), is "ratio between input and organization output". Inputs have the shape of labour, equipments, and finance is needed to produce output. The objectives of productivity can be specified in a few areas, covering methods of activity, machine progress and equipments, and improvement of personnel efficiency. George J. Washnis in article Hadari Nawawi (1990:102) explained productivity as "cover two elementary concepts that is efficiency and effectiveness". Efficiency depicts levels of human sources, fund and nature required just for labour certain result, whereas effectiveness depicts effect of result quality laboured. Explained by Hadari, productivity that measured from efficiency depict accuracy the usage of method or the working of and available tool, until volume and work load can be finished in accordance with involving time. Results that obtained have the character of inestimable nonmaterial with money, until productivity shall only be depicted pass by personnel efficiency in executing its duty. This Productivity usual applied in environment of activity organization that its volume and work load in form of service to society. There is three symptoms that depict productivity, that is: a) internal productivity, b) external productivity, and c) individual productivity and group. Internal Productivity is goals attainment hits a matter of must produced the output that planned during a given time period. For example a high school is told productive if a number of pupils that have learnt for 3 year, without will question will that grad enter College by employment. External Productivity is mounts utilization or reached result an organization especially in employment environment or society group that need it. In other word, external productivity is measured from facet good for or not reached result in society. Whereas individual

productivity and group shows productivity stemmed from personnel ability in individual in working and ability in group. With concerned about reached result by an institute will how institute existence is referred can give a maximum service at customer that have the character of internal and also external. Service that have the character of internal is a process how utilization that happened from various of available resources and can be prepared at pertinent institute, whereas service that have the character of external express how institute are referred can give satisfaction to its customer.

Education in the context of school is a formal institution that viewed as a system which utilize various component or education resources to the maximum level. This means, the result that released by an education institution either quantity or quality depends on the way of processing input becomes output. Headmaster as the leader in formal education institution will also determine the perfection on processing input becomes output. As explained earlier in concept of Sutermeister, that productivity of an organization is influenced by two fundamental variables, that are sources and technology that used in job; and also working manifestation of personnel. From this two fundamental variables emerge some prescriptive variables (determinant) to productivity. Determinants to productivity referring to sources that used and technology that exploited is: (a) human resources, that is all existing human resources in school or external school like instructor staff, extension agents, energy arranges effort, student, or old fellow and society of school environment that help education implentation in school are referred as properly; (b) non human resources, that is all fund sources and powers exclusive of human, for example resources significant, financial resources, and others. Related to determinant technology, can be related to usage of various education technologies that viewed as development, applying and systems assessment, technique and tool to repair and improve learning process. Whereas productivity determinants that have the shape of execution or materialization of employee activity that for example can be seen from personnel work behavior, that is by see whether duties that have been formulated can be executed by existing personnel in an education institution; cognate ability, that is cover personnel of domination have the shape of broadness, deepness and concepts clarity required just for its getting tasks done and responsibility; motivation, that is a complicated process referring to psychological process that express interaction between attitude, need, perception and decision that happened at someone it-self; and individual needs, that is accomplishment of someone need that will influence institute productivity as a whole. Beside fourth determinant in productivity like has been elaborated former, there is five other determinants that elaborated following. Determinants is referred as activities in and outside job, that is intensity and type of individual activity that need attention in improving institute productivity; organization structure, that is school institute as the formal organization have organization structure that depict employment relation in and between all personnel that exist in school; policy in personnel administration; salary level, and incentive that is one of factor of motivation impeller and communication, that is information channel for fluency of organization duty execution. In education,

Bidwell (1980:20) productivity is connective concept output and input. Concept from an education product is connected especially between inputs of an institute bases a theory of economy product. Input Change into education output predicted in a statistic equation, that is: $\hat{Y} = a + b_1X_1 + b_2X_2 + \dots + b_nX_n + e$

In this linear equation, Y is output education, and Xs deputizes various inputs like characteristic and teacher amount and other personnel, instructional matter, and facility. bs designates number for every input, that show estimate of the result of an accretion unit of each input at output. a is constant value that in refer to level education output that not base on input, and e is residual or variance at Y. Fro \hat{Y}_m this linear regression equation show that every the usage of resources in education system will influence education output produced.

According to International Institute for Educational Planning-Unesco (1988:3), explained that efficiency can be defined as "optimal the relationship between inputs and outputs; an activity is being performed efficiently if a given quantity of output is obtained with a minimum of input, or conversely, if a given quantity of inputs yields maximum output." Can be told, that an activity is told efficient if input used in certain activity management smaller the result are compared to result obtained. This condition in accordance with explanation in role about "National Education System" that states junior high school (SLTP) is a form set of elementary education which carries out program in three year. Whereas state elementary school (SD), is a form set of elementary education that carries out program in six years. Third, the average of school year amount that must given to produce a grad are counted start enter class I. Calculation of the average of school year required just for will produce a grad starts class I got by compare to the average of school year amount that experienced student that will enter will start class I with grad proportion. Because level of grad proportion are obtained by assessment of student current pass by input ratio and output from one education system, then the average of school year amount required just for will produce a grad relates to efficiency of student current that influenced by number repeat class and break school. Number repeats class and will break school will lengthen time required just for will produce a grad are counted lated start class I. Education System will be becoming not efficient if happened number repeats class and break high school. Example for SLTP ideal school year amount is 3 year. If this indicator shows number more than three, and then management SLTP is referred as can be told less efficient. For SD, ideal school year amount is 6 year. If this indicator shows a number more than six, management SD can be told less efficient.

From explanation of productivity concept and measurement performed within educational, then to measure education productivity can be conducted by undertaking coefficient analysis between output and input education system that entangle headmaster role in its management. Management that conducted by headmaster in education system for example can look from pertinent school successfulness to pass student. If the three of internal indicator of efficiency in education system SLTP for example shows ratio 1: 3: 3, and for SD 1: 6: 6, then education management that conducted has been efficient. That is conceptually, education productivity is index or

efficiency coefficient internal that show successfulness of education system in passed student according to range of time that was established measured pass by analysis cohort.

2. Methodologies Research

Research is conducted in State Elementary School and State Junior High School in east region of Jakarta, by using descriptive method. In this research, the data source is the headmasters of each school. Data was collected by closed and opened questionnaire and analysis of student data document that required according to its education level. Data in closed and opened questionnaire is used for assessment of the need of cohort analysis for all headmaster. While the document analysis conducted to determine the readiness of the data needed to follow up the results of research to the interests of cohort analysis in each school. Data Analysis is conducted in descriptive method with the process interpretation in each research result by observing data triangulation. Steps that conducted cover: (1) Data Collection, (2) Data Reduction, (3) Data Display, and (4) Data Verification.

3. Result Research and Explanation

By covering headmasters informant from State Elementary School and State Junior High School, research finding shows 92% headmasters have not yet known about concept of cohort in education and how to analyze it to look for coefficient of education management efficiency in each school. While 8% of headmasters which has ever heard concept of cohort, but they never have implemented it because there was no training or education skills that have never been given to them, moreover to the step of internal efficiency calculation. For those the headmasters who already know the concept of cohort, their knowledge was limited that they only knew that cohort was there and used for the cohort of student. From 30 reportage schools, 80% school in general has had student data and information that required for the sake of compilation and analysis cohort. Whereas how cohort is referred as can be analyzed to produce internal efficiency coefficient 100% headmaster does not know it. Generally headmaster only works in their routine activity according to its key task and function. Knowledge that related to concept of productivity they do not even understand properly. They only know that productivity means result like result in a factory/company of have the shape of goods. If concept of productivity related to human resource (SDM) in education management, they tell not will comprehend it more than anything else how measure it. That is, data acquirement in empiric indicates that what explained by experts about productivity that related to managerial institute education is not at all obtained its information in empiric especially in region of research study. Whereas Clune in article Sabrina that obtained from (<http://www.ncrel.org/sdrs/pbriefs/97/97-Ipro.htm.h.37>) explained, "educational productivity usually is defined ace the relationship between input (dollars spent in education) and output (student achievement or other defined goals)". Education Productivity usually defined as the

dependability between input (education expense that must be paid) and output (student ability or the objectives of other). In productivity measurement, must measured either its output or input. Relation between output and this input is usually expressed in ratio or index. This information acquirement shows that headmasters generally have very less knowledge about concept of productivity in education management. From information acquirement, it can be explained in general headmaster less digs other information that related to its key task execution and function. Whereas John G. Belcher, Jr., (1987:51) in its explanation about productivity measurement tell that "if productivity is to be integrated into the organizational culture, a vehicle for monitoring progress, providing feedback, setting quantifiable objectives, managerial and evaluating performance is a sine qua non." From explanation referred as show that if productivity is related to process in an organization, then productivity will concern managerial that executed by a commander function. To reach expected organization productivity, then main aspect that must paid attention in managerial activity at one particular organization will be with reference to planning, organizing, leadership (leading), and controlling. Aspects referred not only gone into effect at business organization but also go into effect for non profit organization like education institution. In planning activity, the education productivity should be already in the mindset vision of education leaders when designing a strategy for effective and efficient education management to their institution. The headmasters should have the ability to organize various education resources under his leadership. The headmasters are also expected to have ability in determining the technique of their managerial behaviors that lead to high task-oriented and high-relationship oriented in order to obtain high productivity.

From result of opened questionnaire by the headmasters, obtained information that up until now still, there are many headmasters who do not have the ability in analyzing cohort to determine whether the implementation of education that was carried out has been efficient or not. Headmaster less comprehends how identification data that required for packed into diagram cohort. For example for SD need data is counted minimize six (6) school year is stepping back from year now, and SMP needs data three (3) school year is stepping back from year now. In each data school year that required cover new amount of pupil student (MB), student at level class starts first class till upper class, student data that drop out (DO) or exit from system of education management, student that go up class of every class level, and student that repeat class. With student note moving is not packed into diagram cohort. Despitefully in general headmaster not comprehends how analysis cohort that has been made in the form of diagram for then counted internal efficiency coefficient by using formula technique. From information that obtained pass by brainstorming, generally headmaster has been nailed at its routine activity just in school that frequently confiscated their time. According to headmaster of compilation process this cohort of vital importance for them as the effort form to see existing efficiency of education management. This headmaster Statement in line with concept that explain that to determine internal efficiency level in course of education as the index of education management successfulness must used

movement current from students that enter and exit from process referred. That Tool is named analysis diagram cohort. According to meaning he/she said, cohort means group or follower. In education term, S. Hidayat interprets cohort as a group student that enter education system in and certain education ladder till graduate from pertinent institute. In execution of analysis training this cohort is aimed at effort how headmaster can assess student current from an education system until obtained internal efficiency coefficient that express successfulness of index an institute in passes a student since enter in class I. In internal efficiency analysis system of headmaster education is expected can analyse three indicators, that is: First, graduation proportion from system that enter since class I that obtained by compare to input amount and output from an education system. Efficient education can be considered if the proportion of graduates of an education institution reaches number 1. That means, student that enter the school since the first grade could graduate completely until final level. In other words, if the proportion of graduates come closer near to number 1, then the education system would be more efficient. In the other hand, if the proportion of graduates be far from number 1, then the education system would be more inefficient. Second, the average number of total academic year that experienced by student who entered since the first grade. In determining the average number of the academic year that experienced by student who entered since the first grade, assumed that every student experience of a one academic year in that year, so the cohort in the first grade receive an average one academic year. And on the next year only who promoted to second grade that receive average one year academic. Thus, the average number of total academic that experienced by student that started since the first grade can be known by summing all coefficients from class I group that received a one academic year up to the class II group that received a one academic year at class III. For example, the average of school year amount that experienced a student as in State Junior High School since start mount I told efficient if come near or equal to 3 that show old learn in State Junior High School. If the average of school year amount that experienced by student less than three year, then education system is referred as less efficient. This condition in accordance with explanation in role about "National Education System" that State Junior High School is form set of elementary education that carry out program three year. Third, the average of school year amount that must given to produce a grad are counted start enter class I. Calculation of the average of school year required to determine the time that needed to produce a graduation started from class I by compare to the average of school year amount that experienced student who entered since the first grade with graduation proportion. Because level of grad proportion are obtained by assessment of student current by input ratio and output from one education system, then the average of school year amount required to produce a grad relates to efficiency of student current that influenced by number of not being promoted to the next grade and dropout. Number of not being promoted to the next grade and dropout will extend the time that required to produce a graduation starting from class I. The education system will be inefficient if the number of not being promoted and dropout is high. For example, for

State Junior High School, the ideal duration of its academic year is 3 year. If this indicator shows the number more than three, then the implementation of State Junior High School was referred to be inefficient. While for State Elementary School, the ideal duration of its academic year is 6 years. If this indicator shows number more than six, and then implementation of State Elementary School was referred to be inefficient.

4. Conclusion

Based on this research, productivity measurement using cohort analysis has not been understood by headmaster. Besides that, the headmaster generally do not have the ability in preparing and analyzing cohort to determine the interests of the success index of education. Up until now, there are many headmasters who do not know whether the implementation of education in their respective school have been efficient or not. Headmasters also not aware that the relevant cohort of student data requires a good data collection system. Headmasters have yet to find a more effective managerial techniques in coordination with the relevant parties in particular to prepare and analyze cohort study.

5. Recommendation

Based on the research finding, this research must be followed up by providing training and giving technical assistance to all headmaster who need it. As an agency or institutions, the coach or assistant can cooperate with headmasters working team (KKS) and the Department of Education. In addition, headmasters must be prepared on their willingness and readiness to always be willing to learn (learning organization) in order to optimize their managerial capabilities. It should be also considered to establish the partner school for institution such as PPs. UNJ as the form of third dharma from Tri Dharma College that is dedication to the society..

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