

Law of Diminishing Return in the Management of Educational Resources and Funding Implications for Senior Secondary Schools in Imo State

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Abstract

The study investigated the law of diminishing returns in the management of educational resources and the funding implications for senior secondary schools in Imo State. The study reveals that an increase in one factor of production should be in equal distribution in other factors of production (land, labour and capital). It also reveals that for effective management of resources to take place in secondary schools, availability of fund should be given upmost priority by the government to avoid economic stagnation. The study suggest that the government and school administrators should ensure that increase in one output will correspond increase in other outputs. Employment of staff in education sector should be done in proportion to the number of students intake. The study further suggests that adequate fund be provided to create a good learning environment. The study concludes that education administrators should made provision other ways of generating income to support the school.

Keywords: Diminishing Returns, Management, Educational resources, Funding implication.

INTRODUCTION

The idea of diminishing returns has its origin from the study of economics. Scholars such as Jacques Turgot, Johann Heinrich, Thomas Robbert Matthews, David Ricardo and James Anderson were among the earliest to come up with the idea of diminishing returns in the mid-17th century (Hayes & James, 2021). These scholars were able to demonstrate how additional labour and capital added to a fixed piece of land will successfully generate smaller output (increase). This theory has also been applied to population growth by Malthus who argues that population grows geometrically while food production increases arithmetically resulting in the population outgrowing its food supply (Harris, 2007). Mathus ideas about limited food production stem from diminishing returns. Similarly, the neo classical economics postulates that each unit of labour is the same and diminishing returns are caused by a disruption of the entire production process as extra unit of labour are added to a set amount of capital.

The law of diminishing returns is not only the fundamental principle of economics, but it also applies to the education sector as a production industry. The production theory is the study of economics process of converting input into outputs of which education lend itself to. Educational resources can also suffer from diminishing returns. Putting in more educational resources to the production of educated workers would always have a counter effect in the long run on the overall production process since the society cannot concentrate in all its resources to education alone and if

all resources are concentrated on education, marginal productivity will result in the long run. This study therefore aims at examining the law of diminishing return in the management of educational resources and the funding implication for senior secondary schools in Imo state.

CONCEPTUAL CLARIFICATION

The Concept of Law of Diminishing Returns

The law of diminishing returns states that in the production process, as a production factor increases, the amount of total output increases, but will reach an optimal output level before it begins to decrease or diminish (Harris, 2007). Production factors include inputs such as labour, machine hours and raw materials. In practical term, the law postulate that in a production process, every additional unit of a production factor (such as land, labour, and capital) will lead to a greater increase in total output (marginal output) initially. After reaching a certain optimal production level, every additional unit of the production factor will result in a smaller increase in total output with a diminishing marginal output as the efficiency is limited by other production factors (Hayes & James, 2021). Let us assume here that the production factor considered in this case is labour, the labour force will increase from point one to point two by the same unit and from point two to three in the same unit. And the increase from point one to two will be much higher than from point two to three without increasing other production factors, the marginal return will eventually decrease to zero which means the total output cannot be increase anymore by merely putting extra labour into the production line.

Understanding the Point of Diminishing Returns

Since adding extra units of a production factor is not always as efficient as it is initially, an optimal production level can be determined. It is the point where the marginal return starts to diminish, and it becomes more difficult to increase the output. It is known as the point of diminishing returns (<https://CorporateFinanceinstitute.com>). At such a point, the marginal output is maximized but will decrease if the units of a production factor continue to increase. As the diagram above shows, the point of diminishing return is at L2. Before reaching an L2 number of labourer, putting additional labourers into the production process can efficiently increase the output.

With an L2 number of labourers, the production line achieves its highest efficiency. It is the optimal level of production, as well as the point of diminishing return. Beyond that point, the marginal output starts to decrease, and each additional unit of added labour will result in a smaller increase in output. In such a case, to efficiently allocate its capital after reaching the point of diminishing return, the company should not invest in extra labour but improve other production factors instead. For example: by increasing capacity through adding more machines or building another factory.

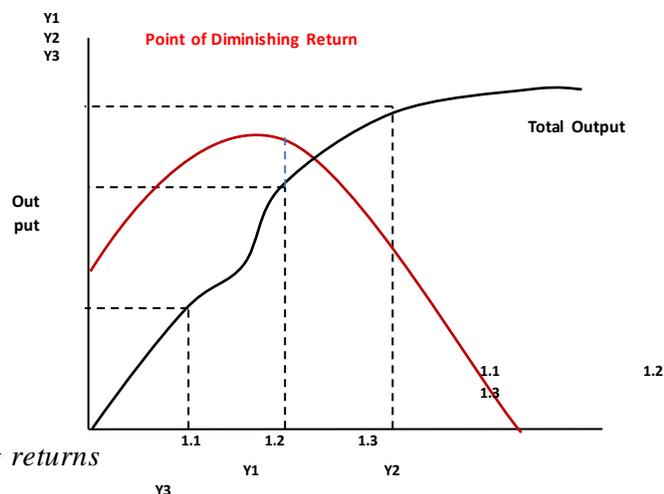


Figure 1: point of diminishing returns

The point of diminishing returns refers to the optimal level of capacity which is the inflection point of a return or production function. The law of diminishing returns states that beyond the optimal level of capacity, every additional unit of production factor will result in a smaller increase in output while keeping the other production factors constant. The point of diminishing returns appears where the marginal return (output) is maximized and can be identified by taking the second derivative of the return (output) function (Harris, 2007).

In another explanation of the principles of diminishing marginal productivity, the encyclopaedia Britannica (2017) sees diminishing returns as law of diminishing returns or principles of diminishing marginal productivity. They defined it as an economic law which states that if one input in the production of a commodity is increased while other inputs are held fixed, a point will eventually be reached at which additions of the inputs will yield progressively smaller or diminishing increase in outputs. They try to explain this using the example of a farmer who own a given acreage of land. The farmer will find out that a certain number of labourers will yield a certain maximum output per worker. If he should hire more workers, the combination of land and labour would be less efficient because the proportional increase in the overall output would be less than the expansion of the labour force, the output per worker would therefore fall. This rule holds in any process of production unless the technique of production also changes.

Production Function in Educational Management

The production function in education is an equation that expresses the relationship between the quantities of productive factors (such as human resources and funding) used as the amount of product obtained (student output). It states that the amount of product (student output) that can be obtained from every combination of factors that is (funding and human resources) assuming that the most efficient available method of production is used in the production process (Austin, 2016). Production function measures the marginal productivity of a particular factor say funding. It can also be used to determine the cheapest combination of productive factors that can be used to produce a given output. What this means is that such factor of production like funding can be used to measure the human resource input that will amount to the production of a given student output in the education industry at all levels of education enterprise. There must be proportionate increase in all the factors of production so that when there is an increase in student population, there must be a corresponding increase in the human resource and the funding of education to ensure high level output in the quality of the product (Ezeanyi in Ebong, 2016). If there is deficiency in any of the factors such as funding and human resource, this will invariably lead to diminishing marginal productivity in student's output. That is if the student's population keeps increasing at all levels of education, there must also be increase in other factors of student production such as the funding which represents the capital and human resource which represents the labour.

The real take home message in the law of diminishing returns in the management of education is that moderate increase in all factors of production in the education enterprise can help to facilitate continuous progress and growth in the education industry. Continued corresponding increase in all the factors of production in the education industry such as student intake, human resource input and funding will keep progressing and high marginal productivity achieved if investment in these factors are kept at equal proportion.

The Wikipedia (2011) also explained diminishing returns from the point of economics to mean the decrease in marginal output of a production process as the amount of a single factor of production is incrementally increased, holding all other factors of production equal. The law of diminishing returns (also known as the law of diminishing marginal productivity) states that in productive

processes, increasing a factor of production by one unit while holding all other production factors constant will at some point return a lower unit of output per incremental unit of input (Aberle, 2014). The law of diminishing returns does not cause a decrease in overall production capabilities, rather it defines a point on a production curve whereby producing an additional unit of output will result in a loss and is known as negative returns. Under diminishing returns, output remains positive however productivity and efficiency decrease.

The modern understanding of the law adds the dimension of holding other outputs equal since a given process is understood to be able to produce co-products. An example would be a factory increasing its saleable product but also increasing its co-products, for the same input increase.

The law of diminishing returns is a fundamental principle of both micro and macro-economics, and it plays a central role in production theory.

The concept of diminishing returns can be explained by considering other theories such as the concept of exponential growth. It is commonly understood that growth will not continue to rise exponentially, rather it is subject to different forms of constraints such as limited availability of resources and capitalization which can cause economic stagnation (Aberle, 2014). This example of production holds true to this common understanding as production is subject to four factors of production which are land, labour, capital, and enterprise. These factors could influence economic growth and can eventually limit or inhabit continuous exponential growth. Therefore, because of these constraints the production process will eventually reach a point of maximum yield on the production curve, and this is where marginal output will stagnate and move towards zero. However, it should also be considered that innovation in the form of technological advances or managerial progress can minimize or eliminate diminishing returns to restore productivity, efficiency, and to generate profit (Investopedia, 2021).

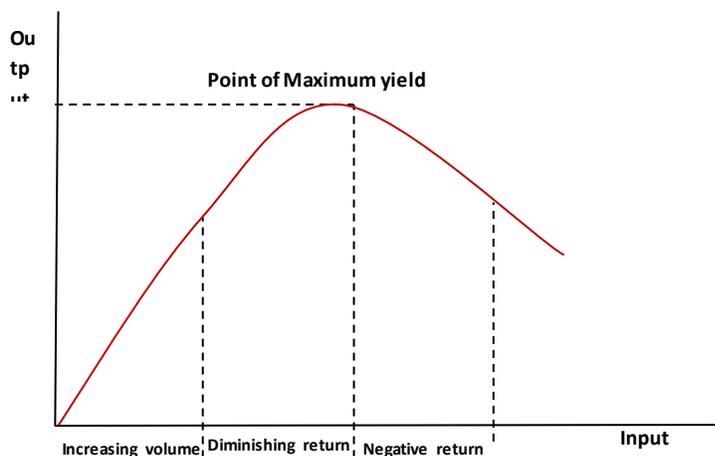


Figure 2: point of maximum yield

This idea can be understood outside of economics theory. For example, the population size on earth is growing rapidly but this will not continue forever (exponentially). Constraints such as resources will see the population growth stagnate at some point and begin to decline. Similarly, it will begin to decline towards zero but will not actually become a negative value. The same idea as in the diminishing rate of return can lead to inevitable output to the production process.

Funding Implications of the Law of Diminishing Returns in Education

In education, it is important to reach a level of optimal production. This ensures that all factors of production are being used in their best capacity, making adjustment to the factors of production or

inputs has varying effect on education. One of such effect is noticeable in the funding of education (Agabi, 2019). A country's education system will experience diminishing marginal returns on education if other production variables such as student intake and human resources kept increasing and the funding variable is kept constant. The law states that the increase in student's intake will result in a smaller increase in output (Agabi, 2018). Secondly, the country will experience change in productivity or what is known as return to scale if all inputs in the production process are kept at par. In the long run, such country will either experience constant return to scale (CRS) or increasing returns to scale (IRS) or decreasing return to scale (DRS) depending on how each of the factors are increased in proportion to other factors.

Returns to Scale

Returns to scale refers to the proportion between the increase in total input and the resulting increase in output. There are three types of return to scale namely constant returns to scale (CRS), increasing returns to scale (IRS), and decreasing returns to scale (DRS). A constant return to scale is when an increase in input results in a proportional increase in output.

Increasing returns to scale is when the output increases in a greater proportion than the increase in input.

Decreasing returns to scale is when all production variables are increased by certain percentage resulting in a less than proportional increase in output.

For example, if a soap manufacturer doubles its total input but gets only a 40% increase in total output, then it can be said to have experienced decreasing returns to scale. If the manufacturer ends up doubling its total output, then it has achieved constant returns to scale. If the output increased by 120% then the manufacturer experienced increasing returns to scale.

Though both diminishing marginal returns and returns to scale looks at how output changes are affected by changes in input. There are key differences between the two that need to be considered. Diminishing marginal returns primarily looks at changes in variable inputs and is therefore a short-term metric. Variable inputs are easier to change in a short time horizon when compared to fixed inputs. As such, returns to scale is a measure focused on changing fixed inputs and is therefore a long-term metric. Both metrics show that an increased input will result to increase in output up until a point, the main difference between the two is the time horizon and therefore the inputs that can be changed: variable or fixed. Understanding both and their differences is important for firms in their decision-making process to reach optimal levels of production and cost efficiency.

Research findings for instance Agabi (2014) have showed that funding have lot implications on diminishing marginal returns to school output. Financial inputs on schools are found to have predominant influence on achievement in developing nations. Where the level of financial inputs is low, the level of development of such nation is relatively low as found in developing nations like Nigeria, Ghana etc. whereas where the funding level is high as in Canada, America etc, the development index is relatively high. Harries (2007) investigated educational expenditure on the effect of student's performance in 32 countries where he examined the variable of decreasing marginal returns to spending on education in relation to students performance and found that the effects of education spending are positively related to the quality of education, even though the family background accounted for some variations in students performance.

CONCLUSION

The study examined the law of diminishing return in the management of educational resources and the funding implications for senior secondary schools in Imo state. The study concludes that

education is an investment, and its funding is paramount in the management of educational resources. The law of diminishing return in this context occurs if there is increase in one factor of production without a proportional increase in other factors of production, that is if there is increase in human resources because of increasing number of students, additional material resources such as table, office, chair should be made available for effective learning outcome.

Similarly, for education to fulfil its production function, adequate fund is needed for its efficient use and should be managed mostly in human resource intake to achieve optimal student output (teacher – student ratio) that will bring economic development of the nation especially in Imo state. Therefore, government should ensure that provision is made for all factors of production in equal proportion to address the issue of marginal productivity and to meet the UNESCO recommendation in all levels of education.

SUGGESTIONS

The following suggestions are made to achieve quality management of educational resources in all levels:

1. There is need for school administrators and government to ensure that increase in one input should be proportional to others. That is if there is increase in student's intake, there should be increase in classrooms to avoid diminishing marginal output.
2. Employment of staff in the education sector should be done in proportion to the number of students admitted. If this is properly addressed, the law of diminishing return will be averted in the educational sector.
3. In managing education resources, government should ensure that funds provided are sufficient to meet school demand for smooth operation.
4. Education administrators should map out other sources of generating fund in addition to the provision made by government.

REFERENCE

- Agabi, C. O (2014). *Teaching and Resources Management in Education*. Port Harcourt. Rodi printing and publishing company.
- Agabi, C. O (2019). *Principles and Theories in Educational Finance*. Port Harcourt. David Stones Global Resources Ltd.
- Agabi, C. O (2018). Student Population Flow. In N.P. Ololube (ED). *Research and Policy Development in Education*. Port Harcourt Pearl.
- Ebong, J. M. (2006). *Understanding Economics of Education*. Port Harcourt, Eagle Lithograph Press.
- Ezeanya, S. A. (2016). Resources in Education. In J.M. Ebong & J. D. Asodike, (Eds). *Economics of Education: Trends in Nigeria*. Port Harcourt: Eagle Lithograph, 328-343.
- Owhondah, S. N. (2018). *Economics of Educational Investment in Nigeria*. Harey Publications Coy.
<https://www.britannica.com>
- Hayes, A & James, M. (2021). Law of Diminishing Marginal Returns. <https://www.investopedia.com>
<https://Corporatefinanceinstitute.com>
- Austin, M. (2016). *Education Funding, Burger Flipping, and the Law of Diminishing Returns*.
- Harris, D. N. (2007). *Diminishing Marginal Returns and the production of Education*. An International Analysis