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The modeling of funding education as a strategic choice in increasing the brand name of companies

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Abstract

The successful distribution of business funds creates the foundation for the development of new products and services. Funding education is one of the most important sectors that a software company can invest, in order to achieve its growth and expansion, success of its products, establishment among the best companies in this kind of industry, increasing of its brand name [1] and ensuring its profit. It is explained how powerful a software company can be when the pool of available students is higher educated and specialized.

In this paper, these funding actions are analyzed on computers [2] with the help of dynamic simulation models [3](i-think), so that a simulation of reality can be achieved, without investing the required capital, predict situations and create a tool for business decisions. Numerous studies have been developed with the aid of computational methods, as the literature reveals [4-18].

Keywords: Dynamic Simulation Models; Information; New product development

1. Introduction

The development of higher education must be accompanied by an increase in opportunities for graduates to apply those that they have learned. Developing countries need to devote resources to enable more young people to acquire higher education, by paying particular attention to obstacles that appear in secondary education. To increase employment opportunities for graduates, incentives are needed to be given to private enterprises, particularly to small and medium sized software companies to hire new university graduates, a strategy that helps create a virtuous cycle of technological upgrading. It becomes obvious that science education should be strengthened in the first levels of education systems. This will require a greater emphasis on science education in

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primary schools. Although the goal of education is limited to achieving universal primary education, scientific technological and innovative education at a secondary and higher level is critical to the creation of an innovative society[19]. Developing countries need to be encouraged to adopt curricula that ensure that all students who have completed secondary education in any field will have been exposed to at least one area of science. They should also be encouraged to invest in science education at a secondary and higher level in order to increase the number of scientists, engineers and technologists.

On the other hand, higher education is increasingly recognized as a critical aspect of the development process, especially with the growing awareness of the rule of science, technology and innovation in economic renewal. While primary and secondary education was the focus of attention of donors for decades, higher education has been regarded as essential for the development only in the recent years. The current economic conditions render higher education as a more imperative need in developing countries than ever. Key factors in this change include an increase in demand for higher education due to improved access to education, pressure on local and national issues that require advanced knowledge and a global economy that favors participants with high expertise. Universities have enormous potential to promote technological development. However, most of them in developing counties are poorly equipped to meet the challenge. Outdated curricula, unmotivated schools, poor management and a constant struggle for funding have undermined the ability of universities to play their roles as "engines" of community or regional development. The professional and polytechnic institutes in developing countries are very important. Technologists, technicians and craftsmen are the foundation on which small and medium sized enterprises are founded, especially in operation and maintenance. Many developing countries have made the mistake of neglecting the training of technicians and technologists.

2. Education Management and Funding

Managing and funding education needs to be taken into account for a software company in order to achieve growth, profit and establishment between the best of its kind. By funding education, the software company will actually invest in better educated and more specialized personnel, in technological and scientific development and as a result in profit in the near future.

Education is divided in 3 individual sectors: Primary, Secondary and Higher education. By funding primary education, the software company ensures that the students who move forward to secondary education, have a starting educational background and as a result increases the possibilities of the students to move to further levels of education and especially to sectors that the company is mostly interested. By funding secondary education, the company increases the number of students that proceed to Universities and Technical Institutes and furthermore the number of available graduates that can work and help it expand and develop. Furthermore, more professionals ready for work are created. Funding higher education is crucial to a company's development and future. This can guide most of the graduates to sectors that interest the company most and as a result, the company can easily choose between graduates that are well educated and specialized in these sectors and can instantly work in all these sections that require work.

Higher education is divided to Universities and Technological Institutes, sectors that increase the local Innovation, Development, Technology and Science sectors. While developing these sectors, an increase in R&D [20], technological parks, entrepreneurship [6], projects, sectors that benefits the company and in business incubators [21] happens. As a result, the company's infrastructure, technology tools and personnel are upgraded and so it's scientific, technological and production capabilities are developed. All these have enormous impact in the company's development and growth, because as a result of investment in education, now the company is capable of creating and using new technology, which means better and more competitive products with more success and more profit.

It is obvious that when a software company decides to invest in education, a profitable cycle is created, which includes better and more specialized scientists, engineers, technicians and professionals available to work for the

company, new and better technology available to use in order to make better and more successful products, and in general, growth and expansion to the company.

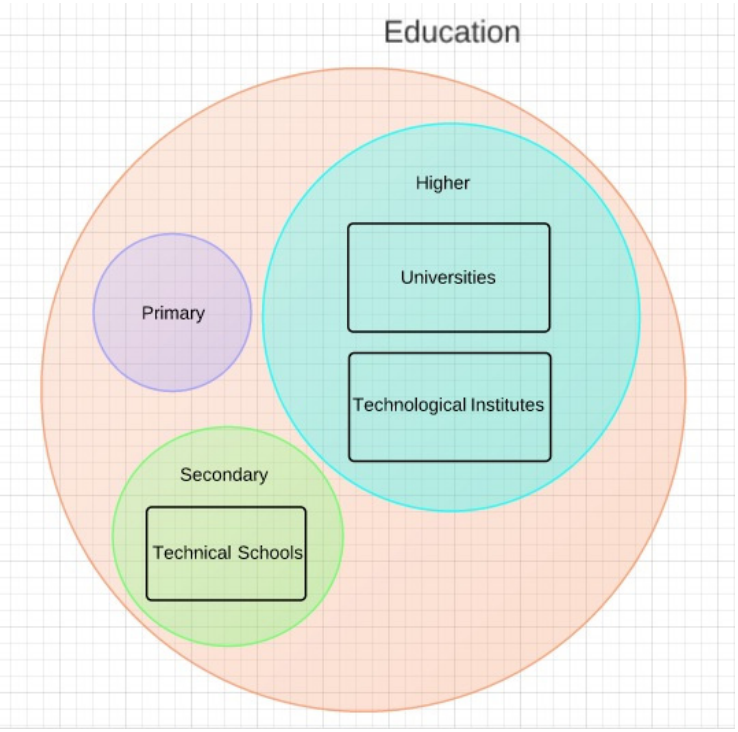

Figure 1. The subsectors of education

3. Modeling Education

Education management system is not very complicated to be separated into sub sectors which can be explained and parameterized. However, modeling and parameterizing these sectors individually is not sufficient. Most of the sectors are connected and interact with each other. Furthermore, the satisfaction or failure of one sector can lead to total education satisfaction or can bring the whole system down. Therefore, education management modeling can be developed by using a systems thinking approach so as to model these sectors and their interaction with others.

This can be achieved with a dynamic simulation modeling program. Only the system of education as a whole will lead to effective solutions. A lot of scientists and researchers are using iThink [22], a program for dynamic simulation models, to test and simulate the outcome of an action. Therefore, iThink, a modeling tool that supports system dynamics, was chosen. iThink is useful for modeling dynamic relationships, such as primary, secondary and higher education and their subsectors. Subsequently, an interactive project which demonstrates the interdependent relationships between the sectors of education was created. This allows users to gain better understanding of how a decision will affect the satisfaction of every sector separately and the general outcome of satisfying education.

4. High level view of education management

Figure 2 shows the basic part of the dynamic modeling system. Resources are distributed from the entity Education to its 3 subsectors. From there, Primary Education's resources are distributed to Secondary Education because funding this domain can lead to more satisfied Secondary Education. Furthermore, satisfied Secondary Education distributes its resources to Technical High Schools and to Higher Education, that's because most of the students proceed to higher education, whereas the rest to technical high schools. The domains of University, Technological Institute and Professionals all are divided to subsectors and lead eventually to the satisfaction of Education, which is the main purpose of this dynamic modeling system. Resources are measured in capital and that's because Primary, Secondary and Higher education need capital to bring new equipment and personnel in order to have better provision of education to students.

5. System dynamics education models

This section reports about the different individual dimensions and subsectors of education. But before discussing about these sections, each element used in this dynamic is defined and showed in Figure 3. In this dynamic simulation system, elements such as stocks, flows, converters and connectors are used. Each of them is further described below:

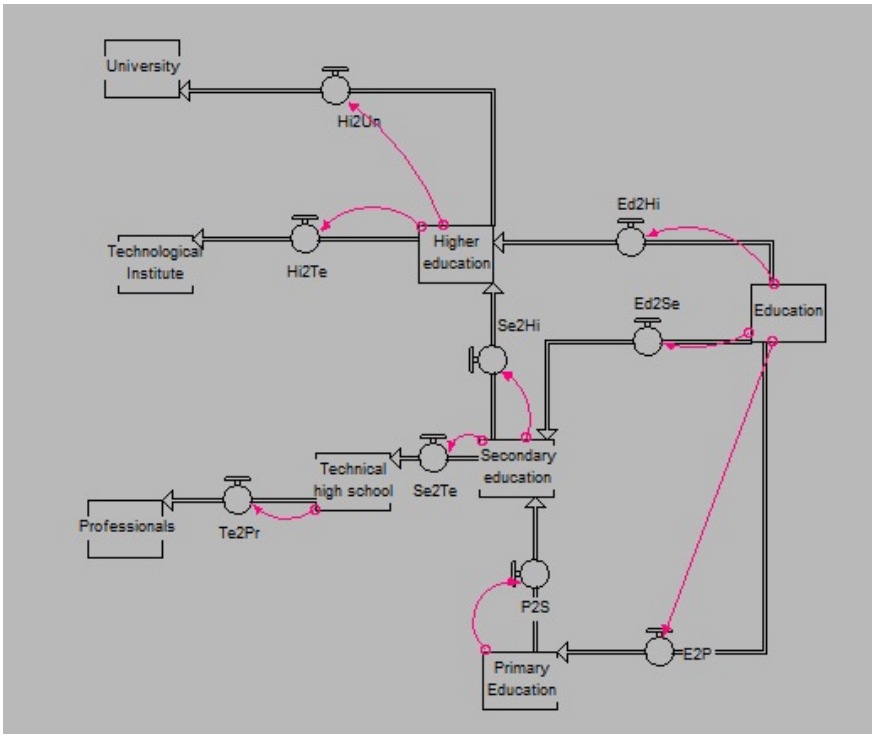

Figure 2. Basic part of the dynamic modeling system of education

- Stocks are accumulations of physical or no-physical quantity. They collect whatever flows into them, net of whatever flows out of them.
- Flows represent an activity of filling or draining accumulations. The unfilled arrow head on the flow pipe indicates the direction of positive flow.

- The converter holds values for constants, defines external inputs to the model, calculates algebraic relationships, and serves as the repository for graphical functions. In general, it converts inputs into outputs.
- The job of the connector is to connect model elements.

6. Interactions between the models/dimensions

As shown briefly the inter-relationships in Section 4, this section is dedicated to demonstrate some of the relationships between the three education dimensions in the education model. As mentioned before, funding education is divided in 3 dimensions: funding primary, secondary and higher education. Funding each of them equally has not the desired outcome to the company compared to other scenarios. It is obvious that funding higher education is of greater importance than funding one of the 2 other sections.

6.1 Primary-Higher education

In order for the company to have a profit and an increase in its brand name, the pool of available and specialized graduates must be greater. By funding primary education, students have a better education background and it's more possible for them to proceed to secondary and further higher education, but the company can't count on it. Whereas, funding higher education can lead to faster pool increase and specialization of graduates in the sections that directly interest the company. So it is obvious that the software company need to invest more in higher education rather than primary. On the other hand, investing a small amount of the company's budget to primary education has positive effects in comparison to not investing at all at this section.

6.2 *Secondary-Higher education*

As mentioned, higher education is the most important section to be funded, but this combination of secondary and higher education must be discussed. Higher education's positives were discussed above, whereas funding secondary education will lead to more students that move further to Universities and Technological institutes and in Technical Schools and consequently, the number of students who will be able to work and help it expand and develop. Thus, with higher education a company focuses more to quality (better educated and specialized) and with secondary education to quantity (more higher education graduates and more technical school professionals). The percentage of investing between these two sectors could differentiate in separate scenarios of this modeling simulation.

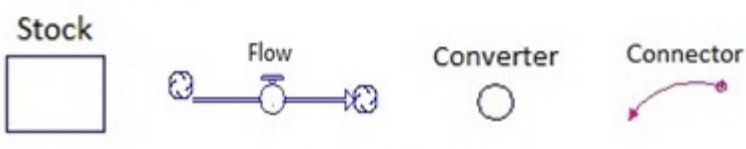

Figure 3. Parts of iThink that were used in this simulation system

7. Implementation of the education models

In simulation program iThink, stock and flow diagrams are used to simulate processes and scenarios. Outputs of every scenario can be displayed in the form of graphs, tables and warning gauges. Creating this dynamic simulation system was an iterative process. It started with a simple model with a "Company Resources" stock, a flow and an "Education" stock. Progressively, every different dimension of education was imported. The whole

process of building the entire model was carried out in this manner to allow ease in identifying errors in the model.

7.1. *System walkthrough*

Figure 4 shows the main user interface of the simulation model. There are 3 inputs:

- Percent Co2Ed: Percentage of company's budget to be invested in education.
- Percent SE2RSE: Percentage of resources from the stock "Satisfaction Education" that move to stock "Counterpoise Education" and eventually return to the company itself.
- Regulator: Resource multiplier (during the implementation of the simulation a lot of resources are wasted, so the ones remaining and returning to the company itself must be multiplied to express the profit).

7.2. Execution and results

In this section, a scenario of this system simulation will be executed. A medium resource investment to education is taken into account (10% of company's budget). In figure 5 are shown all the graphs that can be provided by the program about this individual simulation modeling of education. In these graphs is shown the values of the important sectors of education and the general satisfaction of investing in education. Firstly, a table and a graph exist to show the values and the satisfaction of education and the company resources. Afterwards, there are graphs that show the escalation of value number of the important subsectors of education.

In this scenario execution, the domain of education is satisfied only after the 7th month and at this time, resources are removed from the stock "Satisfaction Education" and return eventually to the starting stock of "Company Resources". During this satisfaction, in the first graph, the resources of the company are slightly increased after a long period of decreasing.

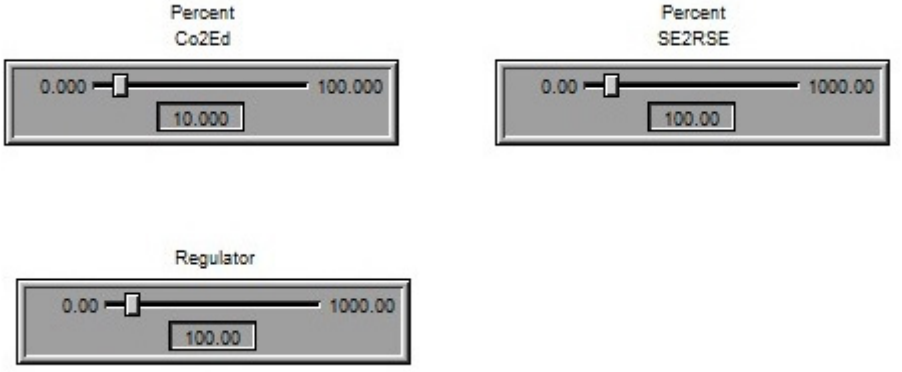

Figure 4. User interface panel

8. Conclusion and future research

In conclusion, after modeling and simulating the investment in the area of education, results show that it might not bring instant profit to the company, as could do an investment in some other sector, but in profits the company long-term while increasing its brand name, which results in company expanding and growing, having larger success in its products, global recognition and a whole new wave of possibilities and opportunities. Its one of the best ways of ensuring the future of a company that depends on cutting-edge technology.

A deep research is needed to comprehend all the different aspects of a software company, its dynamic behavior, processes, resources, limits, abilities and all its operations. Surely, models can help facilitate and

simplify the most complex functions of the company and enable the stakeholders to make right decisions for the future profit, growth, expansion and prosperity of their enterprise.

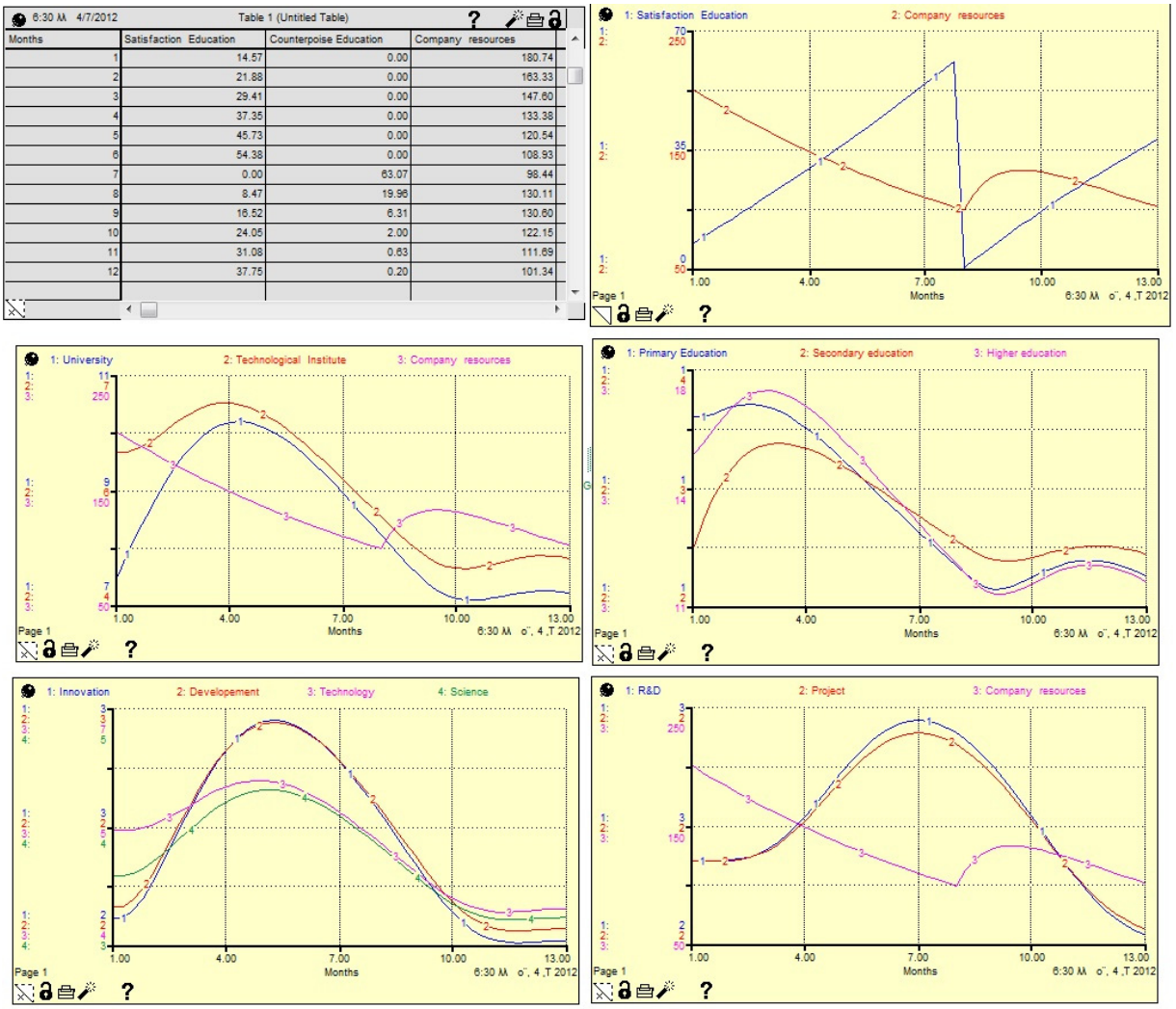

Figure 5. Output Graphs

Modeling in isolation might be quite simple, but in order to be able to comprehend, model and parameterize one function of the company is very complicated, because the relationships and interaction between the parts and functions are the important sectors of the modeling procedure. All environmental, economic, business and social dimensions and aspects of the company must be taken into account to be able to take the best decision for the company and be certain that the outcome will be profitable for the company. In particular, past strategic management literature and research in dynamic simulation have provided evidence that several factors, such as organizational culture [23], R&D strategy [24], business environment and structure [25, 26] contribute significantly to firm performance, even in the educational context [27]. A change in one sector brings change to others and for a software company that has hundreds of separate sectors that interact with each other, this procedure is complex, but surely it's the best way of comprehending and managing this kind of organizations.

With careful programming and the help of dynamic simulation systems such as iThink, countless non-cost simulations can take place in order to show the best decision and investment for the company at that time. Surely, with this day-to-day change and evolution of technology, there is no “best” way of modeling and managing a software company. There are many aspects to be explored and considered, but dynamic simulation modeling is a correct way of leading to a decision that will profit the company and all that skirts around it.

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