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Simulation model for motivating the creation of entrepreneurship actions

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Abstract

The small and medium sized software enterprises should be encouraged to take a leading role in exploiting new opportunities. There is a need to develop, implement and emphasize the important role of engineering, technology and development of small and medium software enterprises on poverty reduction and sustainable social and economic development.
In this paper, there is a scope to inform about the ways that can encourage the creation and establishment of a new software company and explain about the important role of creating new businesses in a developing and changing industry. There is also an analysis on computers with dynamic simulation models [1] (iThink) in order to simulate all the different situations and scenarios of encouraging new software enterprises and predict the outcome. Relevant studies have been devoted in computational methods, giving the impetus for further research in this field [2-16]

Keywords: Dynamic Simulation Models; Information; New product development

1. Introduction

Initiatives are needed that build capacity, establish appropriate financial systems, increase public awareness, craft and implement policy, and ensure that engineering and technology are included in Poverty Reduction Strategy Papers [17] (PRSPs). Governments, universities, NGOs [18], and international agencies all need to play roles in developing and implementing strategy.

In advanced industrial economies, small and medium-size enterprises have developed much of the innovative and cutting-edge technology. In many developing economies these enterprises have been the foundation of industrialization. In Taiwan (China), for example, small and medium-size enterprises were the engines behind the postwar industrial upgrading of the economy. By serving as suppliers to multinational corporations and foreign

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buyers, small and medium-size enterprises in Taiwan (China) gradually acquired both the process and product technologies that enabled the economy to upgrade its technology. Similar evidence on the role of small and medium-size enterprises is emerging from mainland China.

Despite the importance of small and medium-size enterprises, investments and incentives to grow them have been minimal or nonexistent in most developing countries. The focus of governments and foreign investment in developing countries has been on large infrastructure and industrial projects.

Supporting these enterprises is critical, but doing so is fraught with financial, administrative, legal, and market-related difficulties. Developing countries therefore can help foster the growth of small and medium-size enterprises by creating business and technology incubators, supporting clusters, and establishing export-processing zones. Each institution has benefits and drawbacks.

If a developing country is to unlock the potential to turn science, technology, and innovation into business opportunities, it needs to undertake a number of core activities. These include providing broader incentive structures to all firms while creating an institutional environment that encourages entrepreneurship, rewards innovation, fosters start-ups, and sustains existing firms with injections of capital.

Creating links between knowledge generation and enterprise development is one of the most important challenges developing countries face. A range of structures can be used to create and sustain enterprises, from taxation regimes and market-based instruments to consumption policies and sources of change within the innovation system.

2. Encouraging new business Management and Funding

For a software company which seek growth, profit and establishment between the best and most profitable software companies globally, encouraging and motivating the creation of entrepreneurship actions needs to be taken into account. By funding these type of initiatives, the software company will invest in some of the most important factors which will upgrade its technological and production capacities.

The encouragement and motivation of creating entrepreneurship actions is divided in five sectors: Virtual incubators, Business Incubators [19], Technology Incubators [20], Production Networks [21] and Export Processing Zones [22]. All these sectors contribute differently but essentially to the development of the company.

Business Incubators play major roles in the creation and facilitation of small and medium-size businesses. Their role ranges from providing affordable space to providing core enterprise support functions, such as enterprise development, financing, marketing, and legal services. Governments in developing countries are encouraged to support business incubators.

By investing in this sector, a company can achieve significant improvement in several factors. With University based incubators and support services, it can improve its product, get financed, communicate better and wider and to expand.

Technology incubators are a special type of business incubator that focuses on new ventures that employ advanced technologies. Although technology incubators share the same general goals as business incubators, they focus more on the commercialization and diffusion of technology by new firms, both of which are often impeded by market and institutional failures and the high level of uncertainty associated with technology development. Commercialization and diffusion of technology increases the return from public investment.

By investing in technology incubators, the company can ensure communication between its own scientists and other scientists, cooperation with the government, the exchange of ideas and the intersection between scientists and entrepreneurs, and as a result the technological development of the company.

Regarding Incubators without walls or Virtual incubators, costs are an important determinant of services offered by incubators. Costs are especially high for technology incubators, which are usually facilities based. To avoid these costs, so-called “incubators without walls,” or virtual incubators, are sometimes created. Most of them are technology incubators, often created by a university or research institution. These incubators are non–

property- based ventures that require lower fixed investment. They serve small and medium-size enterprises in areas where a sufficient critical mass of tenants is lacking. The important characteristic of these incubators is their ability to operate both within and outside of walls, by linking them through computer and telecommunications networks.

Investment in this sector brings better networking among the company's members and better communication.

Networking is very important, because it allows small and medium-size enterprises to access skills, highly educated labor, and pooled business services. In the rapidly changing technological and global business environment, more attention is paid to groups of firms, teams, and interfirm networks than to individual firms. This makes networking more important than ever before.

When a software company invests in this sector, it manages to have access to higher level of education and therefore better trained scientists.

Export processing zones (EPZs) are areas in developing countries that permit participating firms to acquire their imported inputs duty free as long as they export 100 percent of their products. This scheme works when selling manufactured goods at world prices is profitable given a country's low wages. The concept has been most widely used in Asia.

By investing in this section, the company manages to produce cheaper products because they are produced in external countries and therefore the production cost and expenses are much lower.

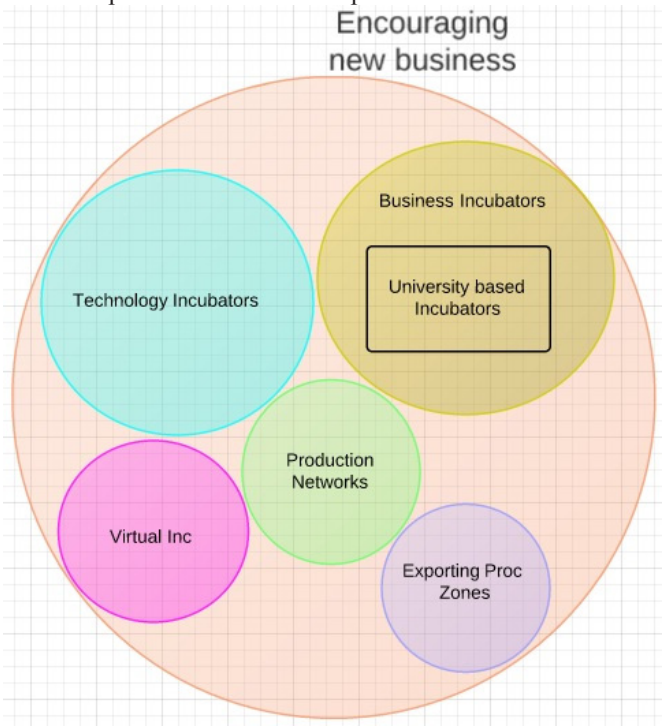


Figure 1. The subsectors of encouraging new business.

3. Modeling Encouraging new business

Encouraging new business system can be broken down into simpler and more comprehensible parts for modeling. However, modeling and simulating these parts separately is not sufficient. That's because most of these parts are connected and in some kind related. As a result there is an interaction between these sectors, which leads

to the conclusion that the satisfaction or failure of one can lead to the satisfaction or failure of every other sector that is connected and interacts with it. Therefore, this modeling can only be simulated and developed by a systems thinking approach that takes into account these relationships and interactions.

Subsequently, a dynamic simulation modeling program was used to demonstrate the independent relationships between the different subsectors of Encouraging new business. Only the whole system of Encouraging new business can lead to effective solutions. Scientists and researchers have trusted and used iThink [23], a program for dynamic simulation models, to test and simulate the outcome of an investment. This program is known for its reliable results that allow users to gain better understanding of how a decision will affect the satisfaction of every sector separately and the general outcome of Encouraging new business.

4. High level view of Encouraging new business

In this section, a basic part of the dynamic modeling system will be presented. Figure 2 shows a high-level view of an Encouraging new business model. Resources are distributed from the entity "Encouraging new business" to its 5 subsectors, dependently on the impact that each will do to the software company.

The sectors of Virtual incubators, Business incubators, Technology incubators, Production networks and Exporting processing zones are all divided separately to subsectors which lead eventually to the satisfaction of Encouraging new business and therefore the main purpose of this dynamic modeling system.

The resources that are distributed through this dynamic simulation system are measured in capital. That's because capital is the only means of investing in the 5 sectors that are mentioned above.

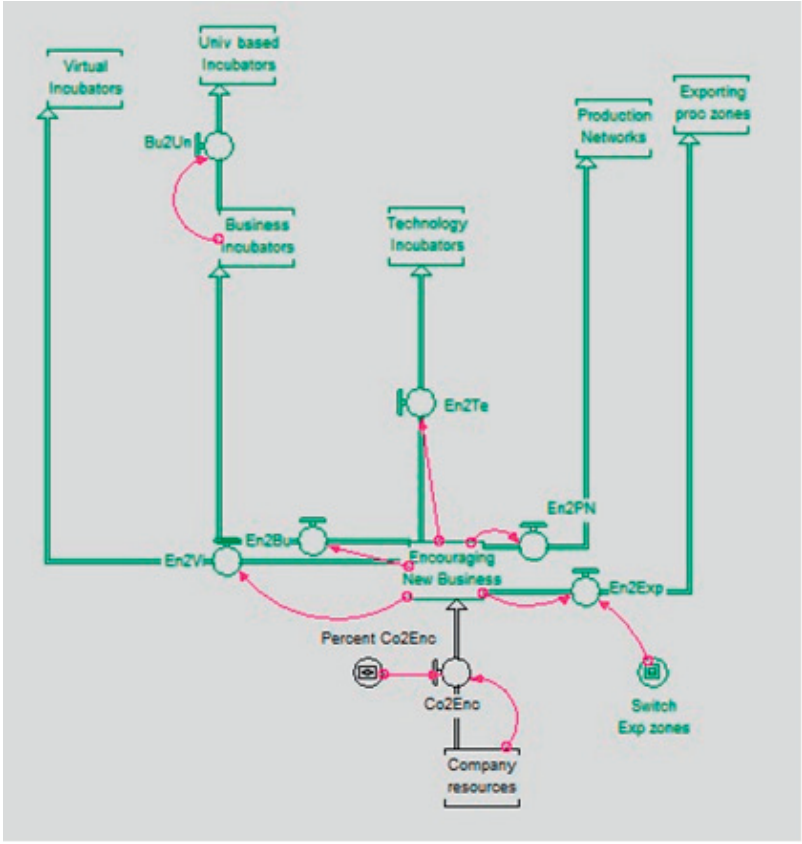


Figure 2. Basic part of the dynamic modeling system of encouraging new business

5. System dynamics encouraging new business models

In this section are reported and discussed the different dimensions and sectors of the Encouraging new business model that was developed using system dynamics modelling concepts. Before that, each different element used in this dynamic system is defined in Figure 3. Stocks, flows, converters and connectors are used in this dynamic system and they are described below:

- 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.
- Connectors are used to connect model elements and define where the resources are distributed.

6. Interactions between the models/dimensions

In Section 2 and Figure 2, the different dimensions and sectors of the entity Encouraging new business are shown and briefly discussed. This section is dedicated to demonstrate some of the relationships between some of the subsectors. As mentioned, Funding the encouragement and motivation of entrepreneurship actions is sundered in 5 dimensions: funding Virtual, Business and Technology incubators, Production networks and Exporting processing zones. It is clear that funding some sectors is more important and profitable than others.

6.1 Virtual – Business Incubators

When a software company invests in virtual incubators, it ensures better networking among the company's scientists, engineers, technicians and all the other members, and enhances communication. Whereas, by investing in business incubators, can achieve significant improvement in several factors. With University based incubators and support services, it can improve its product, get financed, communicate better and wider and to expand. As a result, funding business incubators is more preferable for the greater development and profit that it offers. On the other hand, funding a smaller amount of resources to virtual incubators will be sufficient for the communication and networking needs of the company.

6.2 Technology Incubators – Production Networks

As mentioned, technology incubators are one of the most important aspects for a company, as they ensure communication between their own scientists and other scientists, cooperation with the government, the exchange of ideas and the intersection between scientists and enterpreneurs, and as a result the technological development of the company. In comparison to Production networks, which manage to offer access to higher level of education and therefore better trained scientists of the company, it is obvious that investment in the first mentioned sector will bring sooner desirable results profit to the company.

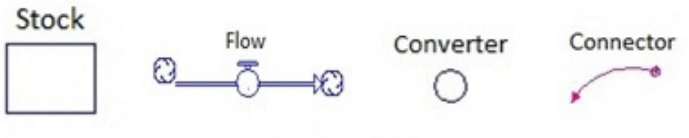


Figure 3. Parts of iThink that were used in this simulation system

7. Implementation of the Encouraging new business models

In order to implement the models that are created, iThink 9.02 tool, from the iSee systems, was used. In this program, stock and flow diagrams were used to simulate different scenarios and demonstrate the output of every one. This process of creating the dynamic model and simulating every scenario was progressive. It started with a stock of "Company Resources" and a flow to another stock, "Encouraging new business". Subsequently, more stocks, flows, converters and connectors were imported to form the complete dynamic system of Encouraging new business. The process of building this system was carried out in this manner to enable reliability and identify possible errors.

7.1. *System walkthrough*

In figure 4, the main user interface of the simulation model is demonstrated. There are 5 inputs:

- Percent Co2Enc: Percentage of company's budget to be invested in Encouraging new business.
- Percent Bus Sat Inc: Percentage of of resources from the stock "Satisf Bus incu" that move to stock "Counterpoise Sat Bus inc" and eventually to stock "Satisfaction Enc New B".
- Percent Sat Tech incu: Percentage of of resources from the stock "Satisf Tech incu" that move to stock "Counterpoise Sat Tech inc" and eventually to stock "Satisfaction Enc New B".
- Percent Satisfaction ENB: Percentage of resources from the stock "Satisfaction Enc New B" that move to stock "Counterpoise Sat Enc New B" and eventually return to the company itself.
- Percentage Counter ENB: 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).
- Switch Exp zones: A switch that enables Exporting Processing zones for the software company. Not every company can invest in exporting processing zones so this is optional and depending to the ability of the company.

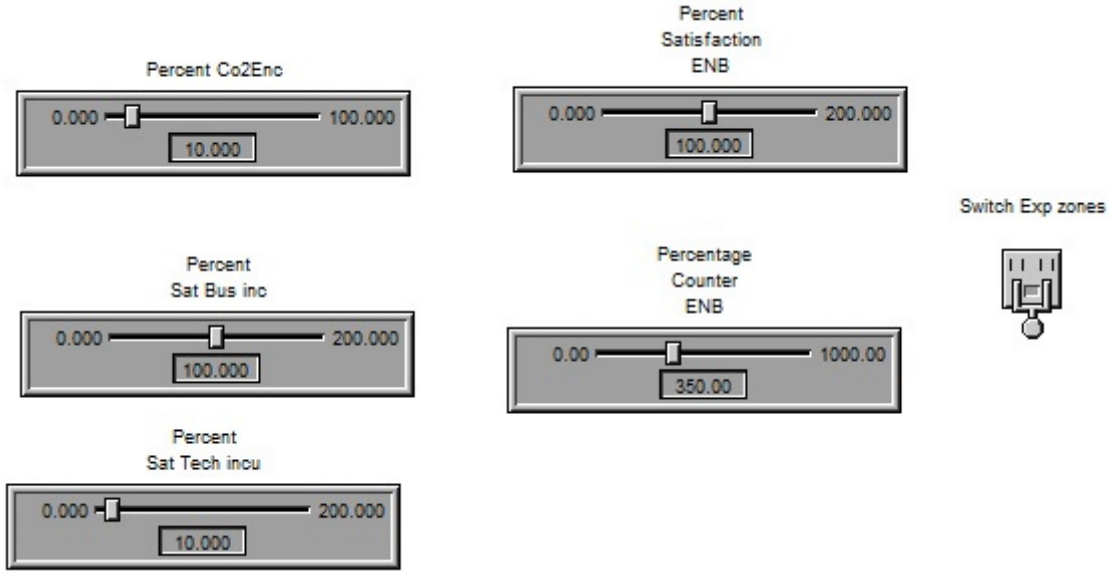


Figure 4. User interface panel

7.2. Execution and results

In this section, a medium scenario of this simulation system is executed. 10% of the company's available budget is taken into account for investment. In figure 5 are demonstrated all the important graphs that were provided by the simulation program, and the values of some important sectors of the executed model such as the company resources, the satisfaction of Encouraging new business.

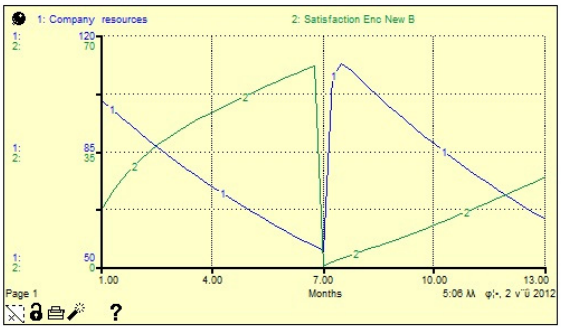
Firstly, there are 2 tables which demonstrate the values of "Company Resources" and "Satisfaction Enc New B". The first one is with the investment in Exporting processing zones and the second one is with this sector inactive. Furthermore, the graphs show the escalation of the value number of the important subsectors of Encouraging new business. It is shown that with the operation of exporting processing zones, the software company has more profit than without them.

In this scenario, the domain Encouraging new business is satisfied right before the 7th month of execution. At this time, resources are removed from the stock "Satisfaction Enc New B" and return with some profit to the starting stock of "Company Resources".

With Exp Proc zones

5:06 AM 2/9/2012 Table 1 (Untitled Table)

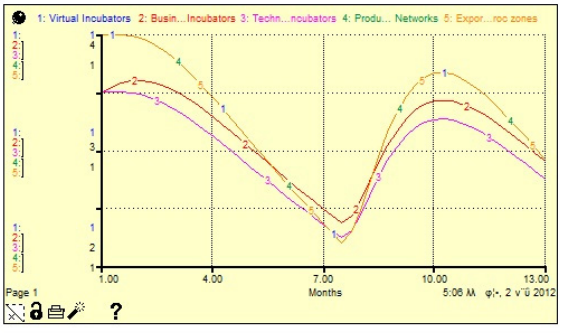
Months	Company res	Satisf Bus inc	Satisf Tech In	Satisfaction E
Initial	100.00	0.45	1.40	17.78
1	90.37	0.62	0.35	32.32
2	81.67	0.67	0.35	40.68
3	73.80	0.68	0.34	46.93
4	66.69	0.67	0.32	52.38
5	60.27	0.66	0.29	57.33
6	54.46	0.64	0.27	0.00
7	106.76	0.62	0.24	4.16
8	96.50	0.59	0.25	8.11
9	87.20	0.59	0.29	12.33
10	78.80	0.62	0.32	16.95
11	71.21	0.64	0.32	21.78
12	64.36	0.65	0.30	28.59

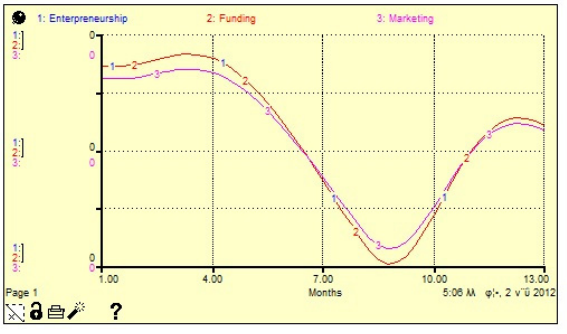


Without Exp Proc zones

5:09 AM 2/9/2012 Table 1 (Untitled Table)

Months	Company res	Satisf Bus inc	Satisf Tech In	Satisfaction E
Initial	100.00	0.45	1.40	16.78
1	90.37	0.62	0.35	30.32
2	81.67	0.67	0.36	37.72
3	73.80	0.68	0.35	43.13
4	66.69	0.69	0.34	47.89
5	60.27	0.68	0.32	52.30
6	54.46	0.67	0.30	56.42
7	49.22	0.65	0.27	60.23
8	102.64	0.62	0.25	2.63
9	92.87	0.60	0.24	5.88
10	83.92	0.59	0.28	9.22
11	75.84	0.61	0.32	12.91
12	68.54	0.64	0.33	16.87





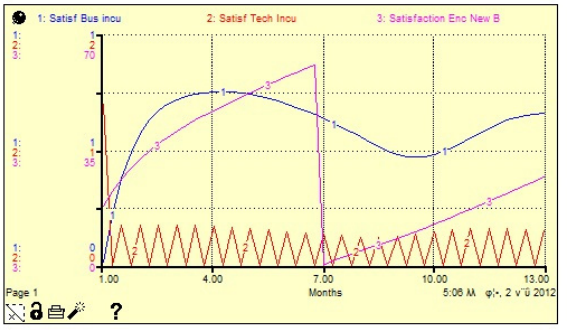


Figure 5. Output Graphs

8. Conclusion and future research

In conclusion, the main scope of investing in encouraging and motivating the creation of entrepreneurship actions is to create a stable infrastructure for the software company that will lead eventually to the increase of its brand name, its growth and expansion and establishment in the top software companies. Furthermore, after having accomplished all these, the company will have greater success in its products, global recognition and a whole new wave of possibilities and opportunities. It's one of the best ways of ensuring the future of a company that depends on cutting-edge technology.

Other than the future success, it is shown that in the 7th month of execution, the company has a small amount of profit. So the company by investing in this section can achieve 2 things, future success and profit. That makes Encouraging and motivating the creation of entrepreneurship one of the main targets of a software company's investment.

Deep research is essential to comprehend and manage all the different aspects and dimensions of a software company, its dynamic behavior, processes, capacities, abilities limits and all its operations. Modeling can help achieve all this but not in isolation. In order to be able to take a reliable conclusion about a decision, all the relationships and interactions between the parts and functions must be understood and taken into account. A change in one sector brings change to others, so it must be a simulation of the complete system of the company that will bring the correct results.

Attentive programming and dynamic simulation models such as iThink can provide countless non-cost simulations in order to demonstrate and guide the company to the best investment that can attempt at that time. With an everyday changing science and technology, things can alter and evolve very fast and new ways of measuring and simulating can be discovered, but dynamic simulation modeling is nowadays the best way of leading to a decision that will enable the company to invest and be sure of its future progress and profit.

Yet, past strategic management literature and research in dynamic simulation have provided evidence that several phenomena, such as organizational culture [24], R&D strategy [25], business environment and structure [26,27] contribute significantly to successful entrepreneurship and firms' effectiveness. Consequently, future investigators should further pry the linkages between these concepts.

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