

LABVIEW APPLICATIONS – INNOVATIVE TOOLS FOR THE YOUNG ENTREPRENEURS

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Abstract:

The paper treats the case of a young entrepreneur that decide to create his own company (a start-up). A very important aspect in creating a business is the possibility of assessing its feasibility. Because the feasibility implies the launch of a competitive product, the young entrepreneur has need for a tool that can offer to him the possibility of assessing the feasibility in real-time, by varying certain parameters. The first part of the paper presents the particularities of the market in a developing country. The second part of the paper presents the approach used to assess the feasibility of the start-up and arrangements that can act on the level of competitiveness of their product. The third part presents a LabVIEW application and some simulation results with it. This tool is simple to use, it providing useful information for the young entrepreneurs, and for the students, while being a very good teaching tool.

Key words: LABVIEW, entrepreneur, innovation, product

1. Introduction

Launching a new product on the market has been and will be a challenge for businesses. There are a number of variables that may influence the competitiveness of a product and a lot of risks [2]. The competitiveness of a product can be regarded as a relationship between the user satisfaction and the unit selling price of the product.

Generally, for a young enterprise, are two type of products:

- An existing product, need to be redesigned because it no longer meets current needs of the users;
- A new product, it is generally an unknown product. This product need to be designed to meet the needs of users reported by some marketing service of society. Most often, the new products not arise from new needs expressed by users. The different customer requirements and their potential financial have led to such new products.

To simulate the scenarios for the different values of the variables, we have defined the concept of balance of competitiveness. This balance is balanced when competitiveness for own product is equal to the competitiveness of the product of competition, and where, for example, will be "inclined" in favour of the competition this indicates that the product of competition is more competitive. The degree of „leaning" shows how much a product is more competitive than the other. Making a computer application allowing the user visual simulation of various financial scenarios would be helpful to young entrepreneurs and students.

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2. The Idea for the Start-up

A start-up is a young company that is just beginning to develop. Start-ups are usually small and initially financed and operated by a handful of founders or one individual. These companies offer a product or service that is not currently being offered elsewhere in the market, or that the founders believe is being offered in an inferior manner.

In the early stages, start-up companies' expenses tend to exceed their revenues as they work on developing, testing and marketing their idea. As such, they often require financing. Start-ups may be funded by traditional small business loans from banks or credit unions, by government-sponsored Small Business Administration loans from local banks, or by grants from nonprofit organizations and state governments.

You need three things to create a successful start-up: to start with good people, to make something customers actually want, and to spend as little money as possible. Most start-ups that fail do it because they fail at one of these. A start-up that does all three will probably succeed. Druker P. [3] said that an entrepreneur is a person who always seeks change, responds to it and exploits it as an opportunity.

Ways that entrepreneurs find opportunities to create new business [6]:

- using a new technology to produce a new product;
- using an existing technology to produce a new product;
- using an existing technology to produce an old product in a new way;
- finding a new source of raw materials;
- development of a market for an existing product.

You don't need a brilliant idea to start a start-up around. The way a start-up makes money is to offer people better technology than they have now. The case of Procter&Gamble Company is very interesting: the company decided to sell detergent in India, but has encountered the following problem: poverty! People could not afford to buy classic detergent containers because they did not have enough money. The company decided to sell the product at very small containers, just enough for one washing.

In a technology start-up, which most start-ups are, the founders should include technical people. Business people are bad at deciding what to do with technology, because they don't know what the options are, or which kinds of problems are hard and which are easy. No matter what kind of start-up you start, it is very important to understand what customers want. According to Rigopoulou [9] customer satisfaction is the state of mind that customers have about a company when their expectations have been met or exceeded over the lifetime of the product or service. According to Singh [10], customer satisfaction does have a positive effect on an organization's profitability. Customer satisfaction measurement involves the collection of data that provides information about how satisfied or dissatisfied customers are with a service. This information can be collected and analyzed in many different ways [1, 5].

When examined as a whole, three general components can be identified:

- Consumer satisfaction is a response (emotional or cognitive);
- The response pertains to a particular focus (expectations, product, consumption experience, etc.);
- The response occurs at a particular time (after consumption, after choice, based on accumulated experience, etc).

Financially, a start-up is like a pass/fail course. The way to get rich from a start-up is to maximize the company's chances of succeeding, not to maximize the amount of stock you retain. So if you can trade stock for something that improves your odds, it's probably a smart move.

The Incubators of Business can provide start-ups with both capital and advice, while friends and family may also provide loans or gifts.

3. The Incubator of Business and Technology

The formal concept of business incubation began in the USA in 1959 when Joseph Mancuso opened the Batavia Industrial Center in a Batavia, New York, warehouse [11, 7, 4].

In the University of Pitesti exist an Incubator of Business and Technology ITA-UPIT which aims:

a) Supporting innovative SMEs in areas / sectors with growth potential and are interested to apply the research results conducted in the University in the Pitesti, to transform into technologies /into products /into new or improved services;

b) Facilitate the initiation and development of new innovative enterprises based on research results from university.

All this studies and the computer application was made in this incubator.

4. The Simulation Model for the Start-up

The algorithm for simulation of the start-up is given in figure 1.

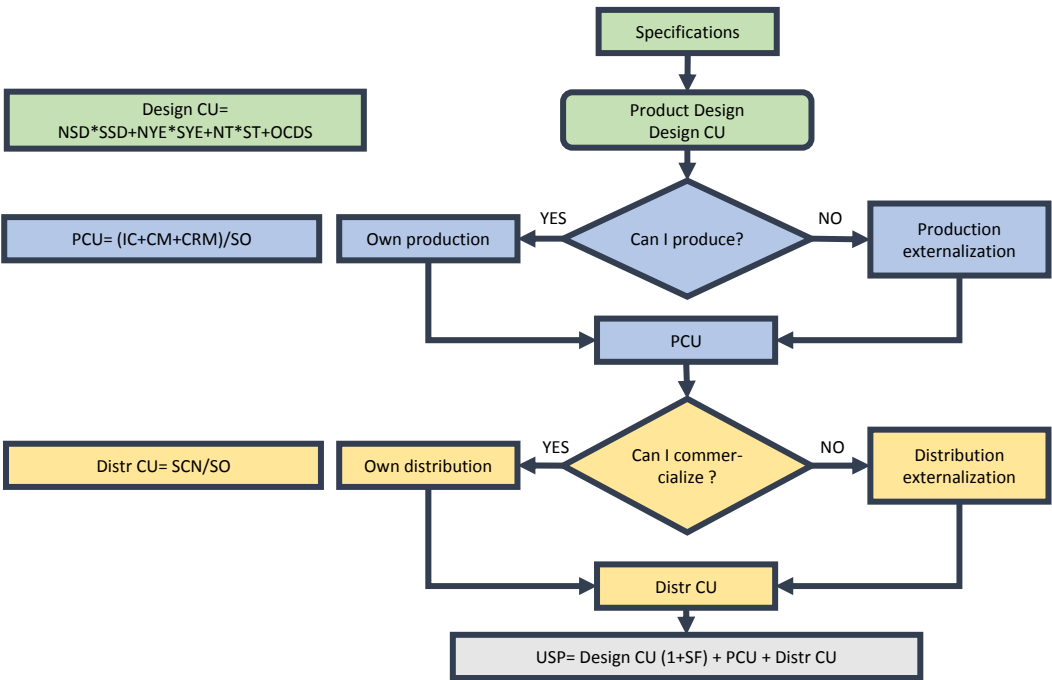


Figure 1. The algorithm for simulation of the start-up

The unit selling price of the product is composed out by a number of costs, shows in table 1:

Table 1. The costs which composed the unit selling price of the product

Design CU – Design cost per unit NSD – Number of senior designers; SSD – Salary of senior designers; NYE – Number of young engineers; SYE – Salary of young engineers; NT – Number of technicians; ST – Salary of technicians; OCDS – Other cost in the design stage.	PCU – Production cost per unit IC – Investition costs; CM – Costs with manufacturing; CRM – Costs with raw materials; SO – Sales objective.	Distr CU – Distribution cost per unit SCN – Spending with commercial network.
SF – safety factor; CSL - Customer satisfaction level of the new product.		

5. Labview Application

LabVIEW [8] is a graphical programming language for the development of instrumentation applications:

- Acquisition through external cards and returning data;

- Analysis and data processing;
- Presentation and data storage and eventually exporting them.

An application developed in LabVIEW is called Virtual Instrument (VI) because we rebuilt the front of a real instrument, based on Block Diagram, figure 2.

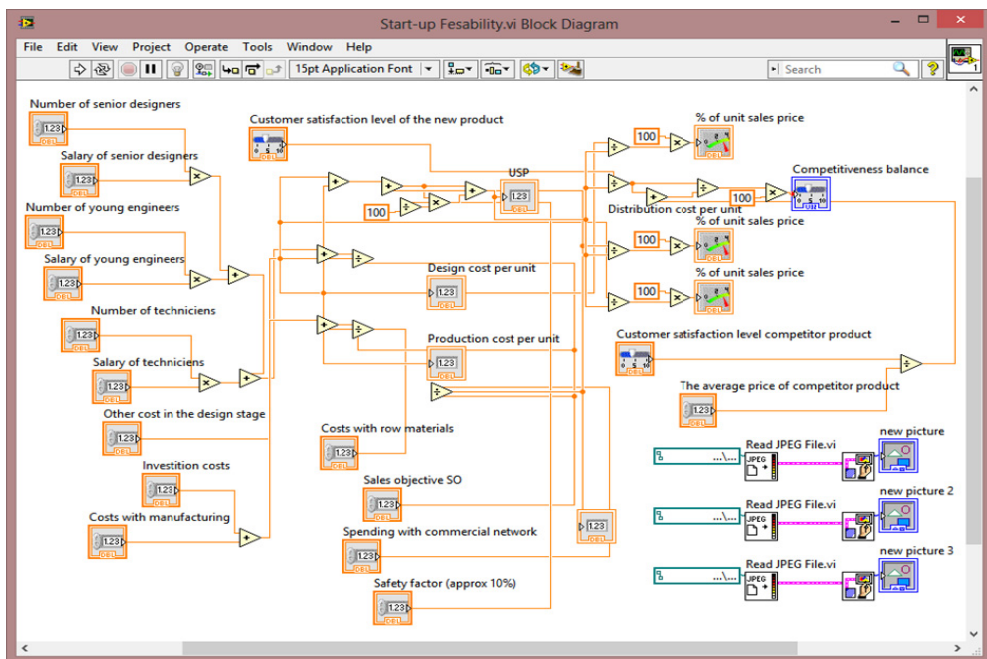


Figure 2. The Block Diagram for the VI

The case study for this article was based on the idea to establish a start-up in order to design, to produce and to commercialize a rechargeable and natural air freshener for a car.

The design stage consists of the following activities, shows in figure 3.

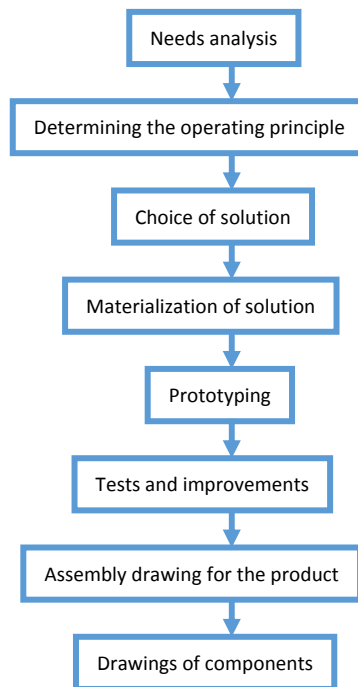


Figure 3. The activities in the design stage

The manufacturing process of the product takes place in own industrial hall.
The product distribution is realized through its own distribution network.

6. Results

From the marketing analysis, we known the average price of competitor product (10 m.u. (monetary units)) and the customer satisfaction level of the competitor product (70%).

We has simulated three situations:

Situation 1: Corresponds to the minimum number of specialists in design, which requires choosing a high safety factor. Customer satisfaction level of the new product is established at 60%, table 2.

Table 2. All the variables for the Situation 1

SO = 30000 m.u.		
Design CU = 0.27 m.u.	PCU = 5.66 m.u.	Distr CU = 0.3 m.u.
NSD =1, SSD = 3000 m.u. NYE = 1, SYE = 1800 m.u. NT = 1, ST = 1500 m.u. OCDS = 2000 m.u.	IC = 100000 m.u. CM = 60000 m.u. CRM 10000 m.u.	SCN = 9000 m.u.
SF = 10%	CSL = 60%	

USP = 6.87 m.u., the competitiveness balance is balance in favor of our product, figure 4.

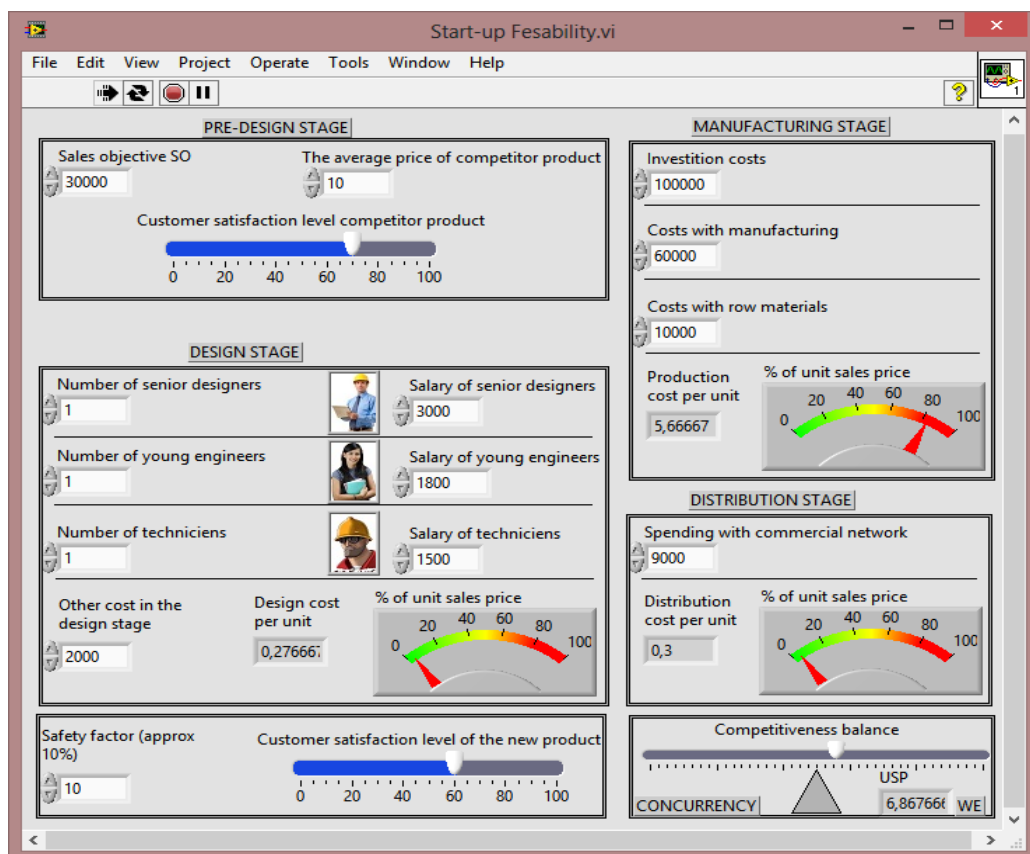


Figure 4. The Front Panel for the VI corresponding at *Situation 1*

Situation 2: Corresponds to the case in which a young engineer was brought into the design team, which allows selection of a lower safety factor, SF = 5%. Customer satisfaction level of the new product can be established at 80%, table 3.

Table 3. All the variables for the *Situation 2*

SO = 20000 m.u.		
Design CU = 0.505 m.u.	PCU = 8.5 m.u.	Distr CU = 0.45 m.u.
NSD = 1	IC = 100000 m.u. CM = 60000 m.u. CRM 10000 m.u.	SCN = 9000 m.u.
SSD = 3000 m.u.		
NYE = 2		
SYE = 1800 m.u.		
NT = 1		
ST = 1500 m.u.		
OCDS = 2000 m.u.		
SF = 5%	CSL = 80%	

USP = 9.93 m.u., the competitiveness balance is balance in favor of our product, figure 5.

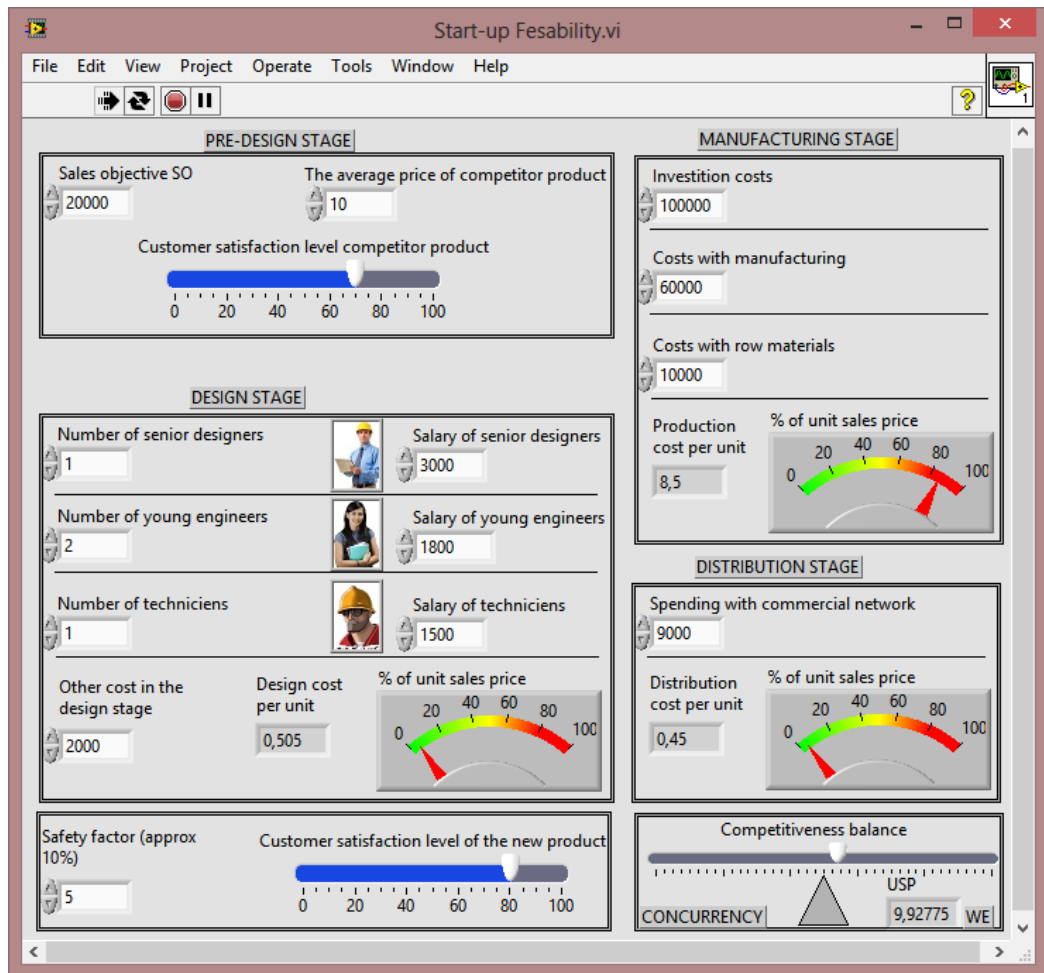


Figure 5. The Front Panel for the VI corresponding at *Situation 2*

Situation 3: Corresponds to the case in which the design team has a large number of specialists, which allows us to choosing a very low safety factor, SF = 2%. Customer satisfaction level of the new product can be established at 95%, table 4.

Table 4. All the variables for the *Situation 3*

SO = 17000 m.u.		
Design CU = 1.2 m.u.	PCU = 10 m.u.	Distr CU = 0.53 m.u.
NSD =3 SSD = 3000 m.u. NYE = 3 SYE = 1800 m.u. NT = 2 ST = 1500 m.u. OCDS = 3000 m.u.	IC = 100000 m.u. CM = 60000 m.u. CRM 10000 m.u.	SCN = 9000 m.u.
SF = 2% CSL = 95%		

USP = 11.96 m.u., the competitiveness balance is balance in favor of our product, but very little, figure 6.

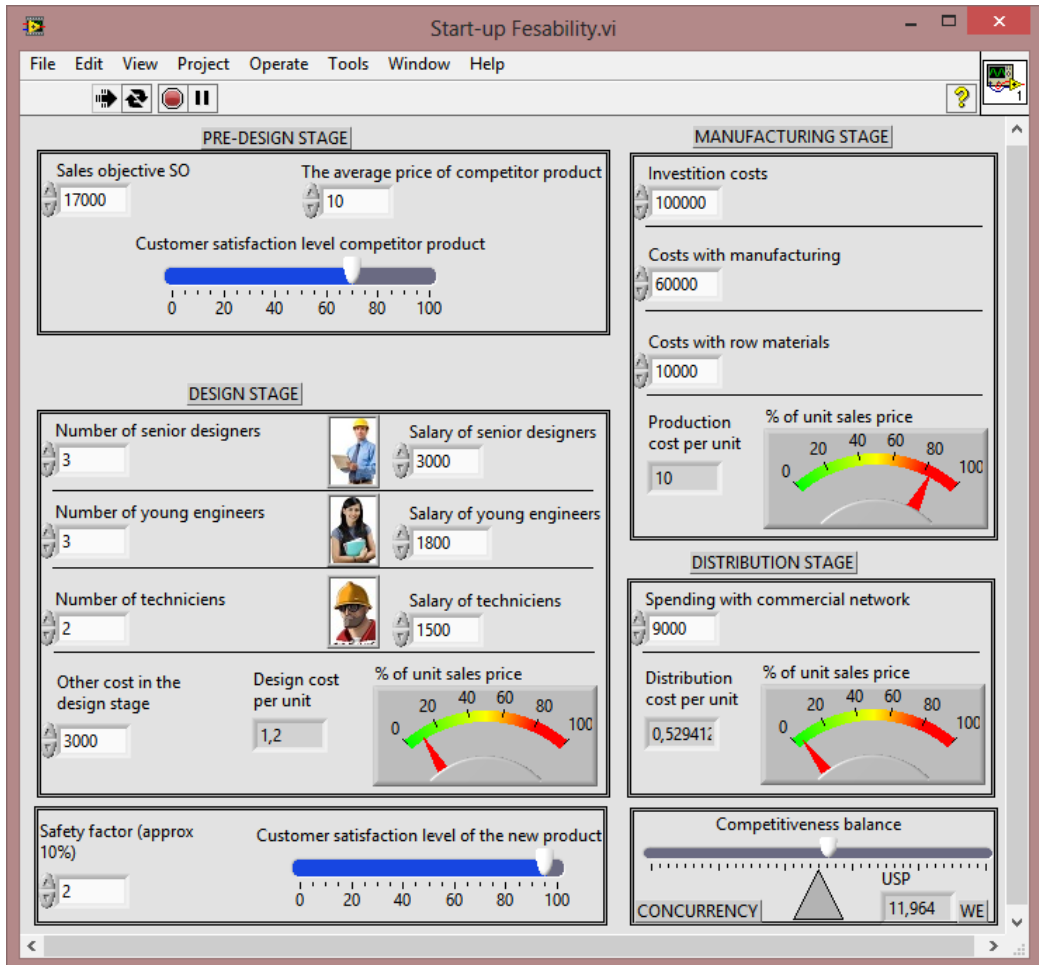


Figure 6. The Front Panel for the VI corresponding at *Situation 3*

7. Conclusions

Development of a tool capable of providing young entrepreneurs and to students resulting from the various scenarios has been and will remain a concern of great interest. Simulation of a start-up based on a simple model has the advantage that it can be applied by people with little experience in the field, and the results can provide a solid basis for making decisions and develop effective strategies.

Basically, within minutes and without much intellectual effort, young management team can simulate different scenarios without the use of complex mathematical models, reaching interesting results.

Very flexible tool, allows operation of several "levers" by varying different parameters of influence.

It has a great visual impact, the results being shown in real time, allowing the user to pinpoint the variables to vary their values.

Can be applied by the students, by the business analysts or by the managers, after a training on a few hours.

Being as a dashboard allows monitoring of global and local process.

In perspective, we want to complete the model with others elements in order to calculate the cost of manufacturing and distribution, thus allowing the user to achieve more accurate forecasts.

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