

Strategic Decision Support for Startup Company Using System

Dynamics: an online startup company's case

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Abstract

Startup companies need to decide when, what, and how to utilize their resources in particular business activities. The necessity of these kinds of decisions is similar to that of long-standing companies. However, there is a significant difference; most startup companies have very limited resources including money, compared to long standing companies. In this situation, a computer simulation reflecting each individual company is valuable. Examining simulation results can be helpful to real company owners and managers. This paper explains a process of introducing system dynamics simulation into startup businesses decision-making and shows a case of use of system dynamics model in a startup company selling original cosmetics online.

Keyword: startup, strategy, decision support, simulation, a cosmetic company.

1. Introduction

Many startup companies have limited financial and other resources. Naturally, they need to decide when, what, and how to utilize their resources in particular business activities. The necessity of these kinds of decisions is similar to that of long standing companies.

However, there is a significant difference. The fact that most of the startup companies have very limited resources means that they cannot use their resources for multiple activities simultaneously. This naturally causes a situation in which startup companies choose only one choice that they really do. This study's purpose is to show how system dynamics models and simulations help decision makers in startup companies with limited

resources.

This strategic decision is not easy even if companies' owners and staffs are well experienced in another company. One of the reasons is that startup companies' products and services are often very new; therefore, similar products' market information and knowledge are not applicable to a particular startup company.

Another reason is that startup companies are relatively vulnerable. Longstanding companies would be able to survive the effects of an unsuccessful decision because their relatively rich resources can cover costs of failures. However, startup companies are often likely to fail because of one inappropriate decision.

Bianchi and Bivona (2002) investigate the whole business of startup companies and show "how managing processes of accumulation and depletion of strategic assets, detecting inertial effects of decisions made in the past, and selectively acting on policy levers are likely to help entrepreneurs in understanding opportunities and pitfalls related to e-commerce strategies." Indeed, these help to improve business people's thinking in middle or long range, but real site business people also need more decision supports to improve the current situation.

In this situation, a computer simulation reflecting each certain company's real situation and stakeholders' real understanding and question is valuable. Examining simulation results are helpful to real company owners and managers. This paper explains a process of introducing system dynamics simulation into startup companies and shows a real case of a startup company selling original cosmetics online. The authors are directly communicating with this company and sharing real business data. The purpose of modeling and simulation is to investigate outcomes of strategic decisions and to help decision making for companies with limited resources.

2. Model and Simulation

The model in this study is a startup company, called here "LP," which sells original cosmetics.

LP's main product is an original skincare cream produced with cranberries. It is unique, and their philosophy (high quality, ecological production, contribution to society) particularly attracts middle-aged women.

They offer a "tester," a small portion of their products. Prospective customers try a tester, and then they decide to continue to use the products. Offering the tester is not only to keep out of troubles with customers but also to have an important means to reach potential customers.

LP reaches consumers by using existing mail order catalogs (paper media), existing Internet shopping sites, and their original website. Paper media is relatively powerful in cultivating new customers. However, it is very expensive compared to the Internet media. Therefore, LP's normal marketing is on the Internet.

Based on the above considerations and interviews with LP owner, the model in this study focuses on transitions of customers shown in figure 1.

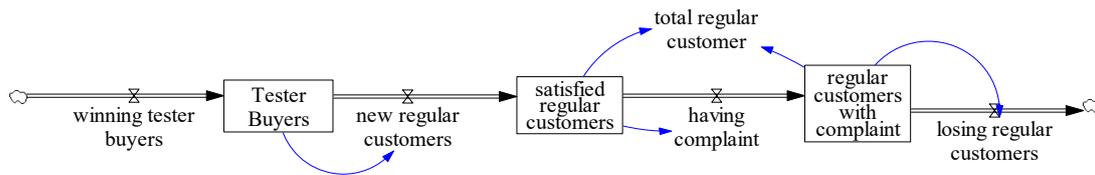


Figure 1. Basic structure of the LP model focusing on customer transitions

LP's main product that occupies almost all sales is skincare cream. It is consumed at a steady pace. Therefore, the sales are considered as in proportional to the customer size.

Winning customers depends on two advertisement media: Internet advertisement and paper (mail-order magazine) advertisement. These advertisement media have contrasting characteristics shown Table 1. LP has limited financial resources for advertisement; therefore, their usual promotion medium is the Internet.

Table 1. Characteristics of advertisement media.

	Cost	Consumer Exposure	Possibility of gaining new customers
WWW	cheap	frequent	low
Paper	expensive	limited	high

Based on ZINTX (2015) and interview with the LP owner

LP understood their total advertising costs. Consequently, the cost of gaining one customer and effect of each advertisement medium can be calculated based on the existing LP's data by the authors. As mentioned above, LP's usual advertisement medium is the Internet. When the marginal effect of Internet advertising is constant, the fluctuation away from the sales from Internet advertising alone is the effect of paper advertisements. Thus, the marginal effect of paper advertisements can be derived.

Customer starts from as "tester buyers." LP's sales data show the fact that almost all customers use the tester at least once. The number of new customers buying a regular size without a tester was negligible.

After the first trial, tester buyers decide whether they would buy the same product or not. In the case of LP, a tester is not free. Therefore, most tester buyers shift to “regular customers” if they value the quality of the products. This rate is stable irrespective of implementation of paper media advertising.

The terms to continue “regular customer” status vary among customers. The majority of customers continue “regular customer” status for three and four months. One and two-month customers are relatively smaller in number than three month customers.

The continuation term distribution suggests customer transition includes a structure of lower order delay. Indeed, the calculation using real data shows that the number which is a square of the average stay time, in which customers keep their regular status, divided by variance of stay time is approximately two (see Sterman, 2000, p. 465).

Transition time, or the time to stay in one stock, can depend on customer volume; more customers, less satisfaction. Therefore, this model has a transition rate (rate of dissatisfaction and average time to cancel) as functions of customer volumes. Each of these functions is defined as a horizontal line when the customer size is small and as a diagonally right down function when it increases. The customers stop buying the product when they perceive a problem, but “loyal core fans” would stay irrespective of other people’s behavior. The change from horizontal to right-down is when “satisfied regular customers” and “regular customers” reach “threshold” and “average time to cancel threshold,” respectively.

Figures 2 and 3 show LP’s real situation (reference mode) and the results of the simulation. Customer numbers and costs values are standardized as one hundred for the time 0 value. They are derived from parameters based on interviews and arithmetically calculated values based on existing data. The LP owner and authors examined each variable’s definition. The simulation values sufficiently trace real history. MAPE of “Total Regular Customers” is 8.41%, and MAPE of “Tester Buyers” is 19.69%. See Sterman (1984).

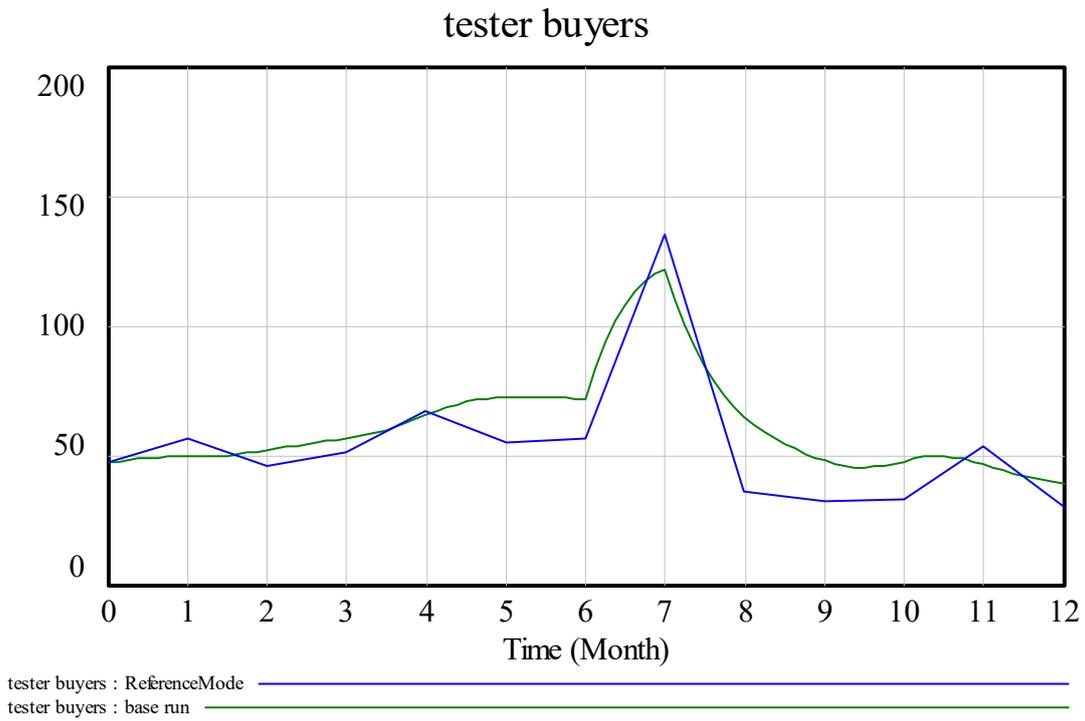


Figure 2. Base simulation result of Tester Buyers and actual data (Reference mode)

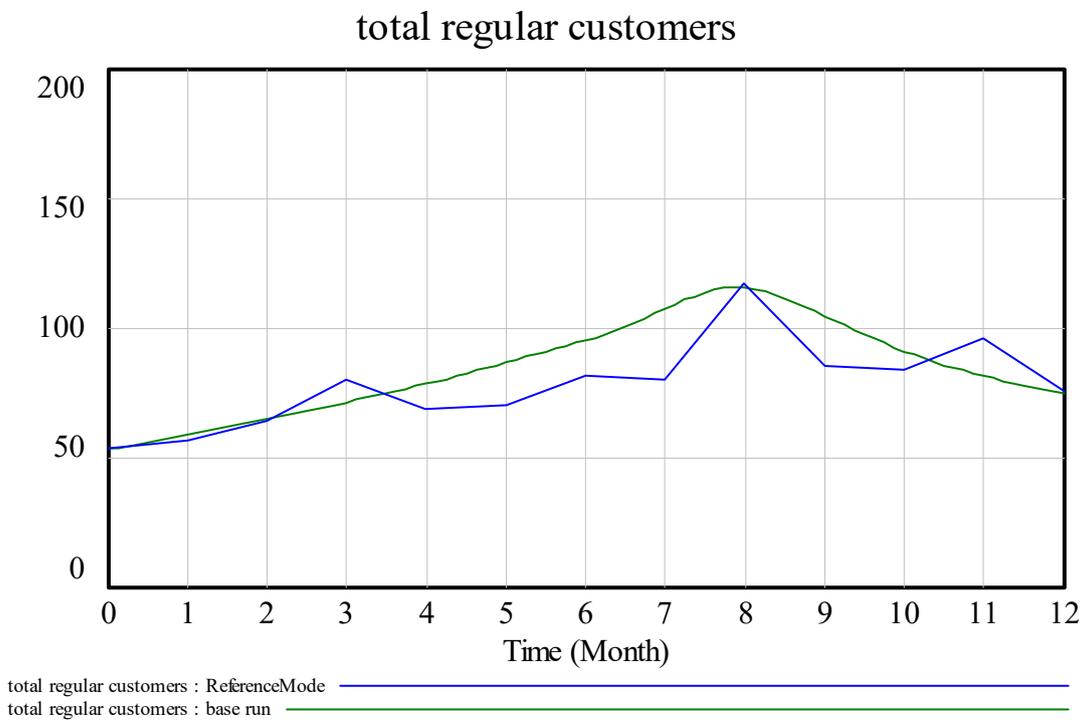


Figure 3. Base simulation result of Regular Customers and actual data (Reference mode)

3. Discussions

After the review of simulation model and a base run, the LP owner agreed to test some scenarios including interventions, which would work effective. One of those scenarios was to employ the popular effective paper advertisement more frequently. It means, the owner hoped to test his advertisement strategy. The price of popular magazines' paper advertisements is much higher than the price of ordinary paper media. Therefore, LP cannot afford the same volume with more frequency. The LP owner thought if these advertisements were conducted more time, the volume should be smaller. The simulation result shows this intervention can retain customers (figure 4).

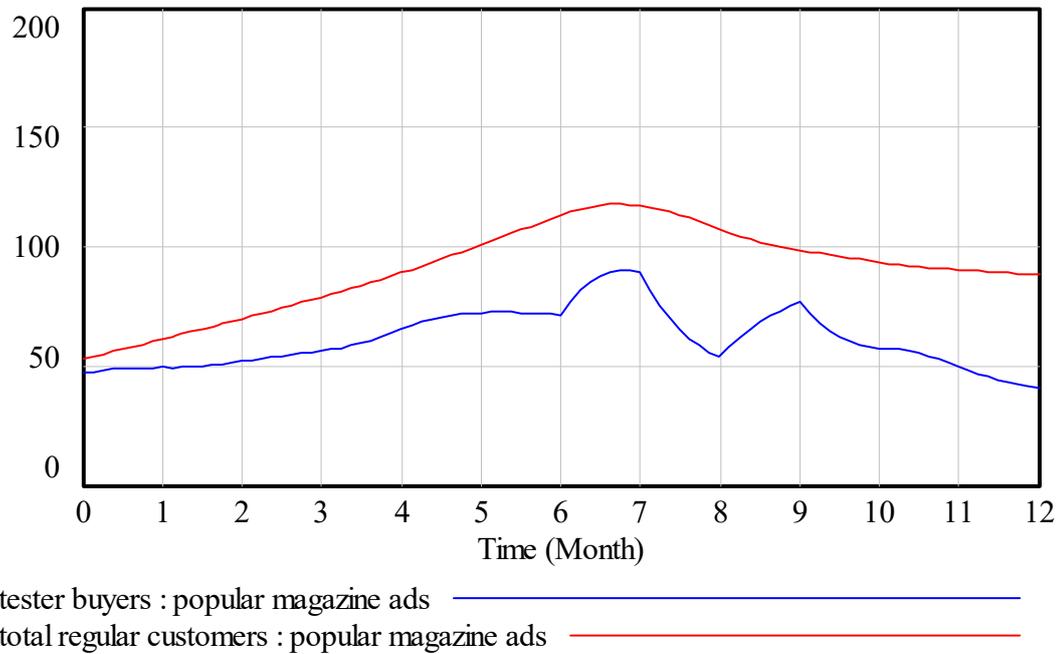


Figure 4. Tester Buyers and total regular customer with twice popular magazine advertisements and halving effect size

This scenario is slightly better than the base run and reference mode (real past data). However, the popular magazine advertisements are expensive. In reality, LP uses it only when the magazine offered the discount advertisement price. Therefore, this scenario would be preferable, but LP cannot drive this situation by itself. The LP owner understand the result, possibility of implement of his scenario, and challenges.

Following this examination, we conducted several examinations that reflect the LP

owner's ideas and questions, sometimes with additional structures. These examinations assisted his decision-makings. Usual qualitative dialogs between LP insiders and advertisement magazine representatives often showed prospective without solid basis. However, simulations can show results with evidence and assumptions. Besides, the system dynamics model is relatively small and shows its details in easy way to stakeholders. Company owners and stakeholders can decide their next strategy with confidence. Thus, computer simulation using system dynamics improve quality of decision-makings.

4. Conclusion

Real company owners are aware of many possibilities of various strategies. At the same time, it is not feasible to distinguish the result or outcome of each strategy. Computer simulations can show the differences and characteristics of each strategy's outcome. Besides, system dynamics models can explain why these outcomes occur, how we manage it, and which strategy we should choose. This research shows the process to give real site stockholders insight and a case study. In particular, the stakeholders' needs are to solve current problems with limited data and experience, rather than to draw a future design. This research succeeds that system dynamics simulations are able to assist relatively short-term decision-makings as well as long-term policy makings.

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