

A Conceptual Model Of Operating Internet-based B2C Business In Fast-growing Industries

Yulin Fang

Richard Ivey School of Business
The University of Western Ontario

yfang@ivey.uwo.ca

ABSTRACT

Most existing econometric studies approached the issue of Internet-based Business-to-Consumer (B2C) operation by analyzing one or two specific relations, but few studies have been done to picture the entire dynamics of online (Internet-based B2C) and offline (traditional brick & mortar) operation in fast-growing industries. Taking the System Dynamics (SD) perspective, this paper offers a comprehensive conceptual model that portrays dynamic processes of simultaneously running online and offline business in fast-growing industries. All major functional operations such as R&D, manufacturing, marketing, product delivery, after sales service, online store construction, as well as online and offline customer interflow are included in the causal loop diagram. Five reinforcing loops and three balancing loops significantly influencing corporate performance are identified and analyzed. The implications of this conceptual model to practitioners in fast-growing industries are discussed.

INTRODUCTION

The Business-to-Consumer (B2C) e-business model is a business model that extends the traditional brick & mortar-based business practice by introducing an online channel to customers. It has been widely accepted by many western computer suppliers, even though dot.coms have experienced dramatic boom and bust in the past five years. It was argued that as the competition in the conventional computer market became increasingly intense, an online business channel would emerge as a strategic imperative for companies to build competitive advantages (Segal 2000). However, in the last few years the whole business world has witnessed dot.com's boom and bust. Dot.coms were one of the fastest growing businesses, while they dropped like stone as fast as they grew. Having seen all these that happened, many companies in developing countries have been extremely cautious about investing in the Internet based B2C, doubting the return on investment as an early mover into the local online market (Mellahi 2000). Two questions arise here: 1) *What are the underlying processes of operating conventional business and online business simultaneously?* 2) *To what extent and how does the introduction to online business affect a company's performance?* By approaching these questions, we expect to help practitioners understand the key issues that may influence corporate performance when they consider the Internet-based B2C business. Considerable research has been done on B2C performance using econometric approach, but few studies examine B2C as a dynamic system with complex interrelationships.

In this paper, an enterprise-wide conceptual B2C model is developed from the System Dynamics (SD) perspective. The model portrays a typical operation model of a common manufacturing company in fast growing industries that does sales through both the conventional channel and the emerging online channel. The focus of the model resides on the interaction among the major functional departments of the company and the interweaving effect between the online market and the conventional market.

Based on the model, we expect to illustrate the major loops that can affect the performance of the company and to pave a path for quantitatively exploring the critical decision factors that significantly influence the company performance, and the behavior with regards to customers' reaction to the company's B2C platform. The result will be of high value to business practitioners with intention to building B2C capabilities in fast-growing industries.

PROBLEM DESCRIPTION

The existing literature has extensively studied the benefits companies can obtain from the B2C model (Fan 2001). However, some major challenges still exist for companies that are adopting B2C, including reduced barriers to entry, huge marketing investment, lack of qualified after sales support workforce, the potential of online market growth in developing countries, etc.

Reduced Barriers to Entry

Internet is drastically reducing barriers to computer market. Current B2C players' market share is constantly being challenged. It is easy for anybody to build a web presence to take customer orders in ways such as email, message board. Customers are free to switch instantaneously to competitors since the comparative information about the product of any competitor can be obtained effortlessly.

Enormous Marketing Investment

Much investment is needed to attract potential customers to online stores. Business on the Internet is just like a battle for people's attention. In order to capture customers, investment needs to be ongoing and huge.

High-Qualified After Sales Service Workforce

The existing literature in e-business has also studied distinct roles that customer service plays. Parasuraman (1991) found that online customers pay great attentions to service quality. It is also found that customer service in e-business may have different characteristics than that in traditional service (Cox 2001). Some determinants in traditional service are not relevant in e-business while some other determinants such as accessibility, communication, credibility, understanding, availability are equally applicable to e-business (Cox 2001). Thus distinct online service quality seems to be important in increasing online customer satisfaction and needs to be addressed be handled differently.

Potential of Online Sales Market

The online selling can only be conducted through computers that are already linked up to Internet, provided that the computer user wants to shop through the Internet. Although the Internet growth rate in developing countries, such as China, appears to be exciting, the overall penetration rate is still much lower than that of the developed countries. Whether the amount of computers and users can push forward the online retailing market is still remaining to be addressed.

Other Major Concerns

Other factors such as security of payment, the Internet access cost and quality may also affect the performance of online selling.

PRELIMINARY LITERATURE REVIEW

Prior Studies associated with this topic is reviewed as the basis of this research. These literatures fall into three categories: 1) Growth Management In Fast Moving Organizations; 2) The Impact of IT Evolution on Business; 3) Skills and Customer Service Dynamics. In the paragraphs to come is a summary of the studies in these fields.

Growth Management for fast moving organization

Managing growth is the focal managerial issue for companies in fast-growing industries. A generic model “Growth and Underinvestment” points out the lag between the support needs and the technical support capacity, which is caused by significant delay of capacity building (Lyneis 1998). The article takes Gateway as an example and emphasizes that the service capacity should be expanded at least as rapidly as the growth in shipments. Also presented is trade-off between huge investment in expansion and short-term profit. See Figure 1

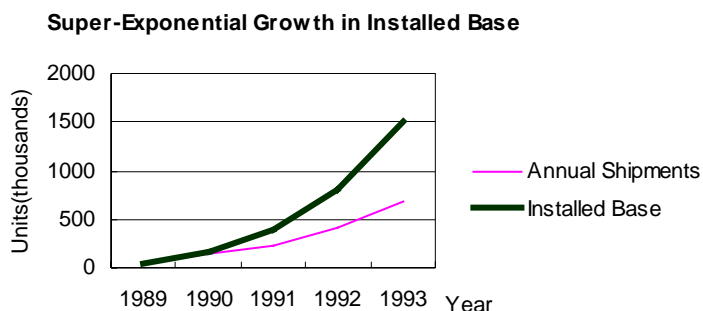


Figure 1A Super-Exponential Growth in Installed Base

From Figure 3-1, we can see that the insufficiency of technical support service is a direct result of the sales success. The article also discusses the situation that arises when a company tries to enter a new market. Both a new market entry and technical support service require a huge amount of investments that reduce the profit margin. Two conflicting goals- a high profit

margin and sufficient infrastructure – potentially challenges the company, as illustrated in Figure 3-2, loop B4 and B5.

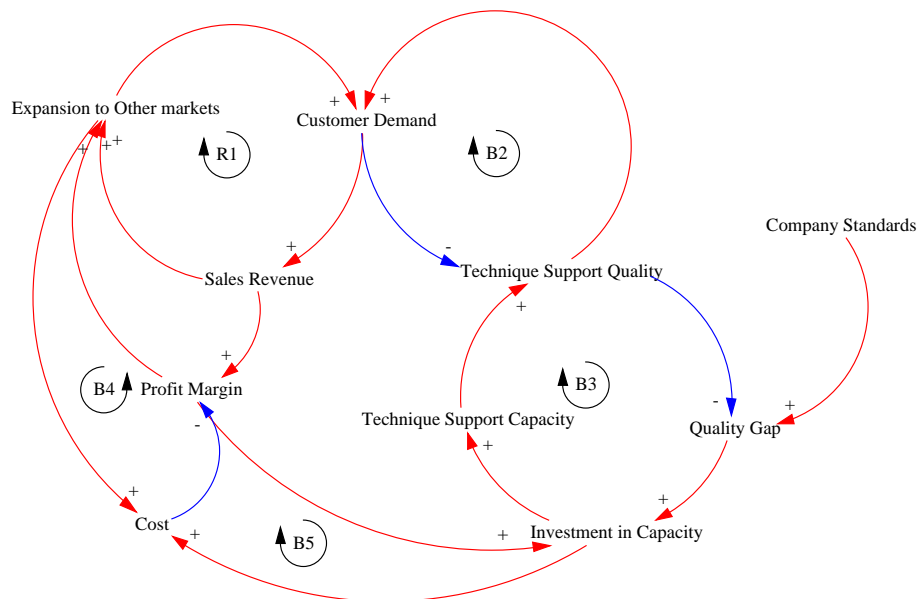


Figure 2 “Expansion Investment and Profit Margin” adapted from Daniel H.Kim and Anne Coyle, 1993

The Impact of IT Evolution on Business

Successfully introducing a product based on a new technology can give company significant advantages over its competitors in terms of the position to define the product standard and the ability to drive down the cost (Kim and Coyle 1993). IT-enabled transactions help firms create value by enhancing interaction with suppliers and customers (Glazer 1993). Conceptually speaking, an important asset firms can build is the IT infrastructure highly aligned with customer-oriented business practice. By doing so, internally it can help to train staffs, and externally can improve the understanding of individual customer shopping habits (Sonka 1998). These lead to customer’s reaction to the change and an enhanced and modified internal knowledge and skills associated with products, service and customer needs (Sterman 2000). The research in this field has articulated how information technology affects the way of doing business with particular focus on the enrichment of staffs’ knowledge and skills.

Skills and Customer Service Dynamics

Service professionals must upgrade their own knowledge to keep up with the new online system and develop skills for dealing with a variety of troubles caused either customers’ unfamiliarity with the website from the technical aspect, or customers’ complaints on the product ordered through the Internet. In other words, the rate of skills obsolescence becomes rapid and normal staff development processes may simply prove inadequate in building up the necessary new skill base in times of major changes such as online business platform

implementation (Winch 1998).

Customer service is playing a more and more important role in the product life cycle. The effectiveness and efficiency of customer service, including pre-sales service such as product information delivery, best suitable product recommendation, and after-sales service, largely leverage the satisfaction degree. In the online business, a company's web site plays an essential role in making up the skill obsolescence caused by the shift of the business platform. A good – performed website takes care of customer service throughout the life cycle of the products by publishing sufficient and relevant information in a user-friendly and well-organized way.

RESEARCH APPROACH

The system under examination features complexity and dynamics. The company is undertaking structure changes when setting up online channels. It has to manage two different, online vs. traditional, channels simultaneously. Customers choose to purchase through one of the two channels or to leave for its competitors. The customer turnover between channels and/or between competitors can cause dynamic and complex interactions. Thus, we need a methodology that can portray the system's dynamics and complexity, reflect delays and feedbacks, and can predict the patterns over time through simulation. Traditional econometrics applies mathematical and statistical approach to economics, but the dynamics (i.e., feedbacks and delays) embedded in a system were not explained (Sterman 2000).

System dynamics (SD) is a perspective and a set of conceptual tools that enable us to understand the structure and dynamics of complex systems. Causal loop diagrams (CLDs) are flexible and useful tools for diagramming the feedback structure of system in any domain. They are simply maps showing the causal links among variables with arrows from a cause to an effect (Sterman 2000). Given its ability in addressing dynamic and complex system structures, the causal loop diagram was adopted in our study.

In this study, an enterprise-wide operation conceptual diagram was built to portray the structure of a computer company with both a conventional sales channel and an online sales channel. The diagram offers a holistic view of the entire operation of a traditional computer company with B2C practice by including major components discussed in the above section (i.e. customer base, customization, open architectures, marketing, customer service, etc). The conceptual causal loop diagram can facilitate can be used to understand the dynamics underlying in the system and facilitate simulation model building process in the future research.

CONCEPTUAL MODEL

This section presents the causal loop diagram. Firstly, the causal loop diagram for companies with the conventional channels is presented. Secondly, we extend this causal loop diagram by including an online sales channel and website operations associated with the online sales channel. Thirdly, the issues implied by adding a new channel is discussed, and preliminary suggestions for performance improvement are presented.

Causal Loop Diagram –Manufacturing Firms With The Conventional Channel Only

A typical manufacturing firm includes multiple functionalities, such as R&D, marketing, production, product delivery and after sales service. Figure 3 presents the feedback loops associated with these functionalities.

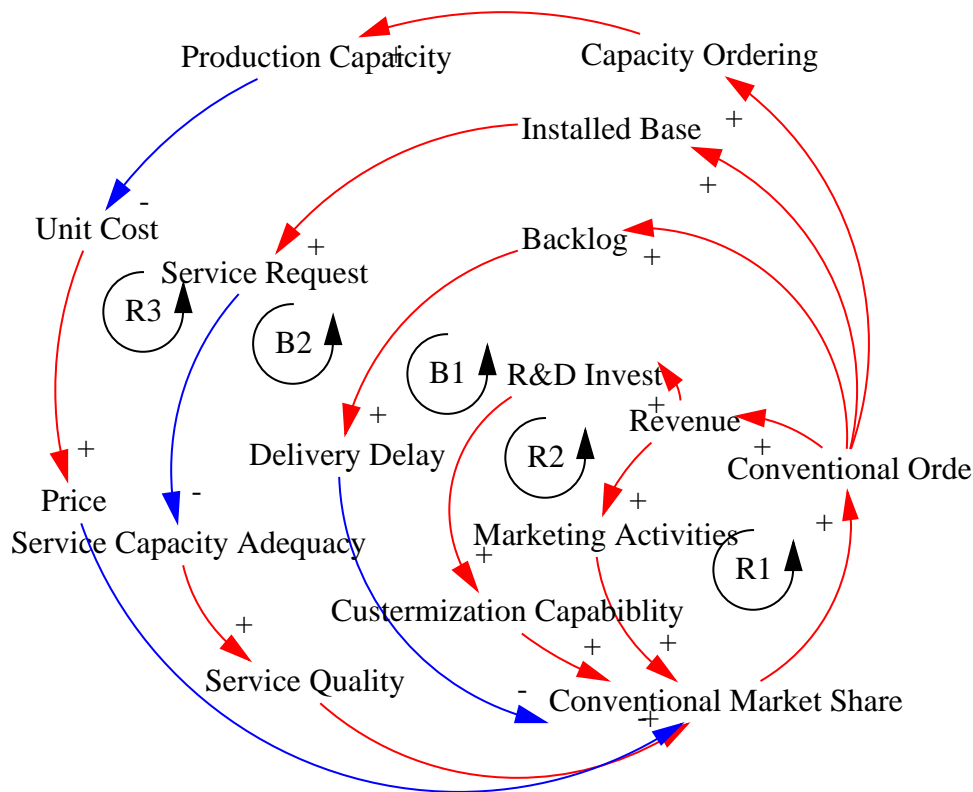


Figure 3: Major feed back loops in a typical manufacturing firm

- R1 Marketing reinforcing loop
- R2 R&D reinforcing loop
- R3 Economy Scale reinforcing Loop
- B1 Delivery capacity balancing loop
- B2 After Sales service balancing loop

Marketing and sales have long been determined as key activities strengthening firms' growth. More marketing & sales activities attract more customers and boot the company's conventional market share, which leads to more product orders. More conventional orders lead to more sales volume, which results in more revenue for the company. Then the company is able to allocate more funds for marketing and sales activities. This reinforcing loop (R1) is a driver of corporate growth.

R&D has long been seen as a source of companies' competitive advantage. An R&D increase can result in more product options or better product quality to customers, which results in more customers and more sales, and consequently make the company be able to allocate more R&D investment. This reinforcing loop (R2) is also a driver of corporate growth.

Increasing economic scale is a major way of driving down production costs. Loop R3 briefly illustrates how capacity increase helps lower down product unit cost, which constitutes a major component of product price. Lower product price helps increase the company's market share and then conventional orders.

By the same token as “growth and undersinvestment” (Lyneis 1998), balancing loops exist and impede companies from constantly growing. A classic literature in the system dynamics field – Limit To The Growth – has addressed the issue of growth constrained by limited resources. In the circumstances of a company, production delay and service capacity are widely suggested as major capacity bottlenecks undermining corporate growth. Loop B1 shows that increasing order quality leads to increasing backlogs, which increase the pressure on product manufacturing and then lead to delayed delivery. Prolonged delivery delay decreases customers' satisfaction that subsequently negatively influences the company's market share. Along the same lines, increasing quantity of products sold leads to a higher amount of installed product base on the market, which require more after sales service. Increased service requests squeeze up service staff's time available for each request, which in turn may cause decrease in customer perceived service quality. Market share then decreases due to worsen service quality. This feedback loop is illustrated as B2 in figure 3.

In short, corporate growth is driven or impeded by these fundamental feedback loops. The dynamics among them (e.g. dominant loop shifts) are seen as the underlying reasons for various corporate behaviors (Senge 1990).

Causal Loop Diagram –Manufacturing Firms With Both The Conventional Channel And The Online Channel

By opening online B2C businesses, conventional manufacturing firms will have one more channel facing customers. Customers can place product orders through the online shopping website that the firm has built. Figure 4 illustrates major feedback loops undergoing the company with both the conventional sales channel as well as the online sales channel.

Similar to conventional orders, orders received through the online shopping site can eventually drives increases in marketing & sales funds and R&D investment by increasing corporate revenue, can help lower down product price by enlarging economic scale, and potentially impact customer satisfaction by changing product delivery backlog and service backlog. Therefore, all the major loops (i.e., R1, R2, R3, B1 and B2 in figure 3) apply to the online channel as well.

In addition, there are three new loops brought into play as the online ordering presence is introduced. They are online store software infrastructure loop (R4), online store maintenance loop (R5) and server load loop (B3) (see figure 4). They are all associated with the Internet-based B2C practice and are independent from the conventional process.

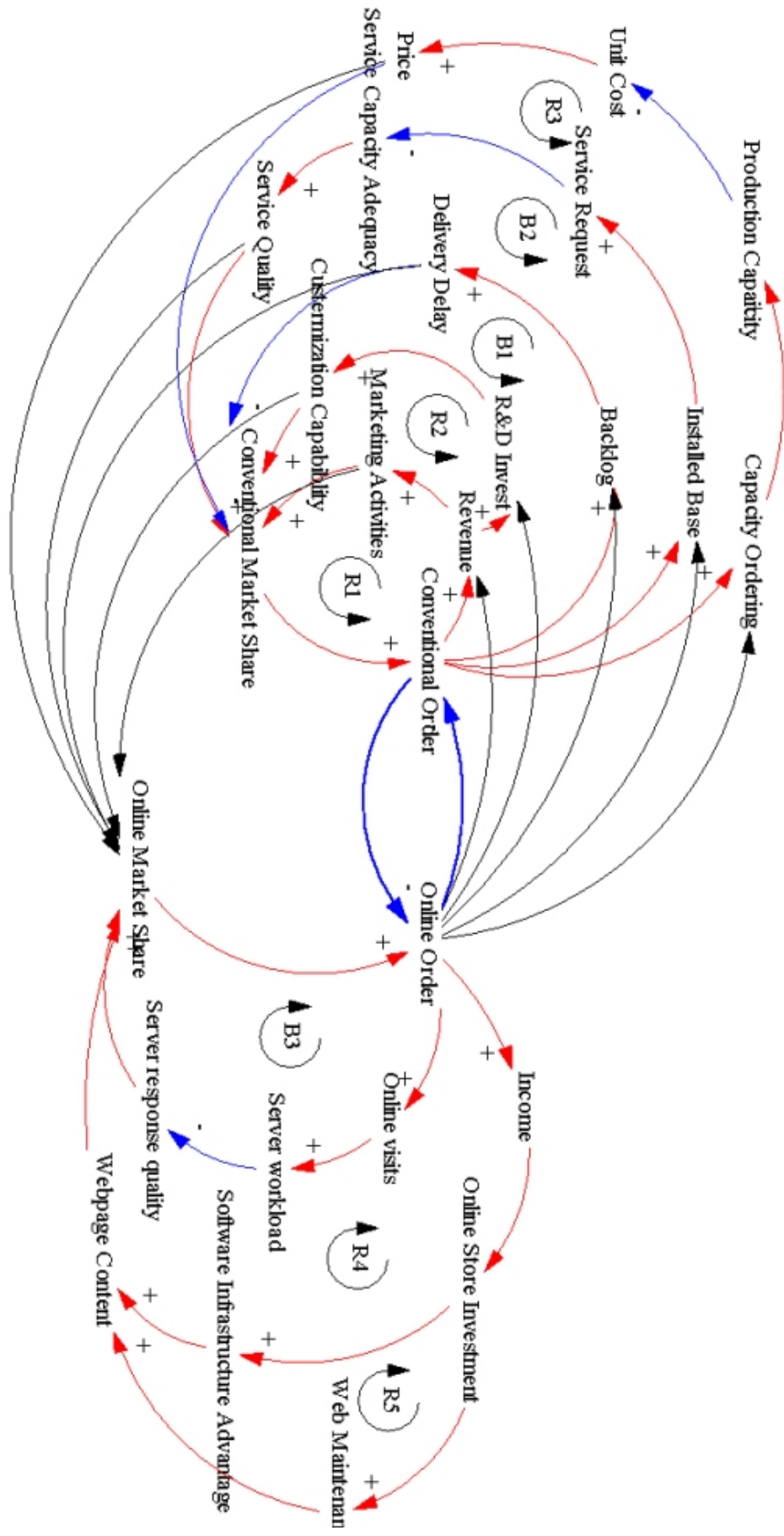


Figure 4 – The operational structure with Internet-based B2C included

An online shopping site is the interface between companies and the potential customers; therefore the quality of the online shopping site (e.g., the extent to which users feel page loading speed, website easy-to-use and usefulness, etc) is a key factor influencing customers' online shopping behavior. Apparently, more investment in online shopping site construction and maintenance leads to higher advantage of the whole software solution, which may in turn lead to better organization of the website, which subsequently attracts more online customers. More online customers come with more orders, subsequently more revenue and more allocation for further investment. This feedback effect is illustrated as the reinforcing loop R4 in figure 4.

Similarly, more online site investment can lead to better site maintenance done by IT professionals, which in turn results in better quality of the website that subsequently leads to more online customers. More online customers will result in more revenue and more funds allocated for investment in web maintenance. This feedback effect is illustrated as reinforcing loop R5 in figure 4.

The two reinforcing loops suggest the upside of increasing online order quantity. However, an increase in online order quantity also has its downside. Similar to the issue of service backlog and delivery backlog, increased web awareness leads to higher quantity of online shopping site visit. This increases the online site's workload, and subsequently slows down server response quality. Slowness in response decreases website visits and eventually has negative effect on orders place through the website. The whole causal-effect chain is a balancing loop limiting the growth of online ordering, illustrated as balancing loop B3 in figure 4.

Furthermore, there appears to be interactions between the conventional ordering process and the online order process. Depending on existing customers' preference and the company's strategy, some conventional customers will become online customers while some online customers will become conventional customers. They may be driven by individuals' shopping presence, by the quality of product life cycle service through either way, or by the company's strategies.

In summary, the whole business process becomes much more complicated when a company has two sales channels, which are partly in common and partly distinct.

IMPLICATIONS AND DISCUSSIONS

Now that the major underlying balancing and reinforcing processes underlying the whole business (i.e., include offline and online business) have been identified and understood, we could broadly discuss how the introduction of online sales can impact corporate performance. As Sterman (2000) suggests, reinforcing loops reinforce changes with more changes. Thus, this kind of loops leads to grow at an ever-increasing rate or leads to decline at an ever-increasing rate. Thus, it is important that the reinforcing loops identified in the diagram should move positively. In other words, it seems that corporate policies should be designed to encourage appropriate marketing investment, R&D investment, and online site construction investment.

Furthermore, he suggests that balancing loops drive systems to seek a goal. If the current level of a variable (e.g., backlog) is above a fixed value, the balancing loop will work to decrease the variable to meet the value. In other words, in many situations balancing loops can stabilize the system behavior to center around a fixed level (e.g., maximal capacity of service or production). This implies that it might be important to “raise the ceiling” – keep balancing loops from stagnating the business.

Strengthening reinforcing loops

Marketing (R1), R&D (R2), production at economic scale (R3) and online construction and maintenance (R4 and R5) have been identified as reinforcing loops in our causal loop diagram. These reinforcing loops are driving customer conventional orders and online orders to grow exponentially. Therefore, it seems essential to guarantee decent resources to fuel these reinforcing positive loops, such as allocating considerable funds for marketing, R&D and dedicating sufficient resources to improve and maintaining the online site. In the circumstances of fast-growing industries, commitment to these actions are particularly important because an increasing number of competitors will join in the industry and threaten the company’s growth quickly.

Managing balancing loops

Three major balancing loops are identified in the study, including production capacity loop (B1) after sales service capacity loop (B2) and the online server capacity loop (B3). These balancing loop constrain the company from growing by prolonging product delivery time, worsening after sales service and slowing down online site response quality respectively. It appears important to relax these limitations before a high corporate growth rate can be sustained. In practice, solutions include increasing production capacity, recruiting qualified service representatives and investing on the server upgrading. Taking after sales service loop as an example (see figure 5), balancing loop B4 indicates that service capacity can be increased by increasing current staff’s work intensity while balancing loop B5 suggests that service capacity can be increased by recruiting new staff. By the same token, we could figure out solutions to addressing other capacity limitations by including additional balancing loops.

Moreover, managing balancing loops has great implications to the effects of reinforcing loops. Namely, the increasing product orders and increasing market share achieved by marketing, R&D and online store investment will be negatively affected by insufficiency in production capacity, service capacity and server capacity caused by these balancing loops. If the caps caused by the balancing loops are not removed, the huge investment put into strengthen reinforcing loops cannot generate expected outcomes.

Managing the customer interflow between two sales channels

Last but not the least, we have understood that existing customers are likely to move between the two different channels (they is also likely to choose competitors, which is not included in the current model). Therefore, corporate policies could be designed and implemented to direct customers to use more of one channel than the other. For instance, it is widely suggested that online order placement and fulfillment can provide customers with faster product delivery and

can provide companies with higher margin (i.e., distribution mark-up is eliminated). Corporate policy could be designed to encourage existing conventional customers to make more use of the online channel.

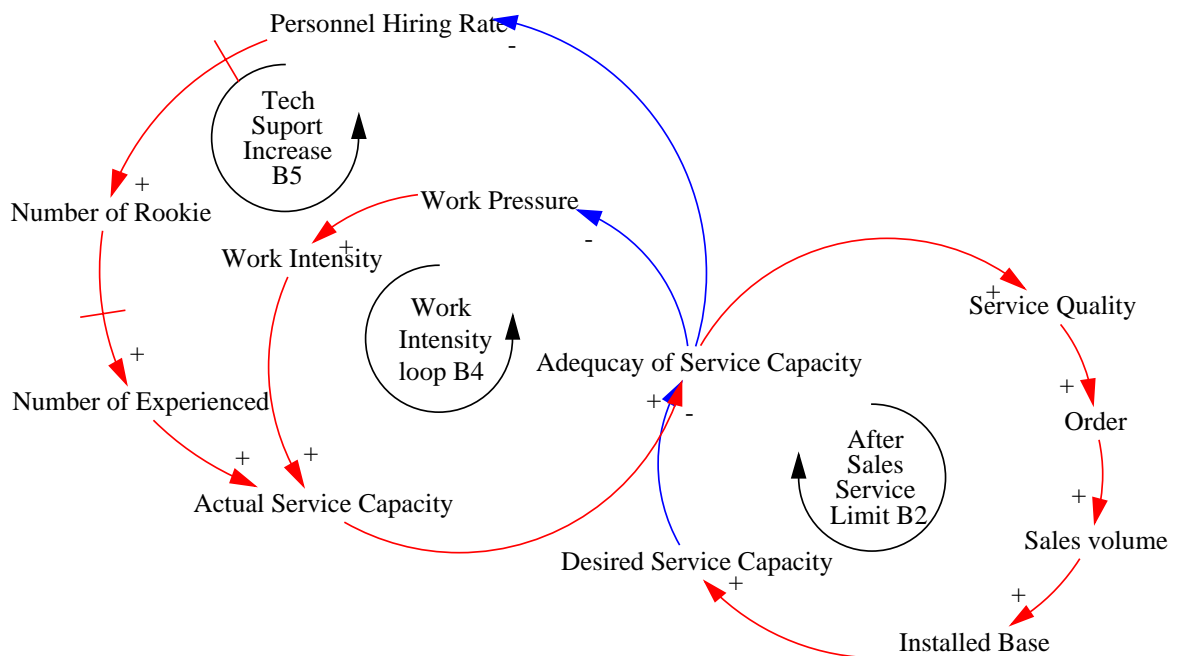


Figure 5 – Relaxing after sales service limit by increasing work intensity or recruiting new staff

LIMITATION AND FUTURE WORK

This study presents early outputs of the whole SD research cycle by extensively using causal loop diagrams. Causal loop diagrams are used here because they make system dynamics more accessible to a wider range of people and practically are often used to clarify conceptual relationships before the formal models are introduced. However, casual loop diagrams have some problems in addressing system dynamics issues. Firstly, casual loop diagrams cannot effectively address delays – an important notion in the field of system dynamics. For instance, it takes a considerable amount of time for marketing initiatives to have effects on target customers; it takes long time to expand production capacity before new capacity get to work. A simple cross over the link can qualitatively indicate the existence of a delay, but it cannot show the magnitude of the delay. Its limitation in terms of quantities representation also applies to other building blocks of causal loop diagrams, such as positive and negative signs. This is also an essential and natural part of SD research. In addition, a crux problem with causal loop diagrams is that they make no distinction between information links and rate-to-level links (Richardson 1986). In the future work, formal quantitative models will be applied to address quantitative relationships.

The current conceptual model presents generic structures of potential problems with Internet-based B2C business at a preliminary stage. It helps achieve conceptual clarification, but is not sufficient to address industry-specific insights and generate insightful analysis based

on simulated behavior. Further research will include developing formal stock-flow diagrams, collecting data from companies in fast-growing industries (e.g., the personal computer industry) in developing countries. By doing so, causal relationships and time delays suggested in the study of this early stage will be further quantified and more insightful implications will be obtained.

REFERENCE

- Fan, C.: 2001. Hong Kong and China: Current E-commerce Climate in HongKong and China. International Tax Review.
- Glazer, R. (1993). "Measuring the value of information: The Information - Intensive Organizations." IBM System Journal 32 99-100.
- Cox, B. G. D. (2001). "Service Quality and E-Commerce: An Exploratory Analysis." Managing Service Quality 11(2) 121-131.
- Kim, D. H. and A. Coyle (1993). "Can Gateway 2000 Service Its Success?" The System Thinker October 7.
- Lyneis, J. M. (1998). Learning to manage growth: Lessons from a management flight simulator. The 16th International System Dynamics Conference, Quebec City.
- Mellahi, K. (2000). "Does it pay to be a first mover in e.commerce? The case of Amazon.com." Management Decision 38(7) 445.
- Parasuraman (1991). "Understanding Customer Expectations of service." Sloan Management Review 32(3) 39-48.
- Richardson, G. P. (1986). "Problems with causal loop diagrams." System Dynamics Review Summer(2) 158-170.
- Segal, R. L. (2000). "Online marketplaces: A new strategic option." The Journal of Business Strategy 21(2).
- Senge, P. (1990) The Fifth Discipline. New York, Bantam Doubleday Dell.
- Sonka, S. T. (1998). A strategic framework for the evolution of information technologies. The 19th International System Dynamics Conference, Quebec City.
- Sterman, J. D. (2000) Business Dynamics: Systems Thinking and Modeling For a Complex World. Boston, Irwin/McGraw-Hill.
- Winch, G. W. (1998). The Skills Paradox in Times of Change. The International System Dynamics Conference.