

## A model for predicting customer value from perspectives of product attractiveness and marketing strategy

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### ABSTRACT

This paper proposes a model for customer relationship management (CRM) using iThink<sup>®</sup>, which incorporates the concept of system dynamics. The proposed CRM model consists of module 1: a customer purchasing behavior model, module 2: a Markov chain model, and module 3: a financial returns model. By considering the marketing activities and product attractiveness to the customer, the probability that a customer will (re)purchase can be modeled in module 1. The probabilities are then fitted into module 2 for the calculation of customer lifetime value (CLV). The estimated CLV for each customer is inputted into module 3 to predict the firm's return on investment in the long term. By defining the parameters on the attractiveness of a product and on user responses from historical marketing campaigns, a firm can easily evaluate its business strategy from both marketing and product development perspectives, thereby refining those parameters and adopting the best strategy for creating customer value and yielding the maximum profit. A case study of a listed firm in Hong Kong is employed to illustrate our model, which not only gives insights into the product development, but can also support the decisions related to marketing activities.

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### 1. Introduction

Customer relationship management (CRM) is increasingly important in all kinds of businesses to sustain long-term growth in today's competitive environment. CRM is a philosophy that anticipates customer needs with the purpose of providing the target customers with the right product, at the right time, in the right place (Yourdon, 2000). Firms are therefore motivated to adopt CRM in order to respond rapidly to market needs. This is due to the fact that the acquisition cost of new customers exceeds the retention cost of existing customers by a substantial margin (Dyche, 2002). Moreover, satisfying customer needs can build up customer retention and customer loyalty, and enhance market share and business position. Importantly, CRM would result in significant financial returns (Chen, Ip, & Sheng, 2004; Ip, Chen, Lau, & Liang, 2006; Rust & Zahorik, 1993). In fact, developing customer relationships is the key value creation activity in today's business strategy, while pursuing long-term customer relationships is the ultimate goal of many firms. Being customer-focused to create and deliver value to customers is therefore essential to enable a firm to remain competitive.

The CRM system in this study includes parameters from both marketing strategy and product attractiveness. Nowadays, marketing strategy, including advertising, promotion, membership programs, etc., is an essential complement to the sales of newly launched or existing products. Moreover, the development and delivery of customer-driven products are of paramount importance for value generation in a customer. This system addresses the increasing customer demand for superior quality, pleasing design, and reasonable price. In terms of management, a CRM system would help a firm to plan its new product development and to design appropriate marketing strategies.

This study is thus designed to propose a system dynamics model, which will not only provide a comprehensive picture to better understand the interactions among all elements in product development and marketing, but will also be practical for predicting the financial returns of a product. There are two major parameters being considered in product development: (a) the attractiveness of a product, which depends on its design, quality and price; (b) the user experience of a product in terms of user satisfaction and brand loyalty; these parameters are identified by a customer survey of a particular product. In marketing activities, the historical marketing data of a firm is acquired to address these two major parameters; (c) adoption from advertising; and (d) adoption from marketing, which are determined by advertising effectiveness and marketing effectiveness respectively. In the next section, a study approach to develop the system dynamics model

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and the relevant methodology will be described. To illustrate the design, development and application of the system dynamics model, as well as the calculation of CLV using the Markov chain model, a case study will be conducted and will be presented in Section 3. The implication of the proposed model and suggestions for extending this study will be given in the conclusion section.

## 2. Study approach and methodology to the model development

It is logical that the ultimate goal of a firm is to create and deliver value to its customers, thereby capturing value from its customers in return. The longer a customer is retained, the higher the value he/she brings to a company, which explicitly explains the importance of CRM. Fig. 1 depicts the relationships between value creation and value capture within a firm. In order to strengthen the value creation and capturing processes, a good customer-oriented marketing strategy is important. This implies that a firm needs to make sensible determinations with regard to the pricing, customer segment, product quality and design, and advertising and promotion strategies in order to strive for a competitive edge in a market. Somehow, these decisions are inter-linked and will affect the net profit of a firm. Thus, in this paper, their interactions will be studied.

For a better understanding of the interactions among the pricing, advertising and marketing strategies, and product design and quality, we adopt the approach from system dynamics. System dynamics was conceived in the late 1950s at the Massachusetts Institute of Technology (Forrester, 1958, 1961). System dynamics, which is related to systems thinking, is defined as the principle and technique of feedback control systems for modeling, analyzing and understanding the dynamic behavior of complex systems (Tarek & Stuart, 1991). System dynamics with system modeling and computer-based simulation is a valuable aid for gaining insights into the complex feedback systems and making appropriate decisions (Lin, Baines, O'Kane, & Link, 1998). The methodology often contains five steps:

1. Defining the specific issue or problem of the system to be examined;
2. Developing a dynamic hypothesis explaining the cause of the problem;

3. Building a simulation model to simulate the root of the problem;
4. Testing and refining the model based on its dynamic behavior patterns in terms of effectiveness and efficiency; and
5. Implementing an appropriate solution to alleviate the problem.

System dynamics has dramatically extended into several disciplines, for example, business process reengineering (Georgantzis et al., 1996), supply chain management (Lai, Lee, & Ip, 2003), project management (Rodrigues & Bowers, 1996), public management, policy design, and so forth.

The approach of this study is shown in Fig. 2. It consists of three modules: (1) the purchasing behavior of an individual customer, (2) the Markov chain model for the CLV, and (3) aggregated financial returns in the long term. A customer purchasing behavior model, using system dynamics as a simulation tool, will consider both the marketing activities and the impact of the product development (including the importance of customer buying decisions on a product; product attractiveness in terms of quality, design, and price; and user experience on a product in terms of their brand loyalty and satisfaction level) on the customer relationship (see Fig. 2). The parameters in product development are recognized through a customer survey of a particular product, while those in marketing activities are obtained from a firm's historical marketing data.

From the model of purchasing behavior, we generate the probability of a customer in his/her initial purchase and his/her repeated purchase in the later stages. These parameters are fitted into a Markov chain to estimate the CLV. This is highlighted as a second module of our system. The CLV, instead of a transaction-based calculation, which counts as a lifelong customer relationship, is highly emphasized in the sustainability of a business.

The financial return of a product in the long term, as indicated in our third module, is simulated using system dynamics. This focuses on the company expenditure and revenue through serving the customers. Through simulations in this module, a firm can easily predict the effectiveness of product development and marketing toward customer value in terms of profitability. In turn, the firm can also gain an insight into any adjustments of the existing strategies of product development and marketing for a better customer relationship and long-term profits.

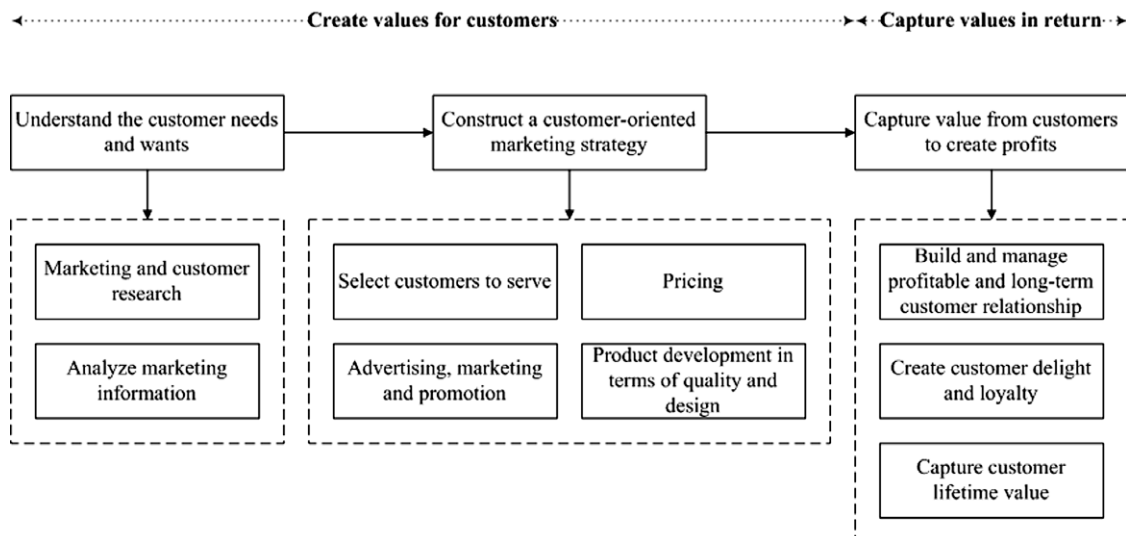


Fig. 1. A process model of value creation and value capture in a firm.

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