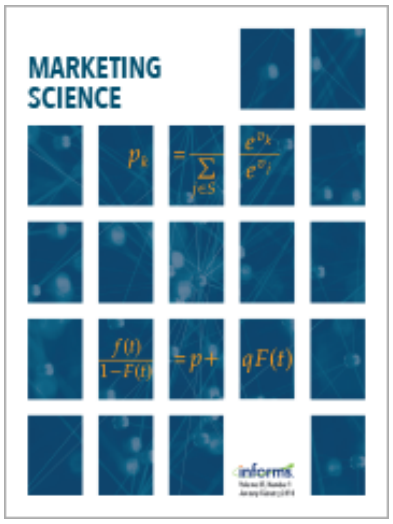

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Invited Commentary

Technology Innovation and Implications for Customer Relationship Management

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Key words: customer relationship management; service channel; CRM programs; pricing of services; development of customer demand; cross-selling; communication campaign; adaptive learning; dynamic marketing interventions

Existing research on services and relationship treats customer service as a major operating variable, and focuses on measuring the resulting customer satisfaction, retention, duration, repeat purchases, word-of-mouth (e.g., Boulding et al. 1993). The recent article by Rust and Chung (2006) gives an excellent review of existing marketing models of service and customer relationship management (CRM).

The rapid advances in information and communication technology provide greater opportunities for today's firms to establish, nurture, and sustain long-term relationships with their customers than ever before. The ultimate goal is to transform these relationships into greater profitability by reducing customer acquisition costs, increasing repeat purchases, and charging higher prices (Winer 2001). First, CRM is no longer the privilege of the service sector. Realizing the increasing importance of customer orientation, firms of all kinds of industries, ranging from manufacturing to information, are exploring service-led growth as a promising means of differentiation (Sawhney et al. 2004). Second, service is no longer defined as a stand-alone marketing decision aimed at increasing customer satisfaction. Contemporary practice of CRM has been integrated into every step of the marketing process—handling product inquiry, telemarketing, advertising, sales, transaction, service, and survey. Third, current CRM has shifted from static relationship to dynamic "learning relationship," from mass-marketing to customer-centric marketing, and from reactive service to proactive relationship building.

The challenge faced by today's CRM practice is: How to learn about individual customers and act on a firm's knowledge of a customer for the purpose of growing a relationship and improving long-term customer value. The recent development of CRM technology calls for rigorous research to better understand the nature of this emerging industry and to help design the best marketing programs. As Rust and Chung (2006) point out, research on service and CRM will inevitably grow as part of mainstream marketing science. Given their thorough review, I will focus on discussing new possibilities for CRM and its implications for marketing models.

1. Increasing Service Channels and Design of Integrated Communication Structure

Since the 1990s, companies have been racing to add 24-hour call centers, direct mail, email, fax, and webpages. Automated service channels, such as Internet access, voice-recognition phone systems, and transaction kiosks, are given special emphasis to encourage self-service. This raises new research issues:

First, how do customers develop channel preference? Recent work in this area (e.g., Ansari et al. 2005, Sullivan and Thomas 2004) focuses on the retail purchase (catalogue versus email). However, selection of a sales channel to make a purchase from the firm is quite different from the selection of a communicated channel. An understanding of channel habit formation and channel migration should shed new light on the best design of channel structure.

Although invited commentaries are not formally peer-reviewed and represent the opinion of the author, authors were carefully chosen based on their outstanding expertise in the areas of their respective commentaries.

Second, what is the role of each channel in every step of the customer decision process, such as information search, purchase, transaction, and postpurchase service? Research has shown both complementary and cannibalizing relationships among channels. How to successfully blend the various functions of multiple communication channels to deliver great service and slash costs?

Third, how can customers be steered to their most preferred channels? How self-sufficient customers be directed to self-learning channels? Given the high cost of customer communication, it is important to learn the unobservable customer characteristics that translate into heterogeneous channel preference and to determine the optimal allocation of resources over multiple channels to improve the effectiveness and efficiency of channel mix strategies.

2. Innovative CRM Programs

Customer relationships are actually built and sustained with CRM programs for which channels serve as a delivery mechanism. We observe more and more novel CRM programs aiming at maintaining long-term customer relationships such as loyalty programs, warranty programs, customization, rewards programs, cross-selling campaigns, and community building. How do customers respond to these programs? How can the effectiveness of each program be measured? How do these programs help build long-term customer relationship? What is the best design of these programs? Each of these programs demonstrates unique properties that have not been extensively studied.

For example, a reward program is a promotion strategy that encourages customers to accumulate purchases to obtain a reward. It is designed to separate (current) purchase from (future) promotion. Customers' current purchasing decisions are determined by future rewards that they anticipate. Furthermore, airlines, hotels, and car rentals advance the design of reward programs by allowing customers to choose when and at what level to claim the reward. Acceptance of a reward becomes the customer's endogenous decision. This endogenous decision is likely to be driven by the design, such as reward amount and distance between reward levels.

3. New Pricing Structure

As firms shift the purpose of offering service from increasing customer satisfaction to growing a relationship with customers and making profit, many innovative pricing structures emerge, such as pricing for service upgrade and subscription pricing, advance selling, and to introduce a long-term relationship with customers. Analytical researchers have started to examine the nature of these pricing tactics (e.g., Xie and Shugan 2001). Empirical research is needed to validate the nominal findings and measure their effectiveness.

While Essegaier et al. (2002) and Danaher (2002) provide good discussions on two-part pricing, research is needed to investigate more sophisticated designs of fixed fee and usage rate. For example, the recent pricing strategy adopted by the fitness industry and online DVD rental (Netflix) is no longer structured as price-per-unit. Instead, it is framed as payment for the right to gain access to consume a certain amount of services within a period of time. Preliminary empirical evidence demonstrates that customers' choice of service plan is driven by their expected maximum future consumption. The actual consumption is much lower than the purchased consumption capacity (Sun et al. 2005).

4. Managing Intertemporal Evolvement of Customer Demand and Cross-Selling

Research has shown that customers' demand for various products is governed by a latent and evolving demand maturity, which develops with shift of customer life-stage, accumulation of product knowledge, change of financial resources, and consumption experience. A better understanding of the development of demand has important implications for the design of cross-selling campaign strategy.

First, by gaining an in-depth understanding of the evolving needs of each customer, the firm can recommend the most appropriate products to best match the unmet needs at different stages of customer demand maturity. It helps the firm to forward-look the development of customers' future needs and provide them with the right product, even before they realize that they need it.

Second, cross-selling campaigns have the indirect effect of cultivating customer needs and are part of a multistage customer education program. It is crucial to take into account the indirect education effect of a cross-selling campaign to better evaluate its effectiveness.

Existing marketing research has focused on developing methodology to better predict purchase probabilities for the product next to be purchased (Kamakura et al. 1991, Kamakura et al. 2002, Edwards and Allenby 2003, Li et al. 2006). The goal is to find the best customers for a scheduled campaign, with the goal of increasing sales. See Li et al. (2005) for discussions on modeling proactive cross-selling campaigns.

5. Adaptive Learning of Customer Preference

Current technology allows the firm to combine the abilities to retrieve real-time customer information, automatically analyze customer insights, respond directly to customer requests and provide the customer with a highly customized experience. This offers the firm the opportunity to learn about customer preference in a real-time fashion. Sun et al. (2006) term the use of accruing information to continuously update the firm's knowledge of customer preference as adaptive learning. As a result, the firm becomes smarter with experience. This learning relationship with customers allows the firm to better customize its CRM programs.

To date, we have observed the booming of a software industry specializing in data analysis and statistical learning tools that help firms to transform their data storage system into a CRM decision support system. Siebel, Epiphany, and Oracle have filled this CRM space with software and hardware products that do everything automatically from predicting their future moves to recommending related products to sending direct email communications (Winer 2001). The emergence of this data-mining technology calls for a substantial amount of research to develop statistical learning rules for adaptive machine learning and automated implementation of CRM. A first step is taken by the field of machine learning with applications to database marketing (see a review by Witten and Frank 2005).

6. Integration of Marketing and Operations Management

Operations management (OM) models focus on minimizing operating cost and often ignore customer reaction. However, in many parts of the service industry, operational and marketing issues are highly intertwined. Customer reaction (acquisition, retention, and development) to a firm's cost control effort, such as product availability or on-time performance, needs to be taken into account. Effectiveness and efficiency are equally important in improving long-term profit. This opens up a vast agenda for multidisciplinary research (Gans et al. 2003). Rust and Chung (2006) point out that OR-based models in marketing-related fields such as routing, supply chains, yield management, and scheduling have provided a basis for marketing models.

As an example, ever since the 1990s, the function of call centers has been transformed from simply dealing with inquiries to being a preferred and prevalent channel for interacting with their customers. Statistics shows that 80% of a firm's customer interaction is through call centers and 92% of customers form their opinion about a firm based on their experience with call centers (Purdue University 2004). The operation of call centers and the resulting customer satisfaction and retention should be studied as crucial elements of a firm's customer strategy, akin to marketing and loyalty programs. Sun and Li (2005) formulate call allocation decisions of a service center as a CRM problem by integrating operating decisions with marketing consequences.

7. Long-Term Profit Implications and Dynamic Marketing Interventions

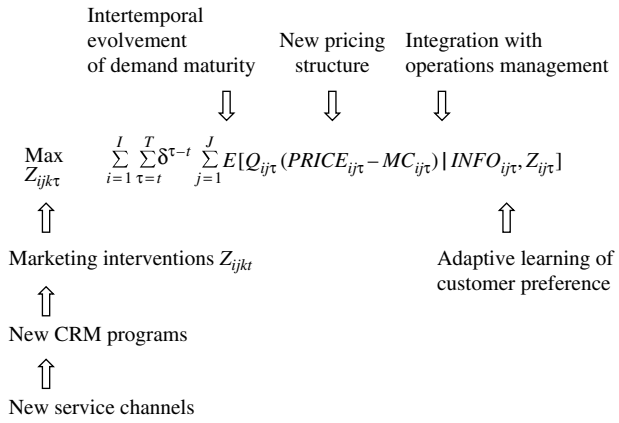
Existing literature on customer lifetime value analysis calculates net present value of customers' future profit (e.g., Kumar et al. 1997). Although future profits are taken into account, many studies treat the value as another segmentation variable to guide targeting strategies. Furthermore, as pointed by Rust and Chung (2006), most of the current methods ignore the endogenization problem that firm's intervention changes customer's future purchase probability.

For a firm with the goal of maximizing long-term profit, CRM should be formulated as a stochastic dynamic control problem under demand uncertainty with the firm as the decision maker which makes dynamic marketing intervention decisions such as pricing, channel strategy, or cross-selling campaign. This framework allows the firm to integrate the evolution of the latent demand maturity, the different functions of the firm's marketing interventions at different stages of customer demand maturity, heterogeneity of customer preferences, the cost of acquisition and long-term payoff with the goal of maximizing "lifetime" profit of customers.

The marketing intervention strategy derived from this framework is *integrative* because it is a multistep, multisegment, multichannel CRM process about *when* to contact *which* customer with *what* product or content using which communication channel (*how*). The marketing intervention is customer-centric because it follows each stage of customer demand maturity and intervenes with the most appropriate marketing tool. The solution is also *proactive* because it allows the firm to forecast the effect of today's marketing intervention on future profitability. In addition, it can forego short-term profit in order to prevent the loss of future profit (e.g., Lewis 2005). Finally, the framework allows the firm to be *experimental* and learn about customer preference. For example, the firm can sample by randomly assigning a customer to a campaign channel in order to learn customer channel preference.

The formulation of CRM from the firm's perspective is summarized in Figure 1. Kamakura et al. (2005) give a good description of existing methodology on modeling customer acquisition, retention, and development, which is represented by the expected

Figure 1 Framework of Customer Relationship Management



Notes. $Z_{ijk\tau}$: Marketing interventions such as price or cross-selling campaign.

δ: Time-discounting variable.

E[.]: Expected profit.

$Q_{ij\tau}$: Quantity of product j being purchased by customer i at time τ, including no-purchase ($Q_{ij\tau} = 0$).

$PRICE_{ij\tau}$: Price paid by customer i for product j at time τ.

$MC_{ij\tau}$: Marginal cost of providing product j at time τ for customer i.

$INFO_{ij\tau}$: Information available to the firm about customer i for product j at time τ.

quantity $E[Q_{ij\tau} \mid I_{ij\tau}, Z_{ij\tau}]$ in Figure 1. Application of CRM involves predictions of customer acquisition, retention, and development probabilities, forecast of future revenues, development of customer demand and preference, firm learning and solution of marketing interventions in a dynamic setting. There are many new managerial issues and methodological challenges. We hope that the summary article by Rust and Chung (2006) and this article will inspire more comprehensive and scientific studies to address the new challenges arising from the growing practice of customer relationship management.

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