



## Marketing Science

Publication details, including instructions for authors and subscription information:  
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To cite this article:

Roland T. Rust, Tuck Siong Chung, (2006) Marketing Models of Service and Relationships. Marketing Science 25(6):560-580.  
<https://doi.org/10.1287/mksc.1050.0139>

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# Marketing Models of Service and Relationships

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Given the growth of the service sector, and advances in information technology and communications that facilitate the management of relationships with customers, models of service and relationships are a fast-growing area of marketing science. This article summarizes existing work in this area and identifies promising topics for future research. Models of service and relationships can help managers manage service more efficiently, customize service more effectively, manage customer satisfaction and relationships, and model the financial impact of those customer relationships. Models for managing service have often emphasized analytical approaches to pricing, but emerging issues such as the trade-off between privacy and customization are attracting increasing attention. The trade-offs between productivity and customization have also been addressed by both analytical and empirical models, but future research in the area of service customization will likely place increased emphasis on e-service and truly personalized interactions. Relationship models will focus less on models of customer expectations and length of relationship, and more on modeling the effects of dynamic marketing interventions with individual customers. The nature of service relationships increasingly leads to financial impact being assessed within customer and across product, rather than the traditional reverse, suggesting the increasing importance of analyzing customer lifetime value (CLV) and managing the firm's customer equity.

**Key words:** services marketing; relationship marketing; customer satisfaction; service quality; service productivity; customization; service design; e-service; service demand; pricing of services; service guarantees; complaint management; customer retention; customer relationship management; word of mouth; customer lifetime value; customer equity; return on quality

**History:** This paper was received October 7, 2004, and was with the authors 3 months for 1 revision; processed by Eugene Anderson.

## 1. Introduction

Traditionally, mainstream marketing science has involved itself principally with the goods sector and sales transactions. For example, in the inaugural issue of *Marketing Science*, in 1982, three of the five articles related to the goods sector and the other two were not specific to sector. The early history of marketing science was typified by understanding the sales of coffee, or the diffusion of consumer durables. Product design was studied as the determination of the optimal set of attributes. Expenditures were by product, and the optimal marketing mix determined product strategies.

By comparison the Fall 2004 issue of *Marketing Science* featured 10 articles, of which only one explicitly related to the goods sector. Newer research in marketing science is typified by such topics as understanding customer behavior on the Internet, or the cultivation of customer relationships. Customer strategy is studied in terms of the optimal interactions with the customer. Expenditures are increasingly by customer, and customer interaction strategies are increasingly determined in a disaggregate way, leading to the customization of service.

The reason for the shift in emphasis in marketing science topics is that the economy itself has changed significantly. For example, in 1920, the service-producing sector in the United States was responsible for 53% of the nonfarm employment. By 1960, that percentage had increased to 62%, and by 2000, the percentage had increased to 81% (U.S. Department of Labor, Bureau of Labor Statistics). A similar pattern is found in every developed economy of the world. The trend toward service is greatest in the most advanced economies, as there is a strong positive relationship between gross domestic product and the percentage of the economy that is service (Sheram and Soubbotina 2000).

The degree to which service dominates the economy may actually be understated, given that service also plays a large and important role in goods-sector companies and the public sector (Quinn et al. 1990). The reason for the importance of service in these sectors is the positive relationship between market orientation and better firm performance, as shown in the research on market orientation (e.g., Jaworski and Kohli 1993, Narver and Slater 1990) and the related concept of customer orientation (Deshpande et al.

1993). With the increasing commodization of goods, firms are increasingly turning to service as the most promising means of differentiation. Firms are adding new activities and reconfiguring existing activities to create services-led growth (Sawhney et al. 2004).

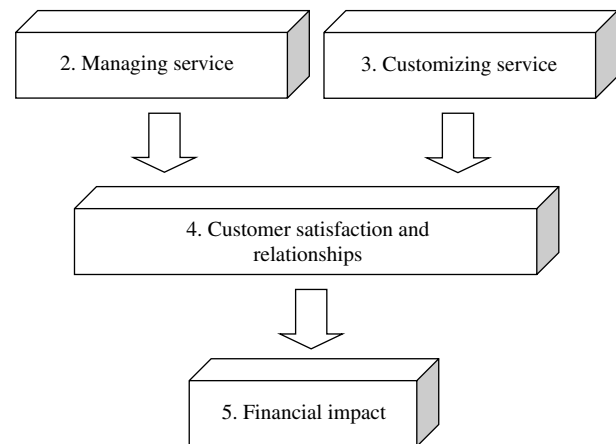
The growth of the service sector may also be viewed as a manifestation of the changes brought by the information revolution, which has brought revolutionary changes in computing, data storage, and communications. Information technology is a key enabler to help firms collect and analyze data on consumer activities, and to make interaction with individual customers economically viable. In a more direct way, the information revolution brings about the growth of the service sector, as it results in the growth of information services in such areas as computer software, financial products, telecommunications, and entertainment. Because the advance of technology is a one-way street, given that knowledge of technology can be stored and passed along to others, the continuing expansion of the service sector and the service part of the goods sector appears to be ensured.

The increasing importance of models of service and relationships also results from several other important factors.<sup>1</sup> First, there has been an explosion of low-cost data produced by new technologies in service sector firms. Second, research focusing on the largest part of the service sector (retailing and business-to-business service) has in many ways provided an academic foundation for much of service research. Finally, the role of service operations research in developing mostly operations research-based models in the marketing-related fields of routing, supply chains, yield management, and scheduling have provided a basis for marketing models in related areas.

We find it useful to classify the literature on service and relationships into four categories. The relationship between these four categories is shown in Figure 1. The area of *managing service* addresses the strategic and tactical decisions (e.g., pricing) that a firm must make to acquire and retain customers most effectively. The area of *customizing service* refers to the firm's efforts to personalize and individualize service products and service delivery. *Customer satisfaction and relationships* addresses the mechanisms that result in a successful, continuing customer relationship. The final area, *financial impact of customer relationships*, has to do with the efforts of the firm to quantify the profitability of its customer relationships.

Table 1 presents some representative articles in the evolution of models of service and relationships. We can see from the table that relatively little progress was made until the mid-1980s when an explosion of

Figure 1 Principal Areas of Research in Service and Relationships



interest occurred. Early work centered on methods of measuring service quality (e.g., Parasuraman et al. 1988) and early models of customer retention and its financial impact (e.g., Fornell and Wernerfelt 1987, 1988). The early 1990s saw the first serious attention to service customization and customer addressability (e.g., Blattberg and Deighton 1991), because of the emergence of large-scale customer databases. That era also saw the development of national customer satisfaction surveys (e.g., Fornell 1992) and the connection of managerial decisions to customer outcomes (e.g., Bolton and Drew 1991). The increasing importance of service and relationships also led to more attention to analytical models of those topics (e.g., Hauser et al. 1994).

The mid-1990s saw the emergence of models of financial accountability (e.g., Rust et al. 1995) and the first model of customer equity (Blattberg and Deighton 1996). The mid- to late-1990s saw increasingly sophisticated analytical models of service (e.g., Shugan and Xie 2000) and the first models of Internet marketing and e-service (e.g., Bakos and Brynjolfsson 1999). Also around this time, researchers began using more sophisticated methods such as hazard models (e.g., Bolton 1998) and fully Bayesian approaches (e.g., Rust et al. 1999) to study customer satisfaction and retention. Also at this time, models and approaches were proposed in direct marketing that would eventually evolve into customer relationship management (CRM) models (e.g., Bult and Wansbeek 1995).

In recent years, the most important advance has been the development of models that focus marketing expenditures on individual customers (e.g., Reinartz et al. 2004), link marketing investments to CLV and customer equity (e.g., Rust et al. 2004), and ultimately connect customer equity to the market capitalization of the firm (e.g., Gupta et al. 2004). Models have tended increasingly to emphasize customization and personalization (e.g., Ansari and Mela 2003), and to

<sup>1</sup> Thanks to the reviewers and editor for their help in identifying these factors.

**Table 1** Representative Articles in the Evolution of Service and Relationship Models

Era	Managing service	Customizing service	Customer satisfaction and relationships	Financial impact of customer relationships
1980–1985	Dhebar and Oren (1985)	NA	Oliver (1980)	NA
1986–1990	Png (1989)	NA	Parasuraman et al. (1988), Tse and Wilton (1988)	Fornell and Wernerfelt (1987, 1988), Dwyer (1989), Reichheld and Sasser (1990)
1991–1995	Padmanabhan and Rao (1993), Hauser et al. (1994), Moorthy and Srinivasan (1995)	Blattberg and Deighton (1991)	Bolton and Drew (1991), Fornell (1992), Boulding et al. (1993), Helsen and Schmittlein (1993)	Rust and Zahorik (1993), Bult and Wansbeek (1995), Rust et al. (1995)
1996–2000	Padmanabhan and Png (1997), Radas and Shugan (1998a), Fruchter and Gerstner (1999), Bakos and Brynjolfsson (1999), Shugan and Xie (2000)	Anderson et al. (1997), Varki and Rust (1998)	Bolton (1998), Rust et al. (1999)	Blattberg and Deighton (1996), Berger and Nasr (1998), Gonul and Shi (1998), Rust et al. (2000)
2001–present	Biyalogorsky et al. (2001), Xie and Shugan (2001), Danaher (2002), Jain and Kannan (2002)	Drew et al. (2001), Ansari and Mela (2003)	Bordley (2001), Mittal and Kamakura (2001)	Gupta et al. (2004), Hogan et al. (2003), Reinartz and Kumar (2003), Rust et al. (2004)
Topics for future research	Privacy versus customization, marketing to computers, real-time marketing, service networks	e-Service, dynamic interaction and customization, infinite product assortments, personalized pricing	Dynamic marketing intervention models in CRM, dynamic customer satisfaction management, relationships with customer networks	Strategic models of customer equity, predicting changes in customer profitability, cross-selling and CLV

draw on elements of the emerging technological environment, such as the Internet and information service products (e.g., Jain and Kannan 2002).

Table 2 presents the major modeling areas in service and relationships, along with the primary methodological approaches used to investigate them. In general, we see that a variety of research approaches have been used to investigate service and relationships. Analytical approaches have been used most for investigating managing service, and especially service pricing, using the economic paradigm. The survey and experimental approaches have been most extensively used for models of customer satisfaction and relationships, for the reason that one needs to ask customers for their perceptions, because those drive satisfaction and retention. Database and panel approaches have been used primarily to map the relationships between managerial actions and customer behavior and its financial impact, as typified by CRM research today.

The remainder of this article summarizes existing work in models of service and relationships, and suggests promising future research directions. Section 2, *Managing Service*, explores research about the optimization of existing service marketing decisions. These decisions include such topics as controlling service pricing and demand, influencing customer's willingness to pay (e.g., service guarantees, complaint management, etc.), and incentivizing employees to maintain the service standard. Section 3, *Customizing Service*, summarizes research about adjusting the

service product and service delivery to better suit the needs of the customer. Apart from the unique challenges faced by a service firm in customizing its service, the firm has to balance the trade-off between increasing customer satisfaction through customization and increasing firm's productivity through standardization. Together with the advent of Internet technology, comes not only new possibilities for managing this trade-off, but also a better way to serve the customer through e-service. Section 4, *Customer Satisfaction and Relationships*, discusses research about how customer satisfaction and delight are formed, and the impact of customer expectations on the quality of the relationship. Section 5, *Financial Impact of Customer Relationships*, explores research about the financial impact of service improvements, CLV, customer equity, CRM, and how customer equity affects the value of a firm. Section 6 concludes this article with a discussion of the most promising topics for future research.

## 2. Managing Service

Managing service is different from managing goods, because of long-recognized differences between the nature of service and the nature of goods (Parasuraman et al. 1985). Some of the notable characteristics of service that make managing service different are (1) intangibility, (2) heterogeneity, (3) simultaneity of production and consumption, and (4) perishability. Intangibility implies that service cannot be

**Table 2** Topics and Methodologies—Representative Articles

Topic	Analytical/simulation approaches	Survey/experimental approaches	Database/panel approaches
2. Managing service			
2.1 Service demand	Krider and Weinberg (1998), Radas and Shugan (1998b)	Neelamegham and Chintagunta (1999)	Sawhney and Eliashberg (1996), Eliashberg and Shugan (1997), Bolton and Lemon (1999), Basuroy et al. (2003)
2.2 Service pricing	Dhebar and Oren (1985), Png (1989), Radas and Shugan (1998a), Bakos and Brynjolfsson (1999), Shugan and Xie (2000), Xie and Shugan (2001)	Danaher (2002)	NA
2.3 Service guarantees	Moorthy and Srinivasan (1995), Fruchter and Gerstner (1999)	Padmanabhan and Rao (1993)	NA
2.4 Complaint management	Fornell and Wernerfelt (1987, 1988), Padmanabhan and Png (1997)	Smith et al. (1999)	NA
2.5 Employee incentives	Hauser et al. (1994)		NA
3. Customizing service			
3.1 Service design and customization	Varki and Rust (1998)	Griffin and Hauser (1993)	NA
3.2 The satisfaction/productivity trade-off	Anderson et al. (1997)	Anderson et al. (1997)	Oliva and Stermann (2001)
3.3 e-Service	Jain and Kannan (2002)	Ratchford et al. (2003)	Ansari and Mela (2003)
4. Customer satisfaction and relationships			
4.1 Customer satisfaction and delight	Rust and Oliver (2000)	Oliver (1980), Bolton and Drew (1991) (1991)	Parasuraman et al. (1988)
4.2 Customer expectations	Bordley (2001), Rust et al. (1999)	Oliver (1980), Tse and Wilton (1988), Fornell (1992), Boulding et al. (1993), Rust et al. (1999)	Anderson and Sullivan (1993), Johnson et al. (1995)
4.3 Customer satisfaction measurement, and analysis	NA	Fornell (1992), Fornell et al. (1996), Simester et al. (2000)	Rust and Zahorik (1993)
4.4 Customer retention and duration of relationship	Schmittlein et al. (1987)	Bolton (1998), Mittal and Kamakura (2001), Rust et al. (2004)	Helsen and Schmittlein (1993), Bolton (1998)
4.5 Word of mouth	Biyalogorsky et al. (2001)	Hogan et al. (2003)	Godes and Mayzlin (2004)
5. Financial impact			
5.1 Chains of financial impact	NA	Rust et al. (1995)	Loveman (1998)
5.2 CLV and customer equity	Blattberg and Deighton (1996), Berger and Nasr (1998)	Dwyer (1989), Rust et al. (2004)	Reinartz and Kumar (2003)
5.3 Financial impact	Gupta et al. (2004)	Rust et al. (2004)	Venkatesan and Kumar (2004)
5.4 CRM	Blattberg and Deighton (1991)	Elsner et al. (2004)	Bult and Wansbeek (1995), Gonul and Shi (1998), Rust and Verhoef (2005)

inventoried or easily displayed. Heterogeneity arises because service often depends on labor, which is inherently more unreliable than machines. Simultaneity of production and consumption (inseparability) means that the consumer participates in the transaction, and therefore service is not easily centralized. Perishability means that for many services, once the time of potential service passes, the opportunity to sell that service perishes. Recently, the four characteristics of service have been challenged, as researchers (e.g., Lovelock and Gummesson 2004, Vargo and Lusch 2004) have criticized the usefulness of the intangibility, heterogeneity, inseparability, and perishability framework in separating goods and service, mainly because the line separating goods and

service is increasingly becoming blurred. Nevertheless, the characteristics of intangibility, heterogeneity, inseparability, and perishability are the primary characteristics of service that result in the unique challenges and opportunities for marketing science.

## 2.1. Service Demand

The key characteristic of service demand is that timing matters. Service demand is perishable, and thus it is important to manage that timing. If demand exceeds capacity at any time, then an opportunity is lost. In the most basic form, the management of service demand is a yield management problem, a problem for which Kimes (1989) provides an excellent review. Yield management is a process of allocating

the right inventory to the right customer at the right time, at the right price, with the objective of maximizing revenue. To achieve these objectives, a firm has to forecast demand and optimize its marketing mix based on the forecast. Sometimes the complexity of the operating environment may make the forecasting and optimization extremely difficult. It is interesting to note that when the environment is complex, some research (e.g., Van Ryzin and McGill 2000, Ha 2001) advocates the use of simple guidelines and heuristics as a viable service and demand management alternative.

The movie industry demonstrates the critical importance of managing the timing in which a service is made available to the consumers. Service demand in the movie industry is highly perishable, and the control over the movie release date critically affects the success of a new movie. It is always easier for a firm to maximize its revenues if the firm can forecast demand accurately. When demand follows a set pattern through time, the firm can make use of past sales data to improve its estimates. Sawhney and Eliashberg (1996) show that the motion picture box office revenues follow a highly regular pattern. This pattern is influenced by the intensity of information flowing to the consumers and the intensity of product distribution. Learning from the past life cycles and seasonal patterns of a movie launch can greatly improve the launch timing, and thus a movie's success. Incorporating seasonal patterns into a service model will also improve the accuracy of demand predictions. We can refer to Radas and Shugan (1998b) for a method of incorporating seasonal patterns to any dynamic model without changing the model's fundamental assumptions. Neelamegham and Chintagunta (1999) deal with a more complex problem of scheduling movie launches across multiple markets with different availability of data and determinants of viewerships. They are able to accurately forecast the success of movie launches using a hierarchical Bayes formulation of the Poisson model. The competitive dynamics of the movie industry is another important consideration for the timing of movie launches (Foutz and Kadiyali 2003). Krider and Weinberg (1998) show that, depending on the product life cycle, it is better for a weaker movie to delay its opening to prevent head-to-head competition with stronger movies.

In addition to timing the availability of the service, a firm can manage demand through shaping the expectations of consumers on the utilities that they will derive from the service. Customer expectations play a major role in shaping consumption behaviors for the movies, theaters, and recreational industries. Critical reviews, along with other psychological variables such as product perception and interest, influence box office receipts, and whether consumers

will consume the service in the first place (see Neelamegham and Jain 1999). By controlling the review process, the firm controls the amount of product information provided to the consumers, and thus controls the formation of consumer expectations. As such, managing demand in the movies, theaters, and recreational industries depends, in part, on how well a firm can influence the review process (Eliashberg and Shugan 1997, Basuroy et al. 2003).

Another way that customer expectations affects demand is through influencing what customers perceive to be a fair exchange. Payment equity is the fairness perceived by the customers when they exchange payment in return for the service that a firm provides. It is evaluated using the difference between a customer's expectations and the actual firm's performance; this equity will determine the customer's usage of the service (Bolton and Lemon 1999).

## 2.2. Service Pricing

Managing demand also involves strategies for pricing over time. The optimal pricing schemes differ with the kinds of services that a firm provides and the consumer segments a firm serves. Different consumers have different reservation prices for different types of services. In addition, these reservation prices can change from one period to the next. A firm improves its profitability when it can observe the reservation prices of the different consumers. This can be done to some extent by observing consumer purchasing behaviors.

One way for a firm to know what kind of pricing strategy it should adopt is by looking at the type of service the firm provides. For example, Desiraju and Shugan (1999) provide a categorization of service types based on the differences between customers' reservation prices during the different periods of arrival. Using this categorization, Desiraju and Shugan (1999) prescribe different pricing strategies for the different types of services. As an illustration, services involving airlines, hotels, and car rentals experience early arrivals from customers with relatively lower reservation prices. These services are grouped into the same category. One of the pricing strategies prescribed for the firm is to limit the sales in the earlier time period. This reserves capacity for customers with relatively higher reservation prices in later periods. We can optimally set advance and spot purchase prices using these differences (Shugan and Xie 2000, 2004). Another pricing strategy that can be used in the airlines, hotels, and car rental industry is contingent pricing. Contingent pricing price discriminates a customer based on the probability that this customer will obtain the product. One customer may pay a high price in exchange for the certainty of receiving the product. Another customer may pay a

low price but face the possibility of not receiving the product. This pricing scheme allocates the product to those who value the product most, and compensates the customer who risks not receiving the product with a lower price (Biyalogorsky and Gerstner 2004).

Technological advancements have made it viable to implement complex pricing schemes, as new technologies have greatly reduced the costs and also the possible abuse of such schemes (Xie and Shugan 2001). In addition, Xie and Shugan (2001) show that the profits from advance selling do not come from extracting more surpluses from consumers, but from making it possible for more consumers to purchase the product. The more a firm knows about the customers' reservation prices, the more a firm can improve its pricing strategy. For example, when customer demand is uncertain and customers are risk averse, Png (1989) shows that it is optimal for a firm to offer reservations to customers at no cost, as a means of inferring how much customers value the service.

The firm may face varying demand over different time periods. During peak periods, the full capacity of the firm is utilized to help satisfy the demand. In off-peak periods, demand is lower, and there is unutilized firm's capacity. One of the usual capacity management techniques involves lowering the price charged during the off-peak period (i.e., off-peak price) to smooth out the fluctuations in sales demand. The notion is that smoothing out demand will help increase yield. Although this is a conventional practice, Radas and Shugan (1998a) show that in some situations, a firm is better off increasing the customers' willingness to pay during the peak period. Their model achieves this through bundling peak service with off-peak service, without decreasing the off-peak price. Other support for the use of service bundling is found in Guiltinan (1987), which provides a framework for selecting the different services to form mixed bundles. That article demonstrates that by concurrently selling product bundles and their individual components (i.e., mixed bundling), a firm is able to cross-sell to existing customers and also to obtain new customers who were not purchasing the firm's products in the past.

If we are to evaluate the short-term profitability impact of bundling alone, the increase in total margins from the use of bundling depends on the ability and quantity of the service that customers are able to consume, based on their cost of time, price sensitivity, and reservation prices (Venkatesh and Mahajan 1993). In addition, the profitability of the bundling strategy also depends on the costs incurred for bundling and administering the sales of the bundle. Thus, in the case of digital goods, when the marginal costs of production and product aggregation are low, it makes

sense to use bundling to increase the appeal and competitiveness of the product (Bakos and Brynjolfsson 1999). When a seller of information goods incurs cost of administering a usage-based pricing scheme, Sundarajan (2004) shows that offering a fixed-fee pricing in addition to a nonlinear usage-based pricing is always profit improving. In addition, the bundle of information goods can be made more appealing to the customers if the seller offers the right combination of fixed-fee- and usage-based contracts.

Whether to use a mixed bundling strategy or a pure bundling strategy (i.e., selling the bundle only and not the individual components) depends, in part, on the costs of administering mixed bundling. Ansari et al. (1996) demonstrate this in a user-maximizing nonprofit organization. In their model, the nonprofit organization faces a nondeficit constraint, and thus is particularly mindful of the fixed costs involved in delivering its products. The administrative cost of offering mixed bundling is higher than pure bundling without substantially increasing product usage. Therefore, a pure bundling strategy is preferred. Maximizing the number of users is especially relevant in the case of a nonprofit service organization. For a nonprofit organization, the main goal may be to maximize the total utilities of the individuals that the organization serves, instead of maximizing the organization's profits (Metters and Vargas 1999).

Dhebar and Oren (1985) characterize an optimal pricing strategy as one that takes into account maximizing the present value of a firm's profits, as well as the dynamics of consumer demand. The pricing of a service affects the adoption rate by consumers. Thus, a service firm may choose to charge a lower price in the introductory stage of the service to generate positive word of mouth among the consumers, and to speed up the learning of the service providers (Mesak and Darrat 2002). After trying a product from one firm, whether a customer will try another product from the competitor depends on the first product quality, and the likelihood of getting a worse product from the competitor. The likelihood of getting a second product that is worse depends on the distribution of product quality in the industry. Thus, this quality distribution will affect how sustainable is the initial market share captured using a lower introductory price (Villas-Boas 2004). In the case of an existing product, firms have to be discerning with the segments of the customer to whom they offer a lower price. Anderson and Simester (2004) show that while deeper price discounts increase future purchases for the new customers, they reduce purchases from established customers. Deeper price discounts can encourage established customers to forward buy and be more sensitive to deals.

The pricing for a service can be done differently for the different components of the service. The idea behind this is that service access pricing and usage pricing have different effects on initial demand and customer retention. Incorporating the effect of customer attrition in a service model results in a better estimation of customer price sensitivity (Danaher 2002). For the case of membership services, Fruchter and Rao (2001) demonstrate the superiority of a two-part pricing scheme when a firm obtains its revenue separately from service access and usage. In Fruchter and Rao's (2001) model, keeping the membership fee low helps to boost the adoption rate of the service through word of mouth. As the early adopters tend to be heavy users, pricing the usage component high at the service's introductory stage extracts maximum surplus from consumers. Eventually, the price of the usage component is lowered to encourage usage of the service by other consumers. The use of a two-part pricing scheme frees the firm from the need to price every component of the service low during the introductory stage.

Apart from differentiating the price charged for the different product options, firms may price differentiate based on how quickly services are delivered to the customers. Van Mieghem (2000) provides a model in which customers measure a firm's service quality by the delay they experienced in receiving the service. Van Mieghem (2000) has also provided a scheduling rule for dealing with such a scenario.

The applications of pricing strategies discussed in this article so far are based mostly on traditional ("offline") service contexts. Nevertheless, pricing strategies are relevant in the online environment as well. Although the Internet has made price comparison easier, it has not ended the online price differences among the different firms. Some researchers (e.g., Pan et al. 2002, Ancarani and Shankar 2004) show that price differences among online firms still persist, and that online firms may adopt different pricing for different consumer segments. Internet shopping agents allow consumers to effortlessly compare the prices offered by the various online retailers. Iyer and Pazgal (2004) show that consumers who use the Internet shopping agents enjoy lower prices as compared to consumers who do not. The number of retailers that join an Internet shopping agent affect the agent's consumer reach. This change in reach and the number of retailers within an Internet shopping agent determine the benefit of a price cut. Thus the average prices paid within an Internet shopping agent can increase or decrease (Iyer and Pazgal 2004).

### 2.3. Service Guarantees

The greater heterogeneity of quality inherent in service leads to additional risk for the customer. This

leads many businesses to create service guarantees that reduce consumer risk. How to construct these guarantees most effectively has formed a fruitful area of research in marketing science. Service guarantees are also relevant in the goods context. Each time a consumer purchases a good, the service components that come with the good are purchased. These components include the delivery service provided by the seller and the after-sales service provided by the manufacturer. Not only do service guarantees affect customer satisfaction, Slotegraaf and Inman (2004) show that the different aspect of a service guarantee affects customer satisfaction differently during the different phases of a product's life.

Kumar et al. (1997) show that providing an assurance on the amount of wait time generally improves customer satisfaction when customers are waiting for the service to be delivered. However, after the customers have received the service, their satisfaction level is affected by whether the service is delivered within the time guaranteed. Service guarantees benefit the firm, as they encourage every consumer to try the product and not to reduce the actual product price paid to compensate for the risk of product nonperformance (Fruchter and Gerstner 1999). Given the opportunity, a consumer may adjust the risk level to one that is more tolerable. For example, Padmanabhan and Rao (1993) show that risk-averse consumers will tend to purchase extended product service contracts if the contracts are available to augment the manufacturer warranty. Service guarantees serve as a credible signal of product quality, as low-quality products are more expensive to warrant (Lutz 1989). In addition, Moorthy and Srinivasan (1995) argue that a full money-back guarantee is a more effective way to signal product quality than charging a premium price or presenting uninformative advertisements.

### 2.4. Complaint Management

Another effect of the heterogeneity of service is the inevitable incidence of consumer complaints when the service is not perceived as adequate. This was one of the earliest service areas to be addressed by marketing modelers, and had considerable impact on subsequent marketing science research, because it introduced the elements of interactive customer experience, continuing customer relationships, and their long-term financial impact.

Not all dissatisfied customers complain, but dissatisfied customers have higher probabilities of reducing their product usages and purchases. Satisfied customers, on the other hand, have a higher probability of generating positive word of mouth, which helps to attract potential customers (Blodgett and Anderson 2000). Complaint management benefits a firm, as it positively influences customers' expected utilities of



a purchase, customers' perceived purchase risk, customers' perception of product quality, and the generation of favorable word of mouth. For example, Chu et al. (1998) show that a more restrictive refund policy will increase consumers' perceived risk of dissatisfaction, and as a result, reduce the number of products consumers purchase. Despite the possibility of customer abuse, they show that a no-questions-asked return policy can be optimal. In the case of a frequently purchased service, the value of future sales generated by a retained customer is likely to be much higher than the compensation needed to appease a complaint. As a defensive strategy, Fornell and Wernerfelt (1987) show that customer complaints should be encouraged, because complaints provide the firm opportunities to appease and retain dissatisfied customers. Fornell and Wernerfelt (1988) show that this strategy is more effective when the firm faces more competitors, and when the customers are more sensitive to quality. In addition, as complaint volume is higher in a concentrated industry where customers have fewer alternative service providers, the potential payoff from introducing complaint management is higher. Firms should be mindful, however, that factors other than the compensation policy also affect customer satisfaction with service failure recoveries. Smith et al. (1999) show that the process that a customer goes through during the service recovery can also affect the level of customer satisfaction.

Complaint management, in the form of a firm's refund policy to its channel intermediaries, will likewise reduce the intermediaries' perceived purchase risks. Padmanabhan and Png (1997) show that by reducing purchase risks, the downstream intermediaries are encouraged to carry an increased supply of the firm's products. The increased supply of the product intensifies competition among these downstream intermediaries, as they compete among themselves for market share. This competition lowers final price to the consumer and helps boost manufacturer sales volume. This is a more effective and profitable way to increase sales quantity for the manufacturer than through lowering the price to the intermediaries. Padmanabhan and Png's (1997) results are driven largely by the intermediaries' uncertainty of their customers' demand. When the intermediaries are certain of the demand, there is no purchase risk. The intermediaries can then strategically reduce their stock holdings to increase their sale prices (Wang 2004, Padmanabhan and Png 2004).

## 2.5. Employee Incentives

While research has long shown that it pays the organization to satisfy customers, a corollary issue is how to incentivize employees to provide the appropriate behavior. The work of Hauser et al. (1994) provides

one approach to addressing this problem, and begins to tie the marketing issues to the human resources (HR) issues required for successful service provision.

Hauser et al. (1994) provide a means of incentivizing employees to increase the customer satisfaction level, and thus ultimately increase the profitability of the service provider. By incentivizing employees on both sales and customer satisfaction, the employees are encouraged to make a short- versus long-term trade-off that is best for the firm. Employees put in more effort in improving customer's satisfaction when a larger portion of their bonus depends on it. Customer satisfaction levels will be a better measure than employee effort levels to use for improving firms' profits when employee efforts are hard to evaluate. The model shows, however, that the reliance on customer satisfaction in an incentive scheme should depend on how precisely customer satisfaction is measured, in addition to how short-term focused the employees are. There is a limit to how much customer satisfaction can be gained from incentivizing employees. Employees work within the service design offered by the firm. The next logical step in increasing customer satisfaction will thus involve customizing the service to better suit the needs of customers.

## 3. Customizing Service

Unlike physical goods, service is often based primarily on personal interaction or information processing, both of which lend themselves well to customization. This is because a human service provider can adjust to the needs of the customer as part of the interaction, and a service based primarily on information may customize by merely changing bits of information. Thus, although service design uses many of the same approaches as product design, service delivery and interactive customization are best seen as entirely different from product design. Research indicates that customization and the satisfaction that results from it often form a trade-off with productivity in the arena of service, whereas satisfaction and productivity tend to be in harmony in the manufacturing context. An important and growing application area with respect to service customization is e-service, the provision of service over the Internet.

### 3.1. Service Design and Customization

Traditional thinking in marketing science holds that the service design problem is no different from the product design problem for physical goods. We can see this viewpoint in the work of Green and colleagues (Wind et al. 1989), who applied standard conjoint methodologies to the problem of designing a service. A similar conceptualization is involved with the application of discrete choice analysis (Verma et al. 1999) and quality function deployment (Griffin

and Hauser 1993, Hauser and Clausing 1988) to service design. This traditional thinking fails in the context of service, as a key component of satisfying the customer in a service context is not only designing the service but also in delivering the service well. The delivery component becomes especially important in service because of the higher degree of variability usually encountered in service, which tends to be more labor intensive.

Unlike physical goods, where product quality is primarily driven by adherence to manufacturing specifications, service demands a multidimensional view of the nature of quality. One conceptualization, that views all offerings as service (Rust et al. 1996), posits that service can be broken down into the physical product, service product, service delivery, and service environment. The elements of physical product, service product (e.g., a warranty or service contract), and service environment (e.g., a showroom or a theme park) are amenable to standard product design methods. The element of service delivery, however, is not amenable to those methods, because service delivery relates to “working your plan” rather than “planning your work.” Service delivery and service design efficiency are seen as distinct (Frei and Harker 1999), and no matter how good the service design might be, the actual delivery of that service design may be lacking. In product design models, the emphasis is on the attributes of the product and adherence to specifications, whereas in service delivery and service customization, the emphasis is on the perceptions of the customer and real-time customization to meet the needs of the customer. In other words, providing high-quality manufactured goods means standardizing as much as possible, but providing high-quality service means customizing as much as possible to what the individual customer desires.

### 3.2. The Satisfaction/Productivity Trade-Off

From the preceding section, we see that providing high-quality manufactured goods means standardizing as much as possible—making every part exactly the same, whereas providing high-quality service means customizing as much as possible—making every service contact different. Standardizing generally leads to higher efficiency, higher productivity, and lower costs. Customization on the other hand, may result in lower efficiency, lower productivity, and higher costs. The nature of service delivery inevitably leads to a trade-off between satisfaction and productivity for services that are not present for goods (Anderson et al. 1997). This same trade-off can lead to tension between the marketing function and the operations/engineering function, with the marketing function seeking to satisfy customers and increase revenues, and the operations/engineering

function seeking to increase efficiency and productivity and decrease costs. Research has shown that the performance feedback loops in the management of a company can systematically lead to the erosion of service quality over time (Oliva and Sterman 2001). Recent research suggests that ignoring the satisfaction/productivity trade-off and trying to both increase revenues and decrease costs simultaneously can lead to suboptimal financial results (Rust et al. 2002).

There is theoretical evidence that the shift from standardization to customization is likely to become more pronounced over time. Varki and Rust (1998) provide a mathematical framework for how the advance of technology impacts optimal segment size (or equivalently, how the advance of technology impacts the degree of customization). The trend of technological changes in the area of flexible manufacturing and programmable automation for example, has been moving toward the reduction of variable production cost. This increased production efficiency has made smaller segments feasible. In addition, improvement in product technology can stimulate consumer demand and increase the depth of consumer consumption. As the optimal segment size is reduced, firms can sell more to existing customers. The economy of scale effects on marginal cost, however, tends to favor an increase in segment size. The optimal segment size as a result of technological changes therefore depends on how the changes affect both demand and costs.

### 3.3. E-Service

The advent of the Internet has opened up new possibilities for personal interaction with the customer and customization of the service to better suit customer needs. First, the Internet is comprised of networked computers, which makes possible the processing of customer information. Second, the Internet is a web of two-way connections, making possible interactivity. Third, the information medium that the Internet operates in means that customer information can be readily sought, the information can be immediately processed, and the customized service product delivered in real time back to the customer.

The Internet empowers consumers as it reduces the cost of searching for information. This benefit to the consumer is shown in Bakos' (1997) model. In that model, a consumer's utility is determined by the reservation price, price paid, cost of fit, and expected cost of search. Bakos (1997) shows that the lowering of search costs helps to reduce buyers' cost of fit, and thus a consumer ends up with a better-suited product in a market with differentiated product offerings. The benefit of online searches, however, suffers from a diminishing marginal return effect.

Ratchford et al. (2003) show that those consumers with less initial information will gain more from an online search than those who started off with more information. Wu et al. (2004) show that a firm benefits by providing free product information online. This is true even if some customers free ride on the information provided and purchase the product elsewhere. A firm that provides free product information improves its reputation, and increases the probability that a nonshopper will visit its website for service and purchases. The importance of a firm's reputation is greater in an online environment as many of the firm's service dimensions are not visible to the customer. Danaher et al. (2003) show that brand share (a proxy for reputation) has a higher correlation to customer loyalty in an online environment as compared to an offline environment. The ability to manage online relationships requires the ability to model online behavior (e.g., Bucklin and Sismeiro 2003, Sismeiro and Bucklin 2004, Telang et al. 2004), taking into account such issues as the difference in consumers' degree of brand considerations as a result of their online search behaviors (Wu and Rangaswamy 2003). As in all relationship-management efforts, a firm requires a means of measuring service quality. Parasuraman et al. (2005) demonstrate the properties of a multiple-item scale for assessing e-service quality, and demonstrate the need for a different scale for routine and nonroutine online customers.

The promise of lower search costs and better product fit does not mean that all consumers will embrace the use of the Internet. Research shows that optimism, innovativeness, insecurity, and discomfort are factors that will determine the readiness that individuals have for new technologies (Parasuraman 2000). Among consumers who utilize online services, there are differences in their abilities to reap the benefits of the service provided online. Jain and Kannan (2002) show that these differences in abilities determine a consumer's online service preference and how a firm should price its service optimally.

Information overload may result as a consequence of the massive amount of information available online and the ease of accessing this information. Consumers deal with this problem by being more selective to the types of information to which they respond. In return, firms work harder to entice consumers to respond to their messages. Messages that are more customized and better designed help firms to get through to consumers. In addition, information that is better presented helps reduce the likelihood of information overload (Lurie 2004), which, in turn, helps a firm to get the key selling points across to consumers. Interestingly, the technology that brings about information overload also brings with it the capacity for better information customization. For example, Ansari and

Mela's (2003) optimization model uses clickstream data from web users to customize the design and content of an e-mail to increase website traffic. Apart from improving the content of the messages, firms may also manage the length and duration of consumers' exposure to them. Chatterjee et al. (2003) show that consumers' responses to firms' messages may also depend on the frequency, duration, and time lapse between message exposures.

At the same time that the Internet empowers consumers with the ability to make better choices, the Internet also empowers firms to manage their customers better, and to better serve those customers' needs. In the area of improving customer management, Padmanabhan and Tuzhilin (2003) discuss the various electronic customer relationship management applications and the opportunities for optimizing them. On the Internet's role in improving a firm's ability to better serve its customers, Rust and Lemon (2001) cite three central changes in which the Internet can help firms improve their services. They include true interactivity with consumers, customer-specific and situational personalization, and opportunities for real-time adjustments of the firm's offering to customers. For general discussions on the framework and future research opportunities for online personalization, we can refer to Murthi and Sarkar (2003).

To better serve the needs of their customers, firms need to obtain information on their customers' preferences. There are many ways in which customer preferences can be obtained online. Raghu et al. (2001), for example, use an adaptive nonmetric revealed preference approach to acquire customers' preferences. These preferences can then be used to segment customers into clusters, and finally to tailor the product makeup to best suit the average preferences of the clusters. The processes of acquiring customers' preferences and subsequently tailoring the product makeup to suit the customers are carried out dynamically online. The ultimate aim of such processes is to achieve real-time marketing, as discussed by Oliver et al. (1998).

Internet technology offers other benefits to firms besides the ability to better serve their customers. For example, it has the potential for improving a firm's revenue management through the use of dynamic and automated sales (Boyd and Bilegan 2003). In addition, Xue and Harker (2002) show that through the Internet, a firm is better able to involve the consumers as coproducers of the service. This increases the role that consumers play in the service-production and delivery processes. One benefit of engaging the customer in the coproduction process is that it allows the firm to be more efficient in the way it manages its customers. Higher margins from the products sold are generated from this better fit between customers'

needs and the products offered. Another caveat is that high tech does not mean neglecting the most important interactions between service employees and the customers. These “critical incidents” are customer experiences that have an important impact on customer satisfaction. Through a series of critical incident studies, Meuter et al. (2000) demonstrated that even in self-service technologies, where customers are supposed to help fulfill their own needs, employees’ initiatives to improve service and customers’ satisfaction in such areas as technical support and troubleshooting still play a critical role in the firm’s strategy.

#### 4. Customer Satisfaction and Relationships

Although the quality of physical products may sometimes be adequately measured by attributes, objective performance indicators, or adherence to manufacturing specifications, the quality of service is adequately measured only by customer perceptions. This implies that customer satisfaction should receive considerable attention in service research. Also, while the marketing of physical goods (e.g., cars or breakfast cereal) may sometimes be adequately examined using individual transactions, the marketing of service (e.g., banking or airlines) generally requires the examination of relationships over time. Because customer satisfaction is one of the primary factors leading to the continuation of relationships, the connection between the two also forms an important area of research.

##### 4.1. Customer Satisfaction and Delight

The measurement and modeling of customer satisfaction (and its most extreme manifestation, customer delight) leads to many interesting and useful research issues. The theoretical basis for models of satisfaction arises primarily from consumer psychology, and especially the theory of expectancy disconfirmation (Oliver 1980, Oliver et al. 1997), which posits that the difference between what a customer expects and what the customer receives is a primary determinant of satisfaction. The early service quality models (Parasuraman et al. 1988) used a similar conceptual formulation.

The nature of consumer response to customer-satisfaction surveys leads to the necessity of modeling many phenomena of practical importance, including response skewness (Peterson and Wilson 1992) and direct versus inferred measurement of the attribute importance (Griffin and Hauser 1993). Including customer satisfaction in a broader nomological net that includes behavior led naturally to the construction of simultaneous equation models of the impact of satisfaction (Bolton and Drew 1991, Danaher and Rust 1996).

Researchers have also investigated the most extreme form of customer satisfaction—customer delight. Its theoretical nature and relationship to other constructs has been investigated (Oliver et al. 1997), and its managerial implications explored analytically (Rust and Oliver 2000). Some researchers have posited a nonlinear effect for satisfaction, involving a “zone of tolerance” (Parasuraman et al. 1994) in which there is a first threshold of satisfaction, below which there is little behavioral impact, and a second threshold of satisfaction, at which customer delight kicks in. Researchers have shown that it is important to model nonlinearity when analyzing the behavioral impact of satisfaction (Rust et al. 1994, Anderson and Mittal 2000).

##### 4.2. Customer Expectations

With customer satisfaction being highly dependent on customer expectations (Oliver 1980), understanding and modeling the nature of expectations is very important. Expectations have generally been studied at the individual consumer level, but work also exists that studies the aggregate average of expectations and how that relates to other aggregate measures (Johnson et al. 1995). At the individual level, Tse and Wilton (1988) provided a deeper understanding of the nature of customer expectations, including the idea that there are multiple kinds of expectations. This idea was extended by Boulding et al. (1993) who incorporated the multiple expectations idea in a linear updating framework. Anderson and Sullivan (1993) provided an alternative updating model, and also suggested (but did not implement) the idea of a fully Bayesian updating model for expectations. A fully Bayesian expectations updating model was supplied by Rust et al. (1999) who showed that a standard Bayesian updating model, combined with a concave utility curve, can successfully predict some unintuitive behavioral effects, and demonstrated those effects with behavioral experiments. Some of that study’s unintuitive behavioral effects include the finding that customers may rationally choose an option with lower expected quality, and that paying more attention to loyal customers can sometimes be counterproductive. The research also showed that consideration of the distribution of expectations, in addition to the point expectation, is necessary to explain some behavioral effects. Bordley (2001) provided an alternative Bayesian approach to expectations, providing a utility model based on probability of exceeding an expectations threshold.

##### 4.3. Customer Satisfaction Measurement and Analysis

The growing importance of customer satisfaction led to companies initiating customer satisfaction measurement on a regular basis. This, in turn, led to longitudinal customer satisfaction databases, which could

then be related to managerial initiatives and business performance. The most ambitious of these databases involve multiple industries and national customer satisfaction indices. The first of these was the Swedish Customer Satisfaction Barometer (Fornell 1992), followed by the American Customer Satisfaction Index (Fornell et al. 1996), and subsequent indices in a number of other countries.

At the individual firm level, companies such as AT&T pioneered in analyzing tree structures by which satisfaction on particular attributes influenced overall satisfaction, customer behavior, market share, and business performance (Kordupleski et al. 1993, Gale 1994). Issues with interaction effects (Taylor 1997) and customer heterogeneity (Danaher 1998, Krishnan et al. 1999) were noted and addressed. Interestingly, the high intercorrelations frequently seen between customer satisfaction items make it much less important to have multiple-item scales (Drolet and Morrison 2001).

Satisfaction tree models are used to identify attributes where investment is likely to be profitable (Johnson and Gustafsson 2000). This, in turn, has led to market testing to verify whether the expenditures actually are profitable (Rust et al. 1999, Simester et al. 2000). As it turns out, the complexity of the satisfaction  $\Rightarrow$  performance link makes careful experimental designs essential. Malthouse et al. (2004) show that the variation of customer satisfaction across organizational units must be modeled with care, and the modeling of different facets of variability has led to the use of generalizability theory to help design customer satisfaction measurement programs (Finn 2001).

#### 4.4. Customer Retention and Duration of Relationship

The importance of retaining customers and tracking the customers that a firm loses is emphasized in articles published by Reichheld and Sasser (1990). Reinartz et al. (2004) show that insufficient allocation into customer-retention efforts will have a greater impact on long-term customer profitability as compared to insufficient allocation into customer-acquisition efforts. Firms should also factor in the probability and cost of wrongly estimating a customer's future profitability in their customer-retention and relationship-building efforts (Malthouse and Blattberg 2005).

One way to motivate customers to take on a more long-term decision-making approach to their choice of products is through the use of loyalty programs. Lewis (2004), for example, shows that a loyalty program is successful in increasing the annual purchasing for a substantial proportion of the customers in the context of an online grocer and drug retailer. How

customers respond to a loyalty program depends on the probability and the magnitude of the rewards provided. In addition, Kivetz (2004) shows that how customers evaluate the trade-off between the chance of winning a reward in a loyalty program and the value of the reward is systematically affected by the efforts required from them.

Marketing science researchers have typically used hazard models to model the length of customer relationship. Schmittlein et al. (1987), for example, propose a model based on the number and timing of the customer's previous transactions. This approach allows the computation of the probability that any particular customer's relationship is still active. Bolton (1998) analyzes instead the duration of the customer's relationship with a continuous service provider. Bolton's (1998) results indicate that customer satisfaction ratings obtained prior to any decision to cancel or stay loyal to the provider are positively related to the duration of the relationship. Another important issue related to customer relationship is how frequently customers purchase a product from a firm. Helsen and Schmittlein (1993) provide such a model, where the interpurchase time is estimated using the product's regular price, promotional price cut, and past average interpurchase time. Subsequent research has provided a more nuanced view of the psychometrics of customer loyalty behavior (Narayandas 1998) and the effect of personal characteristics on customer retention (Bhattacharya 1998, Mittal and Kamakura 2001). Other researchers have shown that future use projections also influence customer retention (Lemon et al. 2002). Most of the research has focused on customer retention and has not explored the possibility of reinitiating the relationship with customers. Reinartz et al. (2004), for example, describe the operationalization of relationship initiation, relationship maintenance, and relationship termination, but fall short of describing how relationships can be reinitialized. This shortfall is partly filled by Thomas et al. (2004) who address the issue of targeting customers for reacquisition, and by Rust et al. (2004) who model the retention and acquisition process using customer-specific Markov switching matrices.

#### 4.5. Word of Mouth

Besides customer retention, customer satisfaction also affects profitability through word of mouth, generating sales and profits from other customers. Word of mouth can be either positive or negative, resulting in either an increase or decrease in sales and profits. One of the few empirical demonstrations of this effect shows that customer satisfaction has a positive impact on word of mouth, which, in turn, has a positive impact on sales and market share (Danaher

and Rust 1996). Another empirical investigation of word of mouth (Anderson 1998) confirms popular expectations that dissatisfaction produces more negative word of mouth than satisfaction produces positive word of mouth. Hogan et al. (2003) explore the mechanisms by which word of mouth impacts customer profitability. They show that word of mouth is more important during the early part of the product life cycle, as the early adopters' word of mouth affects the growth rate of product adoption. One of the challenges in measuring word of mouth is that it is difficult to observe what is usually in the form of private conversations. Through monitoring online conversations, Godes and Mayzlin (2004) demonstrate how word of mouth can be measured. In addition, they show a relationship between the dispersion of online conversations across online communities and the popularity of television shows.

To encourage customer referrals, two possible strategies a firm can use is providing the customer with referral rewards, and providing the customer with exceptional value through price reduction. Biyalogorsky et al. (2001) show that the optimal mix of price and referral reward depends on how demanding consumers are on the price reduction before they are willing to recommend the firm's product to others. The optimal mix also depends on how effective the referral rewards are in bringing in new customers. The Biyalogorsky et al. (2001) model explains why referral rewards are not always used in practice. Verhoef et al. (2002) investigate the variables that impact the tendency to engage in word of mouth. They find that the length of the relationship between a customer and a firm plays a moderating role on how trust, satisfaction, commitment, and payment equity affect customer referrals.

## 5. Financial Impact of Customer Relationships

With relationships increasingly the focus of business, rather than transactions, financial impact becomes less an issue of aggregate response based on aggregate expenditures, and more a matter of individual-level satisfaction, retention, and profitability. In addition, profitability of the relationship is projected in terms of future cash flows. This perspective has led to a proliferation of models of chains of financial impact, with the goal of modeling how service improvements affect profitability. These models have evolved into models that estimate CLV for each customer, aggregate those lifetime values into customer equity, and manage the financial impact of managerial interventions based on CLV and customer equity. Companies are increasingly able to manage those interventions at the individual customer level, resulting in a management approach currently referred to as CRM.

### 5.1. Chains of Financial Impact

Models for projecting the financial impact of service improvements, based on customer retention, emerged in the early 1990s (e.g., Rust and Zahorik 1993). This approach, combined with the tree approach to customer satisfaction analysis (Kordupleski et al. 1993, Gale 1994) culminated in the "return on quality" model (Rust et al. 1994, 1996), a model that can project the return on investment from targeted service quality improvements.

An alternative model was the "service profit chain" (Heskett et al. 1994), which extended the return on quality model by also linking employee satisfaction, the idea being that happy employees lead to happy customers. Unfortunately, there is weak empirical support for this extension (e.g., Loveman 1998), and the subsequent HR literature has shown that the linkage between employee satisfaction and customer satisfaction is far from straightforward (e.g., Schneider et al. 1998). Nevertheless, some researchers (e.g., Kamakura et al. 2002) have continued to build on this framework. While the link from employee satisfaction to customer satisfaction is precarious, the links from customer satisfaction to positive behavioral outcomes (and ultimately financial outcomes) have been demonstrated consistently (e.g., Zeithaml et al. 1996, Anderson et al. 2004). Aggregate chains of effect linking customer satisfaction to financial impact have also been shown (Anderson et al. 1994, Johnson and Gustafsson 2000).

In the same way that customizing products improves customer satisfaction and profitability, Bowman and Narayandas (2004) show that tailoring customer management effort to the different customer is necessary to optimize profits. For example, larger customers are more demanding and the same customer management effort is more effective for customers with greater loyalty.

### 5.2. CLV and Customer Equity

CLV models were first proposed in the direct marketing arena (Dwyer 1989), where the necessary data on individual-level marketing interventions and profitability were readily available. These concepts were soon applied also in financial services (Storbacka 1994). An excellent overview of available CLV models is given in Berger and Nasr (1998) based on the ability to accurately estimate customer profitability (Mulhern 1999).

The CLV concept was extended to the concept of customer equity (the sum of the firm's customers' CLVs), enabling CLV to be used to guide corporate strategy (Blattberg and Deighton 1996, Blattberg et al. 2001, Fruchter and Zhang 2004, Thomas 2001). These models (see also Pfeifer and Carraway 2000) were based on firms that had a customer database, but

no knowledge of competition. Econometric models for projecting the CLV, based on customer databases, have been developed (e.g., Reinartz and Kumar 2000, 2003).

By combining the customer equity idea with the chain of effect models for return on quality, and collecting data necessary to analyze the impact of competition, it is possible to create a model that can project the impact on customer equity of any marketing expenditure (Rust et al. 2000, 2004). Subsequent authors have explored a variety of aspects related to the implementation of customer equity management in practice (Bell et al. 2002, Berger et al. 2002, Hogan et al. 2002, Rust et al. 2004).

### 5.3. Financial Impact

Customer equity is a reasonable proxy for the value of the firm (Gupta et al. 2004, Rust et al. 2004), implying that strategies that improve customer equity also increase the value of the firm. Linking customer assets such as customer satisfaction to the value of the firm and other measures of marketing productivity makes marketing accountable (Hogan et al. 2002). Chain-of-effect models that culminate in customer equity thus provide managers with “what if” capabilities that form a general model for evaluating marketing return on investment (Rust et al. 2004). A comprehensive overview of how customer equity and other marketing assets relate to financial impact and other measures of marketing productivity is given in Rust et al. (2004).

### 5.4. Customer Relationship Management (CRM)

It is perhaps surprising, given the pervasiveness of CRM today, that the term “CRM,” meaning “customer relationship management,” did not appear in a Proquest search of the leading marketing journals until 1999 (Srivastava et al. 1999). CRM refers to managing customers one at a time—usually through automated or database-driven marketing interventions. The importance of customer relationships and CLV have naturally led to this approach.

Scientific methods for direct marketing (Blattberg and Deighton 1991) were devised as a result of data availability, interactivity, and the ability to direct marketing interventions to specific individuals. Methods for optimizing direct marketing followed (e.g., Bult and Wansbeek 1995, Haughton and Oulabi 1997). Many recent advances in direct marketing relate to the ability to analyze and explore large databases, using techniques such as data mining (Drew et al. 2001), stochastic frontier models (Byung-Doa and Sun-Oka 1999), multiple adaptive regression splines (Deichmann et al. 2002), and dynamic multilevel modeling (Elsner et al. 2004). Another direction is the segmentation of marketing interventions using a priori segmentation (Bitran and Mondschein 1996), latent

class segmentation (Bult and Wittink 1996, DeSarbo and Ramaswamy 1994), and finally full personalization of marketing interventions using hierarchical models and Markov Chain Monte Carlo methods (Rossi et al. 1996, Rust and Verhoef 2005).

CRM, however, differs from traditional direct marketing because it usually involves customer contact over a variety of contact media (e.g., direct mail, Internet contacts, personal selling contacts, telephone contacts, etc.). Along with CRM’s multicontact media approach is the need to design a mix of marketing interventions for each customer individually (DeWulf et al. 2001, Rust and Verhoef 2005). Given that customers have different characteristics, different types of interventions impact individual customers differently (e.g., DeWulf et al. 2001). In addition, different CRM interventions could serve different purposes. Some interventions (e.g., direct mailings) help to trigger some favorable actions like cross-purchasing among the customers, while other interventions (e.g., relationship mailings) are more oriented toward customer relationship building (Berry 1995, Bhattacharya and Bolton 1999, McDonald 1998).

## 6. Directions for Future Research

The continuation and possible acceleration of the same trends that produced the shift toward service and relationships make it possible for us to predict the most important areas for future research. We look, therefore, to the influence of computing, data storage, and communications in predicting which areas of research will become more important in the future. In particular, we extrapolate from today’s business environment to a day in which computing is more powerful, data storage is more extensive, and communications are more pervasive. What’s more, we look to ways in which these trends interact. The remainder of this section highlights the future research areas that we believe will be particularly promising.

### 6.1. Privacy Versus Customization

As the data collection, storage, and analysis about individual customers proliferates, concerns mount about the potentially improper use of this information, leading many consumers to seek better protection for their privacy (Peterson 2001). Yet, that same data collection, storage, and analysis permits companies to customize their offerings and serve customers better. The result is a trade-off between privacy and customization (Rust et al. 2002) in which neither complete privacy nor complete lack of privacy is preferred. Better analytical models are needed to more completely model this inherent conflict, and to derive optimal management policies that can steer around this trade-off.

## 6.2. Marketing to Computers

Marketers are used to marketing to people, but increasingly the customer will not be human (Rust 1997). For example, many computerized agents exist that make buying decisions, or at least consideration set decisions, for their human masters. In such a case, marketing to a computer is necessary. So far, efforts related to marketing to computers has involved finding out the algorithms that the computers use, and then addressing the algorithms directly. As algorithms become more complex, or as they become less easy to describe (e.g., neural networks), this approach to marketing to computers will become increasingly obsolete. We need to devise a science of “computer behavior” in which simplifying behavioral rules and heuristics can be discovered that do not require knowledge of the exact algorithms employed. Bradlow and Schmittlein (2000) provide a glimpse of what such an approach will look like by studying the design of a webpage that is effective regardless of the different algorithms used by search engines. Many of the same approaches (e.g., market segmentation) can be employed with “computerized customers” just as with human customers.

## 6.3. Real-Time Marketing

The marketing function traditionally thinks of itself as a centralized function, with decisions being made by executives centrally, and application of those decisions accomplished in a uniform way throughout the sales area. An alternative is to allow marketing decisions to be decentralized, with decisions being made at the point of contact, in real time. This has been the traditional *modus operandi* of field sales personnel, but the advance of information and communication technologies now is making it possible to extend this mode of marketing even to automated customer interactions. Known as real-time marketing (Oliver et al. 1998), this approach requires receiving the needs of the customer, and then calculating and formulating the optimal product in real time. Although such an approach is not always feasible for many physical goods (e.g., cars), it is often quite feasible for many services. For example, for information products, reformulating the product is often merely a matter of changing bits of information, which can often be accomplished virtually free and almost instantaneously. This approach can either be accomplished with centralized databases and rapid communication, or even faster and more privately by using decentralized information storage (e.g., every customer stores his or her own data locally in a smart card or key chain storage device). Models need to be developed to show how optimal real-time marketing decisions can be made, and how customer data should be optimally stored, trading off privacy and speed against data storage capacity.

An interesting twist to the impact of technology is that with new technology, we can actually convert some services that used to be consumed only in real time to something that the customers can consume at their convenience. Services such as entertainment can now be converted into physical manifestations such as DVD and videotapes. These items can be inventoried to meet customer demand and enable consumption at a later point in time. The impact of the timing of such products on the primary service is an interesting issue to investigate.

## 6.4. Service Networks

We are accustomed to thinking about service providers individually. Nevertheless, in many service scenarios, an entire network of service providers is required to provide the complete service that the customer requires (Ghosh and Craig 1986). An example is an airline flight. The airline provides the airplane, pilots and crew, and the passenger check-in, but the service will not be successful without the participation of many other service providers, including the food caterer, air traffic controller, refueling personnel, and security staff. We need to understand better the interactions between these different dimensions of service. For example, if different service providers have different motivations (e.g., if the food caterer wants to charge a high price for food, but the airline wants to keep prices down to please the customers), what is the best way for the service network to be managed, to guarantee all parties receive the benefits they need? What if the food caterer, for example, has multiple contact points with the customer (e.g., a restaurant chain as well as food catering)? How will that affect the service network?

## 6.5. E-Service

The application of e-commerce by traditional companies has generally proceeded from the assumption that profits from e-commerce arise from automating processes and cutting costs (Lucas 1999, Poirier and Bauer 2000). An alternative viewpoint, known as e-service, instead touts the ability of e-commerce to increase profits through increasing revenues (e.g., Rust and Lemon 2001, Rust and Kannan 2003). This opens up the important research area of customer satisfaction, retention, word of mouth, and cross-selling online. We need to know not just what customers do in any particular e-commerce contact (as we see in most existing clickstream research), but also what they do (and how they perceive and feel) across multiple contacts. We need to investigate the kinds of online services that promote growth of the customer relationship, and the most effective ways to combine the online relationship with the offline relationship, with the idea that the full relationship with the customer is not complete without considering both online and offline, as well as how they interact.



### 6.6. Dynamic Interaction and Customization

The combination of advances in communication and advances in data storage and computing results in the potential to interact dynamically with the customer, and to use that dynamic interaction to customize the service offering(s). Instead of considering customer preferences to be fixed, we might instead model how they change over time. To what extent should older customer knowledge be considered just as valid as recent information (as would be assumed by standard Bayesian updating), and to what extent should it instead be considered evidence of a preference shift? How can customer communication and feedback be used to provide a more accurate view of how preferences are shifting over time, and how should that information be combined with observed behavior?

### 6.7. Infinite Product Assortments

Standardization has given way to product differentiation, and even to mass customization, but information services provide even more flexibility to the marketer. While typical physical products achieve mass customization capability through modularity (having individual components that each have several options, that may be combined with the other components combinatorially), information services may have virtually infinite variation, virtually free. For example, an online news website could present stories relating to European news with 23.0% frequency for one customer and 22.99487% frequency for another customer. In such an environment, to what degree should the necessary information be elicited from the consumer, to what degree should the information be inferred from behavior, and to what degree should the information be inferred from other customers? There are conceptual similarities to the recommendation agent problem (e.g., Ansari et al. 2000), but with the added complication that a product optimization problem is overlaid.

### 6.8. Personalized Pricing

Personalized pricing is not the same as price discrimination. Price discrimination is the charging of different prices to different customers for the same product. Amazon.com, for example, ran into trouble because it sought to use customer information to more effectively price discriminate, charging different prices to different customers for the same book. The Amazon.com problem will not always occur. For example, in the world of information services, often the products themselves are personalized (see §6.7). This makes the issue one of personalizing the price for a personalized product that may not be directly comparable to any other customer's product. How can information about the customer relationship be used to set the optimal price for personalized products?

### 6.9. Dynamic Marketing Interventions Models in CRM

The general marketing interventions problem in CRM may be viewed as the following: determine fully personalized levels of marketing interventions, using multiple marketing interventions over time, in such a way as to maximize CLV. We might refer to this as the "Holy Grail" model of CRM. What makes this model difficult is the issue of endogeneity. If we sort customers according to CLV, then that implicitly assumes that the marketing interventions mix will be as it was historically, yet using the CLV estimates to change the marketing intervention mix will itself alter the CLV. Models exist that can optimize personalized marketing intervention levels over time for one type of intervention (e.g., Bult and Wansbeek 1995, Gonul and Shi 1998), provide individual-level models of future purchase (Schmittlein and Peterson 1994), provide multiple marketing intervention levels by ignoring important aspects of endogeneity (Venkatesan and Kumar 2004), or provide fully personalized marketing intervention levels that maximize intermediate-term profitability (Rust and Verhoef 2005). What is missing is a model that puts all of these elements together. We need a model with the following characteristics: (1) marketing intervention levels personalized for each customer; (2) considers the effect of multiple marketing interventions; (3) maximizes CLV, at least up to an arbitrary time horizon; and (4) fully addresses the endogeneity issue.

### 6.10. Dynamic Customer Satisfaction Management

Suppose that we obtain customer feedback (directly or indirectly) that gives us information, in real time, from which we can infer the customer's satisfaction, repurchase intention, and other psychological bases of future behavior. Suppose we also know, from a study of related customers, that particular management interventions can be used to affect those psychological bases. Optimal control theory might be used to derive optimal customer-specific responses to optimize the customer relationship. Also, research has shown that the solicitation of customer satisfaction and behavioral intention measures itself impacts future behavior (Dholakia and Morwitz 2002). Given that phenomenon, what is the optimal strategy for evoking customer satisfaction feedback and other measures of relationship health?

### 6.11. Relationships with Customer Networks

Except for the family context, we are used to thinking about customers one at a time. As communication technologies become more powerful and more pervasive, however, the word-of-mouth effect becomes increasingly important (Anderson 1998). In some cases, it may be possible for a company to

manage a relationship with an entire customer network, rather than with each customer separately. Suppose, for example, that an online financial services company decides to discontinue the relationship with one unprofitable member of a close network. That may cost the company several profitable customers. In other words, managing the relationship with the network profitably may require maintaining relationships with customers who are individually unprofitable. Increasingly, companies have information about networks of customers (e.g., Southwest Airline's "friends fly free") and may be able to analyze the network's data as a network. This implies that the interactions between the behaviors of the members of the network also need to be modeled.

#### 6.12. Strategic Models of Customer Equity

If the company bases its marketing on customer relationships and CLV rather than just transactions, aggregate expenditures, and aggregate sales, then it follows that the company should manage its strategy based on customer equity, the sum of the CLVs of the firm's current and future customers. Although some models exist for addressing this strategy problem (e.g., Rust et al. 2004), there is much more work to do. For example, some strategic initiatives may affect more than one driver of customer equity (e.g., service quality initiatives may improve brand equity as well as value equity over time). How is customer response heterogeneity best handled in customer equity models? How can customer equity strategy be developed from observable behavioral data without requiring customer survey data? Also necessary are models of customer equity that cover a customer's relationships with a portfolio of the company's products.

#### 6.13. Changes in Customer Profitability Over Time

Customer equity models are based on the ability to predict a customer's future profitability. Although some early attempts exist (e.g., Campbell and Frei 2004; Donkers et al. 2003; Reinartz and Kumar 2000, 2002, 2003), considerable additional work is necessary. Complicating the problem is that marketing interventions change future profitability. This implies that an optimal marketing intervention model needs to be overlaid on the CLV model, which is a difficult task. Early attempts (e.g., Venkatesan and Kumar 2004) do not fully model this endogeneity. A good first step is to understand how and why customer profitability changes over time, as a function of both personal history and marketing interventions.

#### 6.14. Cross-Selling and CLV

If the company's relationship with a customer involves more than one product, as is commonplace in financial service, for instance, then the ability of the

firm to cross-sell the customer becomes very important to the CLV. We need to have a more complete understanding of how cross-selling works, and to what degree the relationship is more than the sum of its parts. This has a downside too. To what degree does dissatisfaction with one of the firm's products damage the customer's relationship with the other products with which the customer has a relationship?

## 7. Conclusion

Inexorable technological forces make service and relationships more important over time in every developed economy. This makes the subject area of service and relationships a particularly important one for marketing scientists. These same trends, manifested by improvements in computing, data storage, and communications, make the service and relationships research area especially amenable to both analytical and empirical modeling by marketing scientists. As a result, it seems inevitable that the area of service and relationships will continue to grow in importance in marketing science research.

## Acknowledgments

The authors thank P. K. Kannan for many helpful suggestions.

## References

- Ancarani, F., V. Shankar. 2004. Price levels and price dispersion within and across multiple retailer types: Further evidence and extension. *J. Acad. Marketing Sci.* 32(2) 176–187.
- Anderson, E. 1998. Customer satisfaction and word-of-mouth. *J. Service Res.* 1(1) 5–17.
- Anderson, E. W., V. Mittal. 2000. Strengthening the satisfaction-profit chain. *J. Service Res.* 3(2) 107–120.
- Anderson, E. T., D. I. Simester. 2004. Long-run effects of promotion depth on new versus established customers: Three field studies. *Marketing Sci.* 23(1) 4–20.
- Anderson, E. W., M. W. Sullivan. 1993. The antecedents and consequences of customer satisfaction for firms. *Marketing Sci.* 12(Spring) 125–143.
- Anderson, E. W., C. Fornell, D. R. Lehmann. 1994. Customer satisfaction, market share, and profitability: Findings from Sweden. *J. Marketing* 58(3) 53–66.
- Anderson, E. W., C. Fornell, S. K. Mazvancheryl. 2004. Customer satisfaction and shareholder value. *J. Marketing* 68(October) 172–185.
- Anderson, E. W., C. Fornell, R. T. Rust. 1997. Customer satisfaction, productivity, and profitability: Differences between goods and services. *Marketing Sci.* 16(2) 129–145.
- Ansari, A., C. F. Mela. 2003. E-customization. *J. Marketing Res.* 40(2) 131–145.
- Ansari, A., S. Essegai, R. Kohli. 2000. Internet recommendation systems. *J. Marketing Res.* 37(3) 363–375.
- Ansari, A., S. Siddharth, C. B. Weinberg. 1996. Pricing a bundle of products and services: The case of nonprofits. *J. Marketing Res.* 33(February) 86–93.
- Bakos, J. Y. 1997. Reducing buyer search costs: Implications for electronic marketplaces. *Management Sci.* 43(12) 1676–1692.

- Bakos, J. Y., E. Brynjolfsson. 1999. Bundling information goods: Pricing, profits, and efficiency. *Management Sci.* 45(12) 1613–1630.
- Basuroy, S., S. Chatterjee, S. A. Ravid. 2003. How critical are critical reviews? The box office effects of film critics star power and budgets. *J. Marketing* 67(4) 103–117.
- Bell, D., J. Deighton, W. J. Reinartz, R. T. Rust, G. Swartz. 2002. Seven barriers to customer equity management. *J. Service Res.* 5(1, Special Issue on Managing Customer Equity) 77–85.
- Berger, P. D., N. I. Nasr. 1998. Customer lifetime value: Marketing models and applications. *J. Interactive Marketing* 12(Winter) 17–30.
- Berger, P. D., R. N. Bolton, D. Bowman, E. Briggs, V. Kumar, A. Parasuraman, C. Terry. 2002. Marketing actions and the value of customer assets: A framework for customer asset management. *J. Service Res.* 5(1) 39–54.
- Berry, L. L. 1995. Relationship marketing in services: Growing interest, emerging perspectives. *J. Acad. Marketing Sci.* 23(4) 236–246.
- Bhattacharya, C. B. 1998. When customers are members: Customer retention in paid membership contexts. *J. Acad. Marketing Sci.* 26(1) 31–44.
- Bhattacharya, C. B., R. N. Bolton. 1999. Relationship marketing in mass markets. Jagdish N. Sheth, Atul Parvatiyar, eds. *Handbook of Relationship Marketing*. Sage Publications, 327–354.
- Bitran, G. R., S. V. Mondschein. 1996. Mailing decisions in the catalog sales industry. *Management Sci.* 42(9) 1364–1381.
- Biyalogorsky, E., E. Gerstner. 2004. Contingent pricing to reduce price risks. *Marketing Sci.* 23(1) 146–155.
- Biyalogorsky, E., E. Gerstner, B. Libai. 2001. Customer referral management: Optimal reward programs. *Marketing Sci.* 20(1) 82–95.
- Blattberg, R. C., J. Deighton. 1991. Interactive marketing: Exploiting the age of addressability. *Sloan Management Rev.* 33(Fall) 5–14.
- Blattberg, R. C., J. Deighton. 1996. Manage marketing by the customer equity test. *Harvard Bus. Rev.* 74(July–August) 136–144.
- Blattberg, R. C., G. Getz, J. S. Thomas. 2001. *Customer Equity: Building and Managing Relationships as Valuable Assets*. Harvard Business School Press, Boston, MA.
- Blodgett, J. G., R. D. Anderson. 2000. A Bayesian network model of the consumer complaint process. *J. Service Res.* 2(4) 321–338.
- Bolton, R. N. 1998. A dynamic model of the duration of the customers' relationship with a continuous service provider. *Marketing Sci.* 17(1) 45–65.
- Bolton, R. N., J. H. Drew. 1991. A multistage model of customers' assessments of service quality and value. *J. Consumer Res.* 17(4) 375–384.
- Bolton, R., K. N. Lemon. 1999. A dynamic model of customers' usage of services: Usage as an antecedent and consequence of satisfaction. *J. Marketing Res.* 36(May) 171–186.
- Bordley, R. F. 2001. Integrating gap analysis and utility theory in service research. *J. Service Res.* 3(4) 300–309.
- Boulding, W., A. Kalra, R. Staelin, V. A. Zeithaml. 1993. A dynamic process model of service quality: From expectations to behavioral outcomes. *J. Marketing Res.* 30(February) 7–27.
- Bowman, D., D. Narayandas. 2004. Linking customer management effort to customer profitability in business markets. *J. Marketing Res.* 41(4) 433–447.
- Boyd, E. A., I. C. Bilegan. 2003. Revenue management and e-commerce. *Management Sci.* 49(10) 1363–1386.
- Bradlow, E. T., D. C. Schmittlein. 2000. The little engines that could: Modeling the performance of world wide web search engines. *Marketing Sci.* 19(1) 43–62.
- Bucklin, R. E., C. Sismeiro. 2003. A model of web site browsing behavior estimated on clickstream data. *J. Marketing Res.* 40(August) 249–267.
- Bult, J.-R., T. Wansbeek. 1995. Optimal selection for direct mail. *Marketing Sci.* 14(4) 378–394.
- Bult, J.-R., D. R. Wittink. 1996. Estimating and validating asymmetric heterogeneous loss functions applied to health care fund raising. *Internat. J. Res. Marketing* 13(3) 215–226.
- Byung-Doa, K., K. Sun-Oka. 1999. Measuring upselling potential of life insurance customers: Application of a stochastic frontier model. *J. Interactive Marketing* 13(4) 2–9.
- Campbell, D., F. X. Frei. 2004. The persistence of customer profitability: Empirical evidence and implications from a financial services firm. *J. Service Res.* 7(2) 107–123.
- Chatterjee, P., D. L. Hoffman, T. P. Novak. 2003. Modeling the clickstream: Implications for web-based advertising efforts. *Marketing Sci.* 22(4) 520–541.
- Chu, W., E. Gerstner, J. D. Hess. 1998. Managing dissatisfaction: How to decrease customer opportunism by partial refunds. *J. Service Res.* 1(2) 140–155.
- Danaher, P. J. 1998. Customer heterogeneity in service management. *J. Service Res.* 1(2) 129–139.
- Danaher, P. J. 2002. Optimal pricing of new subscription services: Analysis of a market experiment. *Marketing Sci.* 21(2) 119–138.
- Danaher, P. J., R. T. Rust. 1996. Indirect financial benefits from service quality. *Quality Management J.* 3(2) 63–75.
- Danaher, P. J., I. W. Wilson, R. A. Davis. 2003. A comparison of online and offline consumer brand loyalty. *Marketing Sci.* 22(4) 461–477.
- Deichmann, J., A. Eshghi, D. Haughton, S. Sayek, N. Teebagy. 2002. Application of multiple adaptive regression splines (MARS) in direct response modeling. *J. Interactive Marketing* 16(4) 15–27.
- DeSarbo, W. S., V. Ramaswamy. 1994. Crisp: Customer response-based iterative segmentation procedures for response modeling in direct marketing. *J. Direct Marketing* 8(3) 7–20.
- Deshpande, R., J. U. Farley, F. E. Webster. 1993. Corporate culture, customer orientation, and innovativeness. *J. Marketing* 57(1) 23–37.
- Desiraju, R., S. Shugan. 1999. Strategic service pricing and yield management. *J. Marketing* 63(1) 44–56.
- DeWulf, K., G. Odekerken-Schröder, D. Iacobucci. 2001. Investments in customer relationship: A cross-country and cross-industry exploration. *J. Marketing* 65(4) 33–50.
- Dhebar, A., S. Oren. 1985. Optimal dynamic pricing for expanding networks. *Marketing Sci.* 4(4) 336–351.
- Dholakia, U. M., V. G. Morwitz. 2002. The scope and persistence of mere-measurement effects: Evidence from a field study of customer satisfaction measurement. *J. Consumer Res.* 29(2) 159–167.
- Donkers, B., P. C. Verhoef, M. De Jong. 2003. Predicting customer lifetime value in multi-service industries. ERIM Report Series Reference ERS-2003-038-MKT, ERIM, Rotterdam, The Netherlands.
- Drew, J. H., D. R. Mani, A. L. Betz, P. Datta. 2001. Targeting customers with statistical and data-mining techniques. *J. Service Res.* 3(3) 205–219.
- Drolet, A. L., D. G. Morrison. 2001. Do we really need multiple-item measures in service research? *J. Service Res.* 3(3) 196–204.
- Dwyer, F. R. 1989. Customer lifetime valuation to support marketing decision making. *J. Direct Marketing* 3(4) 8–15.
- Eliashberg, J., S. M. Shugan. 1997. Film critics: Influences or predictors? *J. Marketing* 61(2) 68–78.
- Elsner, R., M. Krafft, A. Huchzermeier. 2004. Optimizing Rhenania's direct marketing business through dynamic multilevel modeling (DMLM) in a multicatalog-brand environment. *Marketing Sci.* 23(2) 192–206.
- Finn, A. 2001. Mystery shopper benchmarking of durable-goods chains and stores. *J. Service Res.* 3(4) 310–320.
- Fornell, C. 1992. A national customer satisfaction barometer. *J. Marketing* 56(January) 6–21.

- Fornell, C., B. Wernerfelt. 1987. Defensive marketing strategy by customer complaint management: A theoretical analysis. *J. Marketing Res.* **24**(November) 337–346.
- Fornell, C., B. Wernerfelt. 1988. A model for customer complaint management. *Marketing Sci.* **7**(Summer) 271–286.
- Fornell, C., M. D. Johnson, E. W. Anderson, J. Cha, B. Bryant. 1996. The American customer satisfaction index: Description, findings, and implications. *J. Marketing* **60**(October) 7–18.
- Foutz, N. Z., V. Kadiyali. 2003. Competitive dynamics in the release date pre-announcements of motion pictures. Working paper, Cornell University, Ithaca, NY.
- Frei, F. X., P. T. Harker. 1999. Measuring the efficiency of service delivery processes: An application to retail banking. *J. Service Res.* **1**(4) 300–312.
- Fruchter, G. E., E. Gerstner. 1999. Selling with “satisfaction guaranteed.” *J. Service Res.* **1**(4) 313–323.
- Fruchter, G. E., R. C. Rao. 2001. Optimal membership fee and usage price over time for a network service. *J. Service Res.* **4**(1) 3–14.
- Fruchter, G. E., Z. J. Zhang. 2004. Dynamic targeted promotions: A customer retention and acquisition perspective. *J. Service Res.* **7**(1) 3–19.
- Gale, B. T. 1994. *Managing Customer Value*. The Free Press, New York.
- Ghosh, A., C. S. Craig. 1986. An approach to determining optimal locations for new services. *J. Marketing Res.* **23**(4) 354–362.
- Godes, D., D. Mayzlin. 2004. Using online conversations to study word-of-mouth communication. *Marketing Sci.* **23**(4) 545–560.
- Gonul, F., M. Z. Shi. 1998. Optimal mailing of catalogs: A new methodology using estimable structural dynamic programming models. *Management Sci.* **44**(9) 1249–1262.
- Griffin, A., J. R. Hauser. 1993. The voice of the customer. *Marketing Sci.* **12**(Winter) 1–25.
- Guiltnan, J. P. 1987. The price bundling of services: A normative framework. *J. Marketing* **51**(2) 74–85.
- Gupta, S., D. R. Lehmann, J. A. Stuart. 2004. Valuing customers. *J. Marketing Res.* **41**(1) 7–18.
- Ha, A. Y. 2001. Optimal pricing that coordinates queues with customer-chosen service requirements. *Management Sci.* **47**(7) 915–930.
- Haughton, D., S. Oulabi. 1997. Direct marketing modeling with CART and CHAID. *J. Interactive Marketing* **11**(4) 42–52.
- Hauser, J. R., D. Clausing. 1988. The house of quality. *Harvard Bus. Rev.* **66**(May–June) 63–73.
- Hauser, J. R., D. I. Simester, B. Wernerfelt. 1994. Customer satisfaction incentives. *Marketing Sci.* **13**(Fall) 327–350.
- Helsen, K., D. C. Schmittlein. 1993. Analyzing duration times in marketing: Evidence for the effectiveness of hazard rate models. *Marketing Sci.* **11**(4) 395–414.
- Heskett, J. L., T. O. Jones, G. W. Loveman, W. E. Sasser Jr., L. Schlesinger. 1994. Putting the service profit chain to work. *Harvard Bus. Rev.* **72**(2) 164–174.
- Hogan, J. E., K. N. Lemon, B. Libai. 2003. What is the true value of a lost customer? *J. Service Res.* **5**(3) 196–208.
- Hogan, J. E., K. N. Lemon, R. T. Rust. 2002. Customer equity management: Charting new directions for the future of marketing. *J. Service Res.* **5**(1, Special Issue on Managing Customer Equity) 4–12.
- Hogan, J. E., D. R. Lehmann, M. Merino, R. K. Srivastava, P. C. Verhoef. 2002. Linking customer assets to financial performance. *J. Service Res.* **5**(1) 26–38.
- Iyer, G., A. Pazgal. 2004. Internet shopping agents: Virtual co-location and competition. *Marketing Sci.* **22**(1) 85–106.
- Jain, S., P. K. Kannan. 2002. Pricing of information products on online pricing of information products on online servers: Issues, models, and analysis. *Management Sci.* **48**(9) 1123–1142.
- Jaworski, B. J., A. K. Kohli. 1993. Market orientation: Antecedents and consequences. *J. Marketing* **57**(July) 53–70.
- Johnson, M. D., A. Gustafsson. 2000. *Improving Customer Satisfaction, Loyalty and Profit*. Jossey-Bass, San Francisco, CA.
- Johnson, M. D., E. W. Anderson, C. Fornell. 1995. Rational and adaptive performance expectations in a customer satisfaction framework. *J. Consumer Res.* **21**(4) 695–707.
- Kamakura, W. A., V. Mittal, F. de Rosa, J. A. Mazzon. 2002. Assessing the service profit chain. *Marketing Sci.* **21**(3) 294–317.
- Kimes, S. 1989. Yield management: A tool for capacity constrained service firms. *J. Oper. Management* **8**(4) 348–363.
- Kivetz, R. 2004. The effects of effort and intrinsic motivation on risky choice. *Marketing Sci.* **22**(4) 477–502.
- Kordupleski, R., R. T. Rust, A. J. Zahorik. 1993. Why improving quality doesn’t improve quality. *California Management Rev.* **35**(Spring) 82–95.
- Krider, R. E., C. B. Weinberg. 1998. Competitive dynamics and the introduction of new products: The motion picture timing game. *J. Marketing Res.* **35**(February) 1–15.
- Krishnan, M. S., V. Ramaswamy, M. C. Meyer, P. Diem. 1999. Customer satisfaction for financial services: The role of products, services and information technology. *Management Sci.* **45**(9) 1194–1209.
- Kumar, P., M. U. Kalwani, M. Dada. 1997. The impact of waiting time guarantees on customers’ waiting experiences. *Marketing Sci.* **16**(4) 295–314.
- Lemon, K. N., T. B. White, R. S. Winer. 2002. Dynamic customer relationship management: Incorporating future considerations into the service retention decision. *J. Marketing* **66**(1) 1–14.
- Lewis, M. 2004. The influence of loyalty programs and short-term promotions on customer retention. *J. Marketing Res.* **41**(August) 281–292.
- Lovelock, C., E. Gummesson. 2004. Whither services marketing? In search of a new paradigm and fresh perspective. *J. Service Res.* **7**(1) 20–41.
- Loveman, G. W. 1998. Employee satisfaction, customer loyalty, and financial performance. *J. Service Res.* **1**(1) 18–31.
- Lucas, H. J. 1999. *Information Technology and the Productivity Paradox: The Search for Value*. Oxford University Press, Oxford, UK.
- Lurie, N. 2004. Decision making in information-rich environments: The role of information structure. *J. Consumer Res.* **30**(4) 473–486.
- Lutz, N. A. 1989. Warranties as signals under consumer moral hazard. *RAND J. Econom.* **20**(2) 239–255.
- Malthouse, E. C., R. C. Blattberg. 2005. Can we predict customer lifetime value? *J. Interactive Marketing* **19**(1) 2–16.
- Malthouse, E. C., J. L. Oakley, B. J. Calder, D. Iacobucci. 2004. Customer satisfaction across organizational units. *J. Service Res.* **6**(3) 231–242.
- McDonald, W. J. 1998. *Direct Marketing: An Integrated Approach*. Irwin-McGraw-Hill, Boston, MA.
- Mesak, H. I., A. F. Darrat. 2002. Optimal pricing of new subscriber services under interdependent adoption processes. *J. Service Res.* **5**(2) 140–153.
- Metters, R., V. Vargas. 1999. Yield management for the nonprofit sector. *J. Service Res.* **1**(3) 215–226.
- Meuter, M. L., A. L. Ostrom, R. I. Rountree, M. J. Bitner. 2000. Self-service technologies: Understanding customer satisfaction with technology-based service encounters. *J. Marketing* **64**(3) 50–64.
- Mittal, V., W. A. Kamakura. 2001. Satisfaction, repurchase intent, and repurchase behavior: Investigating the moderating effect of customer characteristics. *J. Marketing Res.* **38**(1) 131–142.
- Moorthy, S., K. Srinivasan. 1995. Signaling quality with money-back guarantees: The role of transaction costs. *Marketing Sci.* **14**(4) 442–466.

- Mulhern, F. J. 1999. Customer profitability analysis: Measurement, concentration, and research directions. *J. Interactive Marketing* 13(Winter) 25–40.
- Murthi, B. P. S., S. Sarkar. 2003. The role of the management sciences in research on personalization. *Management Sci.* 49(10) 1344–1362.
- Narayandas, D. 1998. Measuring and managing the benefits of customer retention: An empirical investigation. *J. Service Res.* 1(2) 108–128.
- Narver, J. C., S. F. Slater. 1990. The effect of a market orientation on business profitability. *J. Marketing* 54(October) 20–35.
- Neelamegham, R., P. Chintagunta. 1999. A Bayesian model to forecast new product performance in domestic and international markets. *Marketing Sci.* 18(2) 115–136.
- Neelamegham, R., D. Jain. 1999. Consumer choice process for experience goods: An econometric model and analysis. *J. Marketing Res.* 36(August) 373–386.
- Oliva, R., J. D. Sterman. 2001. Cutting corners and working overtime: Quality erosion in the service industry. *Management Sci.* 47(7) 894–914.
- Oliver, R. L. 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. *J. Marketing Res.* 42(November) 460–469.
- Oliver, R. L., R. T. Rust, S. Varki. 1997. Customer delight: Foundations, findings, and managerial insight. *J. Retailing* 73(Fall) 311–336.
- Oliver, R. W., R. T. Rust, S. Varki. 1998. Real-time marketing. *Marketing Management* 7(Fall–Winter) 29–37.
- Padmanabhan, V., I. P. L. Png. 1997. Manufacturer's return policies and retail competition. *Marketing Sci.* 16(1) 81–94.
- Padmanabhan, V., I. P. L. Png. 2004. Reply to "Do returns policies intensify retail competition?" *Marketing Sci.* 23(4) 614–618.
- Padmanabhan, V., R. Rao. 1993. Warranty policy and extended service contracts: Theory and an application to automobiles. *Marketing Sci.* 12(3) 230–247.
- Padmanabhan, B., A. Tuzhilin. 2003. On the use of optimization for data mining: Theoretical interactions and eCRM opportunities. *Management Sci.* 49(10) 1327–1343.
- Pan, X., B. T. Ratchford, V. Shankar. 2002. Can price dispersion in online markets be explained by differences in e-tailer service quality? *J. Acad. Marketing Sci.* 30(4) 433–445.
- Parasuraman, A. 2000. Technology readiness index (TRI): A multiple-item scale to measure readiness to embrace new technologies. *J. Service Res.* 2(4) 307–320.
- Parasuraman, A., V. A. Zeithaml, L. L. Berry. 1985. A conceptual model of service quality and its implications for future research. *J. Marketing* 49(Fall) 41–50.
- Parasuraman, A., V. A. Zeithaml, L. L. Berry. 1988. SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *J. Retailing* 64(1) 12–40.
- Parasuraman, A., V. A. Zeithaml, L. L. Berry. 1994. Alternative scales for measuring service quality: A comparative assessment based on psychometric and diagnostic criteria. *J. Retailing* 70(3) 201–230.
- Parasuraman, A., V. A. Zeithaml, A. Malhotra. 2005. E-S-Qual a multiple-item scale for assessing electronic service quality. *J. Service Res.* 7(3) 213–233.
- Peterson, A. 2001. E-commerce (a special report): Industry-by-industry—privacy—privacy matters: It seems that trust equals revenue, even online. *The Wall Street J.* (February 12) R24.
- Peterson, R. A., W. R. Wilson. 1992. Measuring customer satisfaction: Fact and artifact. *J. Acad. Marketing Sci.* 20(1) 61–71.
- Pfeifer, P. E., R. L. Carraway. 2000. Modeling customer relationships as Markov chains. *J. Interactive Marketing* 14(2) 43–55.
- Png, I. P. L. 1989. Reservations: Customer insurance in the marketing of capacity. *Marketing Sci.* 8(3) 248–264.
- Poirier, C. C., M. J. Bauer. 2000. *E-Supply Chain: Using the Internet to Revolutionize Your Business*. Berret-Kochler, San Francisco, CA.
- Quinn, J. B., T. L. Doorley, P. C. Paquette. 1990. Beyond products: Service-based strategy. *Harvard Bus. Rev.* 68(March/April) 58–66.
- Radas, S., S. M. Shugan. 1998a. Managing service demand: Shifting and bundling. *J. Service Res.* 1(1) 47–64.
- Radas, S., S. M. Shugan. 1998b. Seasonal marketing and timing new product introductions. *J. Marketing Res.* 35(3) 296–325.
- Raghu, T. S., P. K. Kannan, H. R. Rao, A. B. Whinston. 2001. Dynamic profiling of consumers for customized offerings over the Internet: A model and analysis. *Decision Support Systems* 32(2) 189–199.
- Ratchford, B. T., M.-S. Lee, D. Talukdar. 2003. The impact of the Internet on information search for automobiles. *J. Marketing Res.* 40(2) 193–209.
- Reichheld, F. F., W. E. Sasser, Jr. 1990. Zero defections: Quality comes to services. *Harvard Bus. Rev.* 68(5) 105–111.
- Reinartz, W., V. Kumar. 2000. On the profitability of long lifetime customers: An empirical investigation and implications for marketing. *J. Marketing* 64(4) 17–35.
- Reinartz, W., V. Kumar. 2002. On the profitability of long-life customers in a noncontractual setting. *J. Marketing* 64(4) 17–35.
- Reinartz, W., V. Kumar. 2003. The impact of customer relationship characteristics on profitable lifetime duration. *J. Marketing* 67(1) 77–99.
- Reinartz, W., M. Krafft, W. D. Hoyer. 2004. The customer relationship management process: Its measurement and impact on performance. *J. Marketing Res.* 41(3) 293–305.
- Reinartz, W., J. S. Thomas, V. Kumar. 2004. Balancing acquisition and retention resources to maximize customer profitability. *J. Marketing* 69(January) 63–79.
- Rossi, P. E., R. E. McCulloch, G. M. Allenby. 1996. The value of purchase history data in target marketing. *Marketing Sci.* 15(4) 321–340.
- Rust, R. T. 1997. The dawn of computer behavior. *Marketing Management* 6(Fall) 31–33.
- Rust, R. T., P. K. Kannan. 2003. E-service: A new paradigm for business in the electronic environment. *Comm. ACM* 46(5) 37–42.
- Rust, R. T., K. N. Lemon. 2001. E-service and the consumer. *Internat. J. Electronic Commerce* 5(3) 83–99.
- Rust, R. T., R. L. Oliver. 2000. Should we delight the customer? *J. Acad. Marketing Sci.* 28(1) 86–94.
- Rust, R. T., P. C. Verhoef. 2005. Optimizing the marketing interventions mix in CRM. *Marketing Sci.* 24(3) 477–489.
- Rust, R. T., A. J. Zahorik. 1993. Customer satisfaction, customer retention, and market share. *J. Retailing* 69(Summer) 193–215.
- Rust, R. T., P. K. Kannan, N. Peng. 2002. The customer economics of Internet privacy. *J. Acad. Marketing Sci.* 30(4) 455–464.
- Rust, R. T., K. N. Lemon, V. A. Zeithaml. 2004. Return on marketing: Using customer equity to focus marketing strategy. *J. Marketing* 68(1) 109–127.
- Rust, R. T., C. Moorman, P. R. Dickson. 2002. Getting return on quality: Revenue expansion, cost reduction, or both? *J. Marketing* 66(4) 7–24.
- Rust, R. T., A. J. Zahorik, T. L. Keiningham. 1994. *Return on Quality*. Probus Publishing, Chicago, IL.
- Rust, R. T., A. J. Zahorik, T. L. Keiningham. 1995. Return on quality (ROQ): Making service quality financially accountable. *J. Marketing* 59(April) 58–70.
- Rust, R. T., A. J. Zahorik, T. L. Keiningham. 1996. *Service Marketing*. HarperCollins, New York.
- Rust, R. T., V. A. Zeithaml, K. N. Lemon. 2000. *Driving Customer Equity: How Customer Lifetime Value Is Reshaping Corporate Strategy*. The Free Press, New York.

- Rust, R. T., V. A. Zeithaml, K. N. Lemon. 2004. Customer-centered brand management. *Harvard Bus. Rev.* 82(9) 110–118.
- Rust, R. T., J. J. Inman, J. Jia, A. J. Zahorik. 1999. What you don't know about customer-perceived quality: The role of customer expectation distributions. *Marketing Sci.* 18(1) 77–92.
- Rust, R. T., T. Keiningham, S. Clemens, A. Zahorik. 1999. Return on quality at Chase Manhattan Bank. *Interfaces* 29(March–April) 62–72.
- Rust, R. T., T. Ambler, G. S. Carpenter, V. Kumar, R. K. Srivastava. 2004. Measuring marketing productivity: Current knowledge and future directions. *J. Marketing* 68(4) 76–89.
- Sawhney, M. S., J. Eliashberg. 1996. A parsimonious model for forecasting gross box-office revenues of motion pictures. *Marketing Sci.* 15(2) 113–131.
- Sawhney, M. S., S. Balasubramanian, V. V. Krishnan. 2004. Creating growth with services. *MIT Sloan Management Rev.* (Winter) 34–43.
- Schmittlein, D. C., R. A. Peterson. 1994. Customer base analysis: An industrial purchase process application. *Marketing Sci.* 13(1) 40–67.
- Schmittlein, D. C., D. G. Morrison, R. Columbo. 1987. Counting your customers: Who are they and what will they do next? *Management Sci.* 33(January) 1–24.
- Schneider, B., S. S. White, M. C. Paul. 1998. Linking service climate and customer perceptions of service quality: Test of a causal model. *J. Appl. Psych.* 83(2) 150–163.
- Sheram, K., T. P. Soubbotina. 2000. *Beyond Economic Growth: Meeting the Challenges of Global Development*. World Bank, Washington, D.C.
- Shugan, S. M., J. Xie. 2000. Advance pricing of services and other implications of separating purchase and consumption. *J. Service Res.* 2(3) 227–239.
- Shugan, S. M., J. Xie. 2004. Advance selling for services. *California Management Rev.* 46(3) 37–54.
- Simester, D. I., J. R. Hauser, B. Wernerfelt, R. T. Rust. 2000. Implementing quality improvement programs designed to enhance customer satisfaction: Quasi-experiments in the United States and Spain. *J. Marketing Res.* 37(1) 102–112.
- Sismeyro, C., R. E. Bucklin. 2004. Modeling purchase behavior at an e-commerce web site: A task completing approach. *J. Marketing Res.* 41(3) 306–323.
- Slotegraaf, R. J., J. J. Inman. 2004. Longitudinal shifts in the drivers of satisfaction with product quality: The role of attribute resolvability. *J. Marketing Res.* 41(3) 269–280.
- Smith, A. K., R. N. Bolton, J. Wagner. 1999. A model of customer satisfaction with service encounters involving failure and recovery. *J. Marketing Res.* 36(3) 356–372.
- Srivastava, R. K., T. A. Shervani, L. Fahey. 1999. Marketing, business processes, and shareholder value: An organizationally embedded view of marketing activities and the discipline of marketing. *J. Marketing* 63(4) 168–179.
- Storbacka, K. 1994. *The Nature of Customer Relationship Profitability*. Swedish School of Economics and Business Administration, Helsinki, Finland.
- Sundarajan, A. 2004. Nonlinear pricing of information goods. *Management Sci.* 50(12) 1660–1673.
- Taylor, S. A. 1997. Assessing regression-based importance weights for quality perceptions and satisfaction judgments in the presence of higher order and/or interactions effects. *J. Retailing* 73(1) 135–159.
- Telang, R., P. Boatwright, T. Mukhopadhyay. 2004. A mixture model for Internet search-engine visits. *J. Marketing* 41(May) 206–214.
- Thomas, J. S. 2001. A methodology for linking customer acquisition to customer retention. *J. Marketing Res.* 38(2) 262–268.
- Thomas, J. S., R. C. Blattberg, E. J. Fox. 2004. Recapturing lost customers. *J. Marketing Res.* 41(1) 31–45.
- Tse, D. K., P. C. Wilton. 1988. Models of consumer satisfaction formation: An extension. *J. Marketing Res.* 25(May) 204–212.
- U.S. Department of Labor, Bureau of Labor Statistics. 2005. [www.bls.gov](http://www.bls.gov).
- Van Mieghem, J. A. 2000. Price and service discrimination in queuing systems: Incentive compatibility of Gcμ scheduling. *Management Sci.* 46(8) 1249–1267.
- Van Ryzin, G. Van, J. McGill. 2000. Revenue management without forecasting or optimization: An adaptive algorithm for determining airline seat protection levels. *Management Sci.* 46(6) 760–775.
- Vargo, S. L., R. F. Lusch. 2004. Evolving to a new dominant logic for marketing. *J. Marketing* 68(January) 1–17.
- Varki, S., R. T. Rust. 1998. Technology and optimal segment size. *Marketing Lett.* 9(2) 147–167.
- Venkatesan, R., V. Kumar. 2004. A customer lifetime value framework for customer selection and resource allocation strategy. *J. Marketing* 68(4) 106–125.
- Venkatesh, R., V. Mahajan. 1993. A probabilistic approach to pricing a bundle of products or services. *J. Marketing Res.* 30(4) 494–508.
- Verhoef, P. C., P. H. Franses, J. C. Hoekstra. 2002. The effect of relational constructs on customer referrals and number of services purchased from a multiservice provider: Does age of relationship matter? *J. Acad. Marketing Sci.* 30(Summer) 202–212.
- Verma, R., G. M. Thompson, J. J. Louviere. 1999. Configuring service operations in accordance with customer needs and preferences. *J. Service Res.* 1(3) 262–274.
- Villas-Boas, J. M. 2004. Consumer learning, brand loyalty, and competition. *Marketing Sci.* 23(1) 134–145.
- Wang, H. 2004. Do returns policies intensify retail competition? *Marketing Sci.* 23(4) 611–613.
- Wind, J., P. E. Green, D. Shifflet, M. Scarbrough. 1989. Courtyard by Marriott: Designing a hotel facility with consumer-based marketing models. *Interfaces* 19(1) 25–47.
- Wu, D., R. Gautam, X. Geng, A. Whinston. 2004. Implications of reduced search cost and free riding in e-commerce. *Marketing Sci.* 23(2) 255–262.
- Wu, J., A. Rangaswamy. 2003. A fuzzy set model of search and consideration with an application to an online market. *Marketing Sci.* 22(3) 411–434.
- Xie, J., S. M. Shugan. 2001. Electronic tickets, smart cards, and online prepayments: When and how to advance sell. *Marketing Sci.* 20(3) 219–243.
- Xue, M., P. T. Harker. 2002. Customer efficiency: Concept and its impact on e-business management. *J. Service Res.* 4(4) 253–267.
- Zeithaml, V. A., L. L. Berry, A. Parasuraman. 1996. The behavioral consequences of service quality. *J. Marketing* 60(April) 31–46.