

IMC Journal of Integrated Communications

NEW IDEAS AND BEST PRACTICES IN MARKETING COMMUNICATIONS

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Taking Customer Lifetime Value Analysis to the Next Level

V. KUMAR AND GIRISH RAMANI

Many companies are eager to optimize their marketing programs by targeting their most loyal customers. But loyalty programs aiming to increase share-of-wallet may be wasted on the wrong customers, say V. Kumar and Girish Ramani, who develop a framework for assessing customer value that can be tailored to a particular company.

Delta Airlines had long been operating a customer loyalty program that computed the accumulated frequent flier rewards points solely on the basis of the total number of miles flown by a customer. The loyalty program did not differentiate between customers who pay economy class fares and those who pay business class fares, to fly the same distance. From a profitability viewpoint this program was misaligned—it was clearly not based on customer value. No wonder it was recently replaced with one that differentiated between customers paying different classes of fares. Now a customer flying business class gets 50 percent more points than does a customer traveling economy class. This new approach recognizes and rewards more the customers who are more profitable to the firm.

Recently, General Motors Corporation (GM) revised the redemption scheme on their 10-year-old GM Card. The maximum amount of earnings that a customer can redeem toward the purchase or lease of a new GM car, truck or SUV now depends on the year, make and model that is chosen. This move is similar to the one adopted by Delta Air Lines, in that a customer who spends on a premium product is rewarded more than a customer who purchases a low end product.

Such shifts on the part of these two major companies without the fear of a customer backlash signals that the traditional approach of nurturing and rewarding customers on the basis of volume is giving way to a more profit-oriented strategy. Retaining the loyalty of a customer is beginning to seem a little old fashioned in this age of ever increasing squeeze on profits.

There seem to be two complementary reasons why firms are becoming unabashedly profit-oriented in their approach toward customer rewards programs. First, firms are in a better position thanks to technology, to record customer actions and ascertain their individual profitability levels. Thus firms no longer have to use surrogate measures like unit volume of business, share of wallet and duration of association to reward their customers.

Let us examine the share-of-wallet measure that some firms use to decide on customer level investments. Share of wallet (SOW) is defined as the ratio of the total customer spending with the firm to the total category spending (the firm plus its competitors) for that customer. It is clear that achieving a large SOW of a low spending client may not be as good as achieving a low SOW of a high spending client. Thus firms do not have to continue using surrogate measures, as the drawbacks inherent in these measures can now be overcome by concentrating directly on individual customer profitability. Second, customers realize that they can no

longer expect a firm to believe that they are special if they are not genuine high value buyers.

Differential treatment of customers is being accepted as a way of life by both firms and customers. However, differential treatment can work for a firm in the long run only if it has an eye on the future. Killing the proverbial goose that lays the golden egg is an easy mistake to make. The challenge for a firm today is to develop an optimal blend of differential treatments such that over every customer's lifetime, the profits earned by the firm are maximized. Not every firm understands how to develop a strategy that balances customer relations and profitability.

All loyal customers are not necessarily profitable and all profitable customers are not necessarily loyal.

Customer Value: the Future of CRM

How then does a firm manage its interactions with customers on a continuous basis so that it can maintain and improve customer relations and simultaneously maximize customer value? In order to perform this balancing act, it is important for a firm to ensure that its customer relationship management (CRM) program is woven around the concept of customer value. CRM should therefore be defined as the process for achieving a continuing dialogue with customers across all available touch points, through differentially tailored treatment, based on the expected response from each customer to available marketing initiatives, such that the contribution from each customer to overall profitability is maximized. Hence, intrinsic to CRM should be the notion of individual customer value.

The level of sophistication of the adoption of the customer value framework approach into a firm's marketing program could vary. A firm operating a loyalty program can start using the customer value framework (CVF) to examine if the customers being rewarded are indeed the profitable ones, and take corrective action if that is not the case.

At the second level of sophistication, a firm can begin to observe when its customers are beginning to turn unprofitable. The firm can decide to let go of these customers without wasting further efforts on them.

Moving up another level, a firm could determine the factors that are likely to affect how long a customer is likely to stay profitable. This enables the firm to control and manage the variables necessary to increase a customer's profitability.

At the fourth level, a firm can plan investments in marketing initiatives on the basis of an analysis of expected profits from its customers during a given planning period. A firm can achieve the fourth level of sophistication by understanding the impact of changing the frequency of its marketing communication elements on the profitability of each customer. In this manner it can allocate its resources optimally across marketing initiatives, by cutting down on wasteful efforts and increasing the frequency of effective efforts, one customer at a time.

At the fifth and final level, a firm can predict the timing of purchase of each of the products in its portfolio and tailor the communication message around the product likely to be purchased by a customer next. Mathematical models necessary to carry these levels of analyses and predictions have been developed in the CRM literature. (Reinartz and Kumar, 2003; Venkatesan and Kumar 2003; Kumar, Venkatesan and Reinartz 2003) This article illustrates how seemingly divergent marketing decisions can be integrated using these models, all of which are based on the customer value framework (CVF).

Customer Value Framework: A Marketing Tool

Which level of sophistication a company decides to pursue is dependent on the relevance and criticality of a firm's CRM decisions to its survival and growth. An in-depth discussion of each follows.

Level 1: Develop a Deeper Understanding of the Loyalty Phenomenon in the Firm

In practice, loyalty of a customer is usually measured along two dimensions:

1. How long has the customer been with the firm? (Duration of association dimension.)
2. What part of a customer's total category spend constitutes revenue for the firm? (Share of wallet dimension.)

All loyal customers are not necessarily profitable and all profitable customers are not necessarily loyal. It has been demonstrated that the pursuit of loyalty, defined as either of the two constructs above, may not be an optimal marketing goal. (Reinartz and Kumar, 2002) To

The challenge in implementing CVF is that a firm needs to restructure from being product-centric to being customer-centric.

determine the long-term efficacy of a loyalty rewards program, a company must quantify the program's influence on future purchase behavior. Furthermore, it must verify that the positive financial outcomes of the rewards program exceed the investments made in the program (Bolton et al., 2000). Marketing decisions should therefore be based on the understanding of the link between loyalty and profitability rather than on the blind pursuit of loyalty as an end in itself.

It is better to visualize customer value as a multi-dimensional construct, which involves the measurement of profits expected from each individual customer over the duration that the customer is likely to conduct business with a firm. Customer value is the sum of cumulated cash flows—discounted using the cost of capital for the firm—of a customer over his or her entire lifetime with the company.

Given the availability of relevant technology and powerful database management tools, firms should capture transactions pertaining to each customer. When a firm examines its customer database, it should not be too surprised to find that there is a significant set of customers who transact with the firm for a short while, but in that duration contribute handsomely to the firm's profits. A firm focused

purely on rewarding and retaining customers on the basis of how long they have been with the firm may thus miss out on the opportunity to maximize returns from the higher value but shorter duration customers. Similarly, rewarding customers simply because they keep coming to your firm for most of their needs and do not conduct very much business with your competitors is not the shrewdest strategy to adopt in terms of profits.

Evidence has been gathered to show that customers who purchase steadily from a company over time are not necessarily more profitable. Reinartz and Kumar (2002) examine the following beliefs that surround loyalty:

- It is cheaper to serve loyal customers.
- Loyal customers pay higher prices for the same bundle of goods.
- Loyal customers bring in new customers by spreading positive word-of-mouth.

Contrary to expectations, none of the above beliefs find strong empirical support in the study. It seems that many long-standing customers realize their value and often exploit it to demand increasingly higher levels of service over time. Loyal customers also seem to undervalue the value of a product over time and are therefore more price-sensitive than the occasional customers. Many customers identified as loyal may be buying from the firm simply out of inertia and convenience, hence we cannot expect them to be strong advocates of the firm. Therefore we should be aware that the perceived benefits associated with cultivating loyal customers do not always materialize.

The first step in implementing CVF is the examination of a firm's database to determine the extent of the loyalty-profitability link. But an analysis of the customer database is managerially inadequate if it does not lead to actionable decisions. It is important to know early on how long a customer is likely to remain profitable to know when the time has come to relinquish a customer. This necessitates the development of a model that can capture the behavior of each customer and predict the point in time when the customer turns unprofitable. The next level in CVF addresses this issue.

Level 2: Determine the Profitable Lifetime Duration for every Customer

No firm would want to waste its resources by chasing customers who are not likely to be transacting profitably in the future. Therefore deciding when to let go of an unprofitable customer is critical.

Various techniques are available to help compute customer profitable lifetime duration (Reinartz and Kumar, 2003). The first step involves determining the contribution margin expected from each customer in future periods based on the average of the contribution

Table 1: Predictive ability of model

	Bought in the following 12 months	Did not buy in the following 12 months	
Expected to buy in the following 12 months	n=225	n=21	246
Not expected to buy in the following 12 months	n=12	n=66	78

$$\text{Hit Rate} = (225+66)/324 = \mathbf{90 \text{ percent}} \quad \mathbf{N=324}$$

margins in the past. The second step is to determine for each future period, the probability that the customer will be alive and will transact with the firm. The third step is to combine these two components. The fourth step is to discount the expected contribution margin in each future period to its net present value (NPV) using the cost of capital applicable to the firm. If in a given month the cost of additional marketing efforts turns out greater than the NPV, we determine that the profitable lifetime duration of the customer has ended.

While it is useful to know the profitable lifetime duration of each customer in order to determine when to withdraw marketing efforts directed at that customer, it is also important to understand the antecedents of profitable lifetime duration. This provides knowledge to a manager about the controllable and environmental variables that explain systematic differences in profitable customer lifetime durations. With this information, a manager is able to focus on appropriate marketing initiatives that are likely to improve profitability during the tenure of every customer. By analyzing and modeling variables for which data are readily available a firm can determine what factors are significant in affecting customers' profitable lifetime durations.

A proportional hazard model is the recommended procedure that provides a household specific estimate of profitable lifetime duration (Reinartz and Kumar, 2003). It models the probability of a customer purchase over time, given that the customer has not purchased until then, as a function of time and also other predictor variables. Typically we would need to choose predictor variables of two types to incorporate into the model:

1. Exchange variables—Amount purchased, degree of cross-buying, degree of focused-buying, inter-purchase time, number of product returns, ownership of loyalty instruments and mailing effort undertaken by the firm are some variables that can be expected to

contribute significantly.

2. Customer heterogeneity variables—Age, location and income of the customer can be expected to add explanatory power to the lifetime duration model.

Reinartz and Kumar (2003) provide intuitive explanations for the expected effects of some of these variables. For instance, it is likely that the profitable lifetime duration of a customer is higher for a customer who has spent more than the others and thus has a higher value for the variable “amount purchased.” Similarly, we can expect that a customer who has a tendency to buy across the product line of a firm and therefore exhibits a high “degree of cross-buying,” should exhibit sustained profitability compared to other customers. Customers who demonstrate a moderate but stable time interval between successive purchases (inter-purchase time) are likely to be profitable for a longer duration than customers who have long inter-purchase intervals or those who burn out after a rapid series of purchases. Surprisingly, “number of product returns” can relate positively to profitable lifetime duration, because heavier buyers are also likely to return more merchandise, and a positive experience during the return procedure is likely to boost the buyer-seller relationship. A firm should choose the variables that are relevant to its industry situation to include in the model, but as a starting point it can pick from the two types of variables listed above.

Knowing what variables impact profitable lifetime duration of a customer is important. However, the time horizons in which managers operate are typically between one and three years. It is therefore necessary for a manager to plan for marketing initiatives based on an analysis of the value of its customers in a given time frame. The next level addresses this issue.

Level 3: Compute Individual Customer Value, Given the Duration of Analysis

A manager may want to forecast sales and plan appropriate marketing investments for the next year. To do that, it is important to know which customers are likely to purchase in that year alone. The first step is the computation of the inter-purchase time. The contribution of a customer whose inter-purchase time is greater than twelve months will be zero during this period of analysis. And a customer with an inter-purchase time of four months can be expected to purchase three times in that year. The inter-purchase time computation is needed to calculate projected revenues. Also, given a fixed budget, the inter-purchase time computation suggests rules of allocation that is based on the customer lifetime value framework. A model can be developed that builds in the concept of inter-purchase time into the computation of a customer's NPV directly, without computing profitable lifetime duration as an independent step.

(Venkatesan and Kumar, 2003) This results in an accurate estimation of cash flow from individual customers, thereby improving planning efficiencies. Managers would find it useful to know the differential effect of the various marketing mix variables, which a manager has within their control, in influencing individual customer value. The next level in CVF helps a firm identify the optimal distribution of resources across its customers from among various marketing initiatives that are available to it.

Level 4: Optimize Resource Allocation Across Marketing and Communication Strategies

Customer equity is the aggregation of the expected lifetime values of a firm's entire base of existing customers and the expected future value of newly acquired customers (Hogan et al., 2002). A firm needs to make tradeoffs that reserve strategic resources for the areas in which the expenditures will generate the greatest impact on customer equity (Rust et al., 2000). The inter-purchase time for a customer is influenced by marketing initiatives that a firm makes. A mathematical model for inter-purchase time as proposed in level three would include the frequency, nature of marketing and communication efforts. A model to predict the cash flow from each customer can be simultaneously developed. The NPV objective function required to maximize the customer equity of a firm, related to the cash flow from each customer, employs the expected inter-purchase time and the cost and frequency of the marketing / communication strategies. Given the constraint that marketing expense cannot exceed a pre-specified level, a manager can determine the frequency of each of the available marketing and communication strategies such that the NPV objective function is maximized. An optimization technique can be utilized to accurately arrive at the allocation of resources to individual customers across a variety of integrated marketing strategies (Venkatesan and Kumar, 2003).

By applying an optimization model, a manager can know the extent to which they can increase or decrease face-to-face meetings and the frequency of direct mailers—for each customer or for seg-

Table 2: Results of different duration of association approaches

	Shorter duration	Longer duration
Average profit	\$29,235 (n=170)	\$141,655 (n=154)

Table 3: Customer value versus duration of association

	Shorter duration	Longer duration
Low customer value	N=78 Avg. profit=\$1,387	N=82 Avg. profit=\$1,245
High customer value	N=92 Avg. profit=\$52,976	N=72 Avg. profit=\$302,542

nents of customers—to achieve an increase in total profitability. To illustrate the application of CVF in practice it is useful to look at the results of a real world situation.

n Industry Application of CVF

A real world business-to-business illustration where the model for optimal resource allocation was implemented successfully deals with data pertaining to a large high-tech firm that has been in business for many years. A set of variables, similar to the ones discussed in level two, was used in the modeling process. The model for inter-purchase time is able to provide us with an indication of whether a customer is likely to buy during a given period. The predictive ability of the model employed in this situation is apparent from Table 1.

Based on an analysis of a sample of 324 customers, out of the 246 customers that the model predicted would buy a product, 225 of them actually bought the product. Similarly, out of the 78 customers that the model predicted would not buy the product, 66 of them did

not buy the product. This suggests that the model had an accuracy or hit rate of 90 percent.

The CVF approach resulted in an improvement in profits relative to the duration of association approach that was employed by the firm. Duration of association—one of the traditional measures of loyalty, mentioned earlier—indicates how long a customer has been transacting with the firm. Table 2 shows the results of a duration of association approach in terms of the classification of customers and their average profits.

A cross analysis of duration of association and customer value obtained on the basis of the NPV maximization objective function indicates that a superior approach can be adopted by identifying and targeting more responsive and profitable customers and by de-emphasizing efforts on some customers who were not profitable. Some of these customers had escaped the firm’s attention when only the duration of association approach was being followed (See Table 3).

The observations in Cell III indicate that more than 50 percent of the customers whom the firm was targeting in the longer duration segment were actually low value customers. The observations in Cell II indicate that the firm was ignoring a sizable set of customers by classifying them as shorter duration customers, when they were contributing significantly to profits. Thus the customer value based approach is superior to the duration of association approach in terms of effective segmentation.

By reallocating resources across marketing / communication efforts using CVF, we find that we can improve profitability in each of the cells (See Table 4). The CVF analysis recommends changing the frequency of face-to-face meetings, direct mail / telesales in each cell to an optimal level, thereby enhancing the effectiveness of the marketing / communi-

Table 4: Reallocation of resources based on duration of association

	Shorter duration	Longer duration
Low customer value	<p>Face to face meetings: Current: once every six months Optimal: once every 14 months</p> <p>Direct mail and telesales: Current interval is 27 days Ideal interval is 26 days</p>	<p>Face to face meetings: Current: once every three months Optimal: once every four months</p> <p>Direct mail and telesales: Current interval is 10 days Ideal interval is 19 days</p>
High customer value	<p>Face to face meetings: Current: once every four months Optimal: once every once a month</p> <p>Direct mail and telesales: Current interval is 21 days Ideal interval is 13 days</p>	<p>Face to face meetings: Current: once every six months Optimal: once every four months</p> <p>Direct mail and telesales: Current interval is 13 days Ideal interval is four days</p>

Table 5: Change between current year and previous year (hardware)

	Test group	Control group
Revenue (\$)*	1,050 (18,130)	1,033 (17,610)
Cost of communication (\$)	-750** (3,625)	75 (4,580)
Number of attempts before purchase	-4** (15)	1 (18)
Profits (\$)	3,000*** (9,080)	637 (6,275)
Return on investment	5.4*** (3.7)	2.2 (2)

ation initiatives. By changing over to the optimal frequencies recommended by the model for face-to-face meetings and direct mail / tele-sales in each of the four cells, a 10 percent decrease in overall costs and a 6 percent increase in overall profits were observed.

Levels one to four of the customer value framework were helpful in telling us which customers are to be contacted and how to allocate marketing resources, but they do not tell us what message is to be delivered and when that message is to be delivered within the planning cycle. In a multi-product firm it is important to understand which product in the portfolio is likely to be needed next by a customer. An ideal contact strategy is one where the firm is able to deliver a sales message that is relevant to the product that is likely to be purchased in the near future by a customer. The next level is therefore the development of a purchase sequence model.

Level 5: Deliver the Right Message to the Right Customer at the Right Time

In order to tailor the timing and content of marketing communications to a customer, it is necessary to know which product among the various products that the firm offers, is a likely new purchase. A purchase sequence model (Kumar, Venkatesan and Reinartz, 2003) addresses the following questions:

- What is the product category that a customer is expected to buy?
- When is the customer expected to buy?
- What is the expected revenue from that customer?

This model captures the differences in the duration between

Table 6: Performance of test and control groups

	Difference between test and control groups
Revenue (\$)	537
Cost of communications (\$)	-1,780***
Number of attempts before purchase	-8**
Profits (\$)	5,168***
Return on investment	4.9***

* Reported values are unit values per customer
 ** Significant at a .05 confidence level
 *** Significant at a .01 confidence level

purchases for different product categories. The interdependence in purchase propensities across product categories is modeled by incorporating cross-product category variables. An individual customer level profit function is developed to predict customer value. In order to demonstrate that such a model delivers superior results in the field, an experiment was set up in the sales department of a high-tech business to business vendor which markets hardware, software and service products.

The test group of salespeople were asked to contact customers prioritized according to the model, in a particular period and market the category, hardware, software or services, for which the customer had the highest propensity to purchase. Empirical evidence available from this experiment suggests that profits predicted on the basis of a purchase sequence model are accurate and that using the model results in a greater return on marketing investments (ROI). Table 5 is an illustration of the improvement for the hardware category over last year in profits generated by the test group of salespeople who adopted strategies based on the outcome of the purchase sequence model versus the control group of sales people who were not provided the predictions given by the model.

We can see that there is a significant decrease in cost of communication resulting in a saving of \$750 on last year's base of \$3,625. In comparison, the control group saw an increase in its cost of communication by \$75 on an already higher last year base of \$4,580. The test group was able to reduce the average number of attempts before purchase by four whereas for the test group this number increased by one, compared to the respective figures for last year. Similarly, for

the test group, profits were higher and so was ROI.

Table 6 displays the difference in performance between the test group and the control group.

We see again that during the experiment period the test group revenue is higher, cost of communication is lower, number of attempts before a purchase is made is lower, profits are higher and ROI is higher when compared to the control group. The success of the experiment indicates the scope that CVF offers in improving the quality of marketing decisions.

Conclusion

In conclusion, adoption of the customer value framework offers immense advantages to firms, customers and channel members. Customer value is a marketing metric that is proving to be important in evaluating marketing effectiveness and aiding in decision making. Limiting the use of customer value as a financial metric to judge marketing accountability does not do justice to the managerial utility that this concept can be put to. As demonstrated, a firm can both measure and optimize its marketing efforts by incorporating the concept of customer value at the core of its decision-making process. However, the challenge in implementing CVF is that a firm needs to re-structure from being product-centric to being customer-centric.

When Delta Air Lines decided to shift the basis of calculating rewards from miles flown to miles flown and the class of fare paid, it subscribed to the notion of offering greater rewards to its higher value customers. No firm should miss this fundamental aspect of marketing. The customer value framework facilitates a shift in strategy that paves the way for superior marketing decisions.

For more information regarding the techniques used in this article, please visit the the JIC website at ic.medill.northwestern.edu.

Note: All numbers given in tables have been altered by a constant multiplier to maintain confidentiality.

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