Customer Relationship Management
A Databased Approach

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Instructor’s Presentation Slides
Chapter Five

Introduction to Customer Based Marketing Metrics
Topics Discussed

- Traditional Marketing Metrics
- Customer based Marketing Metrics
- Minicase: American Airlines
- CRM at Work: Amazon
Marketing Metrics

- Traditional
  - Market Share
  - Sales Growth
- Primary Customer-based
- Popular Customer-based
- Strategic Customer-based
- Customer Acquisition
- Customer Activity
## Traditional and Customer Based Marketing Metrics

<table>
<thead>
<tr>
<th>Traditional Marketing Metrics</th>
<th>Primary Customer Based metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market share</td>
<td>Acquisition rate</td>
</tr>
<tr>
<td>Sales Growth</td>
<td>Acquisition cost</td>
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<tr>
<td></td>
<td>Retention rate</td>
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<td></td>
<td>Survival rate</td>
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<td>P (Active)</td>
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<td>Lifetime Duration</td>
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<td>Win-back rate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Popular Customer Based metrics</th>
<th>Strategic Customer Based metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of Category Requirement</td>
<td>Past Customer Value</td>
</tr>
<tr>
<td>Size of Wallet</td>
<td>RFM value</td>
</tr>
<tr>
<td>Share of Wallet</td>
<td>Customer Lifetime Value</td>
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<tr>
<td>Expected Share of Wallet</td>
<td>Customer Equity</td>
</tr>
</tbody>
</table>
Traditional Marketing Metrics

- Market share
- Sales Growth
Market Share (MS)

- Share of a firm’s sales relative to the sales of all firms – across all customers in the given market
- Measured in percentage
- Calculated either on a monetary or volumetric basis

  - Market Share (%) of a firm \( (j) \) in a category \( = 100 \times \left[ \frac{S_j}{\sum_{j=1}^{J} S_j} \right] \)

Where \( j = \text{firm} \), \( S = \text{sales} \), \( \sum S_j = \text{sum of sales across all firms in the market} \)

Information source
  
  Numerator: Sales of the local firm available from internal records
  
  Denominator: Category sales from market research reports or competitive intelligence

Evaluation

  Common measure of marketing performance, readily computed
  
  Does not give information about how sales are distributed by customer
Sales Growth

- Compares increase or decrease in sales volume or sales value in a given period to sales volume or value in the previous period

- Measured in percentage
  - Indicates degree of improvement in sales performance between two or more time periods
  - Sales growth in period t (%) = \(100 \times \left[ \frac{\Delta S_{jt}}{S_{jt-1}} \right]\)
    where: \(j = \text{firm}, \ \Delta S_{jt} = \text{change in sales in period } t \text{ from period } t-1, \ S_{jt-1} = \text{sales in period } t-1\)

Information source
Numerator and denominator: from internal records

Evaluation
- Quick indicator of current health of a firm
- Does not give information on which customers grew or which ones did not
Primary Customer Based Metrics

- Customer Acquisition Measurements
  - Acquisition rate
  - Acquisition cost

- Customer Activity Measurements
  - Average interpurchase time (AIT)
  - Retention rate
  - Defection rate
  - Survival rate
  - P (Active)
  - Lifetime Duration
  - Win-back rate
Acquisition Rate

- Acquisition defined as first purchase or purchasing in the first predefined period
- Acquisition rate (%) = 100*Number of prospects acquired / Number of prospects targeted
- Denotes average probability of acquiring a customer from a population
- Always calculated for a group of customers
- Typically computed on a campaign-by-campaign basis

Information source
- Numerator: From internal records
  - Denominator: Prospect database and/or market research data

Evaluation
- Important metric, but cannot be considered in isolation
Acquisition Cost

- Measured in monetary terms
- Acquisition cost ($) = Acquisition spending ($) / Number of prospects acquired
- Precise values for companies targeting prospects through direct mail
- Less precise for broadcasted communication

Information source:

- Numerator: from internal records
- Denominator: from internal records

Evaluation:

- Difficult to monitor on a customer by customer basis
Customer Activity Measurement

- Objectives
  - Managing marketing interventions
  - Align resource allocation with actual customer to demonstrate how knowledge of customer activity adds to shareholder value behavior
  - Key input in customer valuation models such as Net-present Value (NPV)
Average Inter-purchase Time (AIT)

- Average Inter-purchase Time of a customer
  \[= \frac{1}{\text{Number of purchase incidences from the first purchase till the current time period}}\]
- Measured in time periods
- Information from sales records
- Important for industries where customers buy on a frequent basis

Information source
Sales records

Evaluation:
Easy to calculate, useful for industries where customers make frequent purchases
Firm intervention might be warranted anytime customers fall considerably below their AIT
Retention and Defection

- Retention rate (%) = 100 * Number of customers in cohort buying in (t) / Number of customers in cohort buying in (t-1)

- Avg. retention rate (%) = [1 − (1/Avg. lifetime duration)]

- Avg. Defection rate (%) = 1 − Avg. Retention rate

- Avg. retention rate (%) = 1 − Avg. defection rate

- Avg. lifetime duration = [1/ (1- Avg. retention rate)_t]

- Assuming constant retention rates, number of retained customers in any arbitrary period (t+n) = Number of acquired customers in cohort * Retention rate (t+n)

- Given a retention rate of 75%, variation in defection rate with respect to customer tenure results in an average lifetime duration of four years
Retention and Defection-Example

- If the average customer lifetime duration of a group of customers is 4 years, the **Average retention rate** is 1- (1/4) = 0.75 or 75% per year. i.e., on an average, 75% of the customers remain customers in the next period.
- The effect for a cohort of customers over time – out of 100 customers who start in year 1, about 32 are left at the end of year 4.

  Customers starting at the beginning of year 1: 100
  Customers remaining at the end of year 1: 75 (0.75*100)
  Customers remaining at the end of year 2: 56.25 (0.75*75)
  Customers remaining at the end of year 3: 42.18 (0.75*56.25)
  Customers remaining at the end of year 4: 31.64 (0.75*42.18)

  Assuming constant retention rates, the **number of retained customers** at the end of year 4 is 100*0.754 = 31.64. (Number of acquired customers in cohort * Retention rate \((t+n)\) )
  The **defection rate** is 1-0.75 = 0.25 or 25%
Variation in Defection rate with respect to Customer Tenure

Plotting entire series of customers that defect each period, shows variation (or heterogeneity) around the average lifetime duration of 4 years.
Change in Customer Lifetime Duration with Retention Rate

Note: increasing the marginal retention rate is likely to be increasingly expensive
CRM at Work: Amazon

- One of the leaders in implementing customer relationship management programs on the web
- Helped drive both customer acquisition and retention
- In 1999 Amazon acquired 11 million new customers, nearly tripling its number of customers from 1998
- Greatest success in customer retention: Repeat customers during the year accounted for 71% of all sales
- Success attributed to attempt to learn about customers and their needs and then using this information to offer value-added features to them
Survival Rate

- Measured for cohorts of customers

- Provides a summary measure of how many customers survived between the start of the formation of a cohort and any point in time afterwards

- Survival rate_t (%) = 100 * Retention rate_t * Survival rate_{t-1}

- Number of Survivors for period 1 = Survival Rate for Period 1 * number of customers at the beginning
## Survival Rate Computation-Example

Number of Customers starting at the beginning of year 1: 1,000

<table>
<thead>
<tr>
<th>Period</th>
<th>Retention rate</th>
<th>Survival rate</th>
<th>Survivors</th>
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<tr>
<td>Period 1:</td>
<td>0.55</td>
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<td>550</td>
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<tr>
<td>Period 2:</td>
<td>0.62</td>
<td>0.341</td>
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<td>Period 3:</td>
<td>0.68</td>
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<tr>
<td>Period 4:</td>
<td>0.73</td>
<td>0.169</td>
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Number of Survivors for period 1 = 0.55 * 1000 = 550

Survival rate for period 2 = Retention rate of period 2 * Survival Rate of Period 1. Therefore, Survival rate for period 2 = 0.62 * 0.55 = 0.341 (=34.1%)
Projecting Retention Rates

- To forecast non-linear retention rates,

\[ R_{rt} = R_{rc} \times (1 - \exp(-rt)) \]

where:  
- \( R_{rt} \) is predicted retention rate for a given future period, 
- \( R_{rc} \) is the retention rate ceiling 
- \( r \) is the coefficient of retention

- \[ r = \frac{1}{t} \times (\ln(R_{rc}) - \ln(R_{rc} - R_{rt})) \]
Actual and Predicted Retention Rate for a Credit Card Company

R_{rc} = 0.95 means that managers believe that the maximum attainable retention rate is 95%.

The known retention rate in period 9 is 80% while the one in period 10 is 82%.

The parameter r for period 9 is \((1/9) \times (\ln(0.95)-\ln(0.95-0.8)) = 0.205\). The r for period 10 is \((1/10) \times (\ln(0.95)-\ln(0.95-0.82)) = 0.198\). --for both periods r approximates the value 0.2.
## Actual Retention Pattern of a Direct Marketing Firm

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<tr>
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<td>36</td>
<td>538</td>
</tr>
</tbody>
</table>

Cohort of 7500 customers at the outset, maximum retention rate is 0.80 and the coefficient of retention r is 0.5; after period 10, the company retains approximately 80% of customer base
Customer Lifetime Duration

\[ \text{Average Lifetime duration} = \frac{\sum_{t=1}^{T} \text{Customers retained}_t}{N} \times \text{Number of periods} / N \]

Where: \( N = \text{cohort size} \), \( t = \text{time period} \)

- Differentiate between complete and incomplete information on customer
  - Complete information - customer’s first and last purchases are assumed to be known
  - Incomplete information- either the time of first purchase, or the time of the last purchase, or both are unknown
Customer Lifetime Duration (contd.)

- Customer relationships
  - Contractual ("lost-for-good"): Lifetime duration is time from the start of the relationship until the end of the relationship (e.g.: mobile phone contract)
  - Noncontractual ("always-a-share"): Whether customer is active at a given point in time (e.g.: department store purchase)
  - One-off purchases
Customer Lifetime Duration when the Information is Incomplete

Buyer 1: complete information
Buyer 2: left-censored
Buyer 3: right-censored
Buyer 4: left-and-right-censored
P (Active)

- Probability of a customer being active in time t

- \( P(\text{Active}) = T^n \)
  
  Where, \( n \) is the number of purchases in a given period
  
  \( T \) is the time of the last purchase (expressed as a fraction of the observation period)

- Non-contractual case

For an advanced application see:

Estimation of P(Active)-Example

An x indicates that a purchase was made by a customer in that month

To compute the P(Active) of each of the two customers in the 12th month of activity

For Customer 1: T = (8/12) = 0.6667 and n = 4
  P(Active)1 = (0.6667)⁴ = 0.197

And for Customer 2: T = (8/12) = 0.6667 and n = 2
  P(Active)2 = (0.6667)² = 0.444
Win-back Rate

- Contractual and non-contractual situations

- Proportion of the acquired customers in a period who are customers lost in an earlier period

- Indicates either a successful communication of an important change in the product offering or service or a change in the customer needs
Minicase: American Airlines

- Leading scheduled air carrier running both passenger and cargo services
- Uses Database Marketing for efficient customer acquisition
- First to implement a frequent flyer program (AAdvantage)

**Purpose:**
- To induce current members to spend more of their flight dollars with American Airlines
- To efficiently target new prospects and convert patrons of competing airlines

**Strategy: Cooperation with the credit card company American Express**
- To identify attractive customers who are not American Airlines flyers
- Provide attractive offers to these prospects for inducing them to try American Airlines
Summary

- In the absence of individual customer data, companies used to rely on traditional marketing metrics like market share and sales growth.
- Acquisition measurement metrics measure the customer level success of marketing efforts to acquire new customers.
- Customer activity metrics track customer activities after the acquisition stage.
- Lifetime duration is a very important metric in the calculation of the customer lifetime value and is different in contractual and non-contractual situations.