

**Behavior-Based Personalization:
Strategies and Implications**

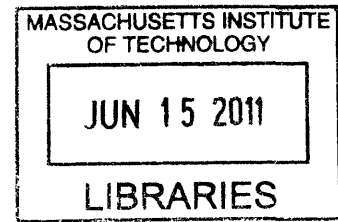
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ARCHIVES

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Behavior-Based Personalization: Strategies and Implications

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ABSTRACT

The personalization of services and products offered to customers is becoming crucial for the success of companies. Firms that can maintain a personalized relationship with their customers will not only gain an advantage from competitors but will also benefit from having more loyal and valuable customers. The recent advances in technology and the associated cost reduction are allowing companies to gather information about their customers and their behavior in an easy and inexpensive way. This collection and analysis of behavior-based information increases the companies' knowledge about their customers and allows a more personalized approach.

This thesis studies what has been accomplished in the domain of behavior-based personalization and in more detail what are the techniques and strategies being used and how companies can take advantage of its applications. Moreover, this thesis discusses the critical role of personalization in building effective customer relationships management (CRM) strategies.

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Table of Contents

1.	Introduction	6
2.	Evolution of Market Segmentation.....	9
2.1	From Mass Marketing to Segmentation	9
2.2	Geographic Segmentation	10
2.3	Demographic Segmentation	11
2.4	Psychographic Segmentation.....	11
2.5	Behavior-Based Segmentation.....	13
3.	Behavior-Based Personalization Techniques	15
3.1	Rule-Based Personalization.....	17
3.2	Content-Based Personalization.....	18
3.3	Collaborative Filtering Personalization	20
3.4	Hybrid Personalization Systems.....	23
3.5	Website Morphing	24
4.	Behavior-Based Personalization Applications.....	27
4.1	Clustering	27
4.2	New Products, Bundling and Pricing.....	27
4.3	Cross-Selling.....	30
4.4	Advertising	33
4.5	Personalization as a Value Proposition.....	36
5.	Personalization and CRM	39
5.1	Customer's Lifetime Value and Profitability	40
5.2	Customer Acquisition.....	43
5.3	Customer Satisfaction, Loyalty and Retention.....	46
5.4	Privacy Issues	48
6.	Conclusion.....	51
7.	References and Readings	53

1. Introduction

There are no companies without customers and companies that don't understand their customers' needs are losing the opportunity to provide better service and will eventually be overtaken by competitors. Companies are moving to customer centric organizations, pulling information about their customers' behavior in order to design better services and products instead of trying to push existing products to customers without knowing how well they actually meet customers' needs. Being able to understand customers and provide them with specific, tailored and personalized services and products is becoming a crucial aspect of any business.

The evolution in technology and reduction in data storage costs is making it easier to collect information about customers. In the online world, every single click a user makes can be stored and analyzed. Offline companies are also adopting strategies, such as loyalty programs, to be able to identify customers and track the interactions they have with them. The information about the behavior of customers and they interactions with companies allows the development of personalized services or products tailored to each customer's needs. Companies such as Amazon and Netflix are well known for using web personalization. By tracking users' behavior they are able to personalize the content of web pages and provide personalized recommendations to each customer.

According to a survey from Forrester Research in 2007, around 69% of the respondents considered online personalization somewhat valuable or valuable and 8% extremely valuable. The same survey also showed that 54% of respondents noticed personal recommendations when shopping online and 34% of them purchased products based on these recommendations. Behavior-Based personalization values the unique identity of each customer, building better and more effective relationships with customers. Customers in turn get better service and more suitable products from companies. Benefits for companies include, among others, increased customer loyalty, increased economic

value of each customer, increased brand awareness and increased customer satisfaction, resulting in increased revenues and profits.

The purpose of this thesis is to discuss behavior-based personalization, the ways it can be implemented and the strategies and implications involved. **Chapter 2 - Evolution of Market Segmentation** begins with a background on the evolution of segmentation, from the times when companies were product-centric and used very simple and limited ways of segmenting their customers to current ways of segmentation such as the ones based on the historical behavioral of customers that can then be used for personalization purposes. This chapter examines how market segmentation has been changing and discusses the evolution from mass market approach to a one-to-one approach. **Chapter 3 – Behavior-Based Personalization Techniques** discusses some of the most relevant behavior-based personalization techniques. Although these techniques have been mainly tested and used online, they can also be applied to brick and mortar stores and companies. This chapter discusses simple implementation techniques and others requiring more complex algorithms and computational power. Some of the techniques are very recent and their evolution is expected in the future. **Chapter 4 – Behavior-Based Personalization Applications** discusses the applications of behavior data gathering and personalization, from new ways of finding clusters of customers based on their historical behavior to the personalization as a value proposition for companies to differentiate themselves from competitors. Other applications discussed include the cross-selling and up-selling of products as well as ways of reshaping product offering, bundling of relevant products and price discrimination. New trends on advertising such as personalization concerns are also discussed in this chapter. **Chapter 5 – Personalization and CRM** discusses behavior-based personalization as part of a broader company strategy that mainly focuses on customer relationship management (CRM). Customer valuation, acquisition and retention are among the core aspects of CRM in which personalization can have a crucial impact. It is important to note that customers have serious concerns in regards to privacy and how their personal information is being used. These concerns and the ways to minimize them are also discussed in this chapter.

Chapter 6 - Conclusion wraps up the thesis and discusses future trends of behavior-based personalization as well as some challenges companies will face in the future.

2. Evolution of Market Segmentation

2.1 From Mass Marketing to Segmentation

Knowing relevant characteristics and information about consumers within a market is essential for the success of a business since it allows companies to approach the consumers in a more efficient way. Companies can then segment the market and target products, services or communications to groups of customer with similar characteristics. A consumer's market might consist of thousands or millions of different individuals. Companies might choose to ignore the differences among consumers and adopt an undifferentiated strategy offering the same product or services, with the same price and characteristics to the entire market (*mass marketing*). Or they might want to create clusters of consumers according to some criteria, creating *segments*, to be able to differentiate products or services for each consumer segment (*segmented marketing*). The more detailed is the criteria chosen the more the individual characteristic of each consumer is captured resulting in segments composed by each customer that composes the market (*one-to-one marketing*).

The evolution in the car industry gives a good example of the difference between mass marketing and segmented marketing. When Henry Ford built the T Model, he was selling the same model with the same color to everyone. Henry Ford used to say that "customers could choose any color they want, as long as it was black". The strategy of Henry Ford was to deliberately ignore any differences between customers, targeting an average customer to achieve the largest market share possible. This is a perfect example of mass marketing. A few years later, GM led by Alfred Sloan understood that customers were not all alike and that he could build value by offering different products to different types of customers. Sloan segmented GM's customers by their lifestyle characteristics and created a new GM brand for each segment. GM introduced the Chevrolet as the plainest and least expensive car in their line and the Cadillac as the fanciest and most expensive car. In between, by

increase order of price and stylishness, GM introduced the Pontiac, Oldsmobile and Buick. This segmentation helped GM to overtake Ford as the market leader in the beginning of the 1930s.

Over the last few decades, market segmentation has been the target of great transformation and evolution. Marketers have found, during this period, better ways of understanding their customers and consequently segmenting their market. This resulted in more efficient product designs, market assessment, customer reach and better communications. The evolution of the PC and databases allowed gathering of huge amounts of data about customers' behavior that then can be used with data mining, artificial intelligence algorithms, clustering analysis and others. This chapter discusses the main topics on this segmentation evolution, from the simple geographic segmentation to the more advanced and technology dependent behavior-based segmentation (Oliviera-Brochado and Martins 2008), (Bailey et al 2009), (Quinn 2009), (Bayer 2010).

2.2 Geographic Segmentation

Geographic segmentation was the first criteria to be used for segmenting a market. It was used during the pre-industrial era since geographical distances made it very difficult to do business across several geographic regions. We can also find this type of segmentation in the car industry just before Henry Ford entered the industry. There were several car manufacturers that built cars mainly for affordable customers living in the surroundings of manufactures' factories. These were mainly hand-made cars that would take a long time to build and were very expensive.

More recently, geographic segmentation looked at criteria that were very specific to a particular region and therefore demanded a specific product offer. Examples of such criteria are: climate, population density and population growth rate.

2.3 Demographic Segmentation

Market segmentation evolved from geographic criteria to a new set of demographic variables that were found to represent patterns of customer consumption. These findings were first mentioned by Irwin Friend and Irving B. Kravis (1957). The research started with segmentation variables such as occupation, race, income class and other socio-economic characteristics. In 1960 Henry Munn studied the impact on segmentation using variables such as age, income and education in some markets. By 1969, social class substituted income as a segmentation variable. This was due to the fact that income was converging among social classes and were not representing as well as social class the life style, taste and consequent purchase behavior.

During the 1960's, demographic criteria was the most popular criteria for market segmentation. The main reason for this popularity was its simplicity. In fact, nowadays, demographic segmentation is still one of the most popular methods of market segmentation. It is often the first choice of market segmentation and positioning strategy for many organizations due to the fact that these variables are very easy to obtain and measure and allow these organizations to categorize the needs of their consumers on the basis of such demographic variables.

A list of demographic segmentation variables that are commonly used are: Age, Gender, Family Size, Family Status, Income, Social Class, Occupation, Education, Ethnicity, Nationality and Religion.

2.4 Psychographic Segmentation

Psychographic segmentation is a method of dividing consumer markets based on consumers' psychological characteristics such as personality, values, attitudes and lifestyle.

Psychographic segmentation derived from research made in clinical psychology, where researchers were interested in the psyche of consumers, focusing on the attitudes and opinions of people seeing consumers as different personalities rather than number in statistical figures.

Personality studies and linkage with market segmentation have been conducted since 1950's. A number of researchers such as Evans (1959), Koponen (1960) and Westfall (1962) have been trying to link personality with buying behavior. However the studies never achieve great evidence on this linkage. Nowadays, it can be argued that the lack of significant results was caused by the difficulty to accurately measure personality since most tests were developed for clinical use and not for segmentation purposes. As measurement instruments develop and became more reliable, greater evidence between personality and buying behavior has been demonstrated. For example, it has been shown that personality sometimes influences the clothes, make-up and hair styles that individuals adopt (Dibbet et all, 2001).

Another concept of psychographic segmentation is lifestyle segmentation, which was introduced in the 1970's. This is a step forward compared to the simple understanding of personality by grouping consumers based on how they live and spend their time as well as other demographic factors such as income, education and place of residence. The characteristics most widely used for lifestyle segmentation are related to people's activities, interests and opinions, known as the AIO rating system, by Plummer (1971).

Activities	Interests	Opinions
Work	Family	Themselves
Hobbies	Home	Social Issues
Social Events	Job	Politics
Holidays	Community	Business
Entertainment	Recreation	Economics
Club Membership	Fashion	Education

Community	Food	Products
Shopping	Media	Future
Sports	Achievements	Culture

Lifestyle dimensions (Plummer 1974)

Lifestyle segmentation is mainly achieved using psychographics techniques which are more difficult to measure accurately than other types of segmentation variables. Moreover the relationship between psychographic variables and consumer's needs are sometimes obscure and unproven, and the segments that result from psychographic segmentation may not be reachable (Dibb et al, 2001).

2.5 Behavior-Based Segmentation

Behavior-Based segmentation uses the history of customer's purchases and interactions with the company to come up with potential segments of the market or even to offer personalized products or services on a one-to-one basis. Behavior-Based segmentation uses data gathering such as customers' frequency of purchases, monetary value, number and reason of complaints and, in the digital era, even customers' product search and web pages search that can be analyzed to generate customer segments. With the advance in technology, gathering high volumes of data has become easier and less expensive. Therefore customer data is now collected massively both on the web and in the physical stores. Several companies established loyalty and discount programs. They give their customers cards with unique identification numbers that allow them to track all transactions customers make. On the web, all it takes is a login identifier and even more information regarding the interactions customers perform on companies' site can be gathered. All these data can then be analyzed and patterns can be found to generate segments and to identify relevant information than can leverage demand.

Moreover, behavior-based segmentation can help companies gather information about their customers in order to personalize product or service offers as well as personalized campaign messages via text messages, email, mail, phone calls and website interaction. All these can lead to more sales per customer, higher retention and greater profitability. It can also help identify where marketing investment should be done. In the end, managers get higher return per dollar spent when they implement the behavior-based segmentation and personalization (Tsai and Chiu 2004).

Ultimately, behavior analysis can lead to segments of one individual. This leads to the marketing of one-to-one, where each customer is looked at individually and has all his interactions with a company tailored to her needs. Behavior-Based analysis can then make companies identify different segments, but can also allow companies to identify individual characteristics and separate each customer from the other in order to provide one-to-one personalized products.

3. Behavior-Based Personalization Techniques

Behavior-Based personalization is a process that focuses on what customers have done in the past and then identifies individual tastes or characteristics of the customers. Companies are then able to present products, services or communications tailored to each customer's individual preferences. It allows companies to increase customers' experience by anticipating what a unique customer or group of customers in a predefined segment is interested in purchasing or just interested in having more information about. Personalization can be as simple as identifying a customer's name or as complex as tailoring each and every interaction that a company has with their customers. With the recent advances in technology and the data storage costs decreases it has become easier and cheaper to personalize commercial products. This is particularly true for websites where it is very easy to follow users' click streams and dynamically change pages. Retailers offline are also finding ways to collect information about their customers in order to offer personalize services. The widespread use of loyalty cards is one example of how offline retailers can track the behavior and interactions of their customers. Moreover, *radio-frequency identifiers* (RFID) can be used in stores to provide a way of intelligent communication with customers. These can be used, for example in clothes tags with intelligent mirrors that can communicate with customers at the time they are trying on the clothes. It is then able to provide recommendations for complementary clothes or other suggestions based on the information about previous customers and inventory in stock. For websites, all the collection of data and association with each customer is more easy and cheap. At the same time, all the content of the websites can be easily changed in real-time. Both online and offline personalization relies on three main stages. First, information from customers' interactions is collected, then the information is processed using personalization techniques and algorithms and finally a personalized outcome is presented to the customer (Jong et al 2001), (Godek 2002), (Adomavicius and Tuzhilin 2005), (Segaran 2007).

The collection of data can be done in explicit forms in which customers are asked to their personal information in a questionnaire, or by implicit ways in which each interaction of customers is stored. These interactions can also take the form of the information concerning the purchases done by the customers or, in the case of websites, the click stream and page navigation history of users.

Personalization techniques and algorithms can be as simple as manually defining rules that will look at the input information and decide which personalized output to present, and as complicated as relying on complex statistical algorithms that examine all the historical data from all customers to come up with personalized recommendations for each one.

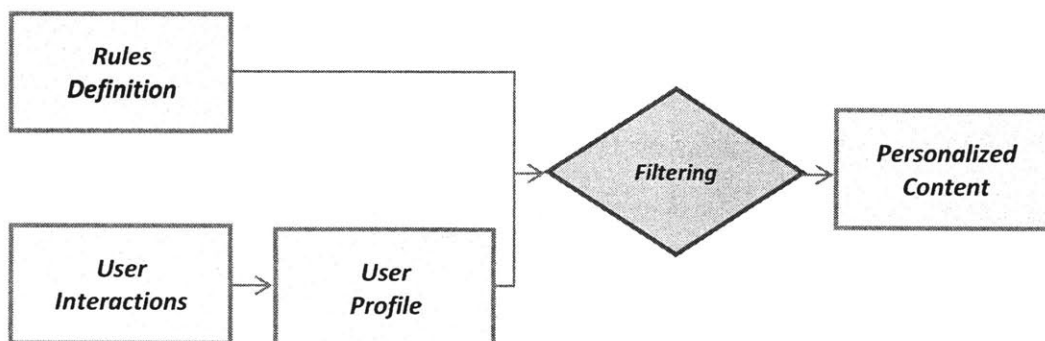
The personalized techniques presented in this section are used mainly online although as long as the relevant information is gathered they can also be applied to offline companies. A summary of these techniques is showed in the table below.

<i>Rule-based</i>	Uses predefined rules to show different personalized content for different input information
<i>Content-based</i>	Uses features associated with products and ratings that a user has given to provide personalized content and recommendations
<i>Collaborative Filtering</i>	Looks at other customers similar behavior history to provide personalized content and recommendations to a particular user
<i>Hybrid</i>	Combines two or more techniques in one system to achieve synergies among them
<i>Web Morphing</i>	Dynamically changes web pages based on perceived cognitive style of each customer

3.1 Rule-Based Personalization

Rule-based systems are the simplest systems that implement personalization or recommendations of web content. This method relies mainly on explicit interactions with the user to gather information regarding the user preferences and demographics to build a user profile. Once the user profile is built with the user's preferences, a rule-based filtering process is applied to provide the personalization of the web content that will be shown to the user. This rule-based filtering is usually a manual process set-up by website administrators. This can, however, be seen as a way of setting simple rules based on demographics, psychographic or other personal characteristics of users. For example, some specific items, web pages or ads can be shown to people from a specific region or of certain age group.

A typical rule-based system will consist of four steps. The first step consists on the definition of rules, which are manually set by a web administrator. These rules follow a set of business logic that will use the user profile definition to defined personalized content. The second step is defined by the user interactions, normally done explicitly by identifying user preferences and demographics. This information is then used to build the user profile. The first two steps will be processed in the filtering stage through an algorithmic form of the type "if ... then ... else" to provide the personalized outcome that will be seen by the user in the last step. These steps are represented in the next diagram:

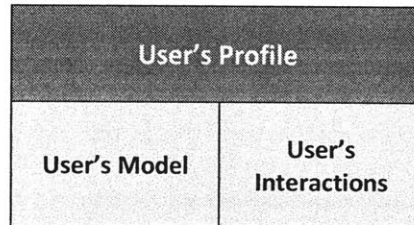


As can be seen from the diagram above, rule-based personalization is very dependent on manual inputs of rules and user preferences. This makes this system difficult to maintain, as web administrators might be requested to change the rules often and is also subject to user profile bias as users explicitly define their preferences. Moreover, this system is prone to have very few updates on the user profile making it very static and therefore causing a downgrade in performance over time as profile ages. On the other hand, this is a simple system to implement that doesn't require many elaborate algorithms.

3.2 Content-Based Personalization

Content-based personalization is a method that will recommend items based on descriptions that are more likely to interest the user. A wide range of items can be used, including web page content, restaurants, movies and items on sale. This method is based on two main information dimensions, first a list of descriptions for each item must be gathered, either in a structured or unstructured way, and then a user's profile must be built. Item's descriptions will often be stored in database tables where the columns will represent the properties of each item. If these properties are limited to a specific set of values, then the data will be presented in a structured way and machine learning algorithms to build user's profiles will be easier to implement than with unstructured data, as in the case of a newspaper article or customer's opinions. In the last example there are no well defined item's properties containing limited amount of possible values. This unstructured data can be found in many applications where a personalization might be wanted. Because of that, some special techniques will need to be used in order to represent the data in a structured or semi-structured way, by for example selecting a small subset of the terms of a free text as properties or attributes of an item. Once the items can be represented in a structured way, a variety of machine learning algorithms can then be used to generate the user's profile.

The user's profile contains two types of information, the user's model of preferences and the history of the user's interactions with the system.



The user's model represents the user's preferences and therefore the types of items the user will most be interested in. A function can be built to predict the level of interest of the user in each item. This function can then be used to list a specific number of items most likely to be of interest to the user. The user's interactions represent the history of interactions between the user and the recommendation system. Examples of interactions that can be registered include purchases of items, rating of items, queries typed by the user, pages viewed and articles read. The history of user interactions can be used to display recently visited items, a list of items the user has already purchased or, in the case of content-based personalization, it can be used as training data for a machine learning algorithm that creates a user's model.

The history of interactions of the user can be obtained either by an explicit feedback interface, as rating items, liking or disliking items or by implicit feedback observing the user interactions in regards to particular items. For example if the user purchases an item, it is an indication that she liked the item, if the user returns an item, then on the other hand, it is an indication the user didn't like the item. This information is then used with machine learning algorithms to build the user's model. Example of algorithms for content-based recommendations include *decision trees and rule induction, nearest neighbor methods, Rocchio's algorithm and probabilistic methods as the naïve Bayesian classifier.*

As mentioned before, content-based personalization systems work better with structured data. This might not be possible for some web applications, where special techniques might be required to transform free text into structured data, allowing the use of the content-based algorithms. This process might imply some degradation on performance and recommendation effectiveness. Moreover, content-based personalization may over-specialize, recommending only items that match the content features of the user's model, whereas items that do not contain the exact same features may not get recommended even if they are similar. In case where opinions of other users are collected it might be useful to complement content-based personalization with collaborative filtering personalization.

3.3 Collaborative Filtering Personalization

Collaborative filtering allows personalization or recommendation of items to a specific user based on the opinions of other users. In other words, collaborative filtering might be seen as bringing the power of "word of mouth" to the personalization system. It typically works by searching a large group of users and selecting a subset with similar tastes as the user. Then, based on the subset group's likes and dislikes, a ranked list of items is created. Items can consist of a wide range of things, such as books, movies, CDs, web pages, ads, news articles or vacation destinations. User's interaction with the system is collected by means of item ratings, and this historical data is then used for personalization and recommendations. Ratings can be given by explicit or implicit feedback. Explicit feedback can be given in the form of scalar rating or binary choices of like/don't like. Implicit feedback can be observed by the system in the same way as seen in content-based personalization, for example, what items the user viewed, or linking purchases to "like" and returns to "don't like".

A good example of collaborative filtering is the website *MovieLens* developed by the *GroupLens* project. This website represents a dataset of movies where users can rate each movie they've seen

using a scale from 1 to 5 stars, where 1 is “Awful” and 5 is “Must See”. The more movies a user rates, the better the system will recommend other movies for this user. *MovieLens* requires a minimum of 15 movies to be rated by the user when first creating an account:

Welcome to MovieLens!

Thank you for joining MovieLens! In order to generate personalized movie recommendations, we need to know a little about what movies you have already seen. MovieLens will now display several lists of movies. If you have seen any of the listed movies, please rate them using the rating scale shown below.

Ratings are on a scale of 1 to 5:

★★★★★ = Must See
 ★★★★☆ = Will Enjoy
 ★★★☆☆ = It's OK
 ★★☆☆☆ = Fairly Bad
 ★☆☆☆☆ = Awful

Remember: the more movies you rate, the more accurate MovieLens' predictions will be.

To rate a movie, just click on the pulldown next to the title of a movie you have seen. Blue stars will appear to indicate that your rating has been received.

★☆☆☆☆ 1.5 stars **Dude, Where's My Car? (2000)**

DVD, VHS, info | imdb
Comedy


































This image shows that the movie 'Dude, Where's My Car?' was rated 1.5 stars.

I'm ready to start rating!

So far you have rated 1 movies.
 MovieLens needs at least 15 ratings from you to generate predictions for you.
 Please rate as many movies as you can from the list below.

	Your Rating	Movie Information	next >
★★★★★	4.0 stars	Cider House Rules, The (1999) Drama	
???	Not seen	U-571 (2000) Action, Thriller, War	
???	Not seen	Spy Hard (1996) Comedy	
???	Not seen	King Kong (1933) Action, Adventure, Horror	
???	Not seen	Hollow Man (2000) Horror, Sci-Fi, Thriller	
???	Not seen	Muppet Treasure Island (1996) Adventure, Children, Comedy, Musical	
???	Not seen	Young Guns (1988) Action, Comedy, Western	
???	Not seen	Waking Ned Devine (a.k.a. Waking Ned) (1998) Comedy	
???	Not seen	Down Periscope (1996) Comedy	
???	Not seen	Shallow Grave (1994) Comedy, Drama, Thriller	next >

With the information provided by the user, *MovieLens* then compares the user's rating with the ones of other users and provides a list of movies that the user will be interested in. The site even predicts the rating that the user would give for each unseen movie.

Prediction or Rating ↕	Your Rating	Movie Information	Wish List
★★★★★	Not seen ▾	From the Earth to the Moon (1998) DVD info imdb flag Movie Tuner  Action, Documentary, Drama, Thriller [add tag] Popular tags: true_story  space  Tom Hanks 	<input type="checkbox"/>
★★★★★	Not seen ▾	Band of Brothers (2001) DVD info imdb flag Movie Tuner  Action, Adventure, Drama, War [add tag] Popular tags: true_story  based on a book  World War II 	<input type="checkbox"/>
★★★★★	Not seen ▾	American History X (1998) DVD VHS info imdb flag Movie Tuner  Crime, Drama [add tag] Popular tags: politics  prison  Edward Norton 	<input type="checkbox"/>
★★★★★	Not seen ▾	Toy Story 3 (2010) DVD info imdb flag Movie Tuner  Adventure, Animation, Children, Comedy, Fantasy, IMAX - English, Spanish [add tag] Popular tags: Pixar  animation  Tom Hanks 	<input type="checkbox"/>
★★★★★	Not seen ▾	Dear Frankie (2004) DVD VHS info imdb flag Movie Tuner  Drama, Romance [add tag] Popular tags: scotland  deafness  Ireland 	<input type="checkbox"/>
★★★★★	Not seen ▾	Godfather, The (1972) DVD info imdb flag Movie Tuner  Crime, Drama - English, Italian [add tag] Popular tags: Mafia  based on a book  Oscar (Best Picture) 	<input type="checkbox"/>
★★★★★	Not seen ▾	Good Will Hunting (1997) DVD VHS info imdb flag Movie Tuner  Drama, Romance [add tag] Popular tags: psychology  Robin Williams  mathematics 	<input type="checkbox"/>
★★★★★	Not seen ▾	Hotel Rwanda (2004) DVD VHS info imdb flag Movie Tuner  Drama, War [add tag] Popular tags: genocide  true story  based on a true story 	<input type="checkbox"/>
★★★★★	Not seen ▾	Inception (2010) DVD info imdb flag Movie Tuner 	<input type="checkbox"/>

This type of system can also be used to find other users that have the similar tastes in movies. For example, a user might want to find a subset of users with the same interests and then view the movies that they have watched that the user has not yet seen. In an e-commerce website, the system might collect purchase's history data in order to recommend other products to a customer, and at the same time, recommend a single product to a group of people with common interests. This might be useful for marketing campaigns as well as for making sure new web pages or items are seen by the users that will most likely enjoy them.

There are two main ways of building collaborative filtering systems, *user-based filtering* and *item-based filtering*. User-based filtering compares the user's rating history with the rating history from other users. Although this will offer the best results, as the number of users and items increases, this process can turn out to be very slow. An alternative way is to use item-based filtering, where the system identifies similar items. The recommendation is then done by looking at the top-rated items and creating a list of the items most similar to them. Since comparisons between items will not change as much as comparisons between users, they can be computed at low-traffic times or in a separate system avoiding degradation in performance to the end user.

Some of the algorithms used for collaborative based personalization are *user-based nearest neighbor, with Euclidean distances or Pearson correlation, decision tree classifiers, neural networks and support-vector machines.*

3.4 Hybrid Personalization Systems

Hybrid personalization systems are systems that combine two or more personalization or recommendation systems to achieve synergies among them. These systems normally use different information and offer a more detailed and focused personalization when needed. They can also be used to overcome some of the gaps of other systems, as in the cold-start problems of collaborative or content-based systems that required historical and rating data from several users to provide relevant recommendation to new users.

Hybrid systems might consist of a combination of personalization systems that use rule-based personalization, requiring information about customer’s needs and preferences and knowledge based systems or other systems that require user’s rating information as the content-based and collaborative recommendation systems. Moreover, these systems can also be combined with personalization based on a demographic profile of the customer. The table below shows the personalization techniques and their knowledge sources:

	User’s Demographics	User’s needs and preferences	Product’s Features	User’s Ratings
Demographic Personalization	X			X
Knowledge-based Personalization		X	X	
Content-based Personalization			X	X
Collaborative Personalization				X

Source: *The Adaptive Web*





There are different ways by which hybrid personalization or recommendation systems can be combined using information across different sources. Among these different ways we can find the *weighted solution* where the score of different recommendation components are combined numerically, the *switching solution* by which the system chooses among different components and applies the selected one, the *mixed solution* where different recommendations and personalization are presented together, the *feature combination solution* where features derived from different sources are combined and given to a single recommendation algorithm and the *meta-level solution* where one personalization technique is applied and produces some sort of a model, which is then used by the next technique (Burke, 2007), (Brusilovsky et al 2007).

3.5 Website Morphing

Website morphing (Hauser et al 2009), (Urban et al 2009) relies on the concept that people feel more comfortable and are more willing to trust other people that think the same way they do. This method then improves website communication to match customers' cognitive styles to build empathy, trust and sales. The idea behind this is that each person is different and has specific ways of interpreting the information that is presented to them. Some are more analytical and deliberative and therefore like to have a lot of data to compare before making a decision. Some people are more visual and like to receive information in form of images or pictures, while others process information better if it is presented in words. By recognizing this cognitive differences and being able to identify which style each customer fits into, websites can be morphed into the best format for each individual to increase the effectiveness of the information sent and improve the empathy and trust between website and user, resulting in better information and higher likelihood of purchase.

By analyzing the interactions of a user with a website, a morphing system can identify which cognitive style the user belongs to. There are several cognitive styles, and a website should use the

ones that are more relevant in the context and purposes for which they are presented. Some dimensions of cognitive styles that have been used with website morphing, had revealed how important the marketing decision are: analytic vs. holistic, deliberative vs. impulsive, verbal vs. visual and leader vs. follower. The website can then vary its features as pictures, graphics, content length, technical level, tone of language or others in order to match the user's identified cognitive style. A user that's identified as being both analytical and visual will see lots of pictures illustrating all key areas, whereas a user that's identified as verbal and holistic will see few and small pictures and more comments and benefits and summary of key phrases. Below is an example of a web ad that takes into consideration two cognitive dimensions, analytic vs. holistic and deliberative vs. impulsive:

	<i>Analytic</i>	<i>Holistic</i>
<i>Deliberative</i>		
<i>Impulsive</i>		

Source: Prof. Glen Urban

As in other personalization techniques, web morphing uses user data interaction to learn about their cognitive styles as well as to learn which site morphs are the best to present to each cognitive style. By the time there are sufficient visitors and interactions the system would have learned about

the best morph site to present to new visitors. Website morphing uses a Bayesian Inference Engine to analyze a user's interactions throughout the site in order to infer the user cognitive style. Then, based on the identified cognitive style and the success rate learned from previous morph web pages used with other users for each cognitive style, the system is able to select the best morph page to present to the user. The system uses "*Gittins indices*" algorithm to classify each morph page for each cognitive style with an index and then selects the one with the highest index. When the user leaves the website the index is updated with the purchase information - whether or not the user purchased the item.

Website morphing is a relatively recent personalization technique that has been used in a few applications. However, the results so far show an increase in sales of about 20%.

4. Behavior-Based Personalization Applications

4.1 Clustering

As seen previously, market segmentation has evolved from considering only generic geographic and demographic variables to also considering customer behavior in the segmentation process. The main reason is that customer behavior either on its own or in combination with other segmentation's variables, represents customer needs better than the traditional methods. The assumption that customers with similar demographics, and even lifestyles, will exhibit the same purchasing behavior is very doubtful. Clustering is an analysis method that identifies group of consumers with common attributes or behaviors, which can be applied to a limited number of variables or to complex multivariate data. This can be particularly useful when working with large amount of data from retail stores, either online or offline. The customer purchasing behavior can then be analyzed and results used to form clusters of customer homogenous groups. The behavior's variables can include among others, items purchased, returned, frequency of purchases, intentions of purchases (such as wish lists) and amount of money spent. Retailers that track this information can use clustering to detect groups of customers with similar buying patterns. Clustering can then be used in combination with other information, such as demographic information to create better and more representative segments. People of similar ages can have very different tastes when purchasing movies or shoes, but by identifying similar behavior patterns about groups from within the same region, companies can adopt better marketing and better retail strategies (Sinha and Medury 2010).

4.2 New Products, Bundling and Pricing

By knowing their customers behavior, retailers can personalize their product offering to each individual. Using the methods described in the previous chapter, retailers can come up with new

products or services that best match the preferences of their customers as observed in their historical behavior. The advent of mass customization, where customers manually customize their products is becoming popular in online stores. However this concept can be leveraged if the seller can predict and anticipate the product and product's configuration the customer is most interested in. This creates a completely new customer experience with added value for both customer and seller. The customer can even give her input to the final product in a normal customization interaction. By providing a recommendation, the seller is not only saving customer's time, but also providing a product that it's believed to be of interest to the customer and might even have some unexpected and valued outcome (Fan and Poople 2006), (Mugge and De Lange 2007), (Montgomery and Smith 2009).

A retailer can also create new product offering by selling two or more items as a package, a concept known as bundling. Bundling can take the form of *price bundling*, where two or more separate items are sold in a package at a discount, or *product bundling*, where two or more items form an integrated product sold at a specific price. Price bundling can easily be implemented as it is a promotional tool, whereas product bundling is more of a long-term differentiation strategy as it might require the integration of physical goods. Some experimental studies, as the study of online bundling strategies by Yang and Lai (Yang and Lai 2006), reveal that bundling can produce increase in sales and profits. The benefits will occur only if proper bundling is applied and different products are linked together to create valued bundling products. Other research also shows that customers are sensitive to the cost of value-added items when bundled in one package. Knowing customers purchase behavior and knowing how to predict customers' interest in new and related items can be crucial when implementing effective bundling strategies. In addition to the personalization algorithms reviewed before, other algorithms such as *learning association rules* methods can be applied to the purpose of bundling. These algorithms analyze data from several customers' interactions in order to discover patterns and associations between products and purchasing behavior. The best-known algorithm for learning association rules is the *Apriori* algorithm, which is

designed to operate in databases containing transactions, such as customers' purchases in a retail store. The typical variable to be analyzed is the purchase transactions, but other variables such as browsing data and shopping-cart data (before the order is submitted) can also generate interesting results (Stremersch and Tellis 2002).

Historical customer purchase behavior, either collected online or off-line using scanners or loyalty card data, can be used to measure customers' price sensitivity (Villas-Boas 1999), (Fudenberg and Villas-Boas 2000), (Acquisti and Varian 2005), (Zhang 2011). Although other variables, such as competitor's prices and promotions, brand awareness and power, and general economic condition can influence the analysis, the historical data can give a very good indication of the customer's price sensitivity which can then be used to more effective price setting, either to each individual or to segments of customers. This can be particularly useful, when setting prices for new products, or when evaluating new promotions (Zhang and Wedel 2009). Nevertheless, this type of analysis should not be the unique factor to consider when setting prices, as other variables also influence customer's willingness to pay. Dynamic pricing is gaining popularity particularly on the internet where costs to change prices are low and the changes can be done quickly. Dynamic price can help business maximize return per customer and provides increased information regarding customers' willingness to pay allowing companies to create better product configurations and services at prices that customers would be willing to pay (Nagle et al 2011). There are commercial software applications that help managers define best web pricing strategies and optimize prices based on previous purchases and responses to promotions. E-commerce software that offers this price optimization technology includes *Zilliant*, *Khimetrics*, *Optivo* and *Talus*.

Dynamic pricing and price or promotional discrimination should be used with the notions that customers might perceive these actions by the seller as unjustifiable and unacceptable. Customers will not like to know they are being charged more for a product than other customers. Companies should try to avoid bad feedback and upsetting their customers. Customers should perceive value

from the products that are being personalized to them. Strategies to overcome these concerns include the use of promotions based on well perceived criteria, price bundling and various value-added features at different prices than the original item. There can also be legal aspects to dynamic pricing and price discrimination that should be taken into account. However, one of the key factors that make price discrimination unlawful is if it affects the structural integrity of competitive markets. This significantly reduces the likelihood that an e-commerce business finds itself in an unlawful situation when using price discrimination, since there are several e-commerce companies in the same competitive market and therefore it is difficult to change the entire structure of the market as a whole. "As long as the price differences are based on reasonable business practices—such as rewarding loyal customers and do not discriminate based on race, gender, or other impermissible categories, dynamic pricing appears to be legal" (Weiss and Mehrotra 2001).¹

4.3 Cross-Selling

Nowadays the cost of acquiring a new customer is far greater than the cost of cross-selling products or services to existing customers. Moreover, the results of effective cross and up-selling not only increase profitability but also increase brand equity and customer satisfaction. The ability to provide good recommendations to existing customers is greatly related to the quantity and quality of information a company has about its customers. Online sellers have easy access to multiple data from its customers, this applies to not only order history but also items viewed, items in the shopping cart that were not placed as an order, pages viewed, flow of navigation and others. Offline sellers have a bit less information available since it is harder to collect. However, the information from loyalty cards and purchases made at point of sale can be of great value for the purpose of cross-selling. Other information about customers and customers behavior can and should be

¹ For a more detailed overview of theoretical studies of behavior-based pricing refer to "Dynamic Competition with Customer Recognition" (Fudenberg and Villas-Boas 2007).

collected, namely from customer service and sales representatives. This information can be of crucial importance since it identifies some complaints and needs that customers have, probably resulting in new cross and up-sell opportunities. Information from different channels should be gathered and maintained in a unique repository for efficient analysis.

Cross-selling is a sales technique intended to get a customer to purchase an item she initially did not intend to buy. Up-selling is a technique by which the seller tries to convince a customer to buy a more expensive item or an upgraded version of an item that the customer initially planned to purchase. The ultimate purpose of both techniques is to increase the sale volume. These techniques can be communicated to the customer by a salesperson, an ad (online or offline) or by an online recommendation communication of the type “If you like item A, you may also want to consider item B”, or in the form of “Customers who bought this item also bought:” as Amazon practices:



Cross-selling should be done in a manner that creates value not only for the seller but also for the customer. The recommendations should be done in a positive way without trying to push the customer to buy something she doesn't want, risking a bad experience for the customer. If done properly it will increase the value for both sides.

One of the moments cross-selling can be most effective is during the checkout process. This is a great opportunity to recommend complementary products, or promote related items from a predefined list. Moreover, by knowing the behavior of the customer during that online session, promotions or recommendations can be done for some of the products that the customer was clicking through. Cookies can be assigned to online sessions to identify customers and track their

behavior such as pages viewed or queries done. The system can then personalize the content that the customer is viewing based on her clickstream and other information previously collected, such as the location. Location is a variable that can be obtained both explicitly, when customers registers at a website, or implicitly by checking the customer's computer IP address or their mobile phone GPS chip. Knowing the location can be used for proximity cross-selling where products or services relevant to the customer's location are recommended or advertised.

Methods such as association rules' algorithms can also be used for cross-selling recommendations as they are used for bundling. The recommendations methods explained earlier, such as content-based and collaborative filtering are among the best techniques for cross-selling recommendations. Netflix's Cinematch system uses collaborative filtering to recommend movies to its customers that they have not yet seen. These recommendations are based not only on the historical data of movies a particular customer has rated but also on ratings of movies provided by other customers.

Offline retailers can also benefit from analyzing customers' behavior for better selling approach. Where online sellers track clickstreams, offline retailers can track store's flow. With this knowledge they can direct flow in a way that will optimize customers' exposure to products that will be of their interest, as well as cross-selling relevant and high-margin products in the same proximity.

Cross-selling by knowing consumer previous behavior gives companies a great opportunity to build strong relationships with their customers. The better the recommendations, the more customers will trust and rely on them. Amazon builds trust with its customers when, as in the example below, it knows what complementary products will or will not work with a main product a customer bought in the past. This adds value for the customer, for the seller and for the buyer/seller relationship.



HP 45 Black Ink Cartridge in Retail Packaging

by HP
★★★★☆ (67 customer reviews) | Like (0)

List Price: ~~\$44.94~~
Price: **\$30.55** & eligible for free shipping with **Amazon Prime**

In Stock.
Ships from and sold by **Amazon.com**. Gift-wrap available.

Want it delivered Wednesday, March 23? Order it in the next 2 hours and 28 minutes, and choose **One-Day Shipping** at checkout. [Details](#)

271 new 10 used from \$4.99 2 refurbished from \$5.49



Will This Work with Your Printer?

No! This won't work with the **HP DeskJet F4480 Inkjet All-in-One Printer (CB745A#B1H)**

[Find ink or toner that works](#)

[Find a different printer](#)

Will This Work with Your Printer?

No! This won't work with the **HP DeskJet F4480 Inkjet All-in-One Printer (CB745A#B1H)**

[Find ink or toner that works](#)

[Find a different printer](#)

Will This Work with Your Printer?

Yes! This will work with the **HP DeskJet F4480 Inkjet All-in-One Printer (CB745A#B1H)**

[Find a different printer](#)

4.4 Advertising

The previous concepts of clustering segments, bundling, promotions and cross-selling recommendations can all leverage the effectiveness of a marketing campaign. The knowledge of customers' behavior can be used to tailor brochures and ads that can be sent to customer either online or offline. Combining historical behavior data with demographic information about customers will help provide personalized communication that will deepen the level of relationships with customers. The more information about customers' interactions a company can collect, the better the analysis and the better the personalized communication. Although online sellers have this information in greater quantity and more accessible than offline ones, the latter should gather customers' information from all channels (customer service, point of sales, sales teams, etc.) in one database for better analyses and better marketing campaigns, personalization and targeting. By

analyzing previous purchases, retailers can predict future needs and prepare marketing campaigns for those products. An apparel retailer might send a catalog with baby clothing to women that were buying maternity clothes one year before. Complementary products, as inkjet cartridges, can be recommended via email to buyers of inkjet printers. These recommendations can take the form of catalogs or newsletters sent by mail or email, or can take the form of online Ads either on the retailer's website or other websites. The effectiveness of these campaigns can also be measured very easily. Click troughs, bounce back and purchases made can be tracked and linked with each campaign to measure its success. The flexibility of these campaigns and tools used also allow for experiments and fine tuning. On the other hand, retailers should be aware of their companies' brand equity and should prevent intrusive and non-desired campaigns. These actions should have positive communications, where the customer can see value. Personalization tools can help with this purpose, and there should also be minimum predefined time gaps between two campaigns to avoid saturation. It is important to find out whether customers are willing to receive these campaigns. Customers should be asked to opt-in for such marketing actions.

Another advertising aspect that can greatly benefit from customers' behavior data is advertising targeting, also known as behavior targeting. Google uses past search queries, users' demographics and users' website navigation (gathered from sites related with Google as videos users see on youtube) to profile users and with that offer personalized Google ads with behavioral targeting. The next text is the abstract of Google's patent for "*Results based personalization of advertisement in a search engine*" (United States patent):

"Personalized advertisements are provided to a user using a search engine to obtain documents relevant to a search query. The advertisements are personalized in response to a search profile that is derived from personalized search results. The search results are personalized based on a user profile of the user providing the query. The user profile describes interests of the user, and can be derived from a variety of sources, including prior search queries, prior search results, expressed interests, demographic, geographic, psychographic, and activity information."

Google also uses the user's profile built from all the interactions between users and Google's related website in *Google Display Network* to place relevant ads in target websites. Therefore, as in the example from Google, if a user is often viewing websites related to gardening, Google will associate this user as a "gardening enthusiast". Moreover, if Google has information regarding this user's demographics, such as gender or location, it will add this information to those demographic categories. Therefore, while the user navigates the websites from *Google Display Network*, specific gardening ads with the relevant demographic information will be showed to this user. This is accomplished through the use of cookies and again can be intrusive to the user. In case users find the ads intrusive they can either clear their cookies on a regular basis or choose to opt out from the Google system (in the *Ads Preference Manager* page).

Google Ads Preferences

Make the ads you see on the web more interesting

Many websites, such as news sites and blogs, partner with us to show ads to their visitors. To see ads that are more related to you and your interests, edit the categories below, which are based on sites you have recently visited. [Learn more](#)

Your interests are associated with an advertising cookie that's stored in your browser. If you don't want us to store your interests, you can opt out below.

Watch our video:

[Ads Preferences explained](#)



Ads Preferences affect ads that Google shows on other websites.

Your categories Below you can edit the interests and inferred demographics that Google has associated with your cookie.

Category

Demographics - Age - 25-34 ?

[Remove](#)

[Add categories](#)

Google does not associate sensitive interest categories with your ads preferences.

Opt out Opt out if you prefer ads not to be based on interests and demographics.

[Opt out](#)

When you opt out, Google disables this cookie and no longer associates interest and demographic categories with your browser.

Other services that offer behavior targeting advertising include Yahoo, Advertising.com and AlmodNet.

Even the traditional advertising channel, the TV, is evolving and trying to understand viewers' behavior for better content personalization and targeting. With the interactive TV (ITV), companies and advertisers can interact with viewers to gather explicit information that can be added to the

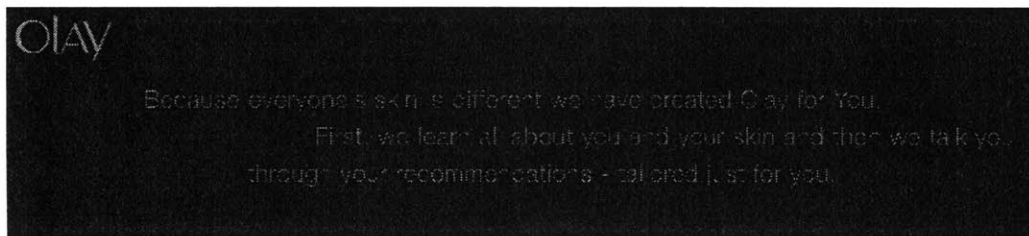
implicit one, depending on what type of TV show or movie the viewer is watching at the moment. This information can be used to extend communication with the viewers and to tailor specific offers at the moment, as a promotion or a coupon for a store in the viewers' location. Flexible, creative and customized TV interfaces can be built for better and more engaging interaction with the viewers. Games and "long form" advertising video on demand can leverage this interaction. ITV allows one-to-one interactions with viewers offering great return potential for companies and advertisers.

4.5 Personalization as a Value Proposition

Nowadays, businesses are evolving towards a concept of offering specific products and services to each individual customer. It is moving towards a market of one. Offering products and services that are personalized or customized to individual customers is becoming a way of differentiation from competitors. We often see the word "You" in companies' advertisings and communications. Being able to offer something that matches "Your" specific needs is a differentiator element that stands out among so many mass market products. Many companies already offer mass customized products, where customers, normally through a web interface or in person with a sales representative, customize their products according to their own needs. Products such as bicycles, fabrics, clothes, shoes and even chocolates and cosmetics can be customized to every single customer. In the example below, *chocri*, a chocolate company differentiates itself from other chocolate companies by allowing its customers to design their own chocolate bar.



Even P&G is using the same strategy to help customers choose from the wide selection of cosmetic products. The cosmetics' brand *Olay* has a personalized service designed to find out more about its customers and to understand their behavior when it comes to skin care and what goals for their skin care they have. This is a service that can be offered in a store or online through a special website that simulates the conversation with the customer in order to make the tailored recommendations.



Mass customization requires, however, that the customer does all or a big part of the final customization process of a customized product by providing explicit feedback. As seen before, personalized products can be suggested and obtained by analyzing implicit feedback from previous customers' behavior, which can then be associated with some explicit information if necessary.

Personalized products and services that are "*just for you*" can not only be a way for companies to differentiate themselves from competitors but also the main or unique way to differentiate. In this way personalization is the main value proposition companies are offering to their customers. Last.fm and Pandora are two examples of web radios that use personalization as the value proposition of

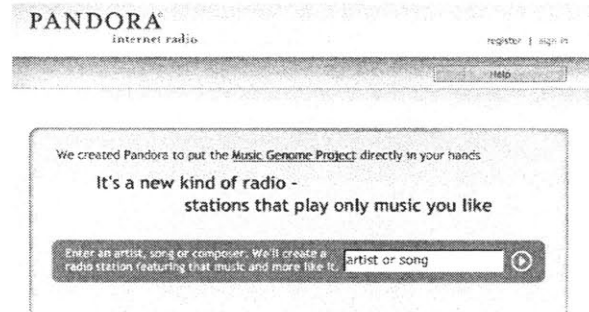
their product offering. Content-based and collaborative filtering methods are used to analyze customer's behaviors and music associations to recommend music tailored to each user.



Need new music?

Last.fm lets you effortlessly **keep a record of what you listen to*** from any player. Based on your taste, Last.fm recommends you more music and concerts!

*We had to invent a word for this, it's called [scrobbling](#).



Knewton, an online learning company that prepares students for tests such as SAT, GMAT and LSAT, has the “adaptive learning engine, that customize educational content to meet the needs of each student” as its main value proposition. This represents a big difference from the traditional classrooms where the same material is provided to all students. At Knewton, content is dynamically created to match each student’s learning curve. As students continue their test preparation and do sample tests, the learning engine identifies the concepts the student knows and how she learns best. Netflix is another example of the importance of personalization for the value proposition of the company. In October 2006 Netflix launched the Netflix Prize, an open competition for the best algorithm to predict movies’ ratings by users based on previous ratings. The goal was to beat Netflix current recommendation algorithm by an increase of 10% in prediction accuracy. The competition went on until September 2009 and the winning team got a prize of \$1,000,000. This competition represents how important the personalized recommendations are for Netflix and how they create an added value for its customers (Murtaza and Greer 2003), (Smith 2005), (Beasty 2007).

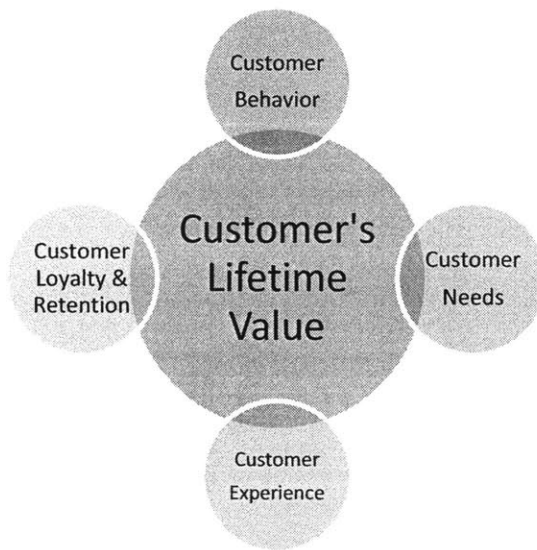
5. Personalization and CRM

Behavior-Based personalization should be a part of a wider business strategy, a strategy with a customer centric focus where the interactions and relationships between the firm and its customers are among its main concerns. Customer Relationship Management (CRM) is such a business strategy. CRM focuses on customer's relationships and interactions in order to increase value for the customer at the same time as it increases the company's knowledge about its customer base, therefore creating value for the company as well. Gartner defines CRM as "a business strategy designed to optimize profitability, revenue and customer satisfaction by organizing the enterprise around customer segments, fostering customer-centric behaviors and implementing customer-centric processes" (Gartner Inc. 2004). Another definition of CRM says it's "a strategy used to learn more about customers' needs and behaviors in order to develop stronger relationships with the customers" (Thakur 2010), (Bolton 1998). CRM relies heavily on data from its customers and therefore requires investments in databases and data warehouse systems as well as analytics and reporting applications. Knowing the customer base and having the relevant information to build meaningful reports is crucial for a successful CRM strategy and implementation. CRM should provide a clear picture of the customers to leverage the company's relationships with them. Data should be gathered at any contact point, either at a sales point, contact center, by a sales representative or via web interface and it should be centralized in one data warehouse system. This information should then be used to understand customers' needs, predict them and anticipate them. It should also be used to understand who the most valuable customers are, how and how often do they interact with the company and their feedback on the service and products they are acquiring. Finally, by using all this information, each new interaction with a customer can be tailored and personalized for a greater value for both the company and the customer. According to Murkejee and Singh (Mukerjee and Singh 2009) the goals of CRM include customer profitability, behavior prediction and segmentation and personalization. As the quality of relationships between companies and

customers increase, so will the reciprocal value that each player sees in the other, resulting in more profitable and equally importantly, more durable relationships. By perceiving the personalized attention customers are being offered, they increase the level of trust and loyalty with companies. The entire customer experience improves and the barriers to look for products of another company where this level of relationship is not yet established get higher. This increases loyalty and retention rates of customers, another important goal of CRM (Anton and Petouhoff 2002), (Harney 2003), (Horn et al 2005), (Jackson 2007), (Raab 2008).

5.1 Customer's Lifetime Value and Profitability

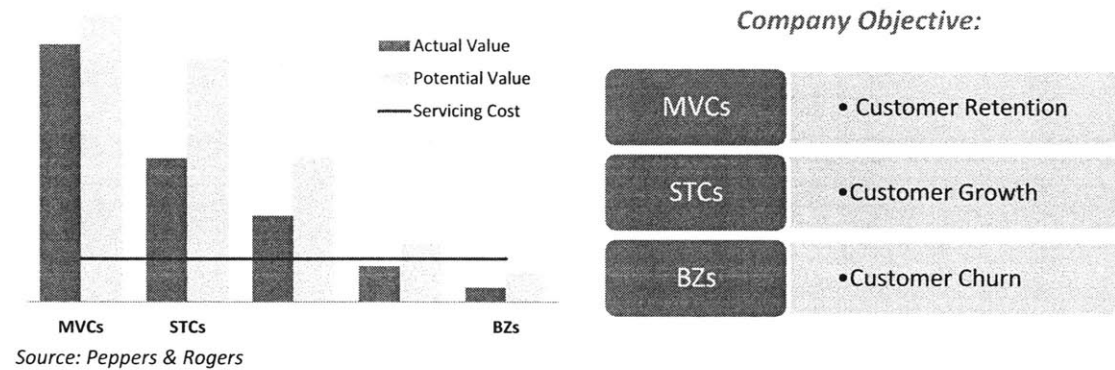
Lifetime Value (LTV) of a customer represents the future expected profit of a customer throughout the time the company and the customer maintain a relationship (Lošt'áková 2009). It is important to note that the value of a customer can go beyond the profit made by its expected purchases. As seen before in collaborative personalization, the feedback that a customer gives to a company can be very valuable for the interaction with other customers. This information adds value to the profit made by purchases alone. Moreover, good company reputation and good word of mouth will also contribute to its value. Understanding customer's interactions and behaviors allows companies to understand customers' needs, creating value for both parties. Understanding customers' behavior and needs also creates better relationships with customers, resulting in more loyal customers and better retention rates. Both the value created and the extension of the expected "lifetime" between the company and the customer increases the customer's lifetime value.



Knowing the lifetime value of its customer base can be very important for a company's profitability. A company can understand the spectrum of its customers' values. Who are the most profitable and valuable customers? What are the behaviors and needs these customers have? Why are other customers not as valuable? What can be done to move some customers from a low end to a higher one in the value spectrum?

With the information about the lifetime value of its customers, a company can segment them across different value ranges. Peppers and Rogers (1997) divide customers in three main strategic values, the most valuable customers, the second-tier customers and the below-zero customers. The most valuable customers (MVCs) are the ones with the highest lifetime value. These are customers that represent a great part of the company's profitability. These are customers that a company tries to retain. The second-tier customers (STCs) are those that although they don't have the highest value, they have the highest unrealized potential value. These are customers with a great potential to grow and become MVCs. Great emphasis should be made towards this segment of customers in order to understand what is preventing these customers from realizing their full value potential. The below-zero customers (BZs) are the ones that along their lifetime will not make enough profit for the

company to justify the expense involved in serving them. These are customers that the company can and should not focus on.



Having the knowledge of customers LTV's segmentation can allow companies earn greater profits. With this knowledge companies can apply a different set of options, as the ones seen in the previous chapter about the applications on personalization to retain and increase customer value. Credit card companies profile their customers according to their purchasing behavior history to give customers different type of credit card (such as platinum, gold, and silver). Then each of these customer segments has a different relationship with the company, which can include services and benefits as well as opportunities for personalized products.

In general, lifetime value can be calculated using the following formula:

$$LTV = \sum_{a=1}^N \frac{(M_a)r^{(a-1)}}{(1+i)^a} - AC$$

Where **N** is the number of years over which the relationship is calculated, **M_a** is the margin the customer generates in year **a**, **r** is the retention rate, **i** is the interest rate and **AC** the acquisition cost (adapted from Ofek 2002).

5.2 Customer Acquisition

In order to manage the lifetime cycle of a customer, a company needs to start by acquiring new customers. New customers can be those who are entirely new to the company or just new to a category of products. The strategies and costs associated with each of this acquisition type are very different. Acquiring existing customers to a new category of products will normally be less costly than acquiring a totally new customer. The strategies for each customer will also differ since for existing customers the company will have much more information to work with and already have an existing relationship with the customer. Understanding the potential lifetime value of acquiring a customer to a new category should be the first step. This value should then be compared with the cost associated with acquiring or promoting this customer to a new category. Ultimately, companies are looking for net contributors. Cross-selling and up-selling are the strategies to follow and they should be done at the most adequate and profitable channel according to the value of each customer.

Acquiring new customers to the company will, in general, be very expensive. Potential customers (also called prospect customers or leads) can be new to the industry and looking for the best offer or customers of a competitor company. The level of commitment of a customer with a company influences the likelihood that customer will switch to another company and also increases the cost that the other company needs to pay to attract the customer. Again, estimating the value that potential customer will generate and the customer acquisition cost is of crucial importance for generating profits. Companies also need to understand the level of commitment of their current customers to understand how customers perceive their relationships with the company and if they are looking for alternative companies. The Conversion Model™, developed by Jan Hofmeyr, segments customer's and non-customers' commitment level into four segments. The companies can identify which customers are at risk of defecting and which non-customers are available to join. Customers are categorized as *entrenched* or *average*, representing the committed customers and as

shallow or *convertible*, representing the uncommitted ones. Non-customers are categorized based on their availability levels according to their commitment scores. *Available* or *ambivalent* represent the open customers willing to change, and *weakly unavailable* and *strongly unavailable* represent the unavailable and not willing to change customers.

Customers	Non-Customers
<p>Committed</p> <p>Entrenched: customers who are strongly committed to the brand they are currently using – they are highly unlikely to switch brands in the future</p> <p>Average: customers that are also committed to the brand they are currently using, but not as strongly – they are unlikely to switch brands in the short-term</p>	<p>Available</p> <p>Available: non-customers of the brand who most likely to be acquired in the short-term</p> <p>Ambivalent: non-customers that are as attracted to other brands as they are to their current brand</p>
<p>Uncommitted</p> <p>Shallow: customers who are uncommitted to the brand and could switch – some are actively considering alternatives</p> <p>Convertible: customers of the brand that are most likely to defect</p>	<p>Unavailable</p> <p>Weakly: non-customers who are not available to the brand, but only weakly</p> <p>Strongly: non-customers who highly unlikely to switch to another brand, their preference lies strongly with their current brand</p>

Source: Conversion Model™

Commitment is presented as a way to understand how strong the relationships between customers and products or services are. Commitment is seen more as a psychological measure than a behavior one, which is more associated with loyalty. “Loyalty is what people do, the likelihood of repurchase based on past behavior. Commitment, on the other hand, is about how people feel, the likelihood of repurchase based on what’s in the consumer’s mind” (Conversion Model™). The goal is to understand how happy the customer is with the current company, if he cares about the relationship she has with the company and if there’s any alternative product that appeals to her and how strongly. Understanding customers in these parameters can be helpful for both acquisition and retention strategies. When the number of available and ambivalent non-customers is greater than

the number of uncommitted customers companies should focus on acquisition strategies (Buttle 2009).

Customer acquisition will rely heavily on identifying customer opportunities, called leads or prospects in the B2B world or on advertising products through traditional or new social media channels to customers in a B2C business. For B2C, more emphasis on advertising, word of mouth or merchandising is needed than for the B2B, which depends more on sales team prospecting for potential customers. Every acquisition program should be concerned with assessing the number of customers acquired, the cost per customer acquired and the value of the acquired customer. New customers that are captured by the firm through word of mouth will not only cost less but also will, on average, have a higher value. Customers attracted by first time promotions might have low loyalty and therefore a low lifetime value. Advertising can be very costly, and should therefore be done through proper segmentation and by proper channel for each identified segment. This will result in better targeting, lowers costs and a higher conversion rate. Campaign management software can be of great help to identify segment of potential customers and send out messages through different channels such as email, direct mail, text messages, and outbound calls.

In the internet world, companies should monitor the acquisition costs and customers' value by acquisition channel. They can associate each customer's value with the channel that was used to acquire her. This way, customer's value and profitability can be linked to customer cost by channel, and the best channels can then be identified. The companies can identify the channels that are not profitable and the channels that are profitable and then restructure their acquisition channels accordingly. Companies can also identify potential customers that are visiting the website but have not made any purchase yet. The management cycle here is based on attraction, engagement, conversion and retention. Again, it's important to focus on the right channels and ways of attraction and conversion that guarantee lower acquisition costs and higher customer value.

5.3 Customer Satisfaction, Loyalty and Retention

In order to retain loyal customers companies must be able to satisfy customers' needs. Customers that see their needs fulfilled and are happy with companies' services or products and quality of relationships are more likely to be loyal. The satisfied customers not only decrease the need to search for alternative companies, but also have an increased value since they will be the source of positive word-of-mouth, as well as the source of feedback for cross-selling recommendations. Moreover, these customers have lower price sensitiveness. Customer satisfaction should therefore be measured regularly. It should be done via surveys and it should include current customers, as well as former and competitors' customers. The studies should measure the gap between customers' expectations and products received or perceived, as well as services or products received when compared with competitors. These studies should be taken and compared over time to see the evolution of specific customers' satisfaction over time. Feedback of these surveys can then be used to implement action plans to manage and match customers' expectations ultimately improving the relationships with customers and their satisfaction level (Fudenberg and Tirole 2000).

Most companies spend the majority of their resources trying to acquire new customers, but there is as much or even more value in keeping good customers and growing existing customers to higher profitability levels. Customer retention is not only less costly than customer acquisition but it can provide greater value from customer referrals, increase willingness to pay and increase purchases over time. As seen before, it is important to identify which customers to retain and which customers to let go. For the ones companies should retain, customers' lifetime value and commitment will identify which customers the company should make efforts to develop to higher level of profitability and which ones don't require that much energy and resource. Customer retention can be defined as "the number of customers doing business with a firm at the end of financial year, expressed as percentage of those who were active customers at the beginning of the year" (Buttle 2009). A note on this definition should be made in order to replace the year for the relevant period of each

business, depending on the customer purchase cycle. Since typically, customer lifetime value and commitment increases over time, it makes sense to spend more on trying to retain customer in the beginning of the lifecycle.

There are two main strategies for customer retention: negative and positive retention strategies. Negative strategies will be the ones that penalize customers for exiting a relationship with a firm. Positive strategies are, on the other hand, the ones that reward customers for remaining in a relationship with a company. Negative strategies normally impose high switching costs on customers, discouraging their defection (Buttle 2009). Although these negative strategies can be effective in increasing the retention of customers, they can have a high cost for the company. The customers might feel trapped and become therefore unsatisfied, which will lead to bad word of mouth and bad referrals and ultimately less value for the company.

It is therefore important to retain customers through positive strategies. Customers can start by understanding their customer needs and expectations and match or exceed them. Managing customers' expectations is of great importance if companies wish to have satisfied and loyal customers. By knowing customers' expectations and perceived service received, companies can manage their own performance to guarantee that the perceived service customers receive matches or exceeds their expectations. Otherwise, customers can look into competitors for better service. Companies can also try to increase the perceived value that customers get from the service they receive. This can be achieved by loyalty schemes or sales promotions. Loyalty programs can be defined as "a scheme that offers delayed or immediate incremental rewards to customers for their cumulative patronage" (Buttle 2009). These schemes incentivize retention of customers since customers get added value for maintaining a longer relationship with the company by purchasing more often and spending more. The rewards are seen by customers as recognition from the company and this reinforces their loyal relationship and satisfaction. Loyalty schemes can however be costly and emphasis should be made on the analysis of their effectiveness in creating value for

the company. Companies can also adopt these programs in a form of “club membership” where some customers can have privileged interactions with the company because they belong to these clubs. Club membership will have a positive psychological effect on customers making them feel as part of the company family. Sales promotions can also be a strategy used to retain customers, being more effective than those that offer vouchers or some other kind of reward for future purchases.

Building positive bonds with customers and creating strong engagement with them will most likely increase customer retention. At the same time the companies are managing these positive strategies to increase retention they should also keep monitoring customer churn. Research on customers should be done to understand the causes of churn and the key indicators that can be managed to prevent it. Monitoring customer behavior can provide early warning signals of change in behavior on key indicators that can lead to customer churn. By identifying them, companies can take early actions to prevent defection.

Customer management requires not only the adoption of strategies for customer retention but also strategies to grow customer value or to terminate relationships with customers when the cost of retaining them is higher than the lifetime value they provide. Personalization techniques can be of great use in increasing customer value and can be combined with CRM campaign management where personalized products can be made to customers, together with cross-selling and up-selling of relevant products or services.

5.4 Privacy Issues

Personalization and CRM relies on gathering interactions data between customers and companies. Moreover, demographic or other types of information might be requested from customers to increase marketing and personalization effectiveness. While marketers try to get their hands on all possible information about their customers, they need to understand that many customers have

concerns regarding having their historical behavioral tracked and might find it as an intrusion to their privacy. Customers need to feel they are in a positive and trustworthy relationship, and companies should make all the efforts to maintain this perception. While the benefits of tracking customers' interactions will ultimately be shared by both companies and customers, the latter can have several privacy concerns regarding the use of their personal information. To minimize these concerns, companies should give customers an option to choose that their information will only be used by the company for marketing or other actions, either before the information is actually gathered. In this case customers are choosing to "opt-in". Alternatively, after data has been used, the customers are offered the option to end the usage of this data, by "opting-out". Each country has its own laws and managers should be aware of them and act accordingly. As a general rule, if only website' clickstream data is being collected then giving customers the option to "opt-out" is a good compromise. If other data is also being collected and used, such as demographic and other personal information, then customer should be given the option to "opt-in". Companies should also make it clear whether the gathered data is intended to be shared with third-party entities. The clearer the customer's understanding of what personal information is being used for, the more confident she will be with the company's intentions of using their data for value proposition. This will make customers more active in the process and better personalization can be achieved. Surveys shows that customers want to be treated differently, each customer has specific needs and for companies to provide these personalized services they need personal data, therefore the more friendly and open this information gathering relationship is, the more value can be shared between both customers and firms.

Companies should keep in mind that privacy issues are a real concern and should do everything to minimize it. As more data is available online and from other channels, the more customers and people in general fear about their privacy being exposed. There is currently a movement defending the need for law on opt-out mechanism. The "Do not track me online act of 2011" defends the opt-out mechanism should "allow a customer to effectively and easily prohibit the collection or use of

any covered information and to require a covered entity to respect the choice of such consumer to opt-out of such collection or use” (Data Privacy Monitor, 2011). Other findings correlate privacy issues with ads’ targeting and obtrusiveness. Ads’ that match websites’ content and are obtrusive will decrease the likelihood of purchase mainly because of privacy concerns, i.e., customers who have privacy concerns will react negatively to these ads (Goldfarb and Tucker 2011).

Studies shows privacy concerns from customers are above all regarded with data dissemination rather than the usage of data for personalization of products or services. Therefore, firms should take this to their advantage and proactively find strategies to properly deal with customer concerns regarding data privacy and use it as a joint value added (Awad and Krishman 2006), (Wathieu and Friedman 2009).

6. Conclusion

The advances in technology over the last few years have helped shape the way business is done and the way companies relate to their customers. Interactions and relationships between companies and customers are managed in a more individual and personalized way. Not doing this can result in missing great opportunities for companies and eventually losing business altogether. Doing personalization properly, can on the other hand, provide companies with a clear competitive advantage. Ultimately, personalization will not only increase a company's value but it will also create value for customers. Personalization should be seen as part of a broader corporate strategy where customer relationship management is the main focus. This assures a correct alignment between personalization implementation, goals and performance and the corporate strategies. Key indicators should be measured to provide feedback on the effectiveness of the personalization implemented.

Behavior-Based personalization is in constant evolution and the future will reveal great improvements in this field. The one-to-one marketing approach is becoming a reality and new ways of leveraging the potential of that approach are being investigated and will be implemented in future. Technology is improving the way to understand customers and the way to offer better and more relevant personalized products. Digital TV is a technology that offers great potential for behavior-based personalization approaches. New trends in advertising are appearing with the inclusion of several personalized elements. Web morph Ads can already identify different user's cognitive style and present different Ads for each style. In the near future this can evolve further and lead to even more effective personalized Ads.

There are still several challenges ahead for behavior-based personalization. Mass customization is becoming more popular with companies offering customers the possibility to design their own products. However, this still relies heavily on explicit feedback from customers and there is a clear opportunity for improvement in this area by anticipating customers' tastes and providing a customized product based on the knowledge acquired from the customer implicit feedback. The

correct and effective measure of personalization's key indicators and its integration in a customer relationship management strategy is another area where companies and researchers should be constantly trying to improve and where new metrics can still be considered and introduced. Privacy issues are also a topic that customers are becoming more and more concerned with and will represent a challenge for both companies and governments in the near future.

7. References and Readings

- Acquisti, A., & Varian, H. R. (2005). Conditioning prices on purchase history. *Marketing Science*, 24(3), 367-381.
- Adomavicius, G., & Tuzhilin, A. (2005). Personalization technologies: A PROCESS-ORIENTED PERSPECTIVE. *Communications of the ACM*, 48(10), 83-90.
- Amazon. Retrieved March, 2011, from www.amazon.com
- Anton, J., & Petouhoff, N. L. (2002). *Customer relationship management : The bottom line to optimizing your ROI* (2nd ed.). Upper Saddle River, N.J.: Prentice Hall.
- Awad, N. F., & Krishnan, M. S. (2006). The personalization privacy paradox: An empirical evaluation of information transparency and the willingness to be profiled online for personalization. *MIS Quarterly*, 30(1), 13-28.
- Bailey, C., Baines, P. R., Wilson, H., & Clark, M. (2009). Segmentation and customer insight in contemporary services marketing practice: Why grouping customers is no longer enough. *Journal of Marketing Management*, 25(3), 227-252.
- Bayer, J. (2010). Customer segmentation in the telecommunications industry. *Journal of Database Marketing & Customer Strategy Management*, 17(3), 247-256.
- Beasty, C. (2007). *The name of the game: Personalization* Information Today Inc.
- Brusilovsky, P., Kobsa, A., & Nejdl, W. (2007). *The adaptive web : Methods and strategies of web personalization*. Berlin ; New York: Springer.
- Buttle, F. (2009). *Customer relationship management : Concepts and technologies* (2nd ed.). Amsterdam ; Boston: Elsevier/Butterworth-Heinemann.
- Conversion model. Retrieved April, 2011, from <http://www.conversionmodel.com/content.asp?page=home&head=home>
- Data privacy monitor. Retrieved April, 2011, from <http://www.dataprivacymonitor.com/>
- Fan, H., & Poole, M. S. (2006). What is personalization? perspectives on the design and implementation of personalization in information systems. *Journal of Organizational Computing & Electronic Commerce*, 16(3), 179-202.
- Fudenberg, D., & Villas-Boas J. (2007). Behavior-based price discrimination and customer recognition. *Economics and Information Systems, Volume 1*,
- Fudenberg, D., & Tirole, J. (2000). Customer poaching and brand switching. *RAND Journal of Economics (RAND Journal of Economics)*, 31(4), 634-657.
- Gartner Inc. (Ed.). (2004). *Reaping business rewards from CRM: From charting the vision to measuring the benefits* Gartner Press.
- Godek, J. (2002). Personalization and customization: Implications for consumer decision making and behavior. *Advances in Consumer Research*, 29(1), 155-157.
- Goldfarb, A., & Tucker, C. (2011). Online display advertising: Targeting and intrusiveness. *Forthcoming, Marketing Science*,

- Google. Retrieved March, 2011, from <http://www.google.com>
- Google adwords. Retrieved March, 2011, from <http://www.google.com/adwords>
- Harney, J. (2003). Personalization and CRM. (cover story). *AIIM E-DOC*, 17(4), 32-36.
- Hauser, J. R., Urban, G. L., Liberali, G., & Braun, M. (2009). Website morphing. *Marketing Science*, 28(2), 202-223.
- Horn, D., Feinberg, R., & Salvendy, G. (2005). Determinant elements of customer relationship management in e-business. *Behaviour & Information Technology*, 24(2), 101-109.
- Jackson, T. W. (2007). Personalisation and CRM. *Journal of Database Marketing & Customer Strategy Management*, 15(1), 24-36.
- Jong, W. K., Byung, H. L., Shaw, M. J., Hsin-Lu Chang, & Nelson, M. (2001). Application of decision-tree induction techniques to personalized advertisements on internet storefronts. *International Journal of Electronic Commerce*, 5(3), 45-62.
- Knewton. Retrieved March, 2011, from <http://www.knewton.com/>
- Last FM. Retrieved March, 2011, from <http://www.last.fm/>
- Loštáková, H. (2009). Benefits of crm differentiated on the basis of customer lifetime value. *Scientific Proceedings of RTU: Economics & Business*, 19, 1-7.
- Montgomery, A. L., & Smith, M. D. (2009). Prospects for personalization on the internet. *Journal of Interactive Marketing (Mergent, Inc.)*, 23(2), 130-137.
- Mugge, R., Schoormans, J. P. L., & De Lange, A. (2007). *Consumers' appreciation of product personalization* Association for Consumer Research.
- Mukerjee, K., & Singh, K. (2009). CRM: A strategic approach. *ICFAI Journal of Management Research*, 8(2), 65-82.
- Murtaza, M. B., & Greer, T. H. (2003). A framework for valuing web site personalization. *Journal of Internet Commerce*, 2(3), 27.
- Nagle, T. T., Hogan, J. E., Ph.D., & Zale, J. (2011). *The strategy and tactics of pricing : A guide to growing more profitably* (5th ed.). Boston: Prentice Hall.
- Pandora. Retrieved March, 2011, from <http://www.netflix.com/>
- Ofek, E. (2002). Customer profitability and lifetime value. *Harvard Business School*,
- Oliviera-Brochado, A., & Martins, F. V. (2008). Aspectos metodológicos da segmentação de mercado: Base de segmentação e métodos de classificação. (portuguese). *Revista Brasileira De Gestão De Negócios*, 10(27), 132-149.
- Pandora. Retrieved March, 2011, from <http://www.pandora.com/>
- Peppers, D., & Rogers, M. (1997). *Enterprise one to one : Tools for competing in the interactive age* (1st ed.). New York: Currency Doubleday.
- Quinn, L. (2009). Market segmentation in managerial practice: A qualitative examination. *Journal of Marketing Management*, 25(3), 253-272.

- Raab, G. (2008). *Customer relationship management : A global perspective*. Aldershot, Hampshire, England ; Burlington, VT: Gower.
- Segaran, T. (2007). *Programming collective intelligence : Building smart web 2.0 applications*. Beijing ; Sebastapol CA}: O'Reilly.
- Sinha, N., Ahuja, V., & Medury, Y. (2010). Effective brand management through consumer profiling using clustering. *IUP Journal of Brand Management*, 7(4), 20-33.
- Smith, A. D. (2005). Exploring service marketing aspects of E-personalization and its impact on online consumer behavior. *Services Marketing Quarterly*, 27(2), 89-102.
- Stremersch, S., & Tellis, G. J. (2002). Strategic bundling of products and prices: A new synthesis for marketing. *Journal of Marketing*, 66(1), 55-72.
- Thakur, R., & Summey, J. H. (2010). Optimizing crm: A framework for enhancing profitability and increasing lifetime value of customers. *Marketing Management Journal*, 20(2), 140-151.
- Tsai, C. & Chiu, C. (2004). A purchase-based market segmentation methodology. *Expert Systems with Applications*, 27(2), 265-276.
- United States patent*. Retrieved April, 2011, from <http://appft1.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PG01&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.html&r=1&f=G&l=50&s1=%2220050222989%22.PGNR.&OS=DN/20050222989&RS=DN/20050222989>
- URBAN, G. L., HAUSER, J. R., LIBERALI, G., BRAUN, M., & SULTAN, F. (2009). Morph the web to build empathy trust and sales. *MIT Sloan Management Review*, 50(4), 53-61.
- Villas-Boas, J. (1999). Dynamic competition with customer recognition. *RAND Journal of Economics (RAND Journal of Economics)*, 30(4), 604-631.
- Wathieu, L., & Friedman, A. (2009). An empirical approach to understanding privacy concerns. *ESMT Research Working Papers ESMT-09-001, ESMT European School of Management and Technology, Revised 14 Jan 2009*,
- Weiss, R. M., & Mehrotra, A. K. (2001). Dynamic pricing on the internet and the future of E-commerce. *Journal of Internet Law*, 4(11), 22.
- Yang, T., & Lai, H. (2006). Comparison of product bundling strategies on different online shopping behaviors. *Electronic Commerce Research & Applications*, 5(4), 295-304.
- Zhang, J., & Wedel, M. (2009). The effectiveness of customized promotions in online and offline stores. *Journal of Marketing Research (JMR)*, 46(2), 190-206.
- Zhang, J. (2011). The perils of behavior-based personalization. *Marketing Science*, 30(1), 170-186.