The Development of a Response-Function for Customer Relationship Marketing

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Abstract:
The paper focuses on the effect of communication on the sales performance within CRM. The paper uses the hotel business as an example to evaluate if communication within Customer Relationship Management creates loyalty measured by the re-purchase behavior of existing hotel guests. The re-purchase behavior is regarded in the paper as the final outcome of loyalty.

The research evaluates the reaction of message receivers who are already customers, which means the receivers know the advertised products and services. Therefore the author assumed that learning effects are not necessary within CRM which leads to the conclusion that an advertising response function for the communication with existing customers should be concave instead of s-shaped. S-shaped response functions though are used in many articles to describe the effects of marketing actions.

To prove the hypothesis the author conducted a quantitative research over a time period of 4.5 years where all marketing and booking transactions of four hotels in Germany were monitored. Due to the fact that hotels are characterized by moderate marketing budgets and brand awareness levels the result of the research should also be applicable for small and medium enterprises (SME’s) in other industries.

The data analysis approved a direct correlation between communication and the sales performance of the hotels. For the first time it was possible to define a response function for CRM, which is a concave increasing function. This new knowledge should stimulate manager to adapt their existing communication strategy and should be used as a basis for further research.

Key words: Response Function, CRM, Communication, Learning Effects
1 Literature Research

1.1 Communication and Customer Relationship Management

Marketing and Customer Relationship Management are strongly intertwined. Already in 1994 Dick, Basau spoke about a dramatic shift in marketing away from a traditional transaction-oriented marketing to a longer-term focus of obtaining and keeping customers.1 Today, the primary focus of marketing activities in an organization is often on the development, maintenance and enhancement of consumer loyalty toward its products or services.2

Customer Relationship Management and Customer Relationship Marketing are commonly used for the same topic, abbreviated with the letters CRM. Customer Relationship Management includes all efforts of a company to positively influence the relationship between a company and a customer in order to stabilize respectively to enhance the relationship.3 CRM requires a sustained program of investing in and developing a wide range of resources e.g. brand, distribution networks, supply chains and know-how.4 Summarized the focus of CRM is to gain and keep profitable customers and those with a high potential.

Harker who analyzed 26 different definitions of Relationship Marketing (RM) respectively Customer Relationship Marketing came to the conclusion that an organization which is engaged in proactively creating, developing and maintaining committed, interactive and profitable exchanges with selected customers (partners) overtime is engaged in relationship marketing.5

Communication plays a central role within Customer Relationship Marketing (CRM). Especially in the service industry a well-structured and valuable communication has a strong effect on consumer perception. Ball, Coelho and Machás cited that a qualitative valuable communication leads to trust, satisfaction and loyalty.6

Following Guffey and Almonte communication is the transmission of information and meaning from one individual or group - the sender - to someone else - the receiver. The main objective of communications is the transmission of meaning.7 Normally communication is the exchange of information between the sender and the receiver. This is slightly different in marketing as in many cases the communication is a one-way transfer of information from the transmitter to the audience.

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Therefore the author follows the definition of Seebohn who describes communication as the exchange of information respectively all forms of information transmission.\(^8\)

The transmission of information can result in learning processes and remembering effects. Since existing customers know the product of a sender the main purpose of communication within Relationship Marketing should be the creation of remembering effects and through that of additional buying impulses.

### 1.2 Response Functions to Measure the Effects of Marketing Actions

Advertisement-Response-Functions are used to refer the quantitative relationship between some input of advertising and some output of presumed value for the advertiser.\(^9\) In literature response functions are mainly described as s-shaped or concave downward increasing functions. Both theories start with the assumption that the efficiency of marketing messages increases disproportionally with a growing communication frequency and that a kind of saturation effect occurs at a certain level.\(^10\) So far the scientific community has not agreed on which of the response functions is appropriate to describe the results of communication actions within Customer Relationship Management. But this is of high interest since this knowledge would have significant effects when it comes to define CRM strategies.

An s-shaped response function is reflecting the theory that consumers have to receive a certain amount of messages before they show a reaction. In order to show the learning effects over time in comparison to the number of messages receivers Zielke exposed consumers to a weekly advertisement campaign over 13 weeks and a second target group to a monthly campaign over a time period of 12 months.\(^11\) The first campaign with 13 advertisements over a time period of 13 weeks with the high frequency caused in high recall numbers during the campaign period with a strong decline after the ending. The second was a monthly campaign evenly distributed over the timer period of one year. The result was a weaker but ongoing digressive increase. The analysis showed that an increased frequency leads to better recall numbers; however the learning effect goes down since oblivion effects work against the learning effects.\(^12\)

Many people in marketing believe that an advertising response function has an inflection point and is s-shaped. Economists such as Dean, Chamberlin, Comanor and Wilson, and Porter claim that there are initial increasing returns to scale of advertising.\(^13\)

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The supporters of the s-shaped logistic response function argue that a consumer needs first some input to afterwards generate a result. The figure above describes this theory and shows the two inflection points, the first when the graph goes upwards and a second when the increase flattens. The area between the two inflection points is the so-called contact-corridor which means too less communication is inefficient as well as too much.\textsuperscript{14} The s-shaped function suggests that the consumer has to first learn a message and needs several contacts to process the content to finally trigger an output. The author assumes that the type of the promoted product plays an important role on the necessity of learning effects to generate measurable results. The less complex a product or the cheaper a product is the less steps are needed to create purchase impulses. Also the consumer knowledge of the advertised products or services should be taken into consideration.

The Three-Hit theory of Krugman supports the s-shaped response function. Krugman differentiates the buying process into three steps. Based on his assumption a consumer has to perceive a message three times. In the first contact the consumer has to learn what the product is, than he has to realize and understand the offered benefits and finally in the third step weather the product fulfills his individual needs or not. Krugman concludes that it is pointless to advertise too little and it is counterproductive to advertise too much.\textsuperscript{15}

Proponents of the Three-Hit theory define effectiveness to be a minimum of three confirmed contacts over an agreed-upon period of time. The number three came to be a commonly accepted industry standard.\textsuperscript{16} But the Three-Hit theory did not necessarily imply a need for three, or even two physical advertising exposures. Kamin analyzed that the probability of perceiving a commercial three times


increases by up to 12 contacts. In his theory 5 to 20 potential contacts are regarded as an effective frequency.\textsuperscript{17} Cannon argues that the three steps are a series of mental steps in message processing which might take place in conjunction with a series of advertising exposures but can also triggered by a single exposure.\textsuperscript{18} The cases of Kamin and Canon show the importance to differentiate between communication frequency and perception of a marketing message, since transmitting does not mean that the receiver perceives the message and learns the content. It can be stated that the Three-Hit theory does not support the assumption that a contact dose should be three messages.

The second response function mainly mentioned is the literature is a concave downward increasing logistic function. The graph in the following figure describes the model. It shows that an output is generated from the beginning on, no learning effects are needed to trigger a reaction.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure2.png}
\caption{Example of an Concave Downwards Response Function}
\end{figure}

Figure 2. Example of an Concave Downwards Response Function
(Source: Own Figure based on Simon J. L., Arndt J. (1980). 'The Shape of the Advertising Response Function'. Journal of Advertising Research, Vol. 20, Number 4, PP. 12-13)

The theoretical root of the concave-downward curve is in the microeconomic law of diminishing returns to productive inputs. At the level of the individual buyer, the reasoning is that a given message conveys less and less information with each additional exposure. Krugman’s Three-Hit theory can also be used to explain the concave curve. Krugman claims that the first exposure creates curiosity, the second brings recognition and first number three creates an output. Following this approach leads to the hypothesis that returns to both frequency and reach for marketing messages are decreasing.\textsuperscript{19}

\textsuperscript{18} C.F. Cannon H. M., Leckenby J. D., Abernethy A. (2001). 'Beyond Effective Frequency: Evaluating Media Schedules Using Frequency Value Planning'. Wayne State University Department of Marketing, PP. 5-6
Dettmer assumes that the efficiency of a marketing message with increasing contacts rises only disproportional and a kind of saturation effect appears.\textsuperscript{20} Simon and Arndt wrote that studies using physical and monetary variables add up to the conclusion that there is no increasing returns to advertising.\textsuperscript{21} This means both disagree with the theory of s-shaped response functions. None of the studies so far analyzed response functions in the context of Customer Relationship Management. The theories of an s-shaped as well of a concave response function follow the same approach that the efficiency of a marketing message decreases at a certain level, at the crest of the graph. Therefore the aspects of reactance as well as of cognitive dissonance will now be reviewed.

The assumption that the efficiency of a message decreases with the frequency leads to the conclusion that a kind of saturation effect appears on the side of the receiver.\textsuperscript{22} The intended positive output of marketing communication opposes the negative effect, the reactance or in other words the resistance against some pressure. The downwards inflection point within a response function can be regarded as a result of reactance from the target group. It means that the inflection point represents a certain communication frequency where an over-commercialization may increase a negative reaction from the sender.\textsuperscript{23}

The reactance theory was developed by Jack W. Brehm.\textsuperscript{24} According to the theory, if individuals feel that any of their free behaviors, in which they can engage at any moment now or in the future, is eliminated or threatened with elimination, the motivational state of psychological reactance will be aroused.\textsuperscript{25} Reactance is also the resistance which normally occurs, if someone feels an inadequate restriction.\textsuperscript{26} If reactance occurs depends on the individual threshold level of the involved person. Below the individual threshold level psychological reactance does not occur. The result of reactance can be a mental as well as a behavioral reaction.

Psychological reactance can be summarized with the resistance against internal or external restrictions or pressures. A high volume of marketing messages can be understood as an effort of hard selling which represents an external restriction which is potentially followed by reactance.\textsuperscript{27} The resistance of consumer against the purpose of influencing through too many marketing messages is called boomerang effect. The condition for the boomerang effect is that the individual threshold level is bypassed.\textsuperscript{28} Behavioral or mental effects occur.\textsuperscript{29} Such an act of defiance occurs if the receiver

\textsuperscript{26} C.F. Schönpfug W., Schönpfug U. (1997). 'Psychologie'. Psychologie Verlags Union, Weinheim, P. 34
\textsuperscript{27} C.F. Rosenstiel L. v. (1996). Psychologie der Werbung; Rosenheim: Komar; P. 183
experiences the effort of influencing as inadequate or too much. The individual tries than to regain its freedom through an opposite reaction.\textsuperscript{30} Psychological reactance occurs normally before a buying decision is made.\textsuperscript{31} Summarized the reactance approach can be regarded as an important brick to define a minimum respectively a maximum communication frequency, also called contact corridor, in which communication generates a positive effect towards a product, a service or a brand.

Beside the reactance theory the cognitive dissonance is a central element of marketing. Within the area of the social psychology the cognitive dissonance theory is regarded as the most influential one of the cognitive consistence theories. Consistence theories explain the pursuit of human beings of reducing conflicts.\textsuperscript{32} The theory goes back to Festinger.\textsuperscript{33} The trigger for cognitive dissonance is the realization of the individual that the decision for a product is also a decision against an alternative, provided that the alternative and the chosen object are on the same attraction level. Another trigger is if the individual buys something which was not its original desire or if the individual gets information afterwards, which devalues or disagree the choice. The fourth trigger is if a person in a position of trust argues that the chosen product is not as good as the alternative.\textsuperscript{34}

It can be summarized that the theory starts at the point where an individual has to make a decision and this process may initiate an internal stress condition. The decision against an alternative can lead to the situation that the individual questioning its decision. This situation of a psychological disagreeable tension is called cognitive dissonance. The individual tries to reduce this uneasy situation in order to come back to a mental balance.\textsuperscript{35} In order to get a mental balance the individual starts a targeted quest for arguments in order to verify the already made decision.\textsuperscript{36} Festinger realized the following psychological reactions: collecting of consonant information in order to argue respectively verify the own decision; appreciation of value of the own decision; ignoring dissonant information which are contrary to the own decision.\textsuperscript{37} The psychological reactance theory is to differentiate from the cognitive dissonance theory as reactance happens before or during a decision, cognitive dissonance instead happens after a decision was made. During the reactance process the alternative is rated more attractive, exactly the opposite happens during cognitive dissonance.

\begin{itemize}
\item \textsuperscript{31} C.F. Felser G. (2001). Werbe- und Konsumentenpsychologie. Stuttgart: Schäffer-Poeschel; P. 15
\item \textsuperscript{32} C.F. Raab G., Unger A., Unger F. (2010). 'Marktpsychologie; Grundlagen und Anwendung'. Gabler Verlag, Wiesbaden, P. 42
\item \textsuperscript{34} C.F. Rosenstiel L. v. (1996). 'Psychologie der Werbung'. Komar-Verlag, Rosenheim, P. 203
\end{itemize}
2 Hypothesis and Development of a Response-Model for Relationship Marketing

2.1 Development of a Response-Model for CRM

Communication within Relationship Marketing has two different functions. The message should remind the receiver about a brand, a service or a product and it should create a new buying impulse now or in the near future. The problem in this context is that a receiver tends to forget even perceived marketing messages typically quite fast.\(^{38}\) Besides the perception of a message, learning effects play a significant role in the scientific research. The theory says that the receiver must learn the content of a message and store it in his long-term memory as normally a time lack exists between the perception and learning of a message and the behavioral effects.\(^{39}\) Semantic networks should positively influence the effect of marketing messages. Within Relationship Marketing the receivers already know the product and combine the sender or the message with some kind of experiences. Semantic networks therefore should support the learning and remembering effects for existing customers.

In order to create a buying impulse the right timing is important. Is the customer at a point in the decision making process where he is searching consciously or unconsciously for information the chance that the message will be perceived and create a positive conative output is better than in times where no travel is planned. It is clear that the higher the frequency the better the chance of the transmitter to contact the consumer in the buying decision phase. Theoretically the more a company communicates with its customers the higher should be the generated outcome.

The goal of reaching an optimal contact frequency conflicts normally with the existing communication budget.\(^{40}\) Although this statement is no longer correct for many online channels. A potential danger today is an over-communication which can create the so called boomerang effect. The reaction can be a disregard of the transmitted marketing messages, the active opt-out for future messages, the migration to a competitor or a negative word-of-mouth. Following the theory from a certain number of communications on additional messages harms the relationship between a sender and the receiver. The author believes that the reaction onto an over-communication of an emotional product like a hotel leads in general only to a disregard of messages not to more severe actions like the migration to a competitor. Therefore the author believes that the response function flattens but does not go downwards.

The fact that with a growing communication frequency of messages increases the level of perception including linked learning effects of the content or the Three-Hit theory of Krugman all result in the assumption of an s-shaped response function for marketing communication. Using the contact corridor model this means that the dispatch of only a few messages would not be effective and a minimum number of actions are needed to generate measurable results. The question to answer is how this theory fits to the approach of Relationship Marketing? Are learning effects needed if a consumer already knows the product?

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The author declines the assumption of an s-shaped response function as learning effects should not play a significant role for current customers which have some level of product knowledge. For Relationship Marketing it should not be important if a customer stayed once or several times in a certain hotel, he consumed and experienced the products and services. The consumer painted a certain picture in his mind; the experience confirmed or disconfirmed the expectations which finally led to satisfaction or dissatisfaction. Therefore no minimum number of contacts should be needed; results should be generated from the first message on. Instead of the s-shaped response function, an increasing concave downward logistic function seems to be more appropriate to describe the effect of communication for Customer Relationship Marketing. Theoretically the main role of communication within CRM is the creation of remembering effects which finally should lead in a re-consumption of the products or services.

2.2 Main Research Question

The literature research revealed that the role of communication frequency in the context of CRM is not answered so far. Although researchers as well as managers agree on that communication is a central part of Customer Relationship Management respectively Relationship Marketing a response-model is not available.

Therefore the main research question the author tries to answer is:

**H0: Does a concave response function describe the role of communication within Customer Relationship Marketing?**

3 Quantitative Analysis of Relationship Marketing Actions

To prove the hypothesis that the response function for CRM is concave the author conducted a quantitave research with secondary data. The data was gathered over a period of 4.5 years from four different hotels. In total 249,742 customers with 474,521 bookings were included in the total data set. In order to rate the value of Customer Relationship Marketing it was necessary to narrow down the test group to the so-called “First-Timers”, new customers which had their first stay within a certain period. The defined lapse of time was the 2nd half-year of 2007. In total 5,222 guests spent their first stay between July and December 2007 in one of the four hotels. All first timers with either a correct mail address or valid email address were included in the test group. From January 2008 to December 2011, all direct marketing actions (e-mail, post mail and multi-channel) were monitored. Through that process all bookings generated after the dispatch of a message from members of the target group were tracked and included in the analysis.

In the research model the independent variables are the number of messages for each communication channel (e-mail, post mail) which influences the dependent variable “Number of Bookings”. In the first step it was evaluated if the distribution is significant between the variables e-mail and post mail and the generated number of bookings. A non-parametrical test (median test) was used since the variables were
not characterized by a normal distribution. Since the significance level (Sig.) was .000 for both communication channels the null hypothesis could be rejected. This means that the reviewed communication channels have a significant influence on the number of bookings. Since the null hypothesis could be rejected the strength of the correlation between the variables was measured with the Pearson correlation systematic. All channels showed a positive correlation coefficient. For the channel e-mail the correlation on the number of bookings was 0.237, for post mail 0.302. Based on the Pearson correlation the coefficient of determination was calculated.

<table>
<thead>
<tr>
<th>Media Channel</th>
<th>Pearson Correlation</th>
<th>Coefficient of Determination</th>
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<tbody>
<tr>
<td>E-mail:</td>
<td>r = 0.237</td>
<td>R² = 0.056</td>
</tr>
<tr>
<td>Post Mail:</td>
<td>r = 0.302</td>
<td>R² = 0.091</td>
</tr>
</tbody>
</table>

Ceteris Paribus the channel post mail has an influence of 9.1% on the generation of hotel bookings. E-mail has an influence of 5.6%. These numbers show that a qualitative difference between the surveyed channels exists.

In the following, the best fitting equation (describing the response function) to summarize the cluster of points of the test data was identified with the help of a linear transformation.\(^\text{41}\) By means of the Curve-Fit functionality within SPSS the most appropriate equation for communication in general was determined. The tested equations were linear, s-shaped and exponential.

Table 2. Model Summary and Parameter Estimates

Dependent Variable: Total Bookings

<table>
<thead>
<tr>
<th>Equation</th>
<th>Model Summary</th>
<th>Parameter Estimates</th>
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<tbody>
<tr>
<td></td>
<td>R Square</td>
<td>F</td>
</tr>
<tr>
<td>Linear</td>
<td>.029</td>
<td>54,967</td>
</tr>
<tr>
<td>S</td>
<td>.029</td>
<td>54,099</td>
</tr>
<tr>
<td>Exponential</td>
<td>.059</td>
<td>115,059</td>
</tr>
</tbody>
</table>

The independent variable is Total_Comm#.

The analysis showed that an exponential function best describes the research data since “R Square” shows the highest value of all three tested equations. This result confirms the assumption that s-shaped

response functions are not adequate to explain communication effects within Relationship Marketing. The following concave exponential function shows the influence of communication on the purchase behavior of existing hotel guests.

\[ f(x) = a \cdot x^b \]

Formula: 1

Title: Concave Response Function for CRM


\[ f(x) = \text{number of bookings} \]
\[ a = \text{initial amount (bookings)} \]
\[ x = \text{frequency (number of communications)} \]
\[ b = \text{exponential growth} \]

The next figure shows the graphs for the three different analyzed communication channels, namely e-mail, post mail and a multi channel communication. The x-axis represents the number of communications, the y-axis the number of bookings.

Figure 3. The Effects of the Different Media Channels on the Number of Bookings

(Source: Own Figure)
The graph indicates that email has the strongest effect on the number of bookings, though the correlation and following the co-efficient of determination between email communication and bookings are the weakest of all three channels. The functions for all three channels show that no boomerang effect appears within Customer Relationship Marketing though some kind of saturation effect can be seen which is represented by the crest of the different graphs.

Based on the data analysis the author was able to approve the hypothesis.

**H0: Does a concave response function describe the role of communication within Customer Relationship Marketing?**

A concave response function describes the role of communication within CRM.

**Conclusion:**

While researching the literature concerning the role of communication within Customer Relationship Management it became clear that this topic is relatively new for the scientific community. The hypothesis that communication plays an important role for the creation of loyalty respectively for keeping existing customers loyal could be confirmed. The channels e-mail and post mail have a direct influence on the number of bookings. But their quality as a message transmitter is different. The knowledge that a concave function describes best marketing actions for existing customers implies that marketing managers should adopt their CRM strategies to this new knowledge. Especially the fact that communication to existing customers show positive effects from the first message on and that no boomerang effect was recognized should lead to the conclusion to increase the communication frequency.

There are of course several limitations to this research. Beside communication several variables are responsible for the creation of loyalty. On top the hotel business has its own specifications and is very fragmented. The research was done with four hotels in Germany, geographical differences may exist. It is recommended to test the outcome with other hotel types in different geographical regions as well as in other industries.
References:


