A Case Study of the Effects of Moderator Posts within a Facebook Brand Page

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Abstract. Social networks have become an additional marketing channel that could be integrated with the traditional ones, such as news and television media, as well as online channels. User participation as a main feature of the social networks imposes challenges to the traditional one-way marketing, resulting in companies experimenting with many different approaches, thus shaping a successful social media approach based on the trial-and-error experiences. Our study analyses the effects of moderator posts characteristics such as post type, category and posting day, on the user interaction in terms of number of comments and likes, and interaction duration for the domain of a sponsored Facebook brand page. Our results show that there is a significant effect of the post type and category on likes and comments ($p < 0.0001$) as well as on interaction duration ($p < 0.01$). The posting day has effect only over the comments ratio ($p < 0.05$). We discuss the implications of our findings for social media marketing.

Keywords: Web mining, Facebook, social media marketing.

1 Introduction

Marketing has recently undergone significant changes in the way information is delivered to the customers [1]. Social networks as a part of Web 2.0 technology provide the technological platform for the individuals to connect, produce and share content online. They are becoming an additional marketing channel that could be integrated with the traditional ones as a part of the marketing mix. Through users' feedback or by observing conversations, a company could learn about customers' needs, resulting in involvement of members of the community in the co-creation of value through the generation of ideas [2].

Companies, from food to electronics, are starting to understand the possibilities offered by the social network marketing. They have evolved the approach to their customers, shifting from traditional one-to-many communication to one-to-one approach, offering assistance at any time through the social media sites such as Facebook, Twitter, MySpace, etc. [3]. Still, social network marketing is currently at a relatively early evolutionary stage and has yet to be studied from different perspectives.

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The goal of our paper is to evaluate the effect of the post characteristics: (1) post type, (2) post category and (3) posting day on the interaction level on the sponsored Facebook brand page. We measure the interaction level through (1) the number of comments on individual post, (2) number of likes and (3) interaction duration. The question we try to answer is:

- What is the effect of the moderator posts on the level of interaction within a Facebook page?

In the continuation of the paper we present the related work, explain the method we used and present and discuss the obtained results.

2 Related Work

A social network (SN) is an online service that allows an individual to create a public profile, connect to other users and access and explore personal and other users' lists of connections [4]. At the moment, Facebook is the largest SN with more than 500 million active users [5] and the second most visited web page [6].

SNs and Facebook have been studied from different perspectives. The usage patterns have been investigated in [7], i.e. "social searching" - to maintain/solidify existing offline relationships, as opposed to "social browsing" for meeting new people. In addition, [7] also revealed the surveillance function of Facebook, allowing users to "track the actions, beliefs and interests of the larger groups to which they belong". Other studies include usage motivations, such as social connection, shared identities, content, social investigation, social network surfing and status updating [8], existence and usage characteristics of communities with high degree of internal interaction [9], messaging activities in terms of regularities in daily and weekly traffic in relation to the users' demographics [10] and high-level characteristics of the users [11].

User participation as a main feature of the social networks imposes challenges to the traditional one-way marketing, resulting in companies experimenting with many different approaches, thus shaping a successful social media approach based on the trial-and-error experiences [12]. Still, according to [13], social networks may play a key role in the future of marketing; they may increase customers' engagement, and help to transform the traditional focus on control with a collaborative approach suitable for the modern business environment.

Previous studies in the field have focused on the users by trying to identify the most influential target group [14] or explain their relation to the social media [15]. Others have addressed the challenges of social marketing such as aggressive advertisement, lack of e-commerce abilities, invasion of user privacy and legal pitfalls [16]. In addition, companies should avoid over-commercialization and favor transparency instead of trying to fully control their image [12], [3]. Inappropriate approach to these challenges could lead to fan loss and exposing the company to the risk of destroying its own credibility.

Apart from the challenges, many opportunities have also been recognized, such as raising public awareness about the company, community involvement and gathering experience for the future steps [16]. In addition, [17] argues that social networking

can also help find talent and new customers, and help conduct brand intelligence and market research.

Based on exploratory findings and practical examples scholars try to generate guidelines for successful social marketing. Guidelines that apply for online word-of-mouth [18] can also be used for Facebook marketing: (1) sharing the control of the brand with consumers and (2) engaging them in an open, honest, and authentic dialog.

According to [14], companies need to build an approach plan before diving into the social marketing in order to appropriately approach the frequent users who are most likely to virally spread their enthusiasm for a new product or service. The given suggestions include (1) focusing on a conversation, (2) developing a close relationship with the brand through "friending" with the social marketing pages and (3) building a plan for engagement and finding out what interactions, content, and features will keep users coming back.

Our study analyses the effects caused by the posts shared by the moderator on a sponsored Facebook brand page in terms of user interactions, such as number of comments and likes, and interaction duration. To the best of our knowledge, this study is the first one trying to measure the interaction on Facebook in relation to the actions undertaken by the page moderator. We discuss our results in order to identify the implications for social media marketing.

3 The Method

3.1 The Dataset

The dataset used for this study consists of posts shared on the ok.- Facebook brand page. ok.- is a Swiss consumer goods brand, targeting the younger customers with a social network marketing approach. This particular brand was selected for this study for the reason of having the possibility to access the shared data since the first day of creation of its Facebook brand page. The data collection was performed over one year, from the official launch of the ok.- page in March, 2010 to March, 2011. To guarantee accuracy of the data and ensure independence from potentially changing Facebook policies, post were fetched on a daily basis, using a script utilizing the Facebook Graph API[1]. For the selected period of time 120 moderator posts were obtained.

3.2 Post Categories Assignment

In addition to the data fetched through the Facebook Graph API, we were interested in evaluating the effect of different post categories. Categories definition was made by the ok.- social media marketing manager in the communication planning phase, before the official launch of the Facebook page. As such, they represent a part of the company's social media marketing strategy for the ok.- Facebook brand page.

The assignment of the categories to each of the posts was also done by the ok.- social media manager, as a part of the interaction planning process. The explanation for each of the assigned categories and a corresponding example are given in Table 1.

[1] http://developers.facebook.com/docs/reference/api/

Table 1. Post categories and examples

Post Category	Explanation	Example
Product(s) announcement	Announcement of new product launch.	4 new ok.- chocolate bars are here!
Information	Information regarding a sales location, number of page fans, etc.	Two k kiosk Shops opened today in Egg. Have fun shopping!
Designed question	Posts in form of questions with a goal to engage users in a dialog.	Is it ok never to grow up?
Questioner	Using the Facebook Poll to obtain answers on a specific question.	There is a new questioner under "Polls/Quizzes+" on a topic…
Competition	Posts related to competition, i.e. announcements, rules, winners, etc.	Do you want to be an ok.- star? Our displays wait for your post…
Advertisement	Advertisement of existing products (mostly used in a form of photo post).	ok.- products, 5 new photos (photo post)
Statement	Posts in form of statement, stating opinion on certain topic.	The fact that sun and rain are changing at the moment is not ok.-

3.3 Used Variables

There are two basic elements that correlate to the posting activity of the moderator as a part of the engagement plan, (1) what should a moderator post on the "wall" to trigger more user interaction, and (2) when should the content be posted.

Posts shared on the Facebook could be categorized by the type of the post and their content. Post type corresponds to the "sharing" action taken by the page moderator within a Facebook page. For the observed period, Facebook pages offered the possibility to share: (1) status, (2) photo, (3) video and (4) link. Depending on the selected sharing action, Facebook assigns the corresponding post type to each post.

Description of the content could be done through the topics reflected in the posts. Since the classification of the posts into topics would result in too many groups, thus making the statistical analysis difficult, we have decided to use the assigned post categories as a more general representation.

In order to answer the second question, we have selected the posting day of the week as a factor that might influence the level of user interaction. This particularly applies to the selected Facebook page since it represents a regional brand, thus all of the users originate from the same time zone. We have confirmed our reasoning with the demographics data from the Facebook Insights.

Based on this reasoning we have selected the following independent variables for our study: (1) the post type, as defined by Facebook, (2) the assigned post category, as described in previous section and (3) the day of the week when posting was done.

In terms of user interaction, apart from posting, Facebook offers the possibility to comment or "like" the posts shared on the "wall". Based on this, we have selected the number of comments and likes as a measure for the level of user interaction. Since the number of comments and likes is not an absolute measure, but is related to the number of page fans at the moment of posting, we have decided to use the likes and comments ratio as a more accurate interaction measure. Thus, the calculation of the depended variables was performed using the following formulas:

$$LR = \frac{N_L}{N_F}, \tag{1}$$

$$CR = \frac{N_C}{N_F}, \text{ and} \tag{2}$$

$$ID = D_{LI} - D_C, \tag{3}$$

where N_L is the number of likes, N_C is the number of comments and N_F is the total number of fans on the day of posting. In addition, D_C, the date of creation and D_{LI}, the date of last interaction are used to calculate the interaction duration.

Table 2 explains all of the used independent and dependent variables and all of their possible values.

Table 2. Independent and dependent variables used in the study

Variable	Description	Values	Type	Source
PT	Post type	status, photo, video, link	Independent	Graph API
DOW	Day of week	Monday, Tuesday, …, Sunday	Independent	Graph API
C	Category	(see Chapter 3.2)	Independent	Valora
LR	Likes ratio	Numerical	Dependent	Graph API
CR	Comments ratio	Numerical	Dependent	Graph API
ID	Interaction duration	Numerical	Dependent	Graph API

3.4 Data Analysis

In order to answer our research questions, we needed to analyze the effects that each of our independent variables has on each of the dependent variables. For that purpose we decided to perform a statistical testing to see if there is a significant difference in our results. We have decided to use the Kruskal–Wallis non-parametric test for one-way analysis of variance since the normality test on our data resulted in negative outcome for all three dependent variables (CI = 95%, $p < 0.0001$). Furthermore, for the post-hoc analysis we have applied the Mann-Whitney tests with Bonferroni correction.

4 Results

4.1 Post Type

In the selected dataset only three post types were present: status, photo and link. A Kruskal-Wallis test has show that there is a significant effect of post type on all three variables, the likes ratio ($H(2) = 20.24$, $p < 0.0001$), the comments ratio ($H(2) = 21.90$, $p < 0.0001$) and the interaction duration ($H(2) = 11.32$, $p = 0.0035$). Table 3 illustrates the obtained descriptive statistics from the Kruskal-Wallis test.

Table 3. Descriptive statistics for LR, CR and ID for each post type

		LR		CR		ID	
Type	N	Median	Sum	Median	Sum	Median	Sum
Status	74	0.00213	0.24853	0.00078	0.12424	0.464	393.825
Photo	29	0.00338	0.87995	0.00122	0.98923	2.121	1626.295
Link	17	0.00072	0.08528	0.00006	0.00418	0.067	20.379

The results from the post-hoc analysis have shown that there are also significant differences between different post types. The detailed results are shown in Table 4.

Table 4. Effect size obtained from the post-hoc analysis (*p<0.05, **p<0.005, ***p<0.0001)

		LR	CR	ID
Status	Photo	0.25*	-	-
Status	Link	0.37**	0.44***	-
Photo	Link	0.56***	0.57***	0.44**

4.2 Post Category

The obtained descriptive statistics for the post category effect are shown in Table 5.

Table 5. Descriptive statistics for LR, CR and ID for each post category

		LR		CR		ID	
Category	N	Median	Sum	Median	Sum	Median	Sum
Statement	8	2.82E-03	3.08E-02	3.65E-04	8.05E-03	3.08E-01	1.02E+01
Des. Question	24	2.21E-03	6.17E-02	1.91E-03	5.16E-02	1.24E+00	2.12E+02
Announcement	12	4.70E-03	1.34E-01	2.59E-03	7.13E-02	3.29E+00	6.81E+02
Information	44	2.09E-03	2.36E-01	3.66E-04	3.34E-02	3.52E-01	3.61E+02
Competition	21	5.54E-04	2.26E-02	2.53E-04	1.43E-02	1.39E-01	3.88E+01
Advertisement	5	9.30E-03	7.07E-01	5.08E-03	9.03E-01	8.34E+01	6.03E+02
Questioner	6	1.12E-03	2.21E-02	1.22E-03	3.57E-02	1.15E+01	1.33E+02

Table 6. Effect size obtained from the post-hoc analysis (*p<0.05, ** p<0.005, ***p<0.0001)

		LR	CR
Statement	Competition	0.57*	-
Des. Question	Information	-	0.55***
Des. Question	Competition	0.58*	0.55**
Announcement	Information	-	0.49**
Announcement	Competition	0.74***	0.50*
Information	Competition	0.42**	-
Information	Advertisement	-	0.42*
Competition	Advertisement	0.59**	0.56*

Significant effect of post category was found to exist on all three variables, the likes ratio ($H(6) = 34.34$, $p < 0.0001$), comments ratio ($H(6) = 35.54$, $p < 0.0001$) and the interaction duration ($H(6) = 17.28$, $p = 0.008$).

A post-hoc analysis has revealed the significant differences between different post categories. Table 6 shows the results of the post-hoc analysis.

4.3 Day of Week

The obtained descriptive statistics from the Kruskal-Wallis test for the effect of the day of week are shown in Table 7.

Table 7. Descriptive statistics for LR, CR and ID for each post category

		LR		CR		ID	
Category	N	Median	Sum	Median	Sum	Median	Sum
Monday	25	1.89E-03	1.21E-01	9.46E-04	6.75E-02	3.21E-01	4.97E+02
Tuesday	18	2.09E-03	7.06E-01	1.59E-03	9.15E-01	8.30E-01	5.52E+02
Wednesday	24	2.55E-03	1.17E-01	8.96E-04	4.56E-02	9.19E-01	1.47E+02
Thursday	15	1.22E-03	6.16E-02	9.64E-05	2.81E-02	1.90E-01	4.12E+02
Friday	30	2.25E-03	1.57E-01	6.07E-04	4.93E-02	1.60E+00	3.89E+02
Saturday	4	2.35E-03	3.64E-02	2.34E-04	3.32E-03	1.72E-02	8.00E-01
Sunday	4	2.69E-03	1.51E-02	1.46E-03	8.95E-03	1.97E+00	4.31E+01

The results obtained from the statistical testing show no significant effect on the likes ratios and interaction duration ($p > 0.05$). A significant effect of day of the week occurs only over the comments ratio ($H(6) = 14.00$, $p = 0.030$). In addition, the significant difference in the comments ratio exists only between posts shared on *Tuesday* and *Thursday* ($p = 0.019$, $r = 0.54$).

5 Discussion and Conclusions

The results presented in the previous section have shown that different post characteristics have effect over the interaction on the Facebook page.

Post type has effect on all three measures for user interaction, i.e. the likes ratio ($H(2) = 20.24$, $p < 0.0001$), the comments ratio ($H(2) = 21.90$, $p < 0.0001$) and the interaction duration ($H(2) = 11.32$, $p = 0.0035$). *Photos* have caused the greatest level of interaction, followed by S*tatues* and *Links*. In addition, a significant difference exists between each of the post types. The likes ratio is significantly larger for *Photos* compared to *Statuses* and *Links*, and for *Statuses* compared to *Links*. The comments ratio is significantly smaller for *Links* compared to other two post types. Finally, interaction on *Photos* lasts significantly longer compared to the one on *Links*.

Post category also displays significant effect over all three measures for user interaction, the likes ratio ($H(6) = 34.34$, $p < 0.0001$), the comments ratio ($H(6) = 35.54$, $p < 0.0001$) and the interaction duration ($H(6) = 17.28$, $p = 0.008$). The results from the post-hoc analysis show that the likes ratio is significantly lower for C*ompetitions* compared to all other categories except *Questioners*. Furthermore,

Information and *Competitions* have significantly lower comments ratio compared to *Designed Questions*, *Announcements* and *Advertisements*. For the interaction duration there is no significant difference between any individual categories.

The posting day has shown no effect on the likes ratio and interaction duration ($p > 0.05$). The effect is only visible for the comments ratio ($H(6) = 14.00$, $p = 0.030$). In addition, a significant difference exists only between posts shared on *Tuesday* and *Thursday*, i.e. comments ratio is much higher on the posts shared *Tuesday*.

User engagement is the social media marketing's new key metrics [19]. In addition, [20] proposes triggering the user interaction as one of the actions to be taken in order to optimize the marketing investment.

In the context of social media marketing on Facebook, user engagement could be measured through the number of posts shared by the user on the brand page, number of comments and likes and the duration of the interaction. Increasing the interaction could be achieved by finding out what actions, content, and features will keep users coming back.

In our previous discussion, we have proposed two basic questions that correlate to the posting activity of the moderator, i.e. what should a moderator post on the "wall" and when the content should be posted in order to increase the user interaction. Furthermore, we suggested the usage of the post type and category for classification of the content, and the posting day of the week as a relevant factor for the selection of the appropriate time for posting.

Our results show that posting type and category have a significant effect over the user interaction and as such should be used for planning of the communication strategy. Furthermore, the effects over comments and likes ratios are larger compared to the effects over the interaction duration. We assume that this is related to the fact that the "wall" of the Facebook brand page can only display a limited number of posts. Once they are not visible on the "wall", the interaction stops. In case of a regular posting strategy, each post would be visible for approximately same time, resulting in the approximately same interaction duration. The interaction over *Photos* lasts significantly longer because of the fact that when a user "clicks" on a photo posts, Facebook opens the full photo album shared on the page. The user would then probably go through all the photos that are new to him, thus interacting with some photos long time after they were posted. We plan to investigate this further in our future studies.

In regard to the posting day of the week, our results indicate that this is not a valuable factor to be used for the interaction planning. Thus, the question when a moderator should share new post on the wall remains to be studied further.

We are aware of the limitations of our study in terms of having a dataset containing only 120 posts from a single Facebook page. In order to overcome this limitation we plan to expand our analysis to the larger dataset gathered from other Facebook brand pages. Still, our results show clear evidence of moderator posts increasing activity of the fans on a Facebook brand page. This should encourage moderators of Facebook pages to prepare clear posting strategies that trigger the activity of users and drive adoption in the long run.

6 Future Work

In this paper we present our results from the evaluation of the effect of the post characteristics: type, category and posting day on the interaction level in terms of number of comments, likes and interaction duration. Our results show that there is a significant effect of the post type and category on all three interaction measures, while posting day has effect only over the comments ratio.

The results presented in this paper are limited to the dataset obtained from only one Facebook page. In order to confirm our findings we plan to expand our analysis to the posts gathered from other Facebook brand pages as well. In addition, we plan to introduce the post topic as an influencing factor. Furthermore, we would like to investigate the interaction on the posts shared by the page fans to understand if they exhibit similar results. This would provide us with an insight into the level of influence of the individual users, i.e. "superfans" [12] versus the moderator within the Facebook brand page. Finally, we want to compare our results to those from different categories of Facebook pages.

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