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Social media marketing for businesses: Organic promotions of web-links on Facebook

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ABSTRACT

The effectiveness of social media marketing is a topic of great interest for researchers as well as marketers. To enrich the literature regarding the effectiveness of various types of posts with a web-link, we designed and conducted an experiment on Facebook (FB). This experiment was conducted in a real business environment, through the FB fanpage of a Polish e-commerce store. The observations were analyzed using multiple linear regression and metrics adapted to this experiment from the literature. The results show that a web-link placed in the comments of an FB post, instead of the caption, is more lucrative. It is also shown that, based on the aims of the campaign, such metrics can give valuable information about the optimal time for posting, as well as the interval between posts.

1. Introduction

Exponential growth in the number of internet users has led businesses to explore efficient ways of managing their presence in electronic space. Businesses have adapted new business models that allow them to utilize the opportunities that the internet has to offer (Wielki, 2010). Together with the growing number of internet users, social media has also gained traction rapidly and a significant increase in social media users is still noticeable across the globe. It was anticipated that, in 2020, the user base would reach 2.96 billion, which would further grow to 3.09 billion in 2021.[1] According to the latest reports,[2] in 2020 when much of the world was in lockdown, the number of social media users grew at its fastest rate in recent years and reached 4.2 billion, thus surpassing the forecast by an enormous margin. The power of the social media ecosystem has been amplified due to these substantial numbers, but its high importance is due to the fact that it connects, directly or indirectly, online elements of the economy to its offline elements (Hanna, Rohm, & Crittenden, 2011). This is especially true in the case of Facebook (FB), with more than 2.74 billion users active monthly[2], which has proven to be a very popular platform for marketing products, promoting brands, managing relationships and communicating with customers (Chodak & Suchacka, 2017; Myers West, 2018). A business can use various types of posts and content on their FB page to inform customers about various products and offers that are available. FB is a two-way medium of communication, thus it proves beneficial in enabling a business to obtain direct feedback from actual and prospective customers (Abeza, O'Reilly, & Reid, 2013). This feedback is vital in understanding the needs and opinions of customers about the range of products or services being offered by a business. FB fanpages are also used to disseminate special discount coupons, spread information about promotions and organize competitions with prizes for customers, which have been found to be effective (Radzi, Harun, Ramayah, Kassim, & Lily, 2018).

There have been numerous studies on social media over the last two decades that have emphasized their growing importance for businesses (Kapoor et al., 2018), especially from the point of view of direct marketing in today's digital economy (Unold, 2003). Therefore, activities on social media frequently form the basis of the marketing strategy of companies. In the modern world, where everyone can communicate about products, businesses, or brands with thousands of peers, the impact of consumer engagement has become greatly magnified (Liu, Lee, Liu, & Chen, 2018). Consequently, in the current culture, when managers plan their marketing content, they strongly rely on the users and algorithms of social media platforms (Kanuri, Chen, & Sridhar,

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[1] for more details see: https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/ (Last Accessed 9th November 2020).

[2] Digital 2021: https://wearesocial.com/digital-2021 (Last Accessed: 4th March 2021).

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2018). However, studies concerning social media communication often do not take into account the effectiveness of communication according to the means of presenting content, in particular the association between the position of web-links, the level of interaction, and the time of posting. There is also a lack of agreement on how to measure the effectiveness of communication, including which social media marketing indicators should be used (Lamberton & Stephen, 2016). This discourse has attracted a lot of research in this field (Alalwan, Rana, Dwivedi, & Algharabat, 2017; de Vries, Gensler, & Leeflang, 2012). However, significant gaps are still observed in this area.

One of the reasons for this gap is the lack of research based on planned experiments in real business environments. This requires access to a real business's FB page, as well as adaptive experimental design. The theory of experimental design is very well-developed, e.g. Montgomery (2017); Emery and Nenarokomov (1998). There is also literature available about experimental design in a real business setting (Gray, 2019). However, there is a research gap in designing experiments in a real business environment involving social media, such as the FB fanpage of a real business in an organic setting. Due to this, most of the papers analyzing the effectiveness of marketing in social media have been based either on customer surveys (Bashar, Ahmad, & Wasiq, 2012; Leung, Bai, & Stahura, 2015; Pradiptarini, 2011), or on the usual activities carried out by a business (Balio & Casais, 2020; Coelho, de Oliveira, & de Almeida, 2016), or aimed at the B2B sector (Michaelidou, Siamagka, & Christodoulides, 2011). This paper aims to fill the aforementioned gaps.

The purpose of this article is to analyze the effectiveness of different types of posts where both the location of a web-link and time of publishing vary. These forms of communication occur in a real business environment and are aimed at generating user engagement on the basis of unpaid/organic promotion on FB. On FB, "Organic Reach" is defined as "the number of people receiving an unpaid post from a business's page on their screen".[3] In particular, we address the following two research questions (RQs):

RQ 1: What is the best time for posting and the optimal gap between posts with a web-link on a FB fanpage intended to promote a business organically (i.e., without paid promotions)?
RQ 2: How do the effectiveness of FB fanpage posts and engagement patterns depend on the position of a web-link intended to promote a business organically (i.e. without paid promotions). What is the best position for a web-link?

Additionally, we present a novel experimental setup that integrates various elements used in previous studies. This setup will be useful for future research, as well as business applications.

The structure of the article is as follows: After a brief introduction to the manuscript in Section 1, a literature review regarding social media marketing, its effectiveness, and challenges to conducting an experiment via social media in a real business environment is presented in Section 2. This section also discusses the theoretical framework applied in this study. After that, Section 3 discusses, at length, the experimental setup and the methods used to analyze the empirical data recorded during the experiment. In the same section, metrics for analyzing the results of a social media campaign and its constituent variables are also described. This is followed by a description of the results and observations from the experiment in Section 4. We discuss the findings from the study and give conclusions in Section 5, which is followed by a description of the limitations of the research and future directions for research in Section 6. Finally, the bibliography and an Appendix A containing tables of data are presented.

[3] https://www.facebook.com/help/285625061456389 (Last Accessed 9th November 2020).

2. Literature review

2.1. Social media marketing and its effectiveness

The concept "social media" is a synthesis of two words: "social" and "media". Social, in this context, means interactions between individuals with a common interest, a group, or even a community. Media are channels or platforms that enable the creation and exchange of user-generated content (Icha & Agwu, 2015). The interconnected nature of social media allows customers to create, develop, and distribute advertising content, which then influences their behavioral intentions (Lee & Cranage, 2014). Technological evolution has led to social media platforms that give users means to share content in various forms, such as text, graphics, audio-visuals and web-links. The general impact of different kinds of content on a brand's page have been studied and show that there is variation in engagement levels according to the type of content (de Vries et al., 2012). However, there is a lack of analysis in the literature on how individual elements of the communication process, including communication strategies, are influenced by mutual feedback in communication channels, especially with regard to posts with web-links. Such processes are fully bi-directional, and highly dependent on the socio-cultural context, variety of media form, the role of participants, as well as the way in which information is interpreted. To determine the effectiveness of communication, drivers of engagement and measures of social media content, as well as further conceptualization, there is a need to assess the relation between social media content and engagement statistics (Dolan, Conduit, Fahy, & Goodman, 2017).

The effectiveness of communication is usually defined by the ISO 9000: 2005 standard, as the degree of achieving planned goals. The meaning of effectiveness is based on praxeology - the theory of efficient action (Kotarbinski, 2013). According to this definition, efficacy describes "good work" as consisting of the following components: effectiveness, favorableness, and economy. The primary form of efficient action is effectiveness, described as the degree to which an action satisfies its intended aim (Pszczołowski, 1967). According to this meaning, action can be described as effective when the activities performed result in established goals being achieved. This can be measured as the level at which goals are achieved (which is not always easy to evaluate) or the degree to which goals are achieved (defined as purposefulness). When a goal is partially achieved, action is also partially effective. When a goal is not achieved in any way, action is not efficacious. Therefore, effectiveness is characterized by different degrees of intensity (Chodak, Chawla, Dzidowski, & Ludwikowska, 2019). To understand in depth the effectiveness of the actions of a certain business via social media, it is not sufficient to take into consideration its presence on social media pages or the number of followers. How media users engage with a business should also be taken into account. Assessing the effectiveness of different types of posts is crucial in many areas of communication research, from campaign design to theory testing (Coelho et al., 2016). Detailed evaluation is very expensive in terms of time, capital, and human resources. However, at the same time, it is necessary to avoid expenditure from campaign funds on types of posts that are not efficient (Kim & Cappella, 2019). Hence, there is a need to develop an experimental setup that can aid business managers to derive simple measures of the effectiveness of campaigns via statistics that are available directly from a social media platform. The form of appropriate measures of effectiveness depends on the type of business, and social media platform. For example, the effectiveness of the use of social media in healthcare and the police was analyzed by Nawaz et al. (2017) and Beshears (2017), respectively. Balio and Casais (2020) compared engagement on FB and Instagram.

Customer engagement may be defined as the level at which customers' behavior is directed towards a brand or company (Gummerus, Liljander, Weman, & Pihlström, 2012). Customer engagement has been linked to indicators of organizational performance, such as increased

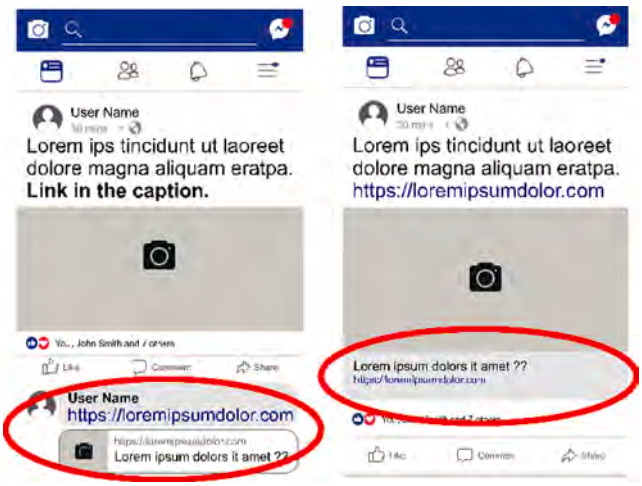

Fig. 1. Preview of the web-links, highlighted for the user by default on FB, when the web-link is placed in the comments (left) and when it is placed in the caption (right).

sales, competitive advantage, profitability (Hollebeek, 2011; Kumar et al., 2010) and emotional connections (Chan & Li, 2010). Dehghani and Tumer (2015) argued that Facebook advertising significantly affects a brand's image and equity. Customers' interactions via Facebook, and the messages posted there, influence their intention to purchase, as well as their choice of products when making a purchasing decision (Di Pietro & Pantano, 2012).

All popular social media platforms provide several measures that help in understanding customers' level of engagement. Although researchers have raised the problem of the expertise necessary and the adequacy of widely available metrics (Baym, 2013), engagement is one of the most popular means for assessing the success of social media marketing. On FB, customer engagement is measured by the numbers of likes, comments, shares and clicks, which also determines the eventual reach of the content. The higher the level of engagement in content, the higher the reach obtained (Lipsman, Mudd, Rich, & Bruich, 2012).

The efficiency of Facebook advertising may be analyzed using methods adapted from theories of Internet marketing, such as the composite efficiency index (CEI) (Vejačka, 2012) or customer engagement in social media (CESM framework) (de Oliveira Santini et al., 2020). However, such methods do not consider the specific conditions of social media. Oviedo-García, Muñoz-Expósito, Castellanos-Verdugo, and Sancho-Mejías (2014) proposed a metric for customer engagement on Facebook called the ratio of effective interest, which takes into consideration the numbers of likes, comments, shares and other clicks, divided by the number of posts in relation to average opinions. Shen, Chiou, Hsiao, Wang, and Li (2016) claimed that the effectiveness of communication, in the form of attitudes towards advertising and intention to share messages, is higher when using an interactive format of advertising than a non-interactive one. Based on analysis using EdgeRank, an algorithm dedicated to structuring the flow of information and communication on FB's 'News Feed', researchers have argued that the level to which content is shared depends on its type (Bucher, 2012) and the time it is posted (Chodak et al., 2019; Golder, Wilkinson, & Huberman, 2007; Villamediana, Küster, & Vila, 2019). Previous studies have also shown that the time of publishing content affects its reach, as well as engagement. However, there is a need to relate the type of content with the time of posting (Dolan et al., 2017). Villamediana et al. (2019), as well as Chodak et al. (2019), on the basis of empirical research in chosen sectors provide various suggestions regarding suitable times for publishing content. However, these results cannot be generalized. This raises the question of what are effective times for posting on FB? Cvijikj and Michahelles (2013) gave a more generalized overview of organic marketing via social media. They found that publishing content when more fans are online leads to less interaction, but such interaction lasts longer. This does not give us a clear indication of an optimal time for publishing content on FB. This brings us to the first hypothesis (H1) corresponding to the first research question (RQ1) of this study.

> H1: The optimal time for publishing content on a business's FB fanpage is not determined purely by the number of users online at the time of posting. It is specific to a campaign's objectives.

Social Media platforms keep updating their algorithms to make content more and more relevant to users. In recent updates, FB has taken steps to curb posts designed as click bait,[4] while increasing efforts to bring people closer together.[5] FB has also recently limited the reach of organic (un-paid or free) content from businesses.[6] Studies in the literature that compare different forms of posts on Facebook usually consider such material as images, videos, albums, and events (Balio & Casais, 2020; Chodak et al., 2019; Coelho et al., 2016; de Vries et al., 2012). However, there is a lack of studies assessing the effect of the location of a web-link within a post. Since the last update of FB's algorithm, social media practitioners and observers have repeatedly observed that native content on FB achieves a far greater reach than any post with a web-link.[7] Although FB has denied that this has anything to do with the platform's goal of increasing its revenue,[8] a question remains regarding how businesses can share web-links on FB without compromising engagement or reach. On this basis, we formulated the second hypothesis (H2) of the study corresponding to the second research question (RQ2).

> H2: Posts in which a web-link is placed in a caption are less effective than posts in which a web-link is placed in comments.

[4] https://about.fb.com/news/2017/12/news-feed-fyi-fighting-engagement-bait-on-facebook/ (Last Accessed 14th June 2021).
[5] https://about.fb.com/news/2018/01/news-feed-fyi-bringing-people-closer-together/ (Last Accessed 14th June 2021).
[6] https://www.adweek.com/digital/on-facebooks-nuclear-bomb/ (Last Accessed 14th June 2021).
[7] https://www.quintly.com/blog/2017/03/facebook-video-study (Last Accessed 14th June 2021).
[8] https://www.facebook.com/business/news/Organic-Reach-on-Facebook (Last Accessed 14th June 2021).

Fig. 2a. Distribution of the number of fans of an e-store who are online at different times of the day (averaged over a period of one week).

It is important to note that, regardless of whether the web-link is placed in the caption or in the comments, the user sees the link highlighted. As shown in Fig. 1, when a web-link is placed in a caption, irrespective of its position with respect to the text within the caption, a highlighted preview of the web-link is generated by FB. This attracts the user. On the other hand, when a link is positioned as a caption, it is also highlighted in a similar way. Hence, the unpacking mechanism, as described by Kruger and Evans (2004) and Min and Arkes (2012), cannot be used to predict in which of these two cases users exhibit a higher level of interaction with posts.

Next, the challenges to and solutions for running experiments on social media in a real business environment will be discussed.

2.2. *Experiments using social media in a real business environment*

In the context of marketing research and as explained by Patzer (1996), experiments are a very popular method among researchers, as well as businesses, for acquiring knowledge. With regard to real business activities on FB, there is a need for scientific discussion on how to plan and carry out experiments. Due to the high level of competition in the market, one of the biggest hurdles is gaining access to the administration panel of a FB fanpage to run an experiment and analyze the findings. Publishing the results of such experiments could provide vital information and sensitive data to competitors (Banks et al., 2016).

Fanpages, websites, and online services provide an opportunity to use controlled experiments, such as A/B tests, split tests, randomized experiments, control/treatment tests, and online field experiments (Kohavi & Longbotham, 2016). Online-controlled experiments began in the 1990s with the growth of the Internet and are now considered an important research tool. Their use is growing, as made evident by a large body of scientific literature (Dmitriev, Gupta, Kim, & Vaz, 2017; Goward, 2012; Gupta et al., 2019; Kohavi, Longbotham, Sommerfield, & Henne, 2009; McFarland, 2012; Siroker & Koomen, 2013). The most basic experimental setup (A/B tests) is designed to assess a single factor based on a control group (version A) and a treatment group (version B). FB itself allows to carries out such experiments only via paid campaigns (Orazi & Johnston, 2020). Using such a format, it is impossible for the firm commissioning an experiment to create, without the knowledge of FB users, control groups or to plan in which configuration and when users from the control group will see posts. To overcome this issue, experimental design can use control constructs on a single group, instead of creating control groups of participants (McKillip, 1992). One of the requirements of applying the concept of control constructs is that there should be a random sample of participants for each period (McKillip, 1992). There are three hurdles to this for a FB business page. Firstly, each business fanpage has followers who are interested in specific products made by the company. Secondly, the process of gathering followers usually requires targeted marketing, which involves selecting users of a certain age, sex and interests. Thirdly, the network effect means that the most active Facebook users, those with a higher number of connections with other users, have a great influence on the results of an experiment. However, users access their news feed at different times, and the content that they see depends on FB's algorithm. In addition to that, as shown in Fig. 2a, the number of fans online varies according to the time of day, as well as day of the week. Hence, if posts are published at different times of the day or at the same time on different days, then they are delivered to random samples. This meets the requirement for an experimental setup.

Next, in designing such an experimental setup, it is important that the antecedents should be homogeneous, i.e., the ceteris paribus condition is met (Bierens & Swanson, 2000). This condition is important when measuring the influence of one factor on another without interference from other factors, such as the quality of the photos of products, category of products, FB's algorithm etc. The duration of an experiment on FB also needs to be planned carefully, so as to avoid any updates in the platform's algorithm. In the environment of a social medium, where reactions from the audience and shares of posts influence the overall reach, there is a need to allow sufficient time for the effect of posts to be observed. On the other hand, an overly long duration of the experiment may mean that additional external factors will blur the results. Pilot testing, involving observation of the minimum time after which organic reach becomes stable, enables researchers to determine the time required between posting and recording the results of a post. The following section discusses the adaptive experimental design constructed for this study on the basis of the factors described above.

Table 1
Four types of posts, based on the position of the link used for each book in the experiment.

Type	Structure	Description
A1	Link then Text + Preview	In the caption, the link was placed in front of the text
A2	Text then Link + Preview	In the caption, the link was placed after the text
A3	Text Link Text + Preview	In the caption, the link was placed within the text.
A4	Text + Image + Link in Comment	In the caption, only text was placed together with the preview image. The link was placed in the post as a comment

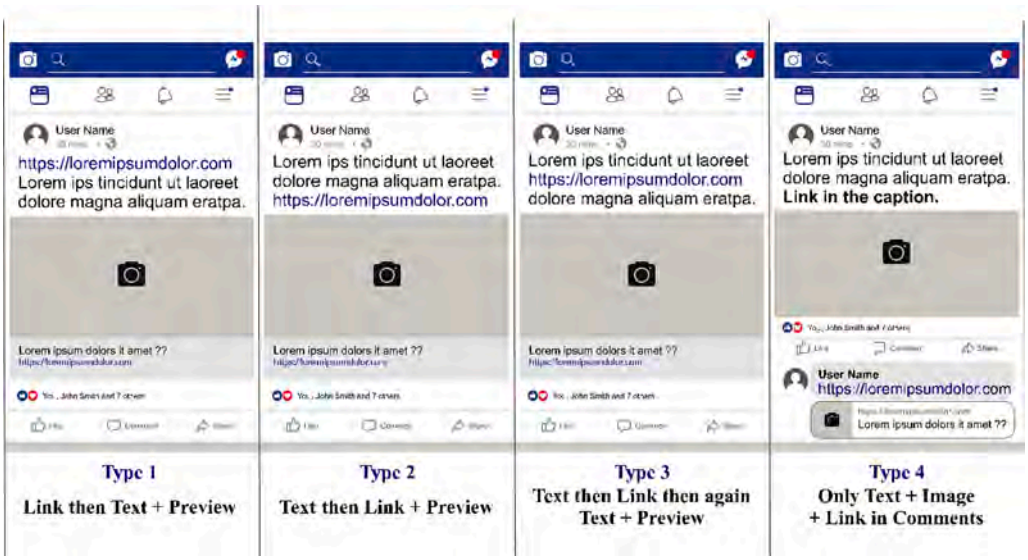

Fig. 2b. The four types of post based on the position of the web-link.

3. Experimental design, method and metrics

3.1. Setting of the experiment and participants in the study

The setting of the experiment was a one-way set of independent samples with four levels, i.e. 4 types of posts and a control construct based on the time of posting. This experimental design was adapted from Chodak et al. (2019), with the aid of other literature as discussed in Section 2.2. To ensure that the antecedents were homogeneous, the experiment was conducted using similar products of analogous market ratings, under the condition of an unchanged FB algorithm over a period of 14 days. Similar graphics and lengths of text/links were used in each case.

The experiment presented here was designed and conducted in collaboration with a Polish e-commerce store that sells various board games, books, films, and other products. The name of this company is not given due to a non-disclosure agreement and is hereafter simply called "the E-Store". FB is one of the two advertising channels, the other being Google Ads, used by the E-Store for reaching out to customers. During the experiment, no other channel of advertising was active. We used the E-Store's FB business page to run the experiment, which enabled us to gather real-time empirical data regarding the engagement and actions of actual customers.

The E-Store's primary FB audience, the research participants, is composed of 5032 followers out of which 73% were women and 27% were men. The largest group of followers (30%) were in the age range of 35–44 years, closely followed by the age groups 45–54 years (24%), and 55–64 years (17%). Geographically, more than 97% of these followers were based in Poland with a handful from Germany (<1%), UK (<0.8%), and USA (<0.5%).

In the next section, the four alternative types of posts used in this experiment are discussed.

3.2. Types of post (manipulations)

The owner of the store randomly selected 24 books (P1-P24), which were similar in type and market ratings, out of the numerous books available from the E-Store. For each book, four types of posts (A1–A4) were created that consisted of a web-link to the book's details and a purchase option, a preview image of the book cover and a short one-line caption. The position of the link in each type of post is described in Table 1 and shown in Fig. 2b. The first three types of post were created following FB's simple description of how to share a link on a FB fanpage post.[9] The position of the link in the text of the caption was varied to observe whether there was any difference between the effectiveness of a) placing the link first, b) placing the link after the text, or c) placing the link within the text. In the fourth type of post, no link was placed in the caption, but instead an image accompanied the text, and the link was placed in the comments. In each of these types of post, the text in the caption and the image that a social media user could see were the same. Only the position of the link was altered.

In the next section, the procedure of carrying out the experiment is elaborated.

3.3. Procedures

A total of 96 posts were created and scheduled over a period of 4 days with an interval of one hour between each post, as shown in Table A.5. The posts were scheduled using the FB's publishing tool, which enabled control over the exact time of posting. The publishing time of the posts for each book title was the same each day and only the type of post

[9] https://www.facebook.com/help/668969529866328 (Last Accessed: 9th November 2020).

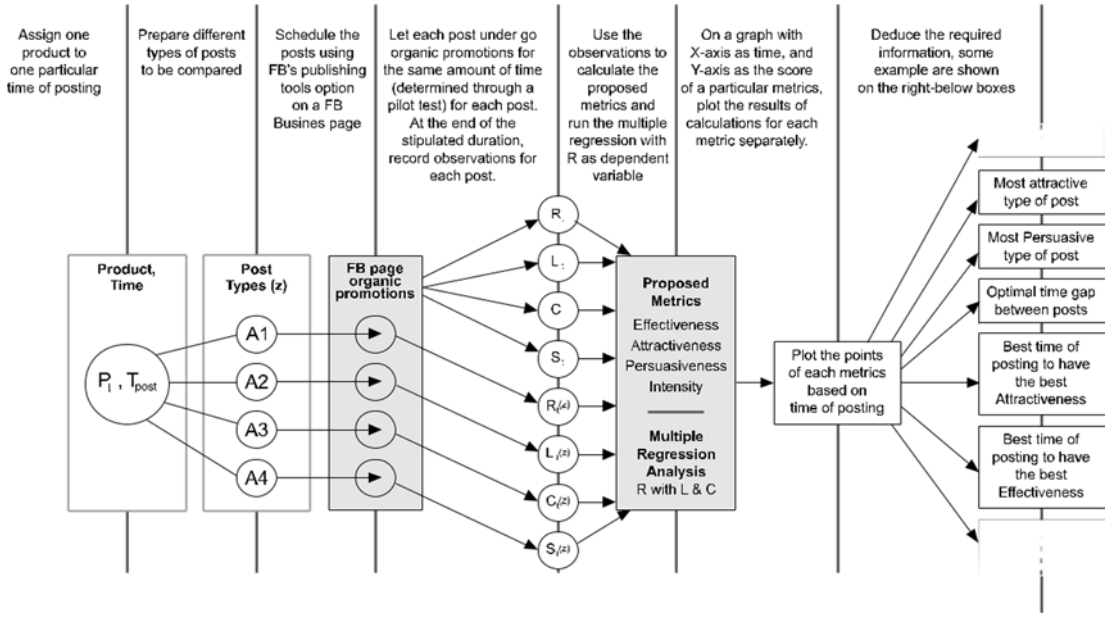

Fig. 3. Framework of the experiment (source: authors' own elaboration based on Chodak et al. (2019)).

changed. For example: for book title P1, the time of posting was 00:00 and the post types were A1, A2, A3 and A4 on day 1, day 2, day 3 and day 4, respectively.

Each post was allowed to undergo organic promotion, without any interference from the authors, for 10 days. The duration of 10 days was selected after a pilot study, which indicated that the organic reach of and reactions to a certain post became negligible after that period, unless an external intervention acted upon it. Such intervention could be from the side of the business or their followers on FB. Any interaction with a post enhances its reach (Lipsman et al., 2012) and it is possible that a reaction to a certain post on the 10th day might mean that it is shown to the audience again. Hence, the average time taken by a post to reach a stage where its reach does not increase further was considered via the pilot study.

No posts were made on the E-Store's FB page, starting from 24 h before the beginning of the experiment and ending 24 h after the experimental posts concluded on day 4. This was done to ensure that no other campaign had an influence on the reactions, clicks or sales of the 24 book titles included in the experiment. Observations were recorded exactly 240 h after each post was published, as shown by "O.Post" in Table A.5.

The numbers of Reactions and Clicks, as well as the Reach, were observed and recorded at the end of the experimental period. These were used to calculate the dependent variables related to the effectiveness, attractiveness, persuasiveness, and intensity of the campaign. The time of posting was considered to be a control variable. Fig. 3 shows the overall framework of the experiment.

The measures described in the framework and used in this experiment are discussed in the next section.

3.4. Measures

Peters, Chen, Kaplan, Ognibeni, and Pauwels (2013), distinguished four dimensions of social media analysis: motives, content, network structure, and social roles and interactions. From this perspective, content has three distinct aspects: quality (e.g. interactivity, vividness, education, entertainment, information), valence (e.g. evoking emotions, tonality, rating variance), and volume (counts and volumes). Since the purpose of this experiment was to measure the difference between the interaction patterns of FB users, the proposed metrics should focus on the third aspect. It is also worth mentioning that, according to Kim, Kang, and Lee (2019), effectiveness is the third most popular subject area in research on digital marketing.

To analyze the effect of the post type A1–A4 (independent variable) and time of posting (control variable), we used metrics adapted from Chodak et al. (2019), which are based on standard measures available from social media sites and for the analysis of volume with regard to social media content given by Peters et al. (2013). These metrics focus mainly on volume, with less focus on the quality of content. For this particular experiment, this does not create a bias, because in order to maintain the ceteris paribus condition (Bierens & Swanson, 2000), it was ensured that all the products (in this case books) were of a similar type and held the same status on the market, i.e. were best sellers. Such a focus on volume also omits the valence dimension, since positive endorsement, instead of rating, provides a stronger basis for the propagation of content on FB. Other negative reactions, such as hide post, hide all posts, report as spam and unlike page, are possible, but we did not observe any such reactions in our experiment. Although only volume related measures are used, since they are easiest to gather and analyze, they can also be treated as indicators of the quality of communication. Based on Moro, Rita, and Vala (2016) and the requirements for calculating the metrics (dependent variables) indicating the most effective way of placing web-links on FB posts for organic promotion, for each advertised book title t (t = {P1, P2……P24}) and post type z (z = {A1, A2, A3, A4}), the following variables were defined and recorded for the experiment:

- $R_t(z)$ – the number of FB users reached by a post of type "z" regarding book title "t".
- R_t – the total number of FB users reached (via all four post types) by book title "t".
- $L_t(z)$ – the number of reactions (in our case only Likes, Comments and Shares) by FB users to a post of type "z" regarding book title "t".
- L_t – the total number of reactions (to all four types of post) by FB users to book title "t".
- $C_t(z)$ – the number of clicks by FB users for a post of type "z" regarding book title "t".

Table 2
Daily sales recorded for each book during the experiment and the effectiveness of the campaign overall (E_t).

Book/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Units Sold	E_t
P1		1			2										3	0.6000
P2															0	0.0000
P3									1		1			2	2	2.0000
P4				2		1	1			1				3	5	0.5000
P5				1	1		1			1	1				5	0.6250
P6		1			2			1	4						8	8.0000
P7	1				1			1	3	7	2		1		15	1.1429
P8		1		1								1		1	2	0.1905
P9					1										1	0.1111
P10															0	0.0000
P11					1	6				1		1	1	1	8	1.2222
P12	11		1	Out of Stock											12	N.A.[+]
P13															0	0.0000
P14															0	0.0000
P15										2					2	0.6667
P16			1						2						3	0.1765
P17									1						1	0.0526
P18															0	0.0000
P19								3		1					4	2.0000
P20					1			4							5	0.7143
P21															0	0.0000
P22					1										1	0.0833
P23				1						1					2	0.2000
P24	3			1		2	1				1	1			8	0.7857
Total number of copies of the selected books sold during the campaign															101	

This title was out of stock in the E-store, after the sale of its final unit on Day 3.
[+] E^t(P12) is not calculated, since the product was not always available in store for the duration of the experiment.

- C_t – the total number of clicks (covering all four types of post) by FB users on book title "t".
- T_{post} – the time of the day when posts regarding book title "t" were published.
- $S_t(z)$ – total sales of book title "t" via a post of type "z".
- S_t – total sales of book title "t" (via all four types of post).

Every campaign must have well defined goals, where the extent to which a goal has been fulfilled can be assessed using appropriate metrics (Goodwin, 1999). Various metrics can be used to assess methods of marketing in multiple dimensions. In this study the volume related metrics considered are: effectiveness, attractiveness, persuasiveness, and intensity. These metrics, described below, can be used to assess methods of marketing in multiple dimensions. For instance, it might be the case that a campaign is attractive but not persuasive. One campaign might be less intense, but more effective, than another campaign. Content might be persuasive, but not presented in an attractive manner, and so on.

- Metrics related to attaining goals (in this case sales) that focus on the conversion rate: **Effectiveness**

By sharing content with web-links, the first motive is to obtain the maximum number of clicks. But clicks are just an expression of interest from the user (Hasouneh & Alqeed, 2010). Hence, the effectiveness of a campaign or posts in terms of attaining goals can be defined as the ratio of sales to the number of clicks. In this regard, we define the following metrics:

– **Effectiveness of a campaign (E_t)**, based on the ratio of total sales to the total number of clicks for a given title.

$$E_t = \frac{S_t}{C_t} \tag{1}$$

– **Effectiveness of a post type ($E_t(z)$)**, z = {A1, A2, A3, A4}, as above, but according to the type of a post.

$$E_t(z) = \frac{S_t(z)}{C_t(z)} \tag{2}$$

- Metrics related to the valence of content, which describe a post's attractiveness and users' willingness to engage (like, comment or share): **Attractiveness**

Customers, and in general people, interact with things they find attractive (Halligan & Shah, 2014; La Rocca, Caruana, & Snehota, 2012). In the same way, we can say that if people find content on social media attractive, then they will engage with it. Hence, we can measure the attractiveness of a campaign or a post by the ratio of the number of reactions to the number of people reached. In this regard, we define the following metrics:

– **Attractiveness of a campaign (A_t)**, the ratio of the number of reactions to the reach for a given title.

$$A_t = \frac{L_t}{R_t} \tag{3}$$

– **Attractiveness of the type of content ($A_t(z)$)**, z = {A1, A2, A3, A4}, as above, but according to the type of a post.

$$A_t(z) = \frac{L_t(z)}{R_t(z)} \tag{4}$$

- Metrics related to the quality of content, which illustrate the power of the message conveyed via the content to obtain the desired reaction (e.g., click on a link): **Persuasiveness**

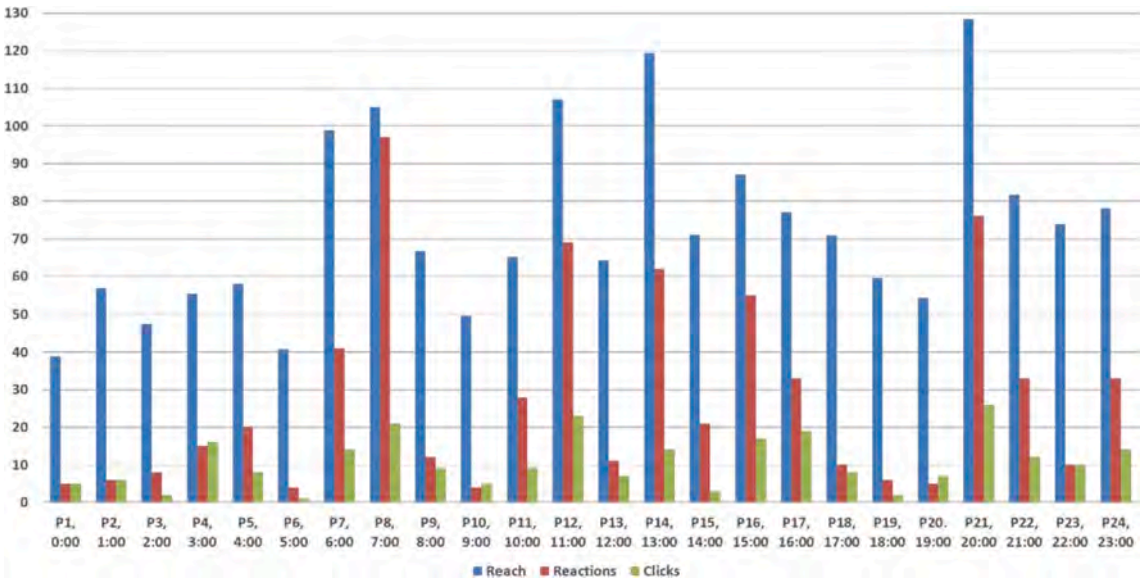

Fig. 4. Total reach, number of reactions to and clicks on posts for each book over the duration of the experiment. Note: The value of "Reach" is scaled by a factor of 1/10th in this graph, in order to improve the visibility of the reach and reactions bars.

Persuasiveness can be measured by the number of individuals undertaking a desired action relative to the number of individuals reached (Tucker, 2015). It has also been discussed in the literature that an audience is persuaded to act when they find the content of a post relevant (Arai, 2007). Hence, such measures can also be considered as describing the quality of content or the message. The following metrics have been devised in this regard:

– **Persuasiveness of a campaign (P_t)**, the ratio of the number of clicks to the reach for a given title.

$$P_t = \frac{C_t}{R_t} \tag{5}$$

– **Persuasiveness of the type of content ($P_t(z)$)**, z = {A1, A2, A3, A4}, as above, but according to the type of a post.

$$P_t(z) = \frac{C_t(z)}{R_t(z)} \tag{6}$$

- Metrics related to the dynamics of the volume of content: **Intensities**

Measures of the number of marketing messages or posts published in order to reach customers within a given time period are referred to as metrics of the intensity of marketing (Mathews & Bianchi, 2010). Here, we apply this concept to the framework of the experiment and in regard to other metrics that are defined above. The "Δ" notation, used in defining the metrics describing intensity, denote differences between the observations of variables from two different points in time. For instance, in Eq. (7), Δ R_t denotes the difference between the values of the reach of a title observed at times t_1 and t_2 (which will be specified as appropriate), whereas Δ T denotes the difference between the times t_1 and t_2. This enables the analysis of the intensity of activity over various time periods within a larger campaign. The following metrics are defined:

– **Intensity of a campaign (I_t)**, the mean rate of growth of the reach of a title over an interval of the campaign.

$$I_t = \frac{\Delta R_t}{\Delta T} \tag{7}$$

– **Intensity of a type of post ($I_t(z)$)**, z = {A1, A2, A3, A4}, as above, but according to the type of post.

$$I_t(z) = \frac{\Delta R_t(z)}{\Delta T} \tag{8}$$

– **Intensity of a campaign's attractiveness (I_t^A)**, the mean rate at which the number of reactions to a title increases over an interval of the campaign.

$$I_t^A = \frac{\Delta L_t}{\Delta T} \tag{9}$$

– **Intensity of the attractiveness of a type of post ($I_t^A(z)$)**, z = {A1, A2, A3, A4}, as above, but according to the type of post.

$$I_t^A(z) = \frac{\Delta L_t(z)}{\Delta T} \tag{10}$$

– **Intensity of campaign's persuasiveness (I_t^P)**, the mean rate at which the number of clicks related to a title increases over an interval of the campaign.

$$I_t^P = \frac{\Delta C_t}{\Delta T} \tag{11}$$

– **Intensity of the persuasiveness of a type of post ($I_t^P(z)$)**, z = {A1, A2, A3, A4}, as above, but according to the type of post.

$$I_t^P(z) = \frac{\Delta C_t(z)}{\Delta T} \tag{12}$$

4. Experimental results and observations

4.1. The data observed and initial data analysis

Data recorded before initiating the experiment show that the E-Store's FB page had 5032 fans, which increased to 5045 at the end of the experiment. In total, the E-Store sold 101 copies of the selected books during the experiment. The daily sales record of each book is presented

Table 3
Results of multiple linear regression with dependent variable R_t and regressors L_t and C_t.

	Coefficient	Std. Error	t-ratio	p-value
For dependent variable R_t and regressors L_t & C_t (all four types of posts considered)				
const	470.597	43.4852	10.82	0.0000
L_t	6.47050	1.63771	3.951	0.0007
C_t	7.57849	6.22431	1.218	0.2369
For dependent variable R_t and regressors L_t & C_t (A4 type posts excluded)				
const	260.407	22.3275	11.66	0.0000
^{L}t(excludingA4)	5.07253	2.31923	2.187	0.0402
^{C}t(excludingA4)	17.8711	9.12456	1.959	0.0636

Table 4
Results of multiple linear regression with dependent variable $R_t(An)$, n = 1; 2; 3; 4 and the regressors being the corresponding $L_t(An)$ and $C_t(An)$.

	Coefficient	Std. Error	t-ratio	p-value
For dependent variable $R_t(A1)$ and regressors $L_t(A1)$ & $C_t(A1)$				
const	89.5194	10.1230	8.843	0.0000
$L_t(A1)$	7.22855	1.51810	4.762	0.0001
$C_t(A1)$	16.8512	5.03877	3.344	0.0031
For dependent variable $R_t(A2)$ and regressors $L_t(A2)$ & $C_t(A2)$				
const	85.9984	10.0510	8.556	0.0000
$L_t(A2)$	5.27508	2.11231	2.497	0.0209
$C_t(A2)$	17.0753	6.67204	2.559	0.0183
For dependent variable $R_t(A3)$ and regressors $L_t(A3)$ & $C_t(A3)$				
const	70.7781	9.38505	7.542	0.0000
$L_t(A3)$	5.63590	2.10307	2.680	0.0140
$C_t(A3)$	19.0862	8.12237	2.350	0.0286
For dependent variable $R_t(A4)$ and regressors $L_t(A4)$ & $C_t(A4)$				
const	208.237	24.5274	8.490	0.0000
$L_t(A4)$	5.86555	1.42167	4.126	0.0005
$C_t(A4)$	5.77798	4.22092	1.369	0.1855

in Table 2. Book P12 ran out of stock and was unavailable after the final unit was sold on the 3rd day. The availability of each book had been checked before initiating the experiment. However, in the case of P12, there was a bulk purchase of 11 units on Day 1, which caused its later unavailability. Hence, this title was not considered in the analysis of effectiveness.

Over the total duration of this experiment, the E-Store reached 17,546 FB users, which resulted in 664 reactions and 258 link clicks. The largest overall reach (1284 FB users) and number of link clicks (26) were found to be for book title (P21), corresponding to posts at 8 pm in the evening. The maximum number of reactions, 97, was observed for posts at 7 am in the morning, corresponding to book title (P8). Fig. 4, shows the total reach, number of reactions to and clicks on the posts for each book title over the duration of the experiment.

In terms of the types of posts, A4 contributed to 44.48% of the reach, 48.34% of the reactions and 62.02% of the clicks overall throughout the

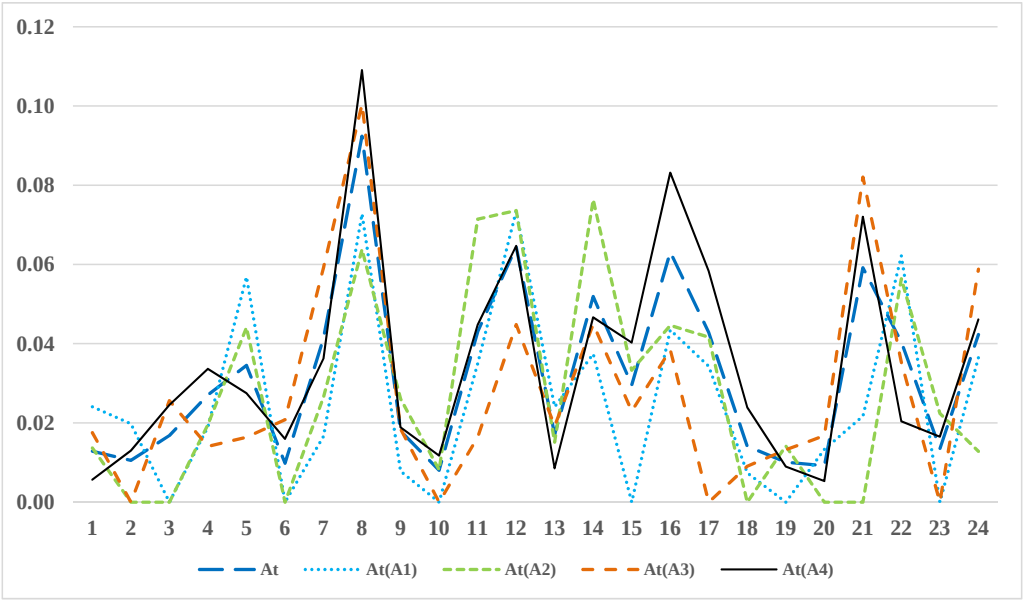

Fig. 5. Attractiveness of the campaign and each type of post, for each book title. Note: At = Attractiveness of the campaign for the corresponding book title (A_t), $A_t(A1)..A_t(A4)$ = Attractiveness of each type of post for a given book title (A_t (A1)..$A_t(A4)$).

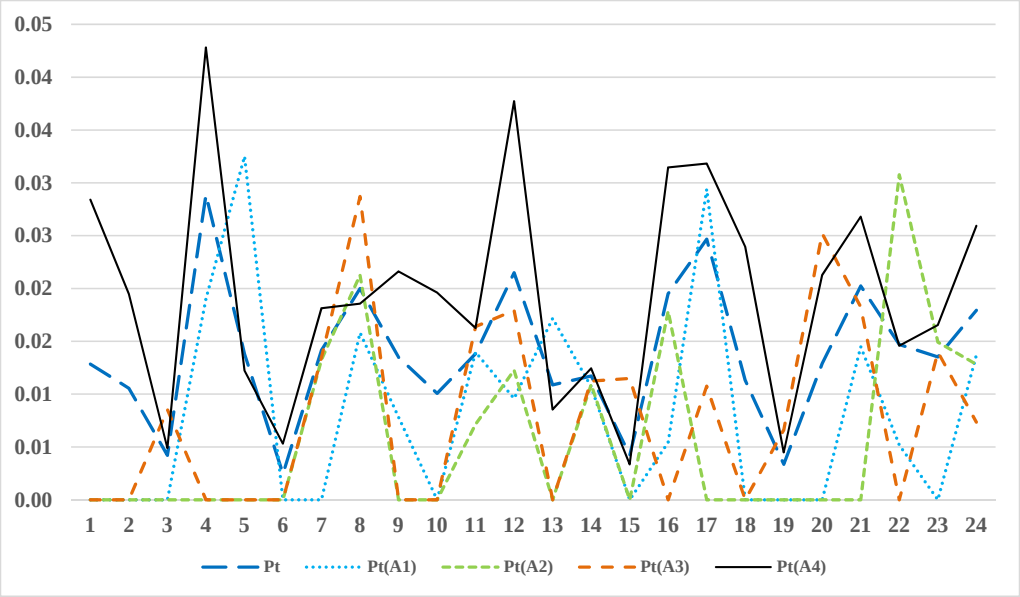

Fig. 6. Persuasiveness of the campaign and each type of post for a given book title. Note: Pt = Persuasiveness of the campaign for a given book title (P_t), P_t(A1).. P_t(A4) = Attractiveness of each type of post for a given book title (P_t(A1)..P_t(A4)).

campaign. This indicates that this type of post was the most effective of the four used in this experiment, indicating hypothesis H2 to be true. To further see the effect of including the A4 type of post in the campaign, we calculated the mean and standard deviation (SD) of the reach, number of reactions and number of clicks for each book title. For each title, two means and SDs were calculated. The first included all four types of posts (A1–A4). The second was based only on the first three types of post (A1–A3), i.e., excluding the dominant A4 type. The results presented in Table A.6 show that, for each of the individual book titles, the inclusion of type A4 posts increased the mean reach and number of clicks. In 20 of 24 cases, the relative number of responses was also higher. The four exceptions were P1, P13, P20 and P22, where the differences between the mean numbers of responses were 0.08, 0.25, 0.08 and 0.42, respectively. There is no clear explanation of these exceptions. It might possibly be related to the time that passes between posting and the first reaction to these posts, but this requires further study.

From the data presented in Table A.6, we observed that a greater reach did not necessarily lead to more reactions or clicks. Hence, we carried out multiple linear regression, with the dependent variable being the overall reach (R_t) of a book title (where all four posts were included) and the total number of reactions (L_t) and clicks (C_t) were treated as explanatory variables. We found that the number of reactions (L_t) had a statistically significant and positive relationship with the reach (R_t),

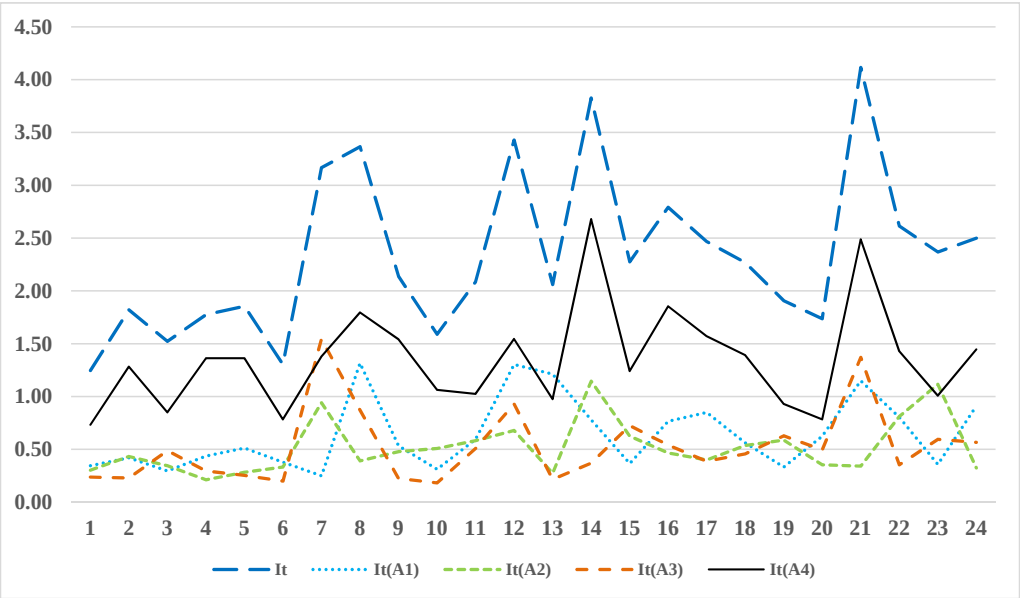

Fig. 7. Intensity of the campaign for each type of post (and over all types of post) for a given book title. Note: It = Intensity of the campaign for a given book title over all types of post (I_t), I_t(A1)..I_t(A4) = Intensity of each type of post for a given book title (I_t(A1)..I_t(A4)).

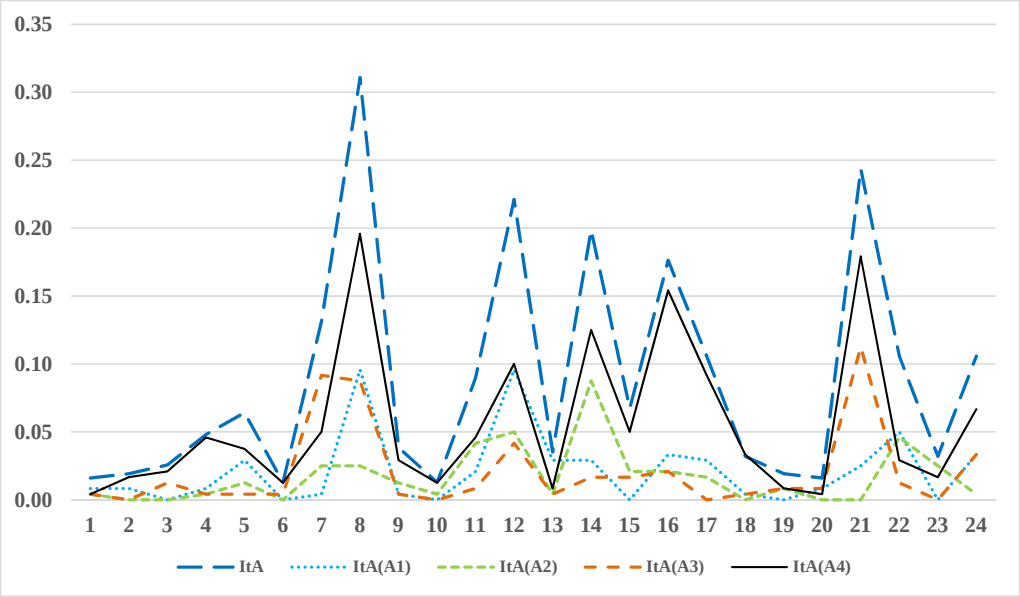

Fig. 8. Intensity of the attractiveness of the overall campaign and each type of post for given book titles. Note: ItA = Intensity of the attractiveness of the overall campaign for each book title (I_t^A), $I_t(A1)..I_t(A4)$ = Intensity of the attractiveness of each type of post for a given book title ($I_t^A(A1)..I_t^A(A4)$).

whereas the relationship between the number of clicks and the reach was statistically insignificant. After excluding post type A4, we derived analogous regression models and obtained similar results. The results for both types of regression are illustrated in Table 3. In both cases, regression analysis indicated that an increased reach followed from a larger number of reactions, but not from a larger number of clicks.

We also performed multiple linear regressions with the dependent variable being the reach of each type of post ($R_t(A1)$, …, $R_t(A4)$) and the corresponding number of reactions and link clicks being treated as the explanatory variables. The results of these regressions are shown in Table 4. Individually, for posts of type A1, A2 and A3, the total reach was positively and significantly related with both the corresponding number of reactions and link clicks. This is interesting because, in terms of the collective sum, there was no significant relation between the reach and the number of link clicks. For posts of type A4, the only significant relation found was between the reach and the number of reactions.

4.2. Performance of the campaign based on metrics

For all the book titles and types of post, various metrics were defined in sub-section 3.2. The results obtained for each metric are illustrated in the following subsections.

4.2.1. Effectiveness

The effectiveness of a campaign was calculated on the basis of Eq. (1), where the sales of each particular book title "t" (S_t) were divided by

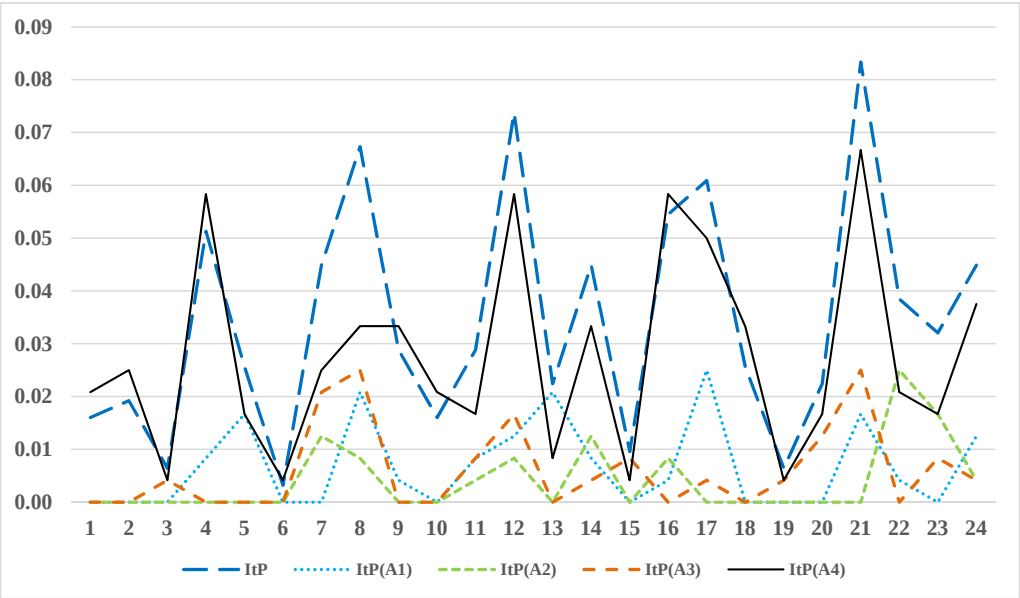

Fig. 9. Intensity of the persuasiveness of the overall campaign and each type of post for given book titles. Note: ItP = Intensity of the persuasiveness of the overall campaign for each book title (I_t^P), $I_t^P(A1)..I_t^P(A4)$ = Intensity of the persuasiveness of each type of post for given book titles ($I_t^P(A1)..I_t^P(A4)$).

the corresponding number of clicks (C_t). These results are illustrated in Table 2, including the sales of each book title. Due to the small number of sales for individual types of post, we do not have any conclusive evidence regarding the effectiveness of the types of post based on Eq. (2). Hence, the observed values of effectiveness according to post type are not included here and there is no conclusive support for hypothesis H2 at this level. The effectiveness of a campaign (E_t) gives us two main results. First, it shows that, even though the collective reach of a certain book title (over all four types of post) might be lower compared to other titles, it might have a higher E_t. For example, let us consider the sales of three book titles, P7, P11 and P19. They had sales of 15, 8 and 4, respectively, whereas their E_t were 1.1429, 1.2222 and 2.000, respectively. As these book titles were all from a similar category, all being best sellers (same level of quality based on market opinion) and all four types of post were used, the difference between these titles lies in the time of posting. This can be a significant factor in determining the effectiveness of social media marketing. Hence, E_t can also be used to determine the best time for posting, when the objective of a campaign is to maximize effectiveness. According to our experiment, the best times for posting in descending order are 5 am, 2 am or 6 pm, and 10 am. These times also show another important detail compared with the insights provided by Facebook to the administrators of a Facebook page. The number of users online at a certain time, shown under the "Posts" section on "Insights", was not significant for the effectiveness of a campaign. According to the insights supplied to the E-Store, the number of users online was greatest at 8 pm and 9 pm. However, these are not the recommended times for posting based on the calculations carried out in this study. This provides support for hypothesis H1 regarding the effectiveness of the campaign.

4.2.2. Attractiveness

The attractiveness of the campaign for a given book title was calculated on the basis of Eq. (3). The attractiveness of each post for a given book title was based on Eq. (4). The results obtained are illustrated in Fig. 5. The attractiveness of a campaign was greatest for book title P8, corresponding to a posting time of 7am, followed by (in decreasing order of attractiveness) P12 (11 am), P16 (3 pm) and P21 (8 pm). On average, post type A4 was the most attractive (average $A_t(A4) = 0.0348$), with the other three types having similar attractiveness scores. The means of $A_t(A1)$, $A_t(A2)$ and $A_t(A3)$, were 0.0253, 0.0277 and 0.0281, respectively.

Individually, the A4 type of post was most attractive for 9 book titles, corresponding to posting times between 3 am and 5 pm. The other three posts were most attractive for 5 book titles each and at times scattered throughout the day. We also observe steep peaks in the attractiveness of the campaign overall, as well as for the individual types of post, according to a regular pattern. From this, we can conclude that posting between 12 am and 2 am, around 5 am, 10 am, or between 5 pm and 7 pm is less attractive to the E-Store's audience. The peaks in the graph in Fig. 5 show the times at which posts can be highly attractive to the audience and the most reactions can be obtained. FB users seem to be particularly active around breakfast time. Hence, with regard to attractiveness, there is support for both hypotheses, H1 and H2.

4.2.3. Persuasiveness

The persuasiveness of a campaign and of each type of post for a given book title were calculated on the basis of Eqs. (5) and (6), respectively. The results of these calculations are presented in Fig. 6. P04, P17, P12, and P21 were associated with the highest levels of persuasiveness in the campaign (in decreasing order), while P06 was associated with the lowest level. A similar pattern of peaks to the one observed for attractiveness was also observed here. The A4 type of post was found to be the most persuasive for 15 out of the 24 book titles in the experiment. Based on the average of the persuasiveness of each type of post overall, A4′s persuasiveness was more than double than that of A1, A2 or A3, individually. This indicates that users were more likely to click on links in the A4 type of post. This again indicates that hypothesis H2 holds true. The average persuasiveness of A3 type posts was found to be lower than that for A1, even though A3 was found to the most attractive for 6 book titles, whereas A1 was found to be the most attractive for 2. The A2 type of post was found to be the least persuasive on average. Regarding the time of posting, a similar pattern of peaks and valleys to the ones obtained for the attractiveness measures is observed. This again gives support to the hypothesis H1.

4.2.4. Intensity

The intensity of a campaign for a given book title was calculated using Eq. (7) and the intensity for each type of post was calculated using Eq. (8). It is very important to ensure that campaigns are not overly intensive, because this can lead to flooding the news feed of a user and may lead to negative reactions. The results illustrated in Fig. 7 show that the overall intensity of the campaign ranged between 1.2468 for P1 and 4.11 for P21. Intensity is characterized by a similar pattern of peaks as for persuasiveness and attractiveness. In addition, there was a general upward trend over the course of a day. This is because there are more users on Facebook during the later part of the day. Comparing different types of posts, it can be seen that the intensity of posts of type A4 was the highest, apart from two instances, around 6 am and 12 noon. At these two times, the A1 type of post had a greater intensity. Knowing the intensity of a campaign and the time of posting can be fruitful in determining an appropriate time interval between posts. This would enable posted content to achieve its maximum possible efficiency.

To describe the intensity of a campaign, two additional metrics, intensity of attractiveness and intensity of persuasiveness, were also calculated using Eqs. (9), (10), (11) and (12), respectively. The results for the intensity of attractiveness for each type of post and each book title are illustrated in Fig. 8. Here again, we observed a similar pattern of peaks and noted that posts of type A4 were associated with the highest levels of intensity. The highest intensity of attractiveness in the campaign as a whole was observed for posts made at 7 am, 11 am, 1 pm, 3 pm and 8 pm. These times also corresponded to the highest intensity of the attractiveness of posts of type A4. These results support both hypothesis H1 and H2 with regard to this campaign goal as well.

The results for the intensity of persuasiveness of the overall campaign and for each type of post are illustrated in Fig. 9 for each book title. The results for the intensity of persuasiveness are quite similar to those for the intensity of attractiveness. Posts of type A4 had the highest intensity of persuasiveness, while the intensities of the attractiveness of the remaining types of post were very similar to each other. Comparing Figs. 7, 8 and 9, it is evident that the intensity of attractiveness and intensity of persuasiveness, for both the overall campaign, as well as each type of post, are strongly associated with the intensity of the overall campaign and of each type of post. It is desirable that a campaign has a moderate intensity combined with a higher intensity of attractiveness and persuasiveness. Based on the results from this experiment, a campaign can be designed to achieve the desired combination by using the appropriate type of posts at appropriate times of the day.

5. Discussion and conclusion

The fabric of social media marketing is very dynamic, which means that both managers and researchers are actively searching for new ways of helping businesses and advancing scientific understanding in rapidly evolving competitive markets. This study contributes to the existing scientific literature and also provides vital practical insights for managers to organically promote content on a business's FB fanpage.

From the theoretical point of view, the study adds to the literature an experimental setup that can be adapted to conduct further studies on FB pages of a real business. There are numerous challenges that researchers face in designing an efficient experiment for determining the effectiveness of marketing communications on social media in a real business environment (Banks et al., 2016). This is one of the first experimental setups for testing the effectiveness of the positioning of

web-links in a FB post within a real business environment in an organic setting. The structure of the experiment is designed so that it can be used under various settings for different types of posts and content, on FB and other similar social media. It has been emphasized several times in the literature that the type of a post has a great effect on consumer engagement (de Vries et al., 2012). Also, there is a need to establish the relation between content type and engagement (Dolan et al., 2017). This study fills the void found in the literature regarding the performance of posts with web-links placed in different ways and adds to the existing discussion by Lipsman et al. (2012); Coelho et al. (2016); Kim and Cappella (2019); Chodak et al. (2019); Balio and Casais (2020). It also adds to the existing debate[7] regarding FB's algorithm, which gives higher priority to native content compared to posts linked to external sites.

It was empirically evident that in the course of the organic promotions presented here, posts with a link in the comments (type A4) had a higher reach, as well as being a lot more effective and engaging in comparison to the other types of post (A1, A2 and A3) which have a web-link in their caption. On the other hand, analysis showed that while the number of clicks was positively associated with the reach of posts for other types of post (A1, A2 and A3), there was no such association for posts of type A4. This means that many of the link clicks via posts of type A4 might be speculative or accidental, which would account for the increased number of link clicks. On the other hand, in addition to the FB algorithm rating the organic appearance of posts with web-links of type (A1, A2 and A3) lower than posts which do not have a web-link (such as A4, since the link is in the comments), the higher reach of posts of type A4 might be related to the fact that the link was placed in a comment along with the post. This follows from the reaction of the FB algorithm, which results in a post obtaining a higher ranking or being assigned a greater probability of being displayed to other users. Hence, posts of type A4 would be the most effective option for organic promotions of a web-link on FB and this affirms hypothesis H2 of this study.

The time of posting has been found to be one of the factors determining engagement in FB posts by several studies in the literature. The results of this study offer alternate explanations to those provided by Cvijikj and Michahelles (2013), who deduced that FB page managers should post during peak hours as the interactions last longer, or by Golder et al. (2007); Villamediana et al. (2019), who found the specific posting times that are associated with high levels of engagement. Firstly, according to the goals of a campaign, different times of the day would be more fruitful, as shown in Figs. 5–9. This might vary according to business, based on its geographic location, location of its audience, exact time of posting, the text in a caption, segment of the market, and so on. This also affirms hypothesis H1 of this study. This study also further elaborates metrics to measure the effectiveness, attractiveness, persuasiveness, and intensity for social media campaigns / posts, which were introduced by Chodak et al. (2019).

From a practical point of view, the structure of the experiment described in this study is appropriate for businesses to conduct experiments and discover the types of posts that work best for them without incurring large costs, a problem that was highlighted by Kim and Cappella (2019). It is recommended that businesses should run similar experiments on their FB and other social media pages, record and then analyze the data to obtain personalized recommendations. Secondly, to organically promote content on FB using a web-link, placing the web-link in the comments would be more effective for businesses to reach their desired goals, compared to placing the web-link in the caption. The patterns of peaks and valleys in the graphs for various metrics were found to be similar. Observing the time interval between peaks in the graphs gives us information about the minimum interval of time that should be maintained between posts. Considering the demographics and the number of fans online is not sufficient. From a managerial point of view, it is recommended that there is a gap of at least 2–3 h between posts. The schedule of posting for a particular experiment or campaign can be synchronized to the peaks in the graphs, which should result in a more uniform profile. A uniform profile would mean that each post is performing to its utmost efficiency and the interval between posts is appropriate. Based on the number of users online, as shown in FB insights, it was interesting to note that there was very little association between the level of traffic on FB and the values of these metrics. The intensity metric depends on the number of users online. However, no clear effect was observed for any of the other metrics.

6. Limitations and future research

Despite the merits of this study, there are some limitations that open new paths for further research into the effectiveness of marketing on social media and experiments carried out under real market conditions. Further study would give additional, valuable insights to marketers. The experiment was designed and conducted for a specific group of products of a specific e-store. Further experiments could be conducted measuring the effectiveness of such types of post across a variety of products offered by a single e-store. This would enable researchers and practitioners to take into account the quality of a good, which was considered to be constant in this study. Further experiments comparing results from e.g. various geographical locations, market segments and social media platforms should be carried out. Although we expect the results to be fairly uniform according to market segment and geographical region, it would also be interesting to replicate this experiment for another e-store in the same market segment with similar products and audience. While analyzing the results, another interesting research hypothesis emerged, which has not yet been addressed in the literature, nor was within the scope of this study. In terms of the time of posting, FB's introduction of screening to reduce the reach of posts specifically designed as click bait has caused a slight delay in posts appearing to their audiences. The basis of this hypothesis comes from the fact that the reach of each of the 96 posts was very low for the first couple of hours and then grew steadily. It would be interesting to investigate the effect of this screening using direct posts and ones that are scheduled in advance.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

See Tables A.5 and A.6.

Table A.5
Schedule for publishing the posts and recording the observations.

Day 1	22nd November 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
T. Post	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4
Day 2	23rd November 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
T. Post	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1
Day 3	24th November 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
T. Post	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2
Day 4	25th November 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
T. Post	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3
Posts were allowed to organically spread from 26th November 2019 to 1st December 2019 (Day 5 to Day 10)																								
Day 11	2nd December 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
O. Post	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4
Day 12	3rd December 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
O. Post	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1
Day 13	4th December 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
O. Post	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2
Day 14	5th December 2019																						
Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
P. Code	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24
O. Post	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3

Note: P. Code = Product Code; T. Post = Type of Post; O. Post = Observations recorded for the type of post.

Table A.6
The mean and standard deviation of reach, numbers of reactions and clicks for each book title, both overall and according to type of post.

Title	$(R_t)^1$	$(R_t)^2$	Reach Mean[1]	Mean[2]	SD[1]	SD[2]	$(L_t)^1$	$(L_t)^2$	Reactions Mean[1]	Mean[2]	SD[1]	SD[2]	$(C_t)^1$	$(C_t)^2$	Clicks Mean[1]	Mean[2]	SD[1]	SD[2]
P1	389	213	97.25	71.00	53.58	13.11	5	4	1.25	1.33	0.50	0.58	5	0	1.25	0.00	2.50	0.00
P2	568	260	142.00	86.67	112.92	27.47	6	2	1.50	0.67	1.91	1.15	6	0	1.50	0.00	3.00	0.00
P3	475	271	118.75	90.33	60.08	23.86	8	3	2.00	1.00	2.45	1.73	2	1	0.50	0.33	0.58	0.58
P4	554	227	138.50	75.67	127.63	27.30	15	4	3.75	1.33	4.86	0.58	16	2	4.00	0.67	6.73	1.15
P5	579	252	144.75	84.00	124.62	33.96	20	11	5.00	3.67	3.65	3.06	8	4	2.00	1.33	2.31	2.31
P6	407	219	101.75	73.00	60.32	22.34	4	1	1.00	0.33	1.41	0.58	1	0	0.25	0.00	0.50	0.00
P7	988	657	247.00	219.00	138.85	155.62	41	29	10.25	9.67	9.03	10.97	14	8	3.50	2.67	2.65	2.52
P8	1050	619	262.50	206.33	144.35	111.02	97	50	24.25	16.67	16.96	9.29	21	13	5.25	4.33	2.50	2.08
P9	667	297	166.75	99.00	139.29	39.51	12	5	3.00	1.67	2.83	1.15	9	1	2.25	0.33	3.86	0.58
P10	496	241	124.00	80.33	93.03	39.27	4	1	1.00	0.33	1.41	0.58	5	0	1.25	0.00	2.50	0.00
P11	651	405	162.75	135.00	56.27	11.36	28	17	7.00	5.67	4.24	4.04	9	5	2.25	1.67	1.26	0.58
P12	1070	699	267.50	233.00	92.53	75.50	69	45	17.25	15.00	7.27	7.00	23	9	5.75	3.00	5.56	1.00
P13	643	409	160.75	136.33	119.91	134.13	11	9	2.75	3.00	2.87	3.46	7	5	1.75	1.67	2.36	2.89
P14	1194	551	298.50	183.67	241.91	93.04	62	32	15.50	10.67	12.18	9.07	14	6	3.50	2.00	3.11	1.00
P15	710	412	177.50	137.33	88.13	44.38	21	9	5.25	3.00	4.99	2.65	3	2	0.75	0.67	0.96	1.15
P16	871	426	217.75	142.00	154.56	37.47	55	18	13.75	6.00	15.56	1.73	17	3	4.25	1.00	6.55	1.00
P17	770	393	192.50	131.00	133.40	63.24	33	11	8.25	3.67	9.60	3.51	19	7	4.75	2.33	5.50	3.21
P18	708	374	177.00	124.67	105.21	13.05	10	2	2.50	0.67	3.70	0.58	8	0	2.00	0.00	4.00	0.00
P19	595	372	148.75	124.00	58.61	38.43	6	4	1.50	1.33	1.00	1.15	2	1	0.50	0.33	0.58	0.58
P20	542	354	135.50	118.00	43.93	32.51	5	4	1.25	1.33	0.96	1.15	7	3	1.75	1.00	2.06	1.73
P21	1284	687	321.00	229.00	212.44	130.03	76	33	19.00	11.00	19.75	14.18	26	10	6.50	3.33	6.81	3.06
P22	816	473	204.00	157.67	105.96	62.94	33	26	8.25	8.67	4.11	4.93	12	7	3.00	2.33	2.94	3.21
P23	739	497	184.75	165.67	85.05	93.09	10	6	2.50	2.00	3.00	3.46	10	6	2.50	2.00	1.91	2.00
P24	780	433	195.00	144.33	116.69	70.87	33	17	8.25	5.67	6.13	4.04	14	5	3.50	1.67	3.79	1.15

[1] Based on all four types of posts (P1-P4).
[2] Based on first three types of posts (P1-P3).

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