Marketing and social media long run performance implications: A time series experiment on small retailing

Abstract

Managers and marketing researchers strive to understand the effect of social media on marketing performance measures. Little is known about the influence of social media measures, such as engagement and reach, on sales and its components, like average ticket. Our study confronts this lacuna by conducting a natural time series experiment on a small retail which involved the development of a Facebook page for a furniture store. The methodology was divided into three periods, promoting adjustments on social media intensity, which varied from non-existent, the control group (period 01), to organic (period 02) and high (period 03). Data analysis involved the estimation of Analysis of Variance (ANOVA) models to compare estimated marginal means from the experiment and cointegration time series analysis in order to identify the "temporal movement" between marketing performance and social media performance measures. The most important result is the identification that social media reach produces effect on average ticket only when social media activity is exclusively organic by the store. This temporal relationship between these two variables dissipates in periods when social media activity is driven by paid advertising, in the form of sponsored postings. These results are important to marketers because it indicates how social media investments must be made in order to increase reach (by paid advertising) or sales (by organic activity).

Keywords: Marketing performance; Retailing; Social media performance.

I. Introduction

Social media renewed the forms that organizations relate to the marketplace, restructuring management and organizational activities, while disrupted entire industries and redefined others (Aral, Dellarocas, & Godes, 2013). Research on digital social media marketing has undergone two developing eras since culminating in the age of social media, from 2011 to 2014. The current period is marked by the consolidation of contemporary platforms such as Facebook, which extends its reach into diverse aspects of consumers' online and offline lives (Lamberton & Stephen, 2016). While people are constantly increasing their rate of Internet use and spending increasing time online, marketers shift advertising to digital channels (Stephen, 2016), placing consumer engagement as a top priority of their managerial efforts (McKinsey, 2014). Digital ad spending is facing heavy growth in mature and developing markets:12% in UK and 39.1% in China, according to reports published by digital marketing specialists (eMarketer, 2016a; eMarketer, 2016b).

As a result, to marketing, marketers and researchers recognize social media as a new and hybrid element of the promotion mix (Kumar et al. 2016; Mangold & Faulds, 2009), since it encompasses traditional and novel characteristics of the communication function (Mangold & Faulds, 2009). Firms are using Facebook pages as platforms of promotional communications, posting informational content which feeds the timelines of those who liked their pages (Mochon, Johnson, Schwartz, & Ariely, 2017). However, while marketing managers in major companies face pressure to increase performance from activities originated in social media platforms (Saboo, Kumar, & Ramani, 2016), their use in small and medium enterprises is unplanned and rely mostly on improvisation (Nakara, Benmoussa, & Jaouen, 2012).

A critical lacuna in this literature refers to monetizing social media activity (Yadav & Pavlou, 2014), as investments are usually not accountable, where no cause and effect links are made between inputs and performance results (Cespedes, 2015). This limitation seems more visible in small business, where mainstream marketing does not hold and empirical research is required to identify the most adequate digital decisions to increase the effectiveness of

marketing efforts (Hanssens & Pauwels, 2016). Specifically, on Facebook, research that examines the relationship between social media activity and offline behavior is starting to exhibit some progress (Mochon et al., 2017) whereas deserves a careful examination on the mechanisms that may drive performance in small business.

This research addresses these issues by measuring the impact of Facebook activity on marketing and social network performance in a small retail store. The framework entails a multidimensional approach to performance (Hanssens & Pauwels, 2016; Katsikeas, Morgan, Leonidou, & Hult, 2016), which considers the intensity of social media into firm/organization and consumer dimensions, as recognized by the literature review conducted by Alves, Fernandes and Raposo (2016). The influence of social media was assessed on store (sales revenue and average ticket) and social network (daily engagement and daily reach) measures.

A time series field experiment was performed during six months in a furniture store without previous social network activity, located in a small Brazilian city. Research methodology involved three stages and was inspired by Mochon et al. (2017) experiment on Facebook. Social network intensity was manipulated in order to identify its impact on performance measures. Data analysis involved the estimation of Analysis of Variance (ANOVA) models to compare estimated marginal means from the experiment and cointegration analysis in order to identify the temporal movement between marketing performance and social media performance measures.

Main results reveal a positive, although small, effect of Facebook activity on sales revenue. However, the most important outcome of the research is to observe than when social media activity is exclusively organic (non-sponsored postings) it produces effect on a derived sales revenue measure, the average ticket. This temporal relationship between these two variables dissipates in the period when social media activity is driven by sponsored postings. Despite the significant growth on reach when social media intensity is high, the organic temporal relationship found vanishes.

II. Background on studying multiple performance measures

The discussion of how marketing can contribute to business performance is continuous and relevant in both business and academic environments (Grønholdt & Martensen, 2006). The different studies of how marketing contributes to corporate performance are brand value approaches (Keller & Lehmann, 2003), customer value (Gupta & Zeithaml, 2006), and relationship (Lamberti et al. 2010). In this sense, Mintz & Currim (2013) sought to contribute by investigating the marketing mix performance from different financial and marketing metrics, such as (a) company strategy, (b) metrics orientation, management characteristics, (c) the company and the environment, and (d) the marketing mix activity. As a result, the authors identified that it is not necessary to follow-up and analyze several metrics, but rather those that can allow the performance of the marketing mix in particular. In this way, we discuss in this article different variables that can evaluate the impact of social media on a company performance.

Among the activities that make up the marketing mix and which has received an increase in investment by companies, approximately US$ 31 billion in 2016, is the social media (Statista, 2017), but few studies contribute to the discussion about metrics that May indicate the return of social media to the sale of companies (see Mochon et al., 2017).

III. Expected influences of online activities on performance measures

The use of social media by firms can impact performance indicators in different ways, such as cost reduction, enhancing sales revenues and other derived marketing performance measures, such as average ticket and Return on Investment (ROI) (Kumar *et al*., 2016; Parveen, Jaafar, & Ainin, 2016; Rishika et al. 2017). Generally, it is expected that consumer engagement

with firms in online environments positively affects revenues, but there are differences in consumer behavior when using a particular social media and his/her offline behavior (Oh, Roumani, Nwankpa, & Hu, 2017; Paniagua, & Sapena, 2014). Performance measures are a function of time as the older a fanpage is – with more fans and comments – the greater this fanpage may impact financial indicators (He, Wang, & Zha, 2014).

Due to the simplicity and ease of being adopted and its inherently low cost, social media is particularly important for small and medium enterprises (SEMs), as these businesses usually present financial constraints (Ainin et al., 2015). The presence in social media enables companies to provide their customers with information they would only obtain through telephone calls or e-mail messages. This significantly reduces customer service associated costs (Ainin *et al*., 2015; Parveen *et al*., 2016; Scuotto *et al*., 2017). Additionally, for companies' active on social networks, searching and consolidating information about potential customers is economical and easier (Parveen *et al*, 2016). A defining implication is that the resulting interaction with customers can stimulate ROI faster in relation to companies that do not incorporate social media into their strategies (Scuotto *et al*., 2017).

Online promotional activities may enhance firm performance at least in two ways, First, online actions are cheaper than those made in traditional media, helping to reduce promotional costs (Parveen *et al*, 2016). Second, paid or sponsored activities conducted on-line (e.g. sponsored content) increase word-of-mouth and organic searches for organizations (Pauwels, Aksehirli, & Lackman, 2016). A resulting implication for SMEs is produce customer engagement with the company fan page, in the form of likes, comments or shares. Usually, SMEs tend to have more likes and comments on their posts than physical visits from customers. Therefore, to produce engagement in on-line environment is to produce reach across a potential market. The more active companies are in social media, by means of generating their own content, the higher is the number of interactions and social media performance (He, Wang, & Zha, 2014). This management inclination may even change customer perception about marketing instruments. Kim, Lim, and Brymer (2015) found that firms participating in social media responding to negative comments made by customers could actually change the price these customers were willing to pay for corporate services.

In terms of financial indicators, Akmese, Aras, and Akmese (2016) evaluated six performance measures and their relation to the company being present (or not) in social media. These authors noted that net profit, average market value, price/earning ratio and market value are significantly higher for firms which make themselves present in social media. Paniagua and Sapena (2014) found evidence that the number of followers of a particular firm in social media impacts its value in the stock market. These results suggest the following marketing implications for empirical research: the need for (i) understand the relationship between marketing performance (in the form of sales derived measures) and social media performance (engagement and reach) in SMEs; (ii) identify temporal effects and relationships among these measures; (iii) disentangle how this effects changes when online activity is paid/stimulated by the company.

IV. Method

IV1. Problem characterization
We decided to use a natural experimental approach to identify the impact by social media, inspired by the study of Kumar et al. (2016) that analyzed a similar problem. Experimental studies use control groups because they are useful for analyzing fluctuations of dependent variables, before and after the manipulation of dependent variables (Cozby & Bates, 2012). In our study, the control group comprises a baseline period where the activity level of the page in a social media was non-existent or reduced to zero, so that we could evaluate the effect. With

the experiment, we verify if postings in a Facebook page influence marketing performance and social media performance variables. Hence, the variables of interest were divided into two groups, those that observe the consumer engagement in a virtual environment and those that represent marketing performance. Table 1 details study variables, definitions and their performance dimension.

Table 1 - *Variables description*

Variables	Definition	Performance dimension
Average ticket	Variable derived from the ratio between sales revenue and the total number of purchases made on the retail store (on time "t")	Marketing performance
Daily engagement	The number of people who engaged with the small retail page. This includes any clicks or stories created by unique users. Data provided by Facebook	Social media performance
Daily reach	The number of people who have seen any content associated to the retail store page (unique users). Data provided by Facebook	Social media performance
Sales revenue	Sales of the retail store on time "t"	Marketing performance

IV2. Natural experiment procedure

The experiment consisted of creating a Facebook page for the small furniture store and manage the on-line page in order to organize daily postings. The retail store is focused on the retail trade of furniture and appliances and is located in an inner city of Brazil, with a population of 30,930, HDI: 0.744 and monthly income per household of U$ 650,00 (IBGE, 2010). The store is a family business founded in 1999. During the year 2016, the average monthly sales revenue was approximately U$ 50.000,00. The store covers an area of approximately 2788ft. The only media used by the company to advertise their business until the beginning of the experiment was radio. During the experiment, radio advertisements continued to occur normally and with the same frequency, so that this variable remained constant during all periods. We choose Facebook among others social media because it has the largest number of users in the country of the study (Statista, 2017), imposes low financial investments to page owners, and is very easy to use by small companies (Kaplan & Haenlein, 2010; Champoux et al., 2012; Hansson et al., 2013; Chen et al., 2014; Jones et al., 2015).

The study occurred during April 1 and September 30, 2016. The first and last 30 days formed what we classified as the ''control group'' and enabled the comparison of periods the other two periods: the organic period (period 02), in which postings on the Facebook page were controlled only by the company and the high intensity social media period (period 03), where paid advertisement, in the form of sponsored postings, was used. Table 2 illustrates the periods each level we used.

Table 2 - *Social media experiment activity level*

Activity level	Description	Period
Period 01 – Control group Low intensity social media activity	No daily posts	April and September 2016
Period 02 – Organic period Moderate intensity social media activity	A daily post without sponsorship Two daily posts without sponsorship	May 2016 and June 2016

| | One daily post with sponsorship | |
| Period 03 – High intensity period High intensity social media activity | Two daily posts with sponsorship | July 2016 and August 2016 |

It is important to highlight that during period 03 postings were "boosted" by a Facebook mechanism that allows content to be sponsored for viewing by a larger number of users, with the frequency of previous phases repeated, one and two daily posts, respectively. During the period of sponsored posts, two publications per week were boosted. For purposes of analysis, the phases of the experiment were grouped into three main activity levels as shown in Table 2. Posting schedule at all activity levels were kept constant. On days when only one post was published, the announcement was made at the beginning of the morning shift. On days with two postings one was made at the beginning of the morning shift and the other at the beginning of the evening shift. The amount invested on sponsored posts and their frequency were kept constant. The frequency of two posts was reproduced from the research by Mochon et. al (2016) that used a similar procedure. The pattern of the postings was also kept constant throughout the experiment. The content was informational with the disclosure of products available in the store and its technical specifications.

As consumers engage and acquire an awareness of products through images (Coursaris et al., 2016), the postings contained a text accompanied by a product photo in a patterned template with the name of the store. The construction of the texts also followed the same pattern. Initially, a customer need was presented. Some technical specifications of the product were then presented. To conclude the text, sentences that focused on stimulating consumer behavior and attitudes were chosen, such as a visit to the store (Chu et al., 2013), which could lead to the sale of products. At no time did the page fans and store customers be informed that they were participating in an experiment so that there was no influence whatsoever on their buying or interacting decision with the page.

Figure 1. Real examples of non sponsored (a) and sponsored postings (b)

V. Results

V1. Descriptive results

Table 3 details the descriptive information about study variables. We organized this table adjusting the variables to the three experimental condition levels (No Facebook activity, Non-sponsored postings and Sponsored postings). Table 1 reveal increasing levels of Average ticket and Sales revenue after the creation of the Facebook page and subsequently using Sponsored postings. Daily engagement and reach were practically absent before the experiment started, indicating raises after the experimental condition. We measured one additional variable as control variable. To remove the influence of product prices from the analysis another control variable used was the average selling price of products for the day. In order to collect this data, the stock report was generated and saved daily. At the end of each day, the quantity of items and the sum of the sale prices of the items were raised, so the average sale price of the products was found.

Table 3 - *Descriptive statistics*

Variable	Experimental condition	n^a	Mean	SD
Average ticket	No Facebook activity	50	610.11	185.52
	Non sponsored postings	50	705.05	251.81
	Sponsored postings	50	759.99	409.93
Daily engagement	No Facebook activity	50	.52	1.09
	Non sponsored postings	50	15.70	13.10
	Sponsored postings	50	70.47	70.57
Daily reach	No Facebook activity	50	53.76	212.89
	Non sponsored postings	50	427.86	120.70
	Sponsored postings	50	1664.72	869.42
Mean price	No Facebook activity	50	485.08	8.16
	Non sponsored postings	50	480.70	6.41
	Sponsored postings	50	493.62	3.74
Sales revenue	No Facebook activity	50	6895.01	2400.82
	Non sponsored postings	50	7618.49	3587.82
	Sponsored postings	50	7877.51	4077.07

[a] n refers to periods (sequential days) as the methodology comprised of a time series field experiment

Figure 2a illustrates the time series behavior of marketing performance variables during the complete experiment. It is possible to observe spikes movements in the average ticket and on sales, but series are marked by strong "noise", as they are daily. Figure 2b unveils the pattern of the growth of engagement measures as intensity on social media becomes higher. This will be further analyzed by a time series technique.
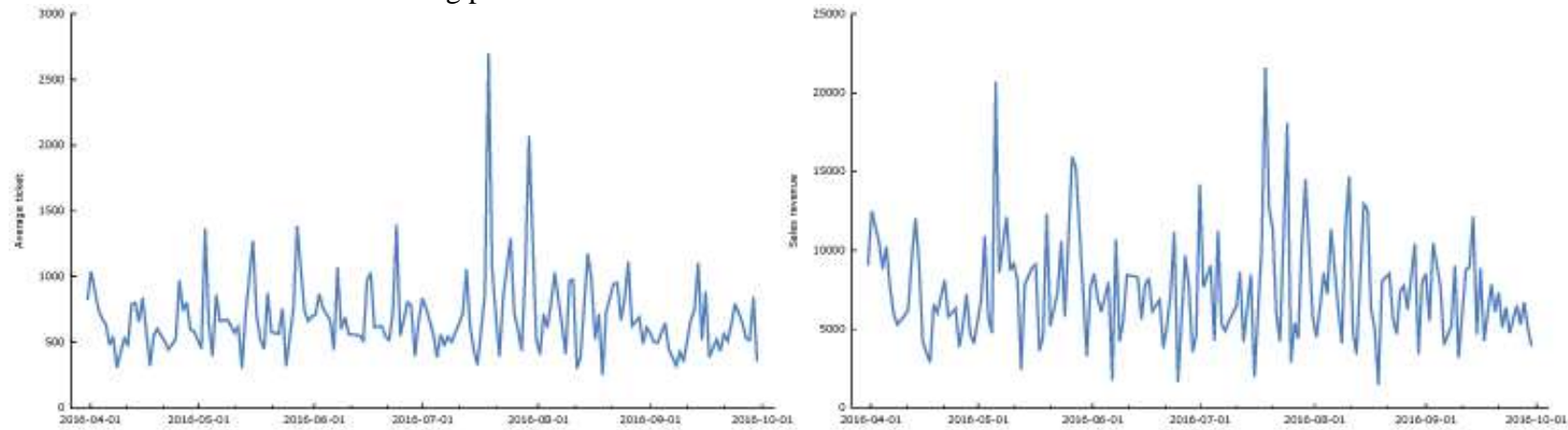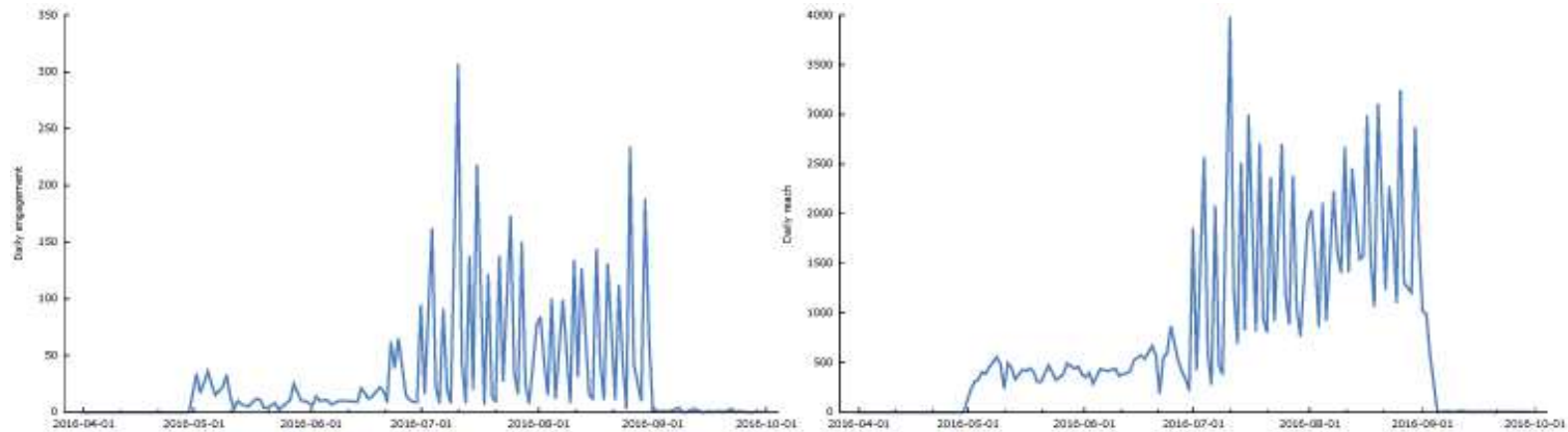
Figure 2a. Time series behavior of marketing performance

Figure 2b. Time series behavior of social network performance

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V2. Analysis of Variance (ANOVA) results

The first analysis involved using a simple ANOVA to identify the experimental effect of Facebook postings on marketing performance and social media performance measures. Hence, we developed four empirical models using as dependent variables the following: Model for marketing performance (1) – Average ticket; Model for marketing performance (2) – Sales revenue; Model for social media performance (3) – Daily engagement; Model for social media performance (4) – Daily reach.

In all these cases, dependent variables were standardized to normal score in order to satisfy the ANOVA assumption of presence of normality within groups, as shown by Table X. Mean price was used as control variable on the marketing performance models, also reduced to normal scores. The main independent variable is this case is a factor variable with three levels, signalizing the natural experimental procedure: level 1 – No Facebook activity; level 2 – Non-sponsored postings; level 3 – Sponsored postings.

The Experimental condition revealed only modest effects to marketing performance, as social network creation and activity (Non-sponsored postings and Sponsored postings) is responsible for a Partial Eta Squared of .03 ($F = 2.82$; $p < 0.10$) in the Average ticket model (Model 01). There was no effect observed on Sales revenue (Model 02). Otherwise, as expected, social media effect is much more prevalent on social media performance measures. Model 3 (Daily engagement as dependent variable) indicates that the experimental condition is responsible for a Partial Eta Squared of .69 ($F = 170.79$; $p < 0.01$) while on Model 4 (Daily reach) the results are even more noteworthy, with Partial Eta Squared of .73 ($F = 212.56$; $p < 0.01$).

The results primarily indicate that the presence of social media for small retail is mostly responsible for generating more impressions (reach) about the content created and engagement (clicks and "actions"). A second indication provided by Table X is that this effect becomes more intense as the retail activity in social media grows. Figures X and X illustrates a common output by ANOVA, the estimated marginal means, considering the three levels of the independent variable. While Figure X reveals almost a flat pattern to marketing performance, Figure X exhibits increasing marginal means of social media performance as social media activity raises.

Table 4

Summary of ANOVA models results

Model	Model R^{2a}	Source of variance	Mean Square	F	Sig.	Partial Eta Squared
Models for marketing performance						
01 – Dep. var. Average ticket	.01	Corrected model	1.84	1.91	.13	.03
		Intercept	.00	.00	.95	.00
		Mean price[b]	.72	.74	.38	.00
		Experimental condition	2.73	2.82	***.06****	.03
02 – Dep. var. Sales revenue	.00	Corrected model	.42	.42	.73	.00
		Intercept	.00	.00	.97	.00
		Mean price	.40	.40	.52	.00
		Experimental condition	.60	.60	.54	.00
Models for social network performance						
01 – Dep. var. Daily engagement	.69	Corrected model	45.74	170.99	**.00***	.695
		Intercept	.01	.05	.81	.00
		Experimental condition	45.72	170.99	**.00***	.69
02 – Dep. var. Daily reach	.73	Corrected model	50.79	212.56	**.00***	.73
		Intercept	.00	.00	.95	.00
		Experimental condition	50.79	212.56	**.00***	.73

Note. Variables were all reduced to normal scores in order to satisfy the basic assumption of presence of normality within groups

[a] Adjusted R^2

[b] Mean price per day at the retail store was used as a control variable. Despite its insignificance, signs of this parameter in both marketing performance models were negative

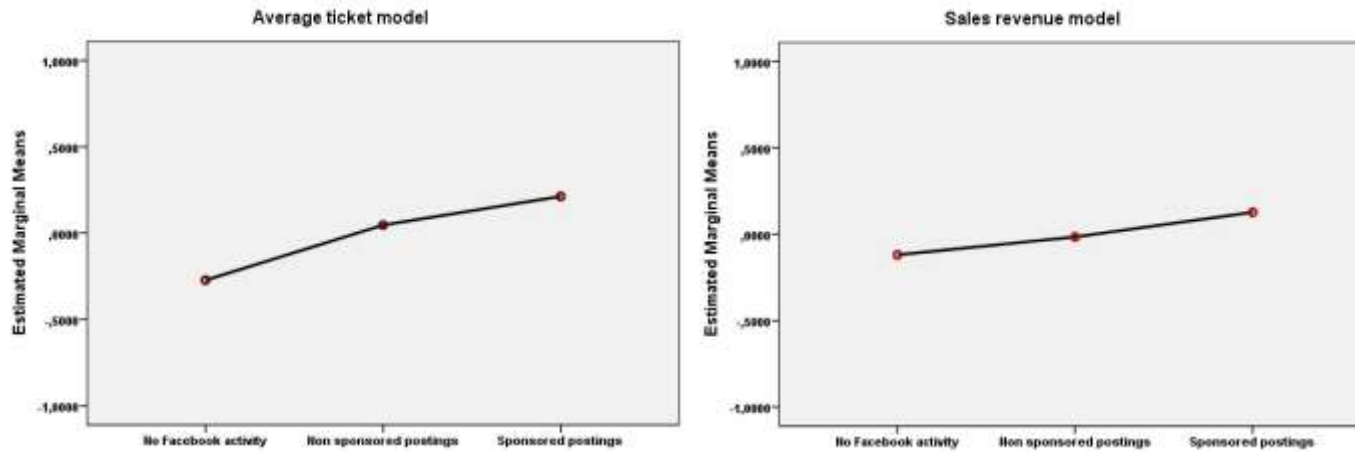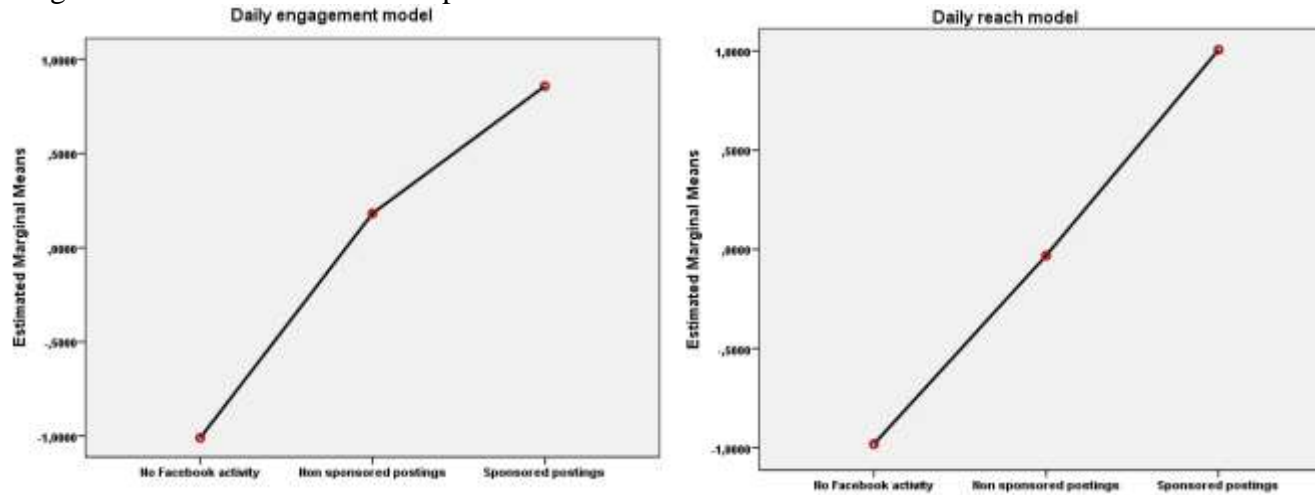**Figure 3.** Estimated marginal means of marketing performance

Figure 4. Estimated marginal means of social network performance

V3. Time series analysis results

The second part of the research uses the times series originated by the experiment and involves finding time series relationships between social media performance and marketing performance variables. As empirical investigation involved imposing different degrees of intensity of social media activity, now our objective turns to identify the underlying temporal relationships between these measures. Hence, this phase encompasses finding eventual connection between sales revenue and average ticket, the two marketing performance measures, with daily engagement and reach, the two social media performance measures. To comply with this objective, we use a formal unit root test routine to identify time series stationarity or evolution and a cointegration regression between the variables classified as in evolution.

Stationarity or Evolution (stochastic) refers to the time series behavior of a given variable over time. While the stationarity condition signalizes a time series process with temporary deviations from deterministic components (e.g. mean and variance), the evolution pattern identifies processes that wander freely over time (Dekimpe & Hanssens, 1995; Hanssens, Parsons, & Schultz, 2002). A cointegration relationship occurs when a long-run component (stochastic) is found in two marketing variables of interest (Srinivasan, & Bass, 2000) (e.g. social media activity inputs and marketing performance outputs). When regressing two evolutionary variables produces a stationary residual, this means the variables are cointegrated, "connected" in the long run (Murray, 1994).

Table X details all the routines to time series analysis. Column 4 identifies the complete routine of Augmented Dickey-Fuller (ADF) tests as stated on Enders (1995) to specify stationarity or evolution of a given variable. When both were in an Evolution pattern, a complementary ADF test was conducted on the residuals of the regression between these variables in order to identify stationary residuals. This methodological procedure enabled the identification of one cointegration relationship, between average ticket and daily reach in period 02, marked by non-sponsored postings.

Table 5 - *Results of time series analysis between marketing and social media performance variables*

Experiment activity level	Variable 01 (Time series classification)	Variable 02 (Time series classification)	ADF tests on residual result	Regression Significant?[a]
02 – Organic Period	Sales revenue (Evolution)	Daily engagement (Evolution)	Stationary	no
02 – Organic period	Sales revenue (Evolution)	Daily reach (Evolution)	Evolution	-
02 – Organic period	Average ticket (Evolution)	Daily engagement (Evolution)	Stationary	no
02 – Organic period	Average ticket (Evolution)	Daily reach (Evolution)	Stationary	yes
03 -High intensity period	Sales revenue (Evolution)	Daily engagement (Evolution)	Evolution	-
03 -High intensity period	Sales revenue (Evolution)	Daily reach (Evolution)	Evolution	-
03 -High intensity period	Average ticket (Evolution)	Daily engagement (Evolution)	Stationary	-
03 -High	Average ticket	Daily reach	Stationary	-

intensity period   (Evolution)   (Evolution)

Table 5 unveils the output from the only regression which showed a statistical significance between the variables and fulfill time series specification of a cointegration relationship. The results show a linear relationship between Daily reach and Average ticket. The single independent social media performance responds for 33% of the variation in the marketing performance variable (Adjusted R-squared). Durbin-Watson statistic of 1.04 reveals a value close to the borderline of a positive autocorrelation problem, but is not much a concern, according to Field (2009).

Table 6 - *Cointegration regression between average ticket and daily reach (period 02)*

| Variable	Coefficient	t
Constant	464.61	10.35***
Daily reach[a]	0.54	5.01***
Anciliarry statistics		
Adjusted R^2		.33
Durbin-Watson		1.04
ADF statistic of Residuals test[b]		-4.79***

Note. *** Significant at 1%
[a] Daily reached suffered a exponential filter in order to remove the volatility, a common approach to daily variables. The same procedure was applied to average ticket
[b] This is the result of the ADF routine conducted on the residuals of the regression between the two variables. The null hypothesis of a stochastic behavior was rejected. Hence, the residual is stationary.

Figure 5 illustrates the cointegrating relationship between average ticket and daily reach on period 02, where social media activity was organic. This is an important output from the research as shows the effect of a social media measure on a performance measure, only when this activity is not boosted by sponsored postings. This temporal relationship dissipates in the period when social media activity is driven by sponsored postings. Despite the significant growth on reach when social media intensity is high, the organic temporal relationship found vanishes. These results are important to marketers because it indicates how social media investments must be made in order to increase reach (by paid advertising, generating engagement and reach alone) or a measure derived from sales (by organic activity).

Figure 5. Cointegrating relationship between average ticket and daily reach (period 02)
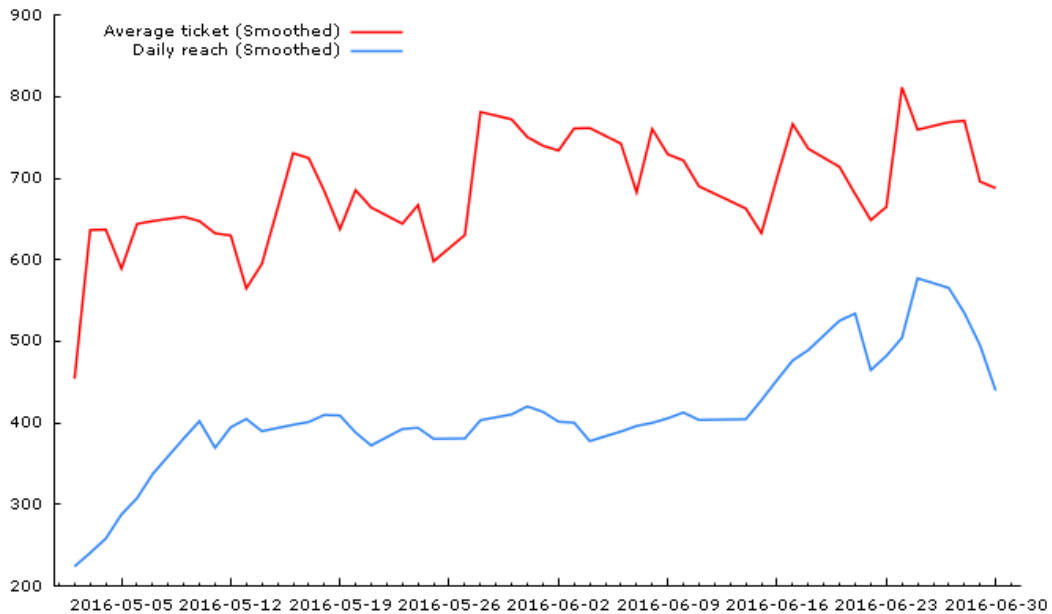
VI. Final remarks

In a digital environment where consumers see a high level of advertising on social media platforms, the analysis of the real impact of investment on postings on financial metrics such as sales, and an average ticket has been little discussed in the marketing literature. Perhaps because of the difficulty in gaining access to the data of the companies about the sale and the investment made in the different posts sponsored by social media like Facebook. Thus, our study sought to contribute to the discussion and analysis of the impact of the influence of social media metrics, such as the engagement and reach of the sales postings of a small company that sells furniture through an experiment. Based on the experimental approach, we were able to identify through three control groups, a time when the company does not use the social media as a tool for product dissemination, when posting without investing in having a greater reach, and finally, A time when you invest so that the post can be viewed by a greater number of users from a segmentation that managers can choose. Thus, our study brings contributions to this topic, in particular, to analyze a context in the field of the impact on sales and not in the laboratory.

Among the findings of our study, we highlight, through different statistical analyzes, the relationship between the variables of marketing performance and the performance of social media. These two approaches are discussed in both marketing textbooks and scholarly articles, that is, does investing in posts on a social media increase my sales? Therefore, we identify that the reach of a social media, in our case we use Facebook, produces an effect on the average ticket only as the posting by the company when it is done organically, that is, without the investment to increase the reach of the users. One justification for this behavior may be the preference of consumers to relate to or even be interested in products they have chosen to link to, rather than selected to view from their preferences. The second result of our study is that from a temporal point of view the relationship between the performance of social media and financial dissipates when the post is sponsored, corroborating the user's behavior in giving preference to what he chooses. Thus, we hope that study can contribute to the debate in both the business and academic environment of the impact and return of actions and investment in social media in the financial performance of companies. Studies that conduct experiments in different scenarios can contribute to the discussion and implication of the variables of engagement of social media and sales, for example.

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