ADMINISTRAÇÃO

Do Marketing Communication Investments Always Pay Off?

Cláudio André Gondim Nogueira[1] | Marcilene Furtado Pinheiro[2] | Alexandre Rabêlo Neto[3] | Danielle Miranda de Oliveira Arruda Gomes[4]

Resumo: Esse artigo buscou contribuir com a discussão acerca deste tema ao analisar o caso de um Shopping Center localizado em uma grande capital brasileira, utilizando dados mensais de janeiro de 2001 a dezembro de 2008. Embora, geralmente se tenha a visão que esses investimentos são muito importantes para as estratégias de crescimento de vendas das firmas, é importante questionar se todas as iniciativas de comunicação de marketing alcançam os objetivos desejados. Além disso, será que todos os instrumentos utilizados atingem o mesmo nível de eficácia? De fato, depois de se levar em consideração a sazonalidade e a tendência de longo prazo das vendas, os resultados sugerem que a relação das vendas (em log) e os investimentos em comunicação de marketing é quadrática, indicando que pode haver rendimentos decrescentes nessa relação, podendo até os retornos serem negativos em alguns casos. Nem todos os tipos de instrumentos de comunicação de marketing se mostraram significantes para explicar o comportamento das vendas, com a exceção de material gráfico e televisão, mas com uma relação quadrática mais uma vez.

Palavras-chave: Investimentos em comunicação de marketing. Retorno de vendas. Análise de regressão.

1. Possui Mestrado em Economia pela Universidade Federal do Ceará (1999) e pela Pennsylvania State University (2002). Doutorando em Administração pela Universidade de Fortaleza (UNIFOR); é professor assistente da UNIFOR. - E-mail: claudioandre@unifor.br

2. Especialista em gerência de recursos humanos pela UECE. Pós-Graduação Latu-sensu em Gestão Empresarial pela FGV. MBA internacional pela *Ohio University*- FGV. 3. Mestre em Administração de Empresas pela Universidade de Fortaleza - UNIFOR, pós-graduado em Gestão de Pessoas pelo Centro de Ensino Unificado de Teresina - CEUT. 4. Doutora em Administração de Empresas pelo *Institut d´Administration d´Entreprises de l´Université de Nice* - França (1992), com Mestrado Acadêmico (DEA) em Administração pelo Institut d´Administration d´Entreprises de l´Université de Nice - França (1987), Mestrado Profissionalizante (DESS) em Marketing pelo *Institut d´Administration d´Entreprises de l´Université de Nice França (* 1986). É professora titular da Universidade de Fortaleza - UNIFOR, onde atua na área de Administração com ênfase em Mercadologia.

Introduction

It seems that few marketing executives are measuring the results of their actions. As an example, in a study from the Chief Marketing Officer Institute (2004) involving 320 marketing executives from global technology industries, around 80% of the respondents were not pleased with their skills to measure marketing performance.

Hence, if this is the case, how can businesses know if their investments in marketing communication are really profitable? It may appear as common sense that promotions, media and advertisement investments will certainly yield returns to companies since they tend to increase consumer awareness of the companies' products and provide incentives to purchases. But, in reality, do marketing communication investments always pay off?

This paper aims to contribute to the discussion about this subject by analyzing the case of a shopping mall in a large Brazilian state capital. This case is particularly interesting because shopping malls usually rely heavily in this type of investments in order to attract customers and to increase sales.

In a theoretical perspective, marketing communication in a shopping mall consists in the sum of media, contests and promotion mechanics and, in this context, media instruments (e.g., radio, newspaper and television) tend to be the main vehicles in terms of financial resource allocation. On the other hand, contests should be attractive enough in order to justify the investment made and the promotion mechanics should function as a link between the shopping mall and its public (PINHEIRO, 2010).

Then, using monthly data from January 2001 to December 2008, three specific objectives were devised in this paper: (1) To determine the long-term trends of sales and marketing communication investments of the shopping mall; (2) to analyze the relationship between marketing communication investments and sales through a regression analysis; and (3) to identify the types of marketing communication investments that yielded higher returns (if any).

According to Siggelkow (2007), case research has basically three important uses: motivation, inspiration, and illustration. More specifically, it may motivate a research question, it may serve as inspiration for new ideas and it may illustrate a theoretical argument. Hence, the expectation is that this case discussed here will not just serve as an illustration of existing theories but it will provide new insights about the subject in question.

Thus, the justification for such a paper relies on the increasing importance of marketing communication investments to companies and, more importantly, on the necessity to correctly evaluate the results of such investments, so that alternative strategies may be devised if the returns are not as high as expected.

Theoretical Background

Marketing communication may create brand awareness and generate strong positive associations in the consumers' memories (PINHEIRO, 2010). According to Shimp (2006), advertisement is part of marketing communication and may perform several functions in commercial companies such as: information, persuasion, remembrance, value aggregation, not to mention that it may aid other companies' efforts. However, investments in advertisement have been declining in recent years. Burns (2009), for example, states that advertisement investments represented on average more than 40% of the companies' budgets in marketing communication until the beginning of the 1980s. On the following decade, this participation fell to 25% on average. And, one may notice also that as investments in promotions increase advertisement investments tend to decrease.

Advertisement as a sales instrument may be interpreted according to two different views: the traditional and the nontraditional views. The traditional view considers that this perspective is not viable because of two arguments: (1) During any period, sales depends on the economic environment, competition, and all other variables that are part of the marketing mix such as price, quality, efficiency in distribution etc., so that it is impossible to precisely determine the effect of advertisement on sales, since it is only one of their determinants; (2) Advertisement investments frequently require some time to yield results on sales; i.e., investments made in one period may have effect only in the future (SHIMP, 2006).

The types of media used should be selected according to the targeted population observing which instruments can have more impact on costumers and their decisions. More specifically, there are certain criteria that when associated with the profile of the targeted consumers allow the determination of the types of media instruments that would generate more sales and yield better financial returns (SANT'ANNA, 2002).

In this context, choosing the right media instrument is crucial for the firm in order to achieve the expected results. And, this choice should be made according

to the message that the firm wants to pass along to the targeted consumers and the particular characteristics of each type of media (FEIMSTER, 2009).

Television, for example, is considered a high-impact type of media, since it has high penetration in several markets and is often highly persuasive, actually being capable of influencing certain desired behaviors. Although it requires large investments, in relative terms, it may not be the case since this type of media is able to reach several consumers at once (SANT'ANA, 2002).

Radio is perceived as a main means of communication and integration in Brazil because of its great diffusion and mobility. Although it is considered a more traditional type of media, it has been modernized in order to better reach the public and, therefore, it is indeed an important vehicle for advertising. In comparative terms, the investments needed are not as large as in other types of media (e.g., television), and it allows high levels of exposition, it is possible to rapidly update the material being broadcasted, and it may be used in different times and in different types of shows according to the firms' needs (PINHEIRO; GULLO, 2005). According to Dickson (1984, apud PINHEIRO; GULLO, 2005), radio is a type of media that allows the transmission of brief messages to the public. Thus, it serves primarily in the context of strategies designed to yield results in the short-run.

Newspaper is even more traditional than the radio and is reasonably selective, focusing in the A, B and C classes. Its primary goal is to inform and to promote the debate about the news and it is often viewed as a credible means of communication, forming opinions in a somewhat fast manner. Hence, it is a recognized vehicle for marketing communication strategies Dickson (1984, apud PINHEIRO; GULLO, 2005).

Outdoor is essentially an urban type of media, reaching the local public in reasonably long periods of exposition, generating important visual impacts. Although it is somewhat expensive, the products and services announced or promoted are often remembered more easily by the consumers, which may generate satisfactory results (SHIMP, 2006).

Busdoor (*Out bus*), a variant of the outdoor, consists in advertising on the sides or on the back of a bus. Its objective is to convey messages about products, services, brands, companies etc. in areas where there is a high circulation of people. As the outdoor, it requires somewhat large investments but it may be viewed by more consumers from different social and economic backgrounds (SHIMP, 2006).

Graphical materials include panflets, banners, folders etc. They are a very effective means to convey the desired messages to the consumers and the levels of investment required are comparatively small if other types of marketing communication instruments are considered. They are a very practical, fast, and democratic way to reach the consumers (OLIVEIRA-CASTRO, 2003).

Contests are also important marketing communication instruments that consist in rewarding the consumers through the opportunity to receive money, goods, services, trips etc. In this perspective a company aims to improve its image with a certain targeted group of consumers. In this type of approach, the luck factor is taken into consideration and, therefore, since not all consumers will actually be rewarded, they end up becoming a less expensive and simpler type of marketing communication initiative (SHIMP, 2003). More specifically, the meticulous selection of the reward or prize given is essential to the success of the promotional campaign and to induce sales growth (D'ASTOUS; LANDREVILLE, 2003; LIAO, 2006).

Sales promotions intrinsically use marketing communication instruments to fulfill the firm's objectives. They are a set of incentive schemes, often used in the short run, designed to stimulate faster and increasing sales of products and services (BLATTBERG; NESLIN, 1990). They can be of two kinds: monetary and nonmonetary (CHANDON et al. 2000; DARKE; CHUNG, 2005; LIAO, 2006). Monetary sales promotions usually focus on prices and aim for fast returns in the short-run by encouraging the consumers to change brands, by inducing user experience and by stimulating growth in demand and consumption. Nonmonetary promotions, on the other hand, are more adequate for actions with a long-run perspective, which include targeting new market segments, launching new products and trying to neutralize the competition's efforts (OGDEN; CRESCITELLI, 2007; AAKER, 1991).

It is important to emphasize that, either way, sales promotions and marketing communication techniques, in general, consist in providing adequate incentives so the consumers would be stimulated to buy or to try a new product or service etc. But, Shimp (2003) argues that consumers are usually more receptive to more immediate rewards (e.g., discounts, bonuses, and prizes) than after-sale rewards such as rebates and fidelity programs.

A marketing communication plan based upon a promotional campaign should be elaborated following five steps. The first step consists in determining

consumers' income and behavior as well as the characteristics of the market and of the economic environment where the firm operates. The next step involves determining the problem faced and possible opportunities to explore. The third step is characterized by the definition of the promotional campaign objectives. The forth step consists in defining the strategy to reach the costumers and achieve the pre-determined goals. Finally, the last step refers to the choice of how much to invest in the promotional campaign, an essential decision that should be compatible with the expected returns (ZENONE; BUAIRIDE, 2005).

The expected returns of the marketing campaign not only will determine how much should be invested but also will have to be linked to the definition of the strategies that will be used. This process ends up becoming extremely complex in several cases in terms of measuring the returns obtained because firms tend to combine different types of marketing communication instruments and also other factors that are not completely controlled (or not at all) by the firm may end up affecting the investment profitability (HAYMAN; SCHULTZ, 1999).

Actually, there are several textbooks examples featuring the relationship between advertisement investments and sales or revenues (e.g., MALHOTRA, 2006; RAGSDALE, 2004; HILL; GRIFFITH; JUDGE, 2003; ANDERSON; SWEENEY; WILLIAMS, 2003). It also can be mentioned the paper from Carlos and Moura (2002), where the authors discuss the returns of advertisement measured by the percentage of new students enrolled in relation to the total amount of places available in a private university in the Brazil's Northeast region.

These cases made use of fairly simple analyses (simple or multiple regression) without taking into consideration properly certain technical problems that may arise when the model is estimated. Particularly, if time series are used, one has to be careful enough in order to isolate long-run trends, seasonality, and deal with problems that are typical in models with this type of data (e.g., spurious regression, autocorrelation etc.).

It is also worth mentioning that this research discusses the case of a shopping mall located in a heavily populated area in one of the largest capital cities in Brazil, and it is also very close to schools and a university. The mall's costumers are mainly from the B and C classes and usually in the 17 closer neighborhoods.

Methodology

According to the previous discussion, this paper aims to evaluate through a regression analysis the impacts of marketing communication investments (MCI) on sales (SALES), both measured in US$ per square meter, using monthly data from a shopping mall located in large capital city in Brazil. The data refers to the period between January 2001 and December 2008, totaling 96 observations.

More specifically, MCI is the sum of several types of marketing communication investments such as: graphical materials (MATGRAF), television (TV), radio (RADIO), outdoor (OUTDOOR), busdoor (BUSDOOR), newspaper (NEWS), and contests (CONTESTS).

Since the variables in consideration are time series, one must be extremely careful in order to avoid a spurious regression and other econometric problems that are typical of this type of series such as serial correlation of the regression residuals (BUENO, 2008; KIRCHGÄSSNER; WOLTERS, 2007; GREENE, 2003; WOOLDRIDGE, 2002; JOHNSTON; DINARDO, 1997; GUJARATI, 1995). The analysis involves several steps, described as follows.

The Hodrick-Prescott Filter is a smoothing method that is used to obtain a smooth estimate of the long-term trend component of a series. This filter has a parameter λ that controls the smoothness of the series. As $\lambda \rightarrow \infty$ the smoothed series approaches a linear trend. Hodrick and Prescott (1987 *apud* TROMPIERI; CASTELAR; BITTENCOURT, 2003) suggest $\lambda = 14400$ for monthly series, which will be used here. The analysis of the behavior of the smoothed series gave a first idea of the existing relation between the two variables in consideration: SALES and MEDIA.

Since the series in analysis are monthly series, it was necessary to seasonally adjust them, i.e., to remove the cyclical seasonal movements from the series. The method chosen was the difference from moving average-additive. The software Econometric Views performs this adjustment automatically. Suppose that we wish to filter y_t. Then, the first step is to compute the centered moving average for a monthly series as follows:

[1]

$$X_t = (0.5y_{t+6} + ... + y_t + ... 0.5y_{t-6}) / 12$$

The next step is to take the difference $d_t = y_t - x_t$. Hence, the seasonal

indices can be computed. More specifically, for monthly series, the seasonal index i_m for month m is the average of d_t using observations only for month m. We then adjust the seasonal indices so that they add up to zero. This is done by setting $s_j = i_j - \bar{i}$ where $\bar{i}$ is the average of all seasonal indices. These s are the reported scaling factors. The interpretation is that the series is higher in period relative to the adjusted series. The seasonally adjusted series is obtained by subtracting the seasonal factors s_j from . It is also worth mentioning that the seasonal factors are assumed to be constant for the moving average method.

In order to estimate a time series structural model it is necessary to test first whether the series in consideration are stationary or not. More specifically, determining the integration order of the series will be extremely important because a regression with nonstationary time series may be spurious (BUENO, 2008; KIRCHGÄSSNER; WOLTERS, 2007; GREENE, 2003; WOOLDRIDGE, 2002; JOHNSTON; DINARDO, 1997; GUJARATI, 1995).

Hence, the presence of a unit root in each series was verified with the help of the Augmented Dickey-Fuller (ADF) test. The null hypothesis of this test is that the series has a unit root, i.e., that it is not stationary (BUENO, 2008; KIRCHGÄSSNER; WOLTERS, 2007; GREENE, 2003; WOOLDRIDGE, 2002; JOHNSTON; DiNARDO, 1997; GUJARATI, 1995).

The number of lags of the ADF test was chosen according to the Schwarz Bayesian Criterion (SBC). There are alternative criteria that can be used for that purpose such as the Akaike Information Criterion (AIC) and the Hannan-Quinn Information Criterion (HQ). But, as Bueno (2008, p. 47) points out, SBC and HQ are asymptotically consistent, but HQ is less powerful than SBC, and AIC is biased since it tends to choose overparameterized models.

It is important to mention that if the series are nonstationary, then it is necessary to test if they are cointegrated because, if not, the regression is considered spurious, i.e., there is no long-run relationship between the variables (BUENO, 2008; KIRCHGÄSSNER; WOLTERS, 2007; GREENE, 2003). In this case, as it will be shown later, cointegration tests were not necessary since the series are trend stationary.

Since the seasonally-adjusted series (indexed by _SA) are all (trend) stationary, then the following econometric model will be estimated by the method of Ordinary Least Squares (OLS):

$$\mathbf{SALES\_SA_t = F(MCI\_SA_t) + \varepsilon_t} \quad [2]$$

Where F is a function of MCI_SA and is the stochastic disturbance term that is assumed to be independently and identically normally distributed with zero mean and constant variance . It is worth mentioning that F was chosen according to the data in order to provide the model with the correct specification as will be better illustrated later.

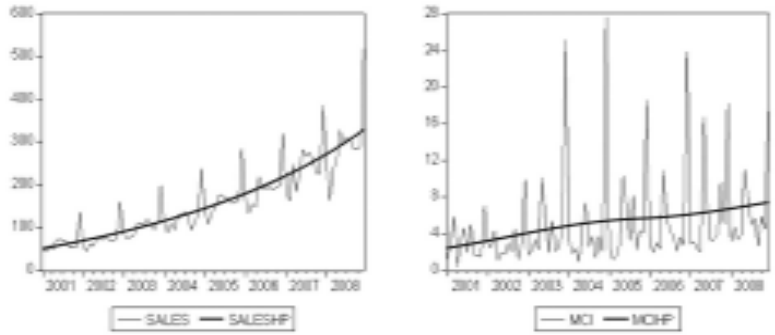
Furthermore, it is necessary to evaluate if the model satisfy properly the assumptions underlying the classical linear regression model (CLRM). More specifically, the following tests and analyses were performed (BUENO, 2008; KIRCHGÄSSNER; WOLTERS, 2007; GREENE, 2003; WOOLDRIDGE, 2002; JOHNSTON; DINARDO, 1997; GUJARATI, 1995):[a] Ramsey's regression specification error test (RESET) in order to evaluate if the model is well-specified, i.e., if the functional form adopted is satisfactory; [b] White heteroskedasticity test to analyze whether or not the residuals of the model may be considered homoskedastic; [c] Serial correlation tests and analyses, such as the Durbin-Watson test for first-order autocorrelation, correlogram inspection, analysis of Ljung-Box Q statistics, and the Breusch-Godfrey Serial Correlation LM test for higher orders of autocorrelation.

It is also worth mentioning that the hypothesis of the normality of the residuals is not essential in this case since the sample is somewhat large and, therefore, asymptotic normality will be guaranteed by the Central Limit Theorem (GREENE, 2003; WOOLDRIDGE, 2002; GUJARATI, 1995). The analysis proposed before considers the sum of all media and advertisement investments and, therefore, will be referred to as the "aggregated analysis". But, what if those investments are considered separately on the attempt to explain the behavior of sales? This will be called the "disaggregated analysis". These analyses are very similar and the same steps defined before will be followed.

Results and Discussion

In Figure 1, the behavior of the series in analysis, SALES and MCI, are presented together with their respective long-term trends derived with the Hodrick-Prescott (HP) Filter. As this figure indicates, SALES exhibits an exponential long-term trend, whereas MCI has a somewhat linear long-term trend. According to this analysis, the data indicates that both series have steady growth patterns over time, even though SALES tended to grow at a faster pace.

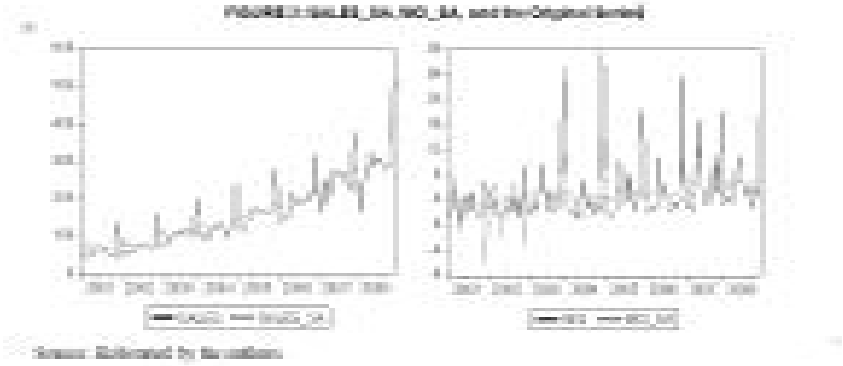
FIGURE 1: SALES, MCI, and their long-term trends with the Hodrick-Prescott (HP) Filter



Source: Elaborated by the authors.

Another feature of the series in analysis that may be perceived in Figure 1 is that they both have somewhat clear seasonal movements. As indicated before, if this is the case, the seasonal component should be removed from the series in order to ensure a proper analysis of its movements over time.

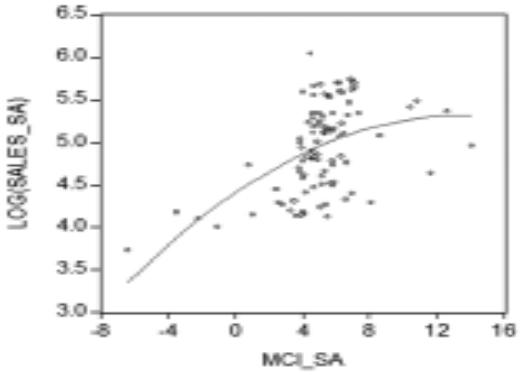
Figure 2 presents SALES_SA and MCI_SA, the seasonally adjusted series, together with the original ones. As the figure indicates, the adjusted series are overall smoother in comparison with the others and present a clearer view of how the series behave.



Since SALES_SA also presents an exponential trend, as it was also suggested by the filtered series presented in Figure 1, a natural logarithm transformation will be performed in order to linearize it and, therefore, to avoid misspecification problems.

The first attempt to analyze the relationship between these series was through a scatter plot, presented below. This scatter plot suggested that the best relationship between LOG(SALES_SA) and MCI_SA is quadratic, i.e., described by a second degree polynomial.

FIGURE 3: Scatter Plot between LOG(SALES_SA) and MCI_SA



Source: Elaborated by the authors.

Hence, the model that will be considered for estimation will be the following:

$$LOG(SALES\_SA_t) = \beta_0 + \beta_1.MCI\_SA_t + \beta_2.MCI\_SA_t^2 + \varepsilon_t \quad [3]$$

Before estimating this model, however, it is necessary to perform unit root tests on the series as it was indicated before in the previous section of this paper.

In Table 1, the results of the Augmented Dickey-Fuller test for unit roots are presented. Since all series considered seem to have a time trend, the results considered were the ones from the test equations with a constant and a time trend. And, since in all cases the null hypothesis of a unit root was rejected at the 1% level of significance, it is possible to consider that all the series in analysis here are trend stationary.

TABLE 1: Results of the Augmented Dickey-Fuller Test for Unit Roots

Variables	Level			
	$T_{(\mu)}$	Prob.	$t_{(t)}$	Prob.
LOG(SALES_SA)	-0.9683	0.7612	-7.3064	0.0000
MCI_SA	-8.1514	0.0000	-9.4350	0.0000
MCI_SA²	-9.4445	0.0000	-10.0410	0.0000

Source: Elaborated by the authors using Econometric Views. (1)

because according to Wooldridge (2002, p. 331):

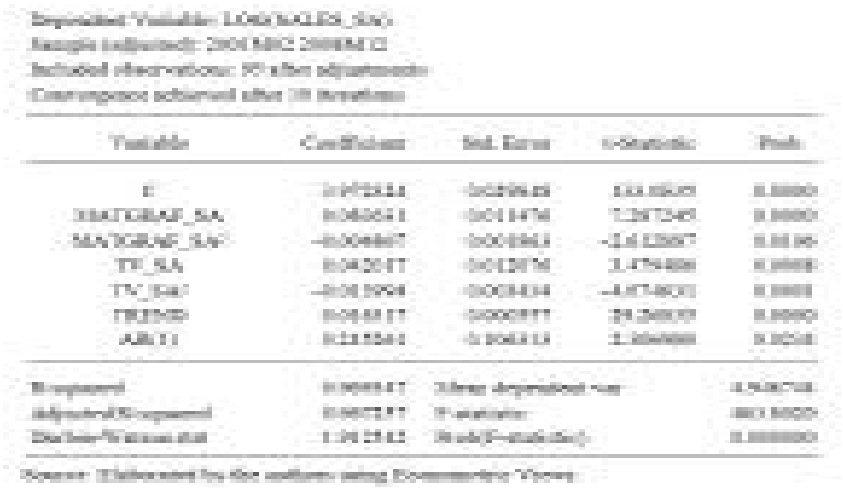
> We must recognize that some series contain a time trend in order to draw causal inference using time series data. Ignoring the fact that two sequences are trending in the same or opposite directions can lead us to falsely conclude that changes in one variable are actually caused by changes in another variable. In many cases, two time series processes appear to be correlated only because they are both trending over time for reasons related to other unobserved factors.

The same author proposed that in a case such as this one, where the series are trend stationary, all series can be detrended simply by adding a linear time trend in the model. Hence, it should be the case that

$$LOG(SALES\_SA_t) = \beta_0 + \beta_1.MCI\_SA_t + \beta_2.MCI\_SA_t^{\ 2} + \beta_3.TREND + \varepsilon_t \quad [4]$$

Hence, the estimate of the proposed model with a linear trend by OLS is presented below, in Table 2.

(1) Notes: The $t_{(m)}$ and $t_{(t)}$ statistics refer to the test equations with a constant and with a constant and a time trend, respectively. The number of lags of the test equations was calculated according to the Schwarz Bayesian Criterion. The one-sided p-values were calculated by MacKinnon (1996).



As Table 2 indicates, the model fitted exceptionally well to the data as the very high values of the R-squared and of the Adjusted R-squared suggest and, consequently, the model is statistically significant at 1% level according to the F-statistic and its p-value. Furthermore, all parameters are statistically different from zero as the t statistics and their respective p-values indicate.

It is very important to mention that two essential corrections were performed in the model in order to guarantee that the standard errors of the OLS estimators are not biased due to the presence of heteroskedasticity and serial correlation of the residuals.

First, the model generated a Durbin-Watson statistic equal to 1.507. Considering a sample with 95 observations and 3 parameters being estimated (excluding the constant), one should have that d_L = 1.60 and d_U = 1.73. Since DW = 1.51 < d_L = 1.60, then test indicates the presence of first-order autocorrelation. This conclusion was corroborated by the analysis of the Autocorrelation and Partial Autocorrelation functions and the Ljung-Box Q statistics.

Hence, the estimated disturbance was modeled as a first-order autoregressive term [AR(1)]. The analysis of the statistics mentioned above confirmed the correction of the problem and gave no evidence of higher order serial correlation of the residuals, which was confirmed by the Breusch-Godfrey test, whose test statistic was equal to 1.0326 with a p-value of 0.4280, not rejecting the null hypothesis that the residuals are serially uncorrelated (up to 12 lags).

Additionally, White's test for heteroskedasticity (with cross terms) indicated the presence of heteroskedastic residuals at the 10% level of significance, since F = 1.9128 and the p-value 0.0682. In other to correct this problem and since it was detected that the residuals were serially correlated, the model was estimated with the Newey-West Heteroskedasticity AutoCorrelation (HAC) Standard Errors and Covariance that is a covariance estimator that is consistent in the presence of both heteroskedasticity and autocorrelation of unknown form.

Furthermore, according to Table 3, below, the specification of the model's functional form was confirmed by Ramsey's RESET test with one and two additional terms, since the values of the F statistic in both cases were very small and the p-values were greater than 5%.

TABLE 3: Results of Ramsey's RESET test – Aggregated Analysis

Number of Additional Terms	F-statistic	Probability
1	1.2916	0.2588
2	0.8105	0.4915

Source: Elaborated by the authors using Econometric Views.

This result is very important, because this functional form adopted presents interesting features that have to be taken into consideration.

Hence, given the results of the model, one should have that:

$$\frac{\partial\ \mathrm{LOG(SALES\_SA)}}{\partial\ \mathrm{TREND}} = 0.017398\,,$$

[5]

indicating that SALES_SA grew, on average, around 1.74% per month from January 2001 until December 2008, indicating that the shopping mall in analysis have been consolidating and maturing steadily during this period. This is in unison with the previous analysis of the long-term trend of the series, derived by the Hodrick-Prescott filter.

Additionally, one has to consider that the seasonal effect and the time trend were removed from both series. Therefore, the effect of marketing communication investments over sales estimated by the model is actually the net effect.

Hence, one should have that:

$$\frac{\partial\ LOG(SALES\_SA)}{\partial\ MCI\_SA} = 0.0447 - 0.0061 \times MCI\_SA$$

[6]

$$\frac{\partial^2 \mathrm{LOG(SALES\_SA)}}{\partial\ \mathrm{MCI\_SA}^2} = -0.0061 < 0$$

[7]

Since the second derivative is negative, then the estimated regression curve is concave. This represents that there seem to be diminishing returns of marketing communication investments on sales as Figure 3 already had suggested. In economic terms this represents that an investment in marketing communication affects sales according to [6] but at decreasing rates. Notice that this effect decreases as MCI_SA increases. More specifically, if $\partial\ \mathrm{MCI\_SA} = 1$, then it should be the case that:

$$\partial\ \mathrm{LOG(SALES\_SA)}.100\% \approx \Delta\%\ \mathrm{SALES\_SA} = (0.0447 - 0.0061 \times \mathrm{MCI\_SA}).100\%$$

[8]

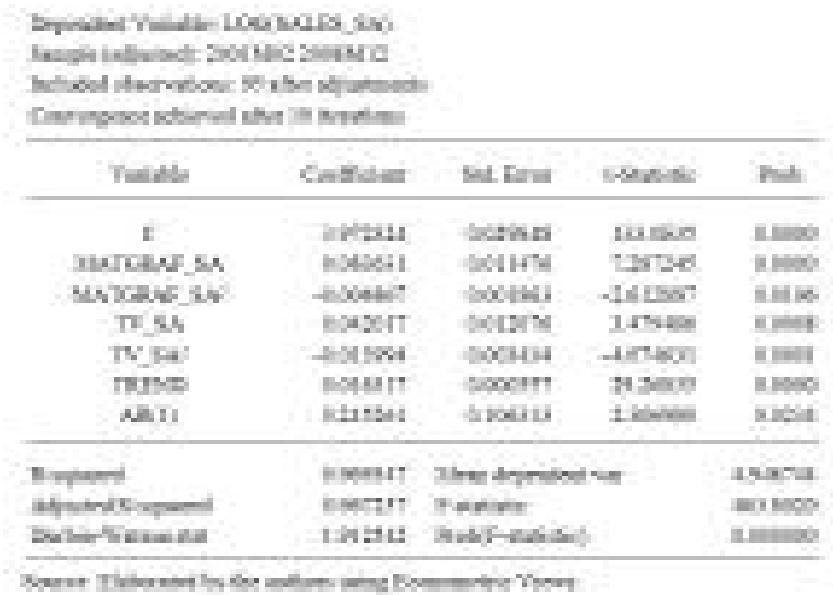
which indicates that the percentage change in SALES_SA may be estimated by the right-hand-side of [8] for a change of US$ 1/m² in MCI_SA.

And, also has to consider that the net effect may even be negative, if the amount invested is reasonably large. This indicates that each additional dollar per square meter in such investments would yield a smaller return on sales as investment levels increase. This result is compatible with the case discussed by Hill, Griffiths and Judge (2003).

In this sub-section, marketing communication investments are disaggregated and the individual effect of each type of investment on sales are estimated. The analysis consisted in finding the best model possible, following the same steps used on the aggregated analysis.

Several models and functional forms where tested, and the best model found was the one that included as regressors a time trend and quadratic functions of MATGRAF_SA and TV_SA. The model estimates are presented in Table 4, below.

TABLE 4: OLS Estimates – Disaggregated Analysis



The model presented a very good adjustment with very high values for R-square and the Adjusted R-square. At the 5% level of significance, all individual parameters were considered statistically different from zero according to the t tests and, consequently, the model was considered statistically significant according to the F test.

The problem of spurious regression was ruled out by performing unit test roots to all series, which is presented in Table 5, below.

As indicated before, the ADF test indicated that SALES_SA was trend stationary (see Table 1). And, the tests in Table 5 indicate that MATGRAF_SA and MATGRAF_SA^2 are also trend stationary, whereas TV_SA and TV_SA^2 were considered stationary.

These results justify the inclusion of the trend in the model.

TABLE 5: Results of the Augmented Dickey-Fuller Test for Unit Roots

Variables	Level			
	$T_{(\mu)}$	Prob.	$t_{(t)}$	Prob.
LOG(SALES_SA)	-0.9683	0.7612	-7.3064	0.0000
MATGRAF_SA	-0.5527	0.8743	-9.2941	0.0000
MATGRAF_SA^2	0.6685	0.9908	-8.9483	0.0000
TV_SA	-8.9938	0.0000	-	-
TV_SA^2	-9.5115	0.0000	-	-

Source: Elaborated by the authors using Econometric Views.
Notes: The $t_{(\mu)}$ and $t_{(t)}$ statistics refer to the test equations with a constant and with a constant and a time trend, respectively. The number of lags of the test equations was calculated according to the Schwarz Bayesian Criterion. The one-sided p-values were calculated by MacKinnon (1996).

The residuals of the model presented, as before, first-order autocorrelation since the Durbin-Watson statistic equal to 1.542 < d_L = 1.56 (considering a sample with 95 observations and 5 parameters being estimated, excluding the constant), which was confirmed by the analysis of the Autocorrelation and Partial Autocorrelation functions and the Ljung-Box Q statistics. Hence, the estimated disturbance was modeled as a first-order autoregressive term [AR(1)].

Once again, after the inclusion of this additional term, the problem was corrected and no evidence was found of higher order serial correlation of the residuals, which was confirmed by the Breusch-Godfrey test, whose test statistic was equal to 1.3549 with a p-value of 0.2066, not rejecting the null hypothesis that the residuals are serially uncorrelated (up to 12 lags). This time, White's test for heteroskedasticity (with cross terms) did not indicate the presence of heteroskedastic residuals, since F = 1.4666 and the p-value 0.1266. Hence, no correction was deemed necessary.

Furthermore, according to Table 6, below, the specification of the model's functional form was confirmed by Ramsey's RESET test with one and two additional terms, since the values of the F statistic in both cases were very small and the p-values were greater than 5%.

TABLE 6: Results of Ramsey's RESET test – Disaggregated Analysis

Number of Additional Terms	F-statistic	Probability
1	3.2203	0.0762
2	1.8666	0.1609

Source: Elaborated by the authors using Econometric Views.

Since the model's functional form specification was corroborated by Ramsey's RESET test, it is important to interpret the relations between SALES_SA and the explanatory variables. The quadratic relations provided the best specification to the model and, since the second partial derivatives are negative in both cases, these media and advertisement investments also present diminishing returns. It is also important to consider that the regression estimates presented in Table 4 indicate that the disaggregated model is somewhat similar to the aggregated one (similar R-squares, Adjusted R-squares, and constant, trend and AR(1) coefficient estimates). Therefore, it is possible to infer that investments in television and, more importantly, in graphical materials tend dominate the behavior of the aggregated series MCI_SA.

Another important comment is related to the role of the other types of investment (radio, outdoor, busdoor, newspaper, and prizes), since the model's estimates indicated that only graphical materials and television accounted for the net effects on sales. More specifically, it may be argued that all media and advertisement investments are "pro-cyclical" in the sense that, in general, they tend to increase when sales increase along each year, and decrease when they decrease, reinforcing the seasonal pattern of sales. It may be true but when the shopping mall's administrators face the decision in which type of investment in media and advertisement is to be made, it is decisive that the most effective types are to be chosen.

Concluding

Many textbook examples suggest a significant positive linear relationship between advertisement investments and sales, except Hill, Griffiths and Judge (2003), where a quadratic relationship was estimated. In other words, most textbook examples assume that a positively-sloped straight line with a slope coefficient greater than one is to be expected, indicating that it is reasonable to consider that advertisement investments would yield positive results on sales.

Considering a broader category of investments, marketing communication investments, but following the same logic, the results from the case studied here partially contradict these basic, but extremely important, ideas. More specifically, the results suggest that after accounting for seasonality and the long-term growth of sales (that may part of the shopping mall consolidation process as well as a signal of how the market in the region in question has been evolving), the relationship between sales (in log) and marketing communication investments is actually quadratic, i.e., positive up to a certain point and nonlinear, as the specification tests suggested. Therefore, the results seem to be closer to the results found by Hill, Griffiths and Judge (2003), even though these authors had conducted a simpler and more straightforward regression analysis.

But, what do these results mean in practice? They indicate that there could be diminishing returns of marketing communication investments on sales, i.e., that sales may increase as a firm raises the amount invested in marketing communication but at decreasing rates and, in extreme situations, when the investments reach a certain threshold the returns may be actually negative.

Furthermore, in a more disaggregated analysis, not all types of marketing communication instruments yielded significant net effects (i.e., already taking into consideration the seasonal effect as well as the time trend) on sales. More specifically, only graphical materials and television presented significant results and, once again, similar to the previous results from the aggregated analysis, revealing a quadratic relationship.

This type of result is very important both in a theoretical and in a more applied perspective. In the theoretical perspective, these results are more compatible with more modern and more in-depth approaches to the problem (SHIMP, 2006, 2003; ZENONE; BUAIRIDE, 2005; HAYMAN; SCHULTZ, 1999), that take into consideration the difficulties involved on the estimation of the returns and that acquiesce that these types of investments may not always be as profitable as intended.

In a more practical point-of-view, according to the case studied here, marketing communication investments do not always pay off and it is necessary to properly define which type of instrument will be used and the amount that should be invested, since nonlinear relationships between such investments and sales

may exist and some instruments may have limited impacts in certain cases. In other words, these results provide incentives to managers and marketing executives to periodically evaluate the effects of their actions, taking into consideration the specific features of their markets, so that higher levels of sales and profits would be reached in the near future.

Of course, as any other study, this analysis developed here has limitations. Firstly, other aspects beyond the control of the firm that may influence sales were not considered, even though aspects such as seasonality and long-term trends were considered. It is often difficult to have all the information necessary, especially in the context where a specific firm is being analyzed.

Another limitation is linked to the methodology used, since the effects were estimated taking into consideration all data points, even though no significant structural break has been detected. But, one may argue that certain types of marketing communication instruments may not be significant in general, but they could yield localized results and that certain combinations of instruments may work well in certain periods of time. This could be partially detected by an analysis of the regression's residuals and using dummy variables. It is important to mention that, in the case discussed here, some tests were made in some observations but no significant results were achieved. But, it is important to consider that not all possibilities were tested, since there were too many.

Finally, one last limitation that could be mentioned regards to difficulty to predict what will happen in the future. In fact, this is a limitation of every predictive exercise, and there are no guarantees that specific types of media and advertisement investments will continue to perform well in the future.

These limitations are indeed a good starting point so that other cases may be analyzed and more sophisticated statistical analyses may be used. It is important to constantly refine the available analytical techniques so that marketing executives have efficient tools to estimate the efficacy of their marketing communication investments.

References bibliográficas

AAKER, David A. Building Strong Brands. **The free press**, Nova Iorque, 1991.

ANDERSON, D.R.; SWEENEY, D.J.; WILLIAMS, T.A. **Estatística aplicada à Administração e Economia**. São Paulo: Pioneira Thomson Learning, 2003.

BLATTBERG, R.; NESLIN, S. **Sales promotion concepts, methods, and strategies**. New Jersey: Prentice-Hall, 1990.

BUENO, R.L.S. **Econometria de series temporais**. São Paulo: Cengage Learning, 2008.

BURNS, Enid. **Active home Web use by country**, *January 2009*. Disponível em: <http://www.com.brclickz.com>. Acesso em: 13 mar. 2009.

CARLOS, M.G.O.; MOURA, H.J. **Análise correlacional e modelo de regressão: um estudo de caso aplicado a uma entidade privada de ensino superior.** *Rev. Cent. Ciênc. Admin.*, v. 8, n. 2, p. 183-192, dez. 2002.

CHANDON, P.; WANSINK B.; LAURENT, G. A Benefit Congruency Framework of Sales Promotion Effectiveness. **Journal of Marketing,** v. 64, p. 65-81, 2000.

DARKE, P. R.; CHUNG, C. M. Y. **Effects of pricing and promotion on consumer perceptions: it depends on how you frame it.** *Journal of Retailing,* v. 81, n. 1, p. 35-47, 2005.

´ASTOUS, A.; LANDREVILLE, V. An expiremental investigation of factors affecting consumers´ perceptions of sales promotion. **European Journal of Marketing,** v. 37 p. 1746-1761, 2003.

FEIMSTER, Carolyn J. Planejamento e mix de mídia. In: **Shopping center:** marketing. New York: ICSC, 2009.

GREENE, W.H. **Econometric Analysis.** 5.ed. Upper Saddle River: Pearson Education, 2003.

GUJARATI, D.N. **Basic Econometrics,** 3.ed. McGraw-Hill, 1995, 838 p.

HAYMAN, Dana; SCHULTZ, Don E. Measuring returns on marketing and communications investments. **Strategy & Leadershi**p, v. 27, n. 3, p. 26-33, May/Jun 1999.

JOHNSTON, J. ; DiNARDO, J. **Econometric methods**. 4.ed. New York: McGraw-Hill, 1997.

HILL, R.C.; GRIFFITHS, W.E.; JUDGE, G.G. **Econometria**. 2.ed. São Paulo: Saraiva, 2003.

INTERNATIONAL COUNCIL OF SHOPPING CENTERS. **Shopping center today**. New York: ICSC, 2001.

KIRCHGÄSSNER, G. ; WOLTERS, J. **Introduction to modern time series**. Berlin / Heidelberg: Springer-Verlag, 2007.

LEHMANN, Donald R. Metrics for making marketing matter. **Journal of Marketing,** v. 68, p. 73-75, October 2004

LIAO, S. The effects of nonmonetary sales promotions on consumer preferences: the contingent role of product category**. Journal of American Academy of Business**, v. 8, n. 2, p. 196-203, 2006.

MacKINNON, J.G. Numerical distribution functions for unit root and cointegration tests. **Journal of Applied Econometrics,** 11, 601-618, 1996.

MALHOTRA, Naresh K. **Pesquisa de Marketing:** uma orientação aplicada, 4.ed. São Paulo: Bookman, 2006.

OGDEN, James R.; CRESCITELLI, Edson. C**omunicação integrada de marketing:** conceitos, técnicas e práticas. São Paulo: Pearson Prentice Hall, 2007.

OLIVEIRA-CASTRO, J. M. Effects of base price upon search behaviour of consumers *in* a supermarket: An operant analysis. **Journal of Economic Psychology,** 2003. Disponível em: <http://www.sciencedirect.com>. Acesso em: 13 abr. 2010.

PINHEIRO, M.F. **Promoções de vendas em shopping center comunitário:** uma análise dos resultados no faturamento das lojas satélites. 2010. 117 f. Dissertação (Mestrado em Administração de Empresas). Programa de Pós-Graduação em Administração (PPGA) da Universidade de Fortaleza (UNIFOR), Fortaleza, 2010.

PINHEIRO, Duda; GULLO, José. **Comunicação integrada de marketing -** *gestão dos elementos de comunicação*: suporte às estratégias de marketing e de negócios da empresa. São Paulo: Atlas, 2005.

PRADO, Guilherme de Almeida. O retorno sobre aplicações em marketing. **Meio & Mensagem**, n. 1194, São Paulo, 6 fev. 2006.

RAGSDALE, C.T. **Spreadsheet modeling and decision analysis**. 4.ed. Mason (OH): Thomson / South-Western, 2004;

SANT'ANNA, Armando. **Propaganda:** teoria, técnica e prática. São Paulo: Pioneira, 2002.

SHIMP, T. A. **Comunicação integrada de marketing em publicidade e promoção**. Thompson Learming, 2006.

ADMINISTRAÇÃO

Efeitos distributivos das políticas públicas: o caso da nova metodologia de cálculo da cota parte do ICMS do Ceará

Cláudio André Gondim Nogueira[1]

Resumo: A partir de 2009, o Governo do Estado do Ceará implementou uma mudança na metodologia de cálculo do rateio da cota parte do ICMS entre os municípios do Ceará. Os critérios anteriores promoviam uma maior participação dos recursos para os municípios mais populosos e economicamente maiores. Já a nova metodologia envolve o cálculo de três índices, compostos por indicadores de educação, saúde e meio ambiente. Trata-se de um mecanismo cujo objetivo é dar incentivos para uma saudável competição entre as gestões municipais de forma a recompensar aquelas que obtiverem melhorias mais expressivas nos indicadores considerados. Então, o principal objetivo deste estudo é analisar como essa nova metodologia modificou a distribuição de recursos da cota parte do ICMS, verificando se a distribuição se tornou mais equitativa entre os municípios e se os menores têm maiores chances de elevar o montante de recursos recebidos. Por meio de uma análise exploratória dos dados e de uma série de análises estatísticas, verificou-se que, de maneira geral, houve mudanças expressivas na distribuição dos recursos. Após a implementação da nova metodologia, as distribuições tenderam a se tornar menos assimétricas e menos dispersas, ou seja, mais equitativas. Os resultados indicaram, também, que os municípios menores agora podem ocupar posições de melhor destaque quanto aos recursos da cota parte.

Palavras-chave: Gestão por resultados. Incentivos. Cota parte. ICMS.

[1] Possui graduação em Economia pela Universidade Federal do Ceará (1996), Mestrado em Economia pela Universidade Federal do Ceará (1999) e pela Pennsylvania State University (2002). Atualmente é doutorando em Administração pelo PPGA/UNIFOR, professor e pesquisador da UNIFOR. - E-mail: claudioandre@unifor.br