

# What Kind of E-Mail Information Is More Effective in Communicating with the Client? Application of Game Theory

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## Abstract

Using game theory, this study analyzed clients' decisions after receiving digital relational marketing campaigns via email for two types of products: apparel and electronics-music-video. The objectives were to analyze the promotional and relational e-mails to discern which of the two is most effective in achieving marketing objectives and short-term business objectives. A cross-sectional study was carried out, with samples from Spain and Colombia, starting from a total of 400 surveys, a game based on the Nash Theory was proposed, having as a more important result, regardless of the type of email received by the client, the last action of the client will be marked as "spam". Likewise, differences were found by country and by gender depending on the type of product and no conclusive differences were found on which type of communication (promotional or differential) is better received by the client.

## Key words

E-mailing, promotional marketing, differential marketing, theory games, purchase, gender, internet.

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**E-mail marketing can entail different actions, promotions, information and services, viral marketing, personalized e-mail and CRM**

## 1. Introduction

Unconventional marketing, called direct marketing, has been very important over the last decade because it allows for personalizing marketing actions towards the client, building a long-term relationship between brand and consumer (Jonker, Piersma & Potharst, 2006). Nevertheless, on the internet, the traditional physical strategies of advertising cannot be applied as the behavior of the consumer on the internet may differ (Mahajan & Venkatesh, 2000). New virtual actions are required such as promotional mechanisms including: e-mail display advertisements and social media (Kannan & Li, 2016; Bruce, Murthi & Rao, 2017; García, 2015).

The use of e-mail as a direct marketing tool is an attractive choice for companies, when they have a database of their potential customers as it allows them to have direct communication with the customer at a low cost and with high rates of return (Jackson & DeCormier, 1999). E-mail advertising has a very low budget (De Haan, Wiesel & Pauwels, 2016). E-mail spending represented only 1% of the budget allotted for advertising in Europe, with 1 euro spent for every 2,500 e-mails sent (De Haan et al., 2016).

E-mail marketing can entail different actions, promotions, information and services, viral marketing, personalized e-mail and customer relation management (CRM) (Golbeck & Hendler, 2004). These can be grouped into two types of mailings: 1) promotional character and 2) engagement character (MacLuhan, 2002). The promotional information mailing seeks to promote advertising discounts on the sale price of one or several products with a limited period for their use. Engagement mailing is based on the previous experience of the client and seeks to consolidate the relationship between customer and brand in a long lasting way (Gázquez Abad & De Cannière, 2010). In addition to studies on the optimal frequency of mailing, or aspects that generate greater impact on the client (Jonker et al., 2006).

Another line of research has focused on data mining as a key element for this type of marketing (Bell, Ledolter & Swersey, 2006). This is supported by Jonker et al. (2006), who found the use of specialized programs and tests causes higher response rates, lower costs and higher profits. With the emergence of the internet and e-mails, a new direct marketing channel has been created called e-mailing and mobile mailing (Chittenden & Rettie, 2003).

Thomas, Feng and Krishnan (2015) analyzed the case of mailing in the acquisition and retention of donors to ONG's, finding that different emails must be sent depending on the action that is required and that these will cause different effects depending on the characteristics of the donor. However, according to Gázquez Abad and De Cannière (2010), there are few studies that analyze the effect of the business activities of personalized mailing on the customer's purchase behavior, or the consumer's response to the types of mailing (promotional and relational). Finally, there is little research on the new forms of digital relational marketing, highlighting the need to analyze the customer's buying responses to e-mailing.

Considering this gap in the literature, this article presents an empirical study that contributes to the knowledge within relational marketing, analyzing the behavior of the client with respect to the type of e-mails sent (promotional and relational). In particular, this paper aims to: 1) analyze the immediate effect of the activities of personalized e-mailing on the behavior of the electronic consumer, for two products with different characteristics (clothing/textiles and electronics/mobile telephony products); 2) offer a differentiated analysis of promotional and

**This study uses a mathematical analysis as a tool for analyzing the efficiency of information that must be sent by e-mail to customers as an action to boost sales**

differential e-mailing with the purpose of determining which of the two is more effective in achieving the objectives of digital marketing (visit to the website, acceptance of the information and purchase); and 3) to establish which of the two e-mails encourages the achievement of short-term commercial objectives.

Finally, and to achieve a larger analysis, this article presents an empirical cross-study between two countries (Spain and Colombia), in which we intend to discern different reactions to the communication strategy, depending on the cultural differences between the two countries, as well as the possible differences between gender.

This study uses a mathematical analysis, drawing on the theory of Nash, as a tool for analyzing the efficiency of information that must be sent by e-mail to customers as an action to boost sales. Analyzing from the calculation of the “payments” the existence of strict dominations, weak dominations and strategies (Mailath, 1998). We seek to determine the best strategies that must be established in the use of this commercial communication channel.

## 2. Review of the Literature

### 2.1. Direct Marketing Route E-Mail

According to Chittenden and Rettie (2003), e-mail marketing must generate three actions in the client: 1) the client must be able to open the e-mail, 2) the e-mail must keep the customer’s interest in the information sent, and 3) persuade the customer to respond positively to the action of the e-mail. Therefore, the words in the e-mail header that are displayed in the client’s inbox, the content of the e-mail and the characteristics of the recipient influence the effectiveness of the e-mail.

It is important in e-mailing campaigns to have a defined database of customers, as this shapes whether the information that is sent will be well received or on the contrary will be taken by the recipient as non-utilitarian, annoying information known as “spam” (Abrahams, Chaudhary & Deane, 2010; Chittenden & Rettie, 2003). It is therefore referred to as “Trust Mail” to messages that pass automatic filtering of e-mail servers and which present reputation characteristics to the client (Golbeck & Hendler, 2004).

According to Chittenden and Rettie (2003), the following steps should be considered for an optimal e-mail marketing campaign:

- The design should be planned based on the strategy that the campaign should be used, Categories (geographical, purchase pattern, a.o.), also, the type of information to send, plain text or HTML formats, images, videos, a.o., and finally, database of potential customers, data mining is necessary to determine the characteristics of the consumer and from this establish different contents, messages, periodicity, shipping schedule, a.o., according to the interests of the established marketing campaign (García, 2015; Jonker et al., 2006).
- The production function, where the entire technological system of communication mail, platforms, automation of shipments and responses is built.
- The test function, it is necessary to do pilot tests with all the segments to see the answer according to its characteristics (gender, age, a.o.).

**Game theory  
it is a research  
method  
for strategic  
situations  
of interaction  
between people  
and/or  
companies,  
which have  
different  
consequences  
for each player,  
depending on  
the strategies  
taken by all  
players**

- The deployment function, it is required to manage all the responses that integrates e-mailing, complaints, suggestions, unsubscribe requests, and positioning to Trust mails.
- Tracking function, gathering important information related to marketing objectives and measuring the effectiveness of the campaign.
- Finally the function of analysis and reporting, with the information collected generate analyzes and reports on the campaigns to optimize the relationship with the client (MacLuhan, 2002).

Ellis-Chadwick & Doherty (2012) conducted a research to different companies that use e-mailing, they was found among the most important aspects for a mailing campaign the following:

- Frequency and time of sending, this includes also define hours and days of sending mails.
- The “Subject line” should clearly define the initial content that will appear in the customer’s inbox, so two components must be taken into account: the “e-mail sender” identified as a reliable sender, usually Include the institutional name of the company and the “subject matter” should use appealing words, that is, offer an incentive in the “Subject line”.
- “Headline” must be distinctive and motivate the customer to continue reading the entire e-mail.
- The extension of the e-mail, if it only contains alphanumeric information or also images, video or sound.
- Hyperlinks should be the least possible so that the client does not feel overwhelmed or lost browsing in them.
- Include interactive functions, that is, providing instant actions to customers to perform such as: customer service, store locators and places, or frequently asked questions.
- Animation, online advertising allows for using animated effects to capture the attention of the receiver.
- And finally personalization, although it is difficult to be able to address the customer by its name or another type of distinctive of its own.

Thus, the following hypotheses are proposed:

- H1: e-mailing campaigns that contain a subject line focused on promotional marketing will have better results than e-mailing campaigns that contain a subject line focused on relational marketing.
- H2: The gender of the client will influence the effectiveness of the e-mailing campaign.
- H3: The cultural characteristics of the client will influence the effectiveness of the e-mailing campaign.

## 2.2. Game Theory

Game theory studies human behavior in conflict situations; it is a research method for strategic situations of interaction between people and/or companies, economic actors have different behaviors in the market, which have different consequences for each player, depending on the strategies taken by all players (Mailath, 1998).

**The Nash model can be used by a company to determine the behavior of agents in strategic decisions making; each company has a combination of strategies and knows that the other player will respond with other strategies**

The Nash model can be used by a company to determine the behavior of agents such as customers, competitors, government, a.o., in strategic decisions making; each company has a combination of strategies and knows that the other player will respond with other strategies. The Nash equilibrium is reached when the best “rewards” are obtained after the game occurs (Pepall, Richards & Norman, 2006).

Although there are few studies on the relationship between buyers and sellers, only Neslin and Greenhalgh (1983) have proposed an experiment on bargaining power relations using Nash’s theory to prove it.

### 3. Methodology

First, we describe the mathematical model to be used, constructing the game proposed for the case study, defining the players, strategies and possible payments. Then the empirical work, which includes the construction of the questionnaire, the data collection, and finally the result of the payments generated as proposed in the model are described.

#### 3.1. Finite Game - Pure Strategies

Given a strategic game in which the players are represented by  $J_1$  and  $J_2$ , the sets of strategies for each player are  $S_1$  and  $S_2$  respectively and the payment functions of each player are:

$$u_1: S_1 \times S_2 \rightarrow R \quad \text{y} \quad u_2: S_1 \times S_2 \rightarrow R \\ (s_1, s_2) \rightarrow u_1(s_1, s_2) \quad \text{y} \quad (s_1, s_2) \rightarrow u_2(s_1, s_2)$$

Given two strategies  $s'_i$  and  $s''_i$  of player  $J_i$ , we say that  $s'_i$  strictly dominates  $s''_i$  “when for any strategy  $s_k$  of the other player  $J_k$  it is true that player  $J_i$  earns more strictly with  $s'_i$  than with  $s''_i$ , that is:  $\forall s_k \in S_k, u_i(s'_i, s_k) > u_i(s''_i, s_k)$ .”

In a game in which each player has a strictly dominant strategy, the solution of the game is clear, since each player will continue with the dominant strategy. Because a rational player will never choose a strictly dominant strategy, we can seek the solution to a game by iteratively eliminating dominant strategies.

We say that strategy  $s'_i$  dominates weakly to strategy  $s''_i$  “when for any strategy  $s_k$  of another player  $J_k$  it is fulfilled that the player  $J_i$  wins more or equal with  $s'_i$  than with  $s''_i$ , and the strict inequality is reached at least for a player strategy and  $J_2$  that is:  $\forall s_k \in S_k, u_i(s'_i, s_k) \geq u_i(s''_i, s_k)$  y  $\exists s_k \in S_k, u_i(s'_i, s_k) > u_i(s''_i, s_k)$ .”

In a game whose players are represented by  $J_1$  and  $J_2$ , the sets of strategies by  $S_1$  and  $S_2$  respectively and in which the payment functions of each player are:  $u_1$  and  $u_2$ , the strategic combination  $(s^*_1, s^*_2)$  is a Nash equilibrium if the following is true:  $\forall s_1 \in S_1, u_1(s^*_1, s^*_2) \geq u_1(s_1, s^*_2)$  y  $\forall s_2 \in S_2, u_2(s^*_1, s^*_2) \geq u_2(s^*_1, s_2)$ .

In other words,  $s^*_1$  is a solution of the optimization problem  $\max_{s_1 \in S_1} \{u_1(s_1, s^*_2)\}$  and  $s^*_2$  is a solution of the optimization problem  $\max_{s_2 \in S_2} \{u_2(s^*_1, s_2)\}$ .

#### 3.2. Description of the Problem

Player J1: company that sends e-mail to potential clients.

Player J2: recipient of the e-mail sent by the company.

In this study, we hypothesize that when mail is sent to a set of potential customers (real situation, since it is meaningless for a single potential customer), we must open the door to the possibility that although a specific strategy may be more favorable to the company

Player 1 shares (G1):

- (OD) offer a discount in the sent e-mail.
- (ND) Do not offer a discount in the e-mail and simply to display information.

Player 2 shares (G2) (We will distinguish the gender of the second player):

- (NOW) Do not open the e-mail, but do not unsubscribe the reception of new e-mails.
- (ONF) Open the mail, do not click on the link to the company website, but do not unsubscribe the reception of new mails.
- (OGW) Open the mail and click on the link.
- (NOS) Do not open the mail, do not click on the link to the company website and unsubscribe the receipt of new emails, marking the email as spam.

### 3.3. Evaluation of the “Payments” to the Company

The evaluation of payments to the company must be made considering the actions carried out by a certain number of individuals of the same sex. However, we must also consider a factor that introduces the “positivity” or “negativity” of the payment. Thus, if for example: 60% of the recipients of the e-mail decide not to open the link and to unsubscribe from the mail distribution list (ONF) and instead 30% of the recipients of the e-mail click the link (OGW), then, it would not be correct to take as payment to the company the value 0’6 corresponding to 60% (ONF), and give as payment to the company the value 0’3 corresponding to 30% (OGW). This would mean a better payment to the company when the situation is worse. These situations could be solved by introducing negativity in cases that actually present an undesirable situation for the company.

If we raise the problem with two players, on the one hand the player G1 which is the company and on the other hand a client receiver of the mail, G2, the matrix of the game with the payments to the company we will consider (Table 1).

Table 1

#### Matrix payment to the company

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	.0	.0’5	.1	-.1
	(ND)	.0	-0’5	.1	-.1

In which there would be no differences, in reference to the payments for the company, if the mail contains discounts or if it does not contain them. This situation changes when the mail stops being sent to a single possible client and is sent to a set of possible clients.

In this study, we hypothesize that when mail is sent to a set of potential customers (real situation, since it is meaningless for a single potential customer), we must open the door to the possibility that although a specific strategy may be more favorable to the company if the mail is sent to a single potential customer, when the mail is sent to multiple recipients, it can generate different responses.



**The reaction of potential customers if offered a discount or if no such discount is offered, are different**

Suppose the company sends the email without offering a discount to a number (N) of possible customers. We represent this in the following:

- $N_1$  is the number of mail recipients that do not open e-mail (NOW).
- $N_2$  is the number of recipients that open the e-mail, do not click the link and do not unsubscribe the reception of new e-mails (ONF).
- $N_3$  is the number of mail receivers that open the e-mail and click the link (OGW).
- $N_4$  is the number of recipients that do not open the mail, do not click the link and unsubscribe to receive new mails (NOS).

Is fulfilled  $N_1 + N_2 + N_3 + N_4 = N$ .

We define the function  $U_1$  of payments to player J1 in the case of N possible clients, when the company does not offer discounts as follows:

$$\begin{aligned} U_1(\text{OD, NOW}) &= 0 * N_1 / N \\ U_1(\text{OD, ONF}) &= .0'5 * N_2 / N \\ U_1(\text{OD, OGW}) &= 1 * N_3 / N \\ U_1(\text{OD, NOS}) &= -1 * N_4 / N \end{aligned}$$

Next, suppose the company sends the email offering a discount to M number of potential customers. We represent this as follows:

- $M_1$  is the number of mail receivers that do not open the e-mail (NOW).
- $M_2$  is the number of receivers that open the e-mail, do not click the link and do not unsubscribe the reception of new e-mails (ONF).
- $M_3$  is the number of mail receivers that open the e-mail and click the link (OGW).
- $M_4$  is the number of receivers that do not open the e-mail, do not click the link and unsubscribe to receive new mails (NOS).

Is fulfills:  $M_1 + M_2 + M_3 + M_4 = M$ .

The  $U_2$  function of payments to player J1 in the case of M possible clients, when the company offers discounts would be:

$$\begin{aligned} U_1(\text{ND, NOW}) &= 0 * M_1 / M \\ U_1(\text{ND, ONF}) &= .0'5 * M_2 / M \\ U_1(\text{ND, OGW}) &= 1 * M_3 / M \\ U_1(\text{ND, NOS}) &= -1 * M_4 / M \end{aligned}$$

Note that the N and M values do not have to coincide, but the definition is based on a situation of proportionality, which allows us to make comparisons between both situations. Also note that it is expected that the reaction of potential customers if offered a discount or if no such discount is offered, are different.

We will determine the “payments” to the client using the theory of the opportunity cost, assigning a positive value to the client when he or she accepts and opens the mail and a negative value when he or she does not

### Example 1

Suppose the company sends hundred men an e-mail offering a discount and imagine that we have obtained the following response:

- 25 people have not opened the e-mail (NOW).
- 35 people open the e-mail, do not click the link and do not unsubscribe the reception of new mails (NGOs).
- 30 people open the e-mail and click the link (OGW).
- 10 people open the e-mail, do not click the link and unsubscribe the reception of new e-mails (NOS).

For this, the matrix of the game in which we only show the payments to the company in the table 2.

Table 2

#### Matrix payments to the company

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	0*25/10.0	.0*5*35/10.0	1*30/100	-1*10/100
	(ND)				

Understanding that in the case where the company sent an e-mail without offering a discount, the possible actions by the receiver would be the same as the payments to the company, but this would change the values obtained in the sample. We could assume that when the company sends hundred and fifty men an email without offering a discount, we have obtained the following responses:

- 30 people have not opened the e-mail (NOW).
- 50 people open the e-mail, do not click the link and do not unsubscribe the receipt of new mails (ONF).
- 45 people open the e-mail and click the link (OGW).
- 25 people open the e-mail, do not click the link and unsubscribe the reception of new emails (NOS).

This would complete the payments to the company as follow matrix (Table 3).

Table 3

#### Matrix payments to the company

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0*25/10.0?)	(.0*5*35/10.0?)	(1*30/10.0?)	(-1*10/10.0?)
	(ND)	(0*30/150 ,?)	(.0*5*50/15.0?)	(1*45/15.0?)	(-1*25/15.0?)

Namely the table in which the payments have not been included to the recipient of the e-mail, it would be table 4.



Table 4  
**Matrix payments to the company**

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,?)	(0'175,?)	(0'3,?)	(-0'.1?)
	(ND)	(0,?)	(0'167,?)	(0'3,?)	(-0'167,?)

### 3.4. Valuation of Payments to the Possible Client

The valuation of the payments to the potential customer cannot depend on the number of clients that have chosen a particular action (unless the company imposes a limited number of discounts). We refer, for example, to when we talk about the payment that the possible client receives, it is indifferent if 55% of the receivers of the mail does not open the mail, or if it is 65% that they do not open it.

We will determine the “payments” to the client using the theory of the opportunity cost, assigning a positive value to the client when he or she accepts and opens the mail and a negative value when he or she does not. In addition, taking into account someone opening the mail but preventing new offers entails the loss of opportunities to obtain new discounts, we should penalize this situation compared to simply not opening the mail.

We define the utility function  $U_2$  of payments to player G2, which as mentioned, does not depend on the number of recipients of the mail, when the mail offers a discount, taking into account:

- If the prospective client does not open (NOW), he or she loses the opportunity cost, but does not close the door to future opportunities.
- If the prospect opens the mail, does not click on the link and does not prevent the receipt of new mails (ONF), we believe that it would gain the opportunity cost of knowing the discount, whether or not to use it in the future.
- If the prospect opens the mail and clicks on the link (OGW), we consider that you would gain the opportunity cost of knowing the discount, in addition to visiting the website and could make a purchase by taking advantage of this discount.
- If the prospective client does not open the mail, does not click the link and does not allow the receipt of new mails (NOS), you will lose the opportunity cost of knowing the discounts forever.

In this way the payment function to J2 player, when the company offers a discount, could be:

$$\begin{aligned}
 U_2(\text{OD}, \text{NOW}) &= 0 \\
 U_2(\text{OD}, \text{ONF}) &= 1 \\
 U_2(\text{OD}, \text{OGW}) &= 1 \\
 U_2(\text{OD}, \text{NOS}) &= -1
 \end{aligned}$$

If the mail does not offer a discount, the  $U_2$  function of payments to player J2 must take into account that:

- Regardless of whether the prospective customer does not open the mail, or if he or she opens it, he or she does not give up receiving new emails (NOW, ONF, OGW), he or she

The analysis has been based on the study of non-cooperative and simultaneous games, the combinations that give rise to Nash equilibrium are not those that maximize the utility of both players, but are those strategic combinations in which neither player has the incentive to unilaterally change his or her choice

does not lose or gain the opportunity cost of obtaining an immediate discount and he or she does open the doors to the possibility of future discounts in subsequent e-mails.

- If the customer opens the mail and gives up receiving new mail (NOS), he or she lose the opportunity to receive further discounts.

The G2 player payments feature when the company does not offer discounts could be:

$$\begin{aligned}U_2(ND, NOW) &= 0 \\U_2(ND, ONF) &= 0 \\U_2(ND, OGW) &= 0 \\U_2(ND, NOS) &= -1\end{aligned}$$

Under the assumptions described in Table 4 we can complete the matrix of the two-dimensional game by adding the payments to the second player and we will obtain the final matrix of payments (Table 5).

Table 5  
Final matrix of payments

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0, 0)	(0'175, 1)	(0'3, 1)	(-0'1, -1)
	(ND)	(0, 0)	(0'167, 0)	(0'3, 0)	(-0'167, -1)

### 3.5. Sample and Questionnaire

The data were collected through a questionnaire that was constructed by a group of university students that allowed for assessing and modifying questions that were not understood or biased. The questionnaire was finalized and distributed online, whose population filter was only that they could do it (People who had a personal e-mail and received communications from brands or companies with whom they maintained continuous relationships of purchase). The survey was carried out in two countries: Colombia and Spain, since they are countries that show great differences in the development of electronic commerce (Sánchez-Torres & Arroyo-Cañada, 2016). Since each population will be analyzed, a statistical sampling was not taken into account. Finally, data were collected for 97 men and 121 women living in Colombia and 105 men and 77 women living in Spain, for a total sample of 400 valid records.

### 3.6. Game Development and Analysis

The answers were grouped by taking the statistical mean to generate the values of each action, for each of the questions about the attitude they would take after receiving emails, to each of the e-mails (the one that promotes the sale offering discount and the other that is about communication of the brand without offering discounts).

Remember that the possible actions by the recipient of the email are: Do not open the mail (NOW), open the email, do not click the link and do not unsubscribe the reception of new mails (ONF), open the mail and click the link (OGW) and finally, do not open the mail, do not click the link and unsubscribe the receipt of new emails (NOS).

When the play is to send direct communication of promotions, Nash equilibrium for male clients in Colombia, while in Spain, in addition to this “equilibrium game”, also clients opening and reading the e-mail and visit the web

The analysis has been based on the study of non-cooperative and simultaneous games, the combinations that give rise to Nash equilibrium are not those that maximize the utility of both players, but are those strategic combinations in which neither player has the incentive to unilaterally change his or her choice (Julmi, 2012).

## 4. Results

Overall, in all situations, the strategy to not open the e-mail, to not click the link and mark as spam by player G2 (client) is strictly dominated by any of the other strategies of the same player G2. In addition, Player G1 (company) does not have strictly dominant strategies. This result means in general terms the effectiveness of direct marketing via e-mail, that for this study, the general customers will prefer to do any action before they mark as spam (unsubscribe) the mails that send their favorite brands.

### 4.1. Product Analysis Clothing - Men - Countries

The first table applies the theory of games exposed in the survey conducted to the 97 men living in Colombia to which clothing has been promoted (Table 6).

Table 6

#### Matrix game theory (Colombian men - clothing)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'227,1)	(0'299,1)	(-0'062,-1)
	(ND)	(0,0)	(0'124,0)	(0'38,10)	(-0'124,-1)

Nash equilibrium is obtained in the strategic combinations (OD, ONF), (ND, NOW) and (ND, OGW).

The second table corresponds to a situation analogous to table 6, promoting men's clothing but among those from Spain (Table 7).

Table 7

#### Matrix game theory (Spain men - clothing)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'152,1)	(0'362,1)	(-0'048,-1)
	(ND)	(0,0)	(0'033,0)	(0'2,0)	(-0'114,-1)

Nash equilibrium is obtained in the strategic combinations (OD, ONF), (ND, NOW) and (OD, OGW). Regarding the analysis focused on direct communication with the client for the case of companies that sell apparel, men behaved in the same way when they received an email with promotional contents. In both cases, a Nash equilibrium was found when the strategic action of the client was to open the content of the email and know its content. However, in

Colombia, male customers did not carry out more actions in general, while in Spain, another equilibrium is presented, having to read the information, finish visiting the website and perhaps buying with that offer is another of the resulting possibilities.

Regarding direct communication of the brand without discount information, for both countries, a Nash equilibrium occurred when customers did not open such e-mails, although in Colombia there is also this equilibrium, another, where they also open the message and also visit the web page, being more interesting for both parties this result.

#### 4.2. Electronic Products and Music Analysis - Men - Countries

The next matrix shows the game that is deduced from the survey of men living in Colombia receiving e-mails about electronic items (Table 8).

Table 8

##### Matrix game theory (Colombian men - electronic products)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'227,1)	(0'309,1)	(-0'04.1-1)
	(ND)	(0,0)	(0'134,0)	(0'402,0)	(-0'082,-1)

Nash equilibrium was obtained in the strategic combinations (OD, ONF), (ND, NAM) and (ND, OGW).

The next matrix represents the game obtained from men living in Spain receiving e-mails about electronic items (Table 9).

Table 9

##### Matrix game theory (Spain men - electronic products)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'129,1)	(0'448,1)	(-0'076,-1)
	(ND)	(0,0)	(0'014,0)	(0'4,0)	(-0.048,-1)

Nash equilibrium was obtained in the strategic combinations (OD, ONF), (ND, NOW) and (OD, OGW).

Regarding what happens in the game between company and clients male, when e-mail is about electronic products and music, when the play is to send direct communication of promotions, Nash equilibrium for male clients in Colombia, comes when these open the email and read the information, while in Spain, in addition to this “equilibrium game”, also presents another, when in addition to opening and reading the e-mail, continue and visit the web.

For the case of direct communications on information without promotions, the same “equilibriums games” are repeated as in the case of the clothing product, the equilibrium is

found when the company sends this type of communication and the action of the clients for both countries is not open the email, except in Colombia where there is also another equilibrium, when in addition to opening it, they visit the web.

### 4.3. Product Analysis Clothing - Women - Countries

The next table represents the game obtained from the survey of Colombian women receiving e-mails about clothing (Table 10).

Table 10

#### Matrix game theory (Colombian women - clothing)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'248,1)	(0'347,1)	(-0'025,-1)
	(ND)	(0,0)	(0'095,0)	(.0'529,0)	(-0'058,-1)

Nash equilibrium was obtained in the strategic combinations (OD, ONF), (ND, NOW) and (ND, OGW).

The next matrix represents the game that obtained from the survey in which women living in Spain received e-mails about clothing (Table 11).

Table 11

#### Matrix game theory (Spain women - clothing)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'273,1)	(0'273,1)	(-0'078,-1)
	(ND)	(0,0)	(0'07.10)	(0'429,0)	(-0'13,-1)

Nash equilibrium was obtained in the strategic combinations (OD, ONF), (ND, NOW) and (ND, OGW).

The analysis of equilibriums with the clothing product for the female group, present in the first place, that when the company sends a direct communication with promotions via e-mail, Nash equilibrium has been the same in both countries, having as equilibriums, that When receiving email with offers, women open and read the information, even if they do not visit the website.

Second, the Nash equilibrium when the company sends e-mails with information without discounts, for the two countries there were also not differences between women by country, the equilibrium is found when women do not open the mail and another when They open it and visit the web.

#### 4.4. Electronic Products and Music Analysis - Women - Countries

The next matrix represents the game obtained from the survey of women in Colombia receiving e-mails about electronic products (Table 12).

Table 12

##### Matrix game theory (Colombian women - electronic products)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'202,1)	(0'413,1)	(-0'05,-1)
	(ND)	(0,0)	(0'136,0)	(0'405,0)	(-0'083,-1)

Nash equilibrium was obtained in the strategic combinations (OD, ONF), (ND, NAM) and (OD, OGW).

The final matrix represents the game obtained from the survey in which women in Spain received e-mails about electronic items (Table 13).

Table 13

##### Matrix game theory (Spain women - electronic products)

		G2			
		NOW	ONF	OGW	NOS
G1	(OD)	(0,0)	(0'143,1)	(0'182,1)	(-0'221,-1)
	(ND)	(0,0)	(0'071,0)	(0'182,0)	(-0'299,-1)

In the case of electronic and music products, Nash equilibrium for companies' actions when they send discounted communications to women for the two countries, are generated when clients receive the e-mail, open it and read it And also appears when they open, read the e-mail and visit the website.

When it comes (e-mail) to only information without a promotional campaign by the company, for both countries, the "equilibrium game" happens when women do not open the e-mail, although in Spain there is another "equilibrium game", when women open the e-mail, read the information and go to the website.

## 5. Conclusions, Limitations and Future Research

The objectives of this study were to: 1) analyze the immediate effect of the actions of personalized e-mailing on the behavior of the electronic consumer, for two products with different characteristics (clothing/textiles and electronics/mobile telephony products); 2) offer a differentiated analysis of promotional and differential e-mailing with the purpose of determining which of the two is more effective in achieving the objectives of digital marketing

**For women, Nash equilibrium has been the same in both countries when the company sends a direct communication with promotions via e-mail, having as equilibriums, that when receiving email with offers, women open and read the information, even if they do not visit the website**

(visit to the website, acceptance of the information and use); and 3) establish which of the two e-mails encourages the achievement of short-term commercial objectives.

We conducted an empirical study and collected data from two countries with pronounced differences in the development of e-commerce (Sánchez-Torres & Arroyo-Cañada, 2016). Spain has a greatly developed commercial channel, while Colombia has begun a very slow process of growth in e-commerce. In addition, we analyzed the data for men and women separately, since previous studies of e-commerce show differences in attitudes and behaviors on the Internet (Chan, Cheung, Shi, & Lee, 2015; San Martín & Jiménez, 2011).

First, Nash's game theory was applied to the two products selected (clothing and electronic products), for all groups analyzed (countries and genders), the use of campaigns Of e-mail by the companies, will be received by its clients in a positive way, understood as in the worst case, clients will not read the e-mail but, the results indicate that they will not send these communications to the Spam what, it is assumed as the acceptance of the client to continue receiving this type of direct communication. This result is in line with previous studies on the effectiveness of e-mailing as a means of direct communication with customers.

For the second objective, this study failed to determine substantial differences between the effectiveness of promotional e-mailing and differential e-mailing, since in some cases clients did not read the e-mail with discounts and may read the emails alone Contain differential communication, in other cases, clients read the promotional communications and end up visiting the web, and the opposite happens with the differential communication e-mail, being unread.

The third objective, related to the efficiency of the two types of e-mails in improving the achievement of short-term commercial objectives (i.e., increasing sales), was measured with the equilibriums where it was met that customers ended up visiting the page Web after reading the e-mail, the results do not allow to establish what type of direct communication is more effective since, as in the previous point, this happened for the two types of direct communication.

Finally the differences depending on the control variables that were established, resulted in the most important ones that by gender, for the product clothes and garments, generate the equilibrium of the game and therefore tend to be the common action, open the e- Mail and finish the commercial funnel by visiting the web, while in men the general "equilibrium of game" is simply read said e-mail. In this case, it is clear that clothing can be a product of greater interest for women than for men, which should be taken into account for this type of industry.

Another interesting difference was found for the electronic product - mobile telephony, the opposite happens, the "equilibriums of the games" are established when the men open promotional emails and also when they visit the web; While for women only happens when they open and read the information but do not go to the site, for this, is better for companies to send this type of products to this type of communication to their male clients, since it will have better effectiveness in their Short-term sales target for example.

Regarding differences by country, a trend is clearly seen for men in each country, Spanish men tend to generate the "equilibrium of the game" for promotional e-mail, when they open such communications and go to the page web achieving the company its objectives with the action, whereas the Colombian men in this case generate "equilibrium of the game" only reading the mail but they continue the way to the web of the company, happens this in the two products



for Colombia. This may be due to the development of e-commerce in Spain, where the purchase of products such as clothing via the internet is massive, in contrast to the Colombian case where despite the development of digital sales portals, society still does not trust this channel. In the case of women, there are no substantial differences.

This study presents major limitations because, first, it is one of the first approaches to use game theory to decipher consumer behavior in relation to business marketing actions. Therefore, the methodology of the game may entail different interpretations or discrepancies in the method, as much mathematical as of the classic marketing. Future research should use the game theory to analyze the actions and final decisions of two players clearly identified in a commercial relationship, on the one hand the company and on the other the client.

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