DIGITAL MARKETING AND BIG DATA IN THE CERAMIC SECTOR. ANALYSIS OF THE PRESENT SITUATION IN SPANISH COMPANIES

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1. ABSTRACT

The ceramic sector, especially the ceramic cluster in the province of Castellón, has been characterised throughout its existence by its competitive nature, dynamism and capacity to adapt to increasingly changing, uncertain, complex and ambiguous environments. This has allowed it to be currently positioned as one of the most competitive industries on a national level, becoming the main Spanish cluster, the most important ceramic cluster in Europe and the second biggest industry in terms of contribution to wealth and added value in the Valencian autonomous community. In the region, it is not just the large export volume that stands out, but it also has a very productive and highly efficient industry. In fact, forecasts for this year indicate that the sector has production levels similar to those of 2008, with an annual growth of 12% with nearly 500 million square metres in 2016, getting closer to the maximum of 600 million square metres, which was reached in the years before the economic crisis, in 2006. Thus, Spain is the largest European exporter and is second globally, which implies continuing to invest in new policies and initiatives to continue being a leading sector and, above all, to invest in R&D&I as a guarantee of success.

The globalisation of the economy and the arrival of the 4th industrial revolution or digitalisation of the industry have meant that we need to know our environment better. Companies need to know how to manage production and distribution, with the aim of improving decision making and also saving time, ultimately optimising industrial activity. However, above all, they need to know more about their clients. A focus on production, the product and sales, so significant in the previous decades, must give way to a focus on the client. For this, Big Data must be implemented in processes and resource allocation, as well as a greater company presence in on and off-line environments, and the resulting need to learn how to manage intangible assets. The process is born and dies with the client and for this, companies must be very attentive, appropriately manage information flows in their environment and have the data and information necessary, on time and in due form, to be able to make the best business management decisions.

In this new physical-digital environment, new concepts are arising in this sector, such as: analysis of web traffic; brand image, positioning and reputation; integrated or 360º marketing; inbound marketing; sales through electronic platforms or e-commerce sales funnels, which necessarily implies in one way or another working with people or teams of people who have digital skills and are appropriately integrated into the company's marketing and sales policies.

This study aims to analyse the state of the issue in the ceramic sector, to examine the sector's online development and how the companies in the Castellón ceramic cluster are implementing Big Data.

2. INTRODUCTION

The ceramic sector, especially the ceramic cluster in the province of Castellón, has been characterised throughout its existence by its competitive nature, its dynamism and capacity to adapt to increasingly changing, uncertain, complex and ambiguous environments, which has allowed it to be currently positioned as one of the most competitive industries on a national level, becoming the main Spanish cluster, the most important ceramic cluster in Europe and the second biggest industry in terms of contribution to wealth and added value in the Valencian autonomous community. In the region, it is not just the large export volume that stands out, but it also has a very productive and highly efficient industry. In fact, forecasts for this year indicate that the sector has production levels similar to those of 2008, with an annual growth of 12% with nearly 500 million square metres in 2016, getting closer to the maximum of 600 million square metres, which was reached in the years before the economic crisis, in 2006. Thus, Spain is the largest European exporter and is second globally, which implies continuing to invest in new policies and initiatives to continue being a leading sector and, above all, to invest in R&D&I as a guarantee of success.

The globalisation of the economy and the arrival of the 4th industrial revolution or digitalisation of the industry have meant that we need to know our environment better. Companies need to know how to manage production and distribution, with the aim of improving decision making and also saving time, ultimately optimising industrial activity. However, above all, they need to know more about their clients. The focus on production, the product and sales, so significant in the previous decades, must give way to a focus on the client. For this, Big Data must be implemented in processes and resource allocation, as well as a greater company presence in on- and off-line environments, and the resulting need to learn how to manage intangible assets. The process is born and dies with the client and for this, companies must be very attentive, appropriately manage information flows in their environment and have the data and information necessary, on time and in due form, to be able to make the best business management decisions.

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This study aims to analyse the state of the issue in the ceramic industry, to examine the sector's online development and how the companies in the Castellón ceramic cluster are implementing Big Data.

3. BIG DATA IN THE CERAMIC SECTOR

The Spanish ceramic sector is positioned as one of the most competitive sectors on a national level, as well as on a global level. Among the aspects worth highlighting from this excellent positioning, are the large volume of exports as well as the industry's productivity and high efficiency.

According to data from the ASCER report (2016), Spain is by volume the top European exporter and is second globally. It also holds a privileged position in production, as it is the largest European producer. According to macroeconomic data, the Spanish ceramic sector is the industrial sector that brings the third largest trade surplus to the Spanish economy with €2.253 billion in 2014.

If we focus on the latest published data, in 2016 Spanish production of ceramic floor and wall tiles increased by approximately 11.8%. All these data on productivity and exports extend to employability data, which increased by more than 500 direct jobs in 2016, compared to data from the previous year.

Year/millions €	2009	2010	2011	2012	2013	2014	2015	2016	2016/15
Exports	1,673	1,747	1,897	2,082	2,240	2,328	2,452	2,570	4.8%
Domestic	918	801	700	575	557	574	647	746	16%
TOTAL SALES	2,591	2,548	2,597	2,657	2,797	2,902	3,100	3,316	7.1%

Source: ASCER Report on 2016
Table 1. *Spanish ceramic sector sales (2009-2016)*

The sector's export volume in 2016 was €2.57 billion, with an increase of 4.8% compared to 2015 and products reached 191 countries. This figure is significant, because it helps us to understand the business dimension of the sector's companies. The current export volume is approximately 80% of turnover, and this noticeably complicates logistics and product distribution, as well as requiring an important commercial network to achieve profitable volumes of turnover for companies.

In this sense, the Spanish ceramic sector has always notably committed to the design and implementation of new policies and initiatives of a technological, productive and commercial nature as success factors in order to remain a leading industry and, above all, to invest in R&D&I as a key element for differentiation and guaranteeing success compared to other countries that go for reducing costs.

One of the factors or indicators that serves to measure the level of involvement or implementation in the use of new information technologies is the digital skill index of people and companies. This index is an indicator that determines the level of the company's implementation of these digital skills. In fact, it appears that the digital skills that could be available are still not well-known, despite the fact that they have existed for some time and considering the relevance they have on corporate sales and marketing policies. It may be that the rapid advance and evolution of new technologies and their application to the field of communication and marketing makes it difficult to appropriately keep up with this technological rhythm, so that only the technologically privileged can do so.

Within the framework of international trade and investment in new technologies and R&D&I, the ceramic industry has been implementing Big Data technology in resource allocation and processes for the last few years. In fact, there is growing interest in the implementation of Big Data among the companies of the ceramic sector in their decision making and management processes.

As various authors state (Bowker 2005 and 2013, Boyd and Crawford, 2012; Manovich, 2011), the Big Data age has begun. Computer scientists, physicists, economists, mathematicians, political scientists, bioinformaticians, sociologists and other researchers have been calling for the need to manage access to the enormous amounts of information produced by and about people, things, companies and organisations and their interactions. Various groups have discussed the potential benefits and costs of the analysis of genetic sequences, social media interactions, health registers, telephone registers, governmental registers and other digital traces or imprints that people have left by navigating the internet or in the very personal or professional relationships that are later codified and introduced into business management programs, among others.

The literature on Big Data solutions arose mainly in the 1990s with the appearance of the internet. "Big Data and the Next Wave of Infrastress" (Mashey, 1998), by theoretical mathematician John Mashey, can be considered a landmark article, as it was this article that popularised the term. In the article, the author already predicted exponential growth in the generation of data and the possible problems that it could cause for the management tools that existed at that time. He also indicated that the amount of information that would be generated in the near future would require technologies with a huge processing capacity that did not yet exist.

Boyd and Crawford (2012) define Big Data as a cultural, technological and academic phenomenon that is based on the interaction of three factors:

1) Technology: that allows the maximising of calculation power and algorithmic precision for copying, analysing, linking and comparing large groups of data.
2) Analysis: using large groups of data with the aim of identifying economic, social, technical or legal patterns.
3) Mythology: the generalised belief that large groups of data offer a form of intelligence and knowledge that can generate ideas that were impossible, with an aura of truthfulness, objectivity and precision.

The commitment to Big Data solutions, one of the pillars of Industry 4.0, implies a radical change in business culture: the decision-making processes go from being based on reports and intuition to being based on objective data and sales and

production projections based on the analysis of data that are being introduced into the system by the main actors. This allows notable improvements in the management of production and distribution, with the aim of improving decision making and, also, saving production time and client delivery times, improving energy efficiency, enhancing quality and ultimately optimising industrial activity. Having a better knowledge of markets, clients and suppliers, in addition to skills, have become key success factors for companies.

In accordance with the latest Worldwide Semiannual Big Data and Analytics Spending Guide from the International Data Corporation (IDC, 2017), the prediction for global income for Big Data and Business Analytics (BDA) will grow from 130.1 billion dollars in 2016 to 150.8 billion dollars in 2017, 12.4% more than in 2016, and it is expected to reach 210 billion dollars in 2020, the banking and manufacturing sectors being those that will allocate the greatest budget. According to this study, the availability of data, a new generation of technology and a cultural change towards decision-making based on the availability of data, will drive demand for Big Data and analysis technology and services.

One of the main characteristics and advantages of Big Data solutions is that their applicability can be extended throughout the industry's value chain, from procurement and the manufacturing process to the post-sales service for the products and services that the company offers. In an increasingly globalised environment, where companies have a greater need to be able to offer and sell their products to any client in any country of the world, it is very important to be able to make decisions that can facilitate the prediction of which products best fit the needs and requirements of each client, and therefore to be able to sell them better, to be able to manufacture them with a better balance between sales predictions and the company's manufacturing capacity. With this, procurement and the manufacturing period can be optimised (optimisation of price and supply in the purchase of raw materials and energy) and stock, as well as being able to optimise distribution logistics, by optimising delivery routes. It also allows companies to improve the level of behaviour of the client to be able to optimise marketing strategies, as well as being able to improve the processes of selection of human resources in companies, by being able to detect labour needs as a consequence of this radical change in business culture and vision.

According to the Survey on the use of Information and Communication Technologies (ICT) and on companies' electronic commerce by the INE (Spanish national statistics institute) (2017), during the first quarter of 2017, 46.7% of companies that had 10 or more employees were using IT packages for the integration of the different areas of the company (ERP - Enterprise Resource Planning), compared to 37.8% of companies that were using CRM tools (Customer Relationship Management) to manage their client information.

In addition, 16.9% of companies were using web pages or other types of electronic formats to share information on the supply chain with their suppliers or clients.

In the ceramic sector in particular, companies have been working with Big Data solutions for several years with varying results and applications. Large companies such as SAP, IBM or Microsoft positioned themselves a long time ago in this field through the generation and development of platforms, tools and applications that allow the gathering, handling and visualisation of this type of

information. Nevertheless, one of the main problems that this innovative technology brings is that it requires specific knowledge that is still difficult to acquire due to the lack of supply of specific training. Study plans have not advanced at the same speed as technology, and the training of specialists in the field of data management and handling and the existing supply is currently insufficient for demand. In the last two years, a greater quantity of data has been accumulated than in the entire history of humanity, but we are lacking experts who can analyse it. According to the MIT publication Sloan Management Review, 40% of companies have problems in finding and retaining specialist talent in Big Data, a trend that continues to increase: IDC data indicate that in 2018 it will be necessary to fill nearly a million new posts for specialist Data Management work.

Facing this situation, one of the solutions that is being adopted in the industry is contracting the services of specialised companies, with applied knowledge for exploiting nthis type of information. Through the use and application of the tools that we have mentioned in the previous paragraph, they are capable of personalising data handling and the results of the information according to their clients' needs. Companies such as Zeus or Enantio, among others, carry out this type of development and applications, as indicated in the Big Data Report by the Instituto de Tecnología Cerámico (ITC) Market Observatory. In the specific case of Enantio, a Spanish company headquartered in San Sebastián (in the Basque Country), they have developed an IT tool that allows the management and analysis of data obtained from over 50 official import and export databases, updating the information in real time.

4. SOCIAL MEDIA IN THE CERAMIC SECTOR

Another aspect that we have analysed in this study is the use and application of social networks by companies in the ceramic sector.

The use of social networks has become generalised among the population. According to the 8th Study of Social Networks in Spain (IAB Spain-Elogia, 2017), 86% of web users between 16-65 years old use social networks, which accounts for over 40% of the Spanish population and 6% more than in 2016. Among users, there are no differences based on gender (49% men - 51% women), users between the ages of 31 - 45 being the most numerous.

Among users in general, Facebook is the most widely used social network, with nearly two billion users (IAB Spain-Elogia, 2017). It is followed by two of its most recent acquisitions, and Instagram. WhatsApp, which was created in 2009, has surpassed YouTube occupying second place, with over 1.2 billion users per month. Facebook Messenger YouTube have over 1 billion active users per month. Instagram, one of the social networks which has grown the most strongly in the last few years, has over 700 million active users per month. Google+ has over 540 million users each month, similar to the around 500 million monthly users of LinkedIn. Twitter, in turn, has been losing strength over time, and has over 328 million active users each month.

The use of social networks has also been incorporated by companies and has meant some significant changes in their operation. In the last few years, control over communications has gone from being managed by the company to the consumers, which has meant that companies have started generating and looking to share experiences and communications among consumers (Heller Baird and

Parasnis 2011). It has also provoked a revolution in the way we form relationships, interact and get involved with our immediate environment, meaning with consumers, suppliers and partners. The accessibility and possibility to communicate instantly allow greater flexibility in communication, but also a greater dedication to it, which causes changes to organisational behaviour. In addition, they have also produced changes within the companies and organisations themselves, as they have significantly transformed the way in which employees interact and collaborate within the same organisation (Deans 2011; Kim, Lee, and Lee, 2013). On an organisational level this new communication environment has meant in some cases important changes in companies' marketing and communications departments, with the aim of trying to adapt to this changing and sometimes uncertain environment (Heller Baird and Parasnis 2011) and to be able to control and manage everything relating to them (Parveen 2012). Nevertheless, we must understand that, given the size of SMEs, in the majority of cases the responsibility for managing and controlling social networks usually falls on the executive directors themselves (Meske and Stieglitz 2013).

In terms of the use of social networks, the main reasons for companies to use them are to attract new consumers, to develop relations with their audience or to increase brand perception (Michaelidou, Siamagka and Christodoulides 2011). Nevertheless, the observation that can be made through the internet shows us that many of these companies continue to use social networks in a one-way manner, meaning they only use their accounts for one-way communication where they advertise their products and introduce new promotions to consumers, without necessarily seeking to interact with them (Parveen 2012, Bernard, 2016). However, it is important to observe a more diversified use of the social networks. In addition to the previously mentioned use that is merely communicational, in recent years a usage more in line with its true potential has emerged, beginning to use them as an important tool for competitive intelligence, with the aim of developing corporate strategies based on information obtained and times shared, about their competitors and consumers. On the other hand, when they are used as an instrument for communication with consumers, what they seek is brand creation, the generation of corporate image, publicity and promotion, the development of relationships with consumers and improvement of their customer service (Bernard, 2016; Kim and Ko 2012; Kaplan and Haenlein 2010). In Spain, according to the survey on the use of ICT and on companies' electronic commerce by the INE (2017), 49.6% of companies with an Internet connection used one or other of the social media sites for work reasons in the first quarter of 2017. Of these, 94.4% used social networks and 92% of them believe they are useful for their business activities, using them mainly for marketing, publicity and image management and, to a lesser extent, as an informational channel for the client. Year-on-year from 2016 to 2017 the use of social sites (Facebook, LinkedIn, Google+...) blogs and microblogs (Twitter, Present.ly, Blogger, Typead...) and Web 2.0 tools for knowledge sharing or wikis has been increasing in the corporate sphere by 0.1%, 3.2% and 1.3% respectively. On the other hand, the use of websites for sharing multimedia content (YouTube, Flickr, Picassa...) has reduced by 0.8%. In terms of the expected future development of social networks within business, studies carried out by Michaelidou, Siamagka and Christodoulides (2011), Bernard (2016) and Leader-Chivee, Hamilton and Cowan (2008) saw that none of the companies analysed planned a reduction in the budget allocation for social networks, but rather an increase for the next few years.

In very similar terms, this has been shown by a recent study by the consulting firm Clutch (2016), where Facebook is the most widely used social network by the business sector and where it appears that many medium and large companies decide to create their profiles on various social networks to improve their communication, distribution and sales strategies. In this manner, the social networks preferred by companies are Facebook (96%), Twitter (71%), Youtube (61%), LinkedIn (60%), Instagram (55%), Google + (47%) and Pinterest (34%). In terms of content, preferred by large and medium-sized companies are videos (23%), images (22%), offers and promotions (18%), articles (16%), product reviews (12%) and infographics (11%). According to this study, for small companies that have not yet made the definitive leap to digital marketing, social networks are the preferred starting point. In 2016, nearly 60% had a presence on social networks and nearly 75% stated that they planned to implement some type of social media marketing strategy for 2017 or later.

They also indicate that there is no universal rule on social networking activity for small companies. As a result, 35% post content and interact with followers weekly, while 26% interact several times per day.

The reasons given by companies for choosing Youtube were the growth in value of the videos and the possibility for promotion of youtubers. Google+ to achieve better positioning on Google. Pinterest so that fashion companies can share their photos. LinkedIn because it is a meeting point for employees and is used by individuals as well as by human resources managers of companies and organisations for work placement and mediation.

If we focus on the ceramic sector, according to the study carried out by the ITC Market Observatory "Competitive analysis of digital reputation and social networks" in global ceramics (2016), only 9.1% of these companies scored over 50 points on the Klout ranking that measures their influence on social networks.

These data are in accordance with those found by the 2nd Study of digital skills in Spanish companies for 2016, prepared by Kantar Millward Brown for ICEMD – ESIC. In this study, only 16% of companies in the main economic sectors had a High Digital Competence Index[1].

In short, it can be stated that social networks have taken on an important role, and will continue to do so in the future in the business world, through which companies seek to differentiate themselves from the rest through their content managers on their social networks.

5. METHODOLOGY

In order to carry out the study, a structured questionnaire was written and sent to 122 companies in the Castellón ceramic sector, between September and October 2017.The questionnaire was sent by email to the addresses that appear in the ASCER directory - they were sent twice, and each one of the companies that appeared on the list was followed up by telephone. Despite this, only 13 companies replied, one of which indicated that social networking was managed by an external company and that they could not answer the questionnaire. Therefore, the study is based on 12 valid responses, which highlights its clearly exploratory nature.

In terms of the characteristics of the people who responded, 66.66% were men and 33.33% women; the average age was 38 years; 45.5% had completed university studies and 54.5% studies at masters' level or above; and in relation to the post they occupied in the company, there were 2 commercial directors, 5 marketing or communication directors or managers, 1 digital marketing manager, 1 from the accounting and finance department, 1 from the design department and 1 from the press department (one of the respondents did not indicate their post).

The questionnaire was divided into three sections (the complete questionnaire can be consulted in annex I). The first referred to general profiling questions: gender, age, level of studies and post occupied in the company. The second section referred to the use of social networks in the relationships with specific distributors, suppliers and clients and the frequency of use. The third section referred to the use of Big Data, where the programs used, reasons and frequency of use were detailed.

The program used for data analysis was SPSS 24.

[1] The Digital Competence Index is an indicator that determines the level of implementation of digital skills in the company

6. DATA ANALYSIS

Table 2 shows the social networks that the analysed companies use in their relationships with their distributor clients, their suppliers and their direct clients. In all cases Facebook is the predominant network, both when asked about all of the networks used as well as when it is mentioned that they indicate only the most used network.

	Distributor Clients	Most used with distributors	Suppliers	Most used with suppliers	Direct Clients	Most used with direct clients
Facebook	66.7	40	58.3	62.5	66.7	50
Twitter	50	20	16.7	12.5	25	12.5
Instagram	58.3	20	16.7	12.5	41.7	25
YouTube	58.3	10	25	12.5	50	12.5
Pinterest	41.7	0	8.3	0	33.3	0
LinkedIn	41.7	10	8.3	0	33.3	0
Houzz	8.3	0	0	0	0	0

Table 2. *Social networks used (%)*

In relation to the type of information most often shared on social networks by ceramic companies in their relationships with their distributor clients, their suppliers and their direct clients, the most used in all cases are images and photographs (table 3).

	Distributor Clients	Suppliers	Direct Clients
Images and photographs	75	50	75
Videos	58.3	16.7	33.3
Comments or debate forums	16.7	25	25

Table 3. *Type of information most used on social networks (%)*

In terms of who is consulted and with what frequency information on social networks is consulted, the most valued alternatives were, in order of importance: competitors, professionals, business organisations and suppliers (table 4).

	Average value*
Competing companies	3.80
Known people or professionals	3.50
Social networks of organisations and companies of the sector	3.40
Supplying companies	2.67
Social networks of organisations and companies from other sectors	2.40

**Scale of 1 to 5 (1=never, 5=always)*

Table 4. *Who is consulted and with what frequency information is consulted on social networks*

Below we will focus on analysing the intensity of use of the social networks, in this respect by indicating that the companies analysed have an average of 8,547 followers, with a maximum of 42,000 and a minimum of 60. The majority of the companies access social networks every day or several times per day (table 5). The time per week dedicated to social networking is only greater than 10 hours in a few cases (table 6). And in terms of the time dedicated every time they log on, it is usually between 10 and 30 minutes (table 7).

	%
Hardly ever	0
Once per month	0
Several times per month	11.1
Several times per week	22.2
Every day	33.3
Several times per day	33.3

Table 5. *Frequency of connecting to social networks*

	%
Less than 1 hour	27.3
1-5 hours	36.4
6-10 hours	27.3
Over 10 hours	9.1

Table 6. *Time per week dedicated to social networks*

	%
Less than 10 minutes	18.2
10–30 minutes	54.5
31–60 minutes	18.2
1–2 hours	9.1

Table 7. *Time spent whenever connected to social networks*

The reasons for using social networks in order of importance: promotion, communication and positioning, learning about new products, monitoring the competition and research (table 8).

	Average value*
...to **promote** and introduce our brands and products	4.00
...to improve the information and **communication** of the company and have a greater presence and online **positioning**	3.91
...to **find out about new products**	3.55
...to **monitor** and get to know the **competition** better	3.45
... for **research**	3.09
...to **be up to date** with the news and to find information	3.00
...to **stay in contact**, interact and get to know our suppliers and distributor clients and direct clients (loyalty)	2.91
...to be in **communication** with the **rest of the companies in the sector**	2.09

**Scale of 1 to 5 (1=very low, 5=very high)*
Table 8. *Reasons for using social networks.*

If we focus on analysing the creation and content of the social networks, in the large majority of cases this process is managed by the company itself, although in a quarter of cases they receive the help of a specialist external company (table 9).

	%
The company itself completely	66.7
An external specialist company	8.3
The company itself with help from an external specialist company.	25

Table 9. *Social network management (creation and content)*

The following group of questions analysed is focused on the use, by ceramic companies, of enterprise resource planning (ERP) systems, or customer relationship management programs (CRM) and those for human resources, or supply chain management programs (SCM). In relation to this topic, 91% of the companies analysed indicated that in their company, one or other type of the above management programs was used. Regarding the type of program used, the results were greatly fragmented, the only one used by more than one company being the SAP program (table 10).

	%
SAP	25
Microsoft	8.3
SAGE	8.3
Sugar	8.3
JOVER	8.3
PLANATEC	8.3
Sales Force	8.3
Undegest	8.3
UNIT4	8.3
Expande (user IT)	8.3
Oracle	0
INFOR	0
Zeus	0

Table 10. *Programs used (ERP, CRM, SCM...)*

Table 11 shows the reasons for using business management programs, this mainly being management and control, followed by: improving the agility of management, having a comprehensive view of the information and cost management. It may be noted that increasing knowledge of the client had an average value lower than 4.

	Average value*
Managing and controlling materials, stocks, dispatches and product deliveries	4.70
Improving management agility and having greater control over production and distribution.	4.50
Having a **comprehensive view** of information from all of the company's departments.	4.40
Improving/reducing **the management of costs**, time and company resources.	4.40
Getting to know my clients better and offering them a better service.	3.70
Sharing the data that really matter	3.44
Anticipating any impact thanks to an alert system, improving performance and optimising processes	3.44

**Scale of 1 to 5 (1=very unimportant, 5=very important)*
Table 11. *Reasons for using business management programs*

Lastly, we focus on the use of Big Data information management systems. Only two of the companies analysed indicated that they used Big Data and both used a resident program, specifically they use Python, the program being updated daily and used several times per day.

7. CONCLUSIONS

The use of new information technologies in companies from the ceramic sector is still in the introductory phase and is growing slightly. The clear focus on production and the product of the 1990s remains present among companies, combining it with focus on sales, necessary to be able to maintain and improve their business turnover.

The use of social networks in the ceramic industry is limited and with a non-preferential use. The use of images, photographs and videos predominates over the rest. In this manner, and following on from what companies are doing in general, Facebook is the most widely used social network in the ceramic industry, followed by Youtube, Instagram and Twitter in that order. They are used both in their relationships with their distributor clients, their suppliers and their direct clients.

In terms of the reasons for consulting information on social networks, they are basically used to find out what the competition are doing, to know what professionals and business organisations in the industry are thinking and saying. To a lesser extent appear the importance of what the supplier companies are saying as well as business organisations and companies from other sectors. In this section there may appear to be some inbreeding, which requires opening up to other sectors to be able to enrich themselves with more disruptive ideas or projects that can bring differential value and singularity to companies for the sake of achieving greater notoriety and acceptance by their clients.

The intensity of use of these is also significant. Despite the fact that the analysed companies have an average of 8,547 followers, with a maximum of 42,000 and a minimum of 60, the use of social networks, where the companies connect daily and even several times per day, does not surpass half an hour every time they connect, or
10 hours per week, which indicates their limited, albeit significant, use by companies.

In terms of the reasons for using social networks, they are basically focused on the promotion of their brands and products and on the development of strategies for business positioning and communications, in addition to finding out about new products, as commented in the initial part regarding use, monitoring the competition and researching what is happening in the sector and in other relevant sectors. These are aspects that are similar to the uses for social networks by companies in the studies mentioned in the first part of this paper.

It is also worth pointing out that the management of information and of the contents of these social networks falls mainly on the companies themselves and to a lesser extent, they do so with the support of an external specialist company. In this case, the management of content by the company itself seems important regarding the rhythm of their publication and their way of presenting it.

Therefore, regarding the use of new information technologies for managing and improving client relationships, it is still in its initial phase, as shown in table 11. The main reasons that lead companies to use business management programs are precisely those of improving business management and control (management and control, followed by improving the agility of management, having a comprehensive view of the information and cost management). In turn, the necessary vision and knowledge of the client seem to not be among the basic reasons, appearing in

second place, which is a good indicator of companies' focus, as indicated at the beginning of this section.

Lastly, in relation to the use, by ceramic companies, of enterprise resource planning (ERP) systems, or customer relationship management programs (CRM) and those for human resources, or supply chain management programs (SCM), the great majority of companies that replied to the questionnaire (91%) stated that they used one, SAP being the most used program. Nevertheless, the level of fragmentation among the companies is very high, more standard programs or more generally used programs in other sectors, such as Sugar, Microsoft, SAGE or Sales Force, being combined with programs developed specifically for these companies. Perhaps, as is the case in product design and manufacture, the imitation effect or the strategy of following the most representative companies in the sector can partially explain this finding.

The results obtained are in accordance with those appearing in earlier studies and in other sectors, as has been reflected in the review of studies carried out at the beginning of this article, which must make us reflect on how new information technologies are being used in the ceramic sector. The self-management of the information, both in the use of social networks as well as the use of management tools, provides greater control by the companies, but can detract from aspects such as creativity, possibility of new uses or the obtainment of new results and the consequent generation of new knowledge, which could be obtained through interacting with specialised organisations or companies.

Regarding the limitations of this study, to be noted is the low response rate of the companies. It would be desirable in future to replicate this study with an increased sample size that would allow us to obtain information that is more representative of the business reality.

In terms of new lines of research, it is necessary to go deeper into the uses both of social networks and of programs for managing and improving knowledge of clients and the sector in general, including the new trends that are emerging.

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