Analysis of the big data generated in the company's social networks “Sistemas Expertos SAS” using NVivo

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Abstract. The fourth industrial revolution sparked by the advent of the Internet caused a wide variety of media to interact with the shareholders of a company. The interaction on Facebook, Instagram, Twitter, YouTube, websites, and others, generated a large quantity of data that overwhelms the ability of a small entrepreneur to analyze, process and make appropriate decisions regarding the behavior of its consumers. The objective of this research paper is to analyze the social networks of “Sistemas Expertos SAS”, a consulting company in project management through NVivo 12 software. For the construction of this case a bibliographic analysis of the literature and a quantitative and qualitative analysis of the social channels of the company under study were carried out, using the technology of “Servicio Nacional de Aprendizaje” information processing and analysis laboratory. With this analysis we want to provide valuable information to better satisfy customers, thus generating social inclusion for small business owners who do not have access to advanced tools to innovate and allowing an approximation to the reality experienced by the 87% represented by Colombian small and medium sized enterprises.

1. Introduction

Quantitative research has the potential to yield data on the frequency of a behavior, however, if it is intended to expand information on the origin of this behavior, qualitative research can be used, which contributes to the understanding of reality in the social world [1]. In this kind of research, the inductive approach predominates, understanding it as the way in which people interprets their environment, thus being the social reality a creation of individuals [2]. Therefore, it has been pointed out that this is immersed in subjectivity; so it is plausible to adopt a methodological route that provides greater reliability to the results [3]. This route requires the use of digital technologies; which provide technical support, such as the computer assisted qualitative data analysis software (CAQDAS)software, which facilitates the triangulation of huge qualitative data collected with statistical techniques, allowing the analysis to be reliable, endowed with greater scientific rigor [4]. Some computer-assisted programs such as CAQDAS, NVivo® (QSR International Pty Ltd), MAXQDA (Verbi GmbH), and ATLAS.ti® (Scientific Software Development GmbH) [5] facilitate the deep analysis of qualitative data making the investigative process more efficient. The NVivo 12 Plus tool was used, since it allowed analyzing unstructured data from interviews, audios, videos, images, and even with the Ncapture component of social networks, such as YouTube, Facebook and Twitter. This component is a browser extension that
allows information to be captured and imported into the program as a portable document format (PDF) [6,7].

Large amounts of information and data related to the continuous interaction among the market, personal, commercial or professional transactions is currently circulating in the social networks. Information is duly identified, analyzed and facilitates the decision-making of companies to know their reputational index, in this case in social networks [8].

The amount of data currently generated and stored by applications from various areas is constantly growing; not only from the point of view of objects and attributes, but also in the complexity of the attributes that describe each object. The scale of this data has exceeded the ability to process, properly store, analyze and understand. It is of great interest to organizations to be able to extract knowledge from the massive data, making the data a useful resource for decision-making [9]. The Big Data is essentially used as method and technique that allows companies to reveal and explain that no perceptible or hidden information is in the network. One of the advantages of the most advanced systems or data analysis tools is that they automatically show the identified content, which often appears hidden and is not noticeable to naked eyes. When valuable and concise information about the subject of interest is found, it is clear how important it is in decision-making and how it can increase positions in a market due to its knowledge [10].

The “Servicio Nacional de Aprendizaje (SENA)” is a Colombian entity responsible for providing comprehensive professional training to workers in all economic activities, promoting the economic development of the country [11].

Micro and small businesses can approach the SENA information processing and analysis laboratory that is attended by apprentices and their instructors and provides service for education and for different companies that do not have the technological tools such as NVivo or knowledge to do the analysis described below in the “Sistemas Expertos SAS” case.

Social networks have the potential to attract and maintain the attention of the demographic group prioritized by companies; providing benefits such as targeted advertising, improved brand reputation, credibility building, increased traffic and customer loyalty [12]. “Sistemas Expertos SAS” has all the characteristics mentioned above since they have active profiles on social networks such as Twitter, Facebook, LinkedIn, SlideShare, YouTube and Instagram.

1.1. Context of the company “Sistemas Expertos SAS”

“Sistemas Expertos SAS” was founded in the city of Medellin, Colombia in February 1987, evolving in the provision of computer services. This company currently generates employment for 20 people. Within its portfolio, the company offers analysis of organizational project management, definition and adoption of the project management office (PMO) model tailored to the client. It also offers Implementation of the project management information system (PMIS) solution based on Microsoft Project to achieve adequate management of: initiatives, project life cycle, capacity management, project portfolio optimization, collaboration/reports and knowledge management. “Sistemas Expertos SAS” offers training and support to the different roles involved in project management. Its services are aimed at companies and professionals from different sectors with whom it interacts in person and through social media, to achieve engagement and recommendation by its target audience. This research helps the company to understand how its target audience uses social media to direct the interaction according to such management and what impact “Sistemas Expertos SAS” can propose in each social media.

2. Materials and methods

Documentary analysis was carried out in scientific journals and books that allowed to extract essential information to carry out the research. The study population was the social channels of the company Sistemas Expertos SAS”. The measurement period started with the date of opening the “Sistemas Expertos SAS” in the social networks Facebook and Twitter, to obtain significant data. The NVivo 12 Plus software was used to extract the publications and comments from the aforementioned social channels. The NCapture add-on for NVivo was installed in the browser to download the required
information from social networks. The data set was exported to NVivo for further analysis in SENA information processing and analysis laboratory. The following steps were performed to classify the Macrodata.

2.1. Data cleaning
In the case of Facebook, the extracted data comes out with a large amount of metadata such as, name of the person or entity that makes the publication, actual text of publication, date and time of the publication, place of publication, number of likes and some additional information that had to be removed since they were not relevant for the analysis. Increased queries: A word frequency search was conducted to identify the most relevant keywords. A consultation with Facebook was made. It was executed within a group of exact matches, a minimum length of 3 and the maximum number of words analyzed by the software was 1000.

2.2. Coding
We proceeded with the coding of nodes; automatic coding was used. This system increases the speed and accuracy of the coding process, eliminates bottlenecks when the workload increases since the program is the one that assigns the code without primary intervention of the coding user [13]. It is recommended to organize the information imported from the social networks like Twitter [14,15].

2.3. Visualization
Finally, the software generates different visualizations of the analysis performed, whether in graphics, maps, cloud marks, sociograms, among others, and provides textual information automatically through a link generated in each visualization.

3. Results and discussion

3.1. Facebook social network analysis
NVivo 12 Plus analyzes the frequency of words, identifying the number of times they are repeated, such as those listed in Table 1. This data is useful for entrepreneurs so that they can identify the keywords being used in their web positioning strategy.

| Word                   | Length | Count |
|------------------------|--------|-------|
| “Sistemas Expertos”    | 16     | 556   |
| Projects               | 16     | 215   |
| PMI                    | 3      | 85    |
| Projects management    | 20     | 79    |
| Colombia               | 8      | 67    |
| Management             | 8      | 57    |
| Antioquia              | 9      | 50    |
| Microsoft              | 9      | 40    |
| YouTube                | 15     | 73    |
| Training               | 14     | 35    |
| PMO                    | 7      | 68    |
| Lessons                | 9      | 30    |

In the case under study, the non-relevant keywords are scanned and the remaining ones that report the greatest repetition are analyzed, such as the company's business name and the words projects, project and PMI, which are directly related to the services provided. By optimizing these keywords in the different pages of the site and in the social networks of the company, it drives increases in web traffic from search engines.
On the other hand, in Figure 1, is clear where you can see the most used words in social networks. The size of each one is proportional to the frequency of appearance, that means, they are the most talked about topics and where the clients showed more interest. The most repeated interactions are systems, experts, projects, management, among others.

Figure 1. Word cloud.

3.2. Twitter social network analysis
The software used in the SENA laboratory geolocates the origin of interactions in social networks, shown in Figure 2, which makes it possible to determine that the location of the users of Twitter. The profile generated by “Sistemas Expertos SAS”, shows a high concentration of users in Medellín, Bogotá and Villavicencio, with Medellin users reporting the highest interaction with the different publications.

Figure 2. Social network map twitter “Sistemas Expertos SAS”.  

From the map it can be deduced that, despite having provided services in 20 countries on different continents, as observed on the company's website, it is not clearly reflected in their social networks where the majority of the interaction with users take place. This represents the loss of a great opportunity to become visible and reach other areas by building engagement with them and requesting their recommendation on social networks. This data allows the user to make commercial decisions regarding the geographical area to be prioritized by the company. This allows the company to take advantage of the market detected in the analysis or generate commercial efforts to explore new opportunities in sites that report less interaction.

Software NVivo 12, in the SENA laboratory indicates the quarter in which there is a greater user interaction to the analyzed social network. For a case study, the quarter from July to September 2018
was used. It was the one with the greatest participation by Internet users, as shown in Figure 3. This allowed the company “Sistemas Expertos SAS” to analyze what kind of publications had been made in the period detected, so that the new material to be shared on the social network. This takes advantage of the reaction potential that it had. This is how “Sistemas Expertos SAS” was able to conclude the photographs of the business training events that were shared in its social networks and some webinars about lessons learned in the implementation of project offices, linked from the company’s YouTube channel, causing positive reactions from its followers, which encouraged the variations of shared and commented publications, being able to reach a broader audience and generate greater positioning.

Figure 3. Number of references. Timeline per quarter.

3.3. Contribution of the analysis to entrepreneurs

Small and medium-sized businesses have a limited marketing structure, to the extent that their economic infrastructure and personnel resources are restricted regarding with respect to the wide range of commercial opportunities presented. However, the entrepreneur must make investments in marketing, even if they are modest, in order to survive in the competitive environment, they operate in. In this context, it is necessary to have tools that allow the prioritization of their commercial efforts and the optimization of their resources.

In the analysis carried out of the social networks of “Sistemas Expertos SAS”, it was possible to show that the software yielded relevant data for the planning of marketing activities, since it allowed identification of the company’s customer segment and its characterization, which is a fundamental input for strategic marketing decisions.

It is difficult for the small business owner to define the goods and services to offer, as their clients are usually part of the local natural market, which provides a biased view of the new opportunities that are created in the environment. With the NVivo software, it is possible to identify the products demanded by the market, which can be analyzed for later inclusion in the company’s portfolio, being able to cover the unmet needs of the consumer, thus acquiring new customers and consolidating existing ones.

Another aspect to consider is that the small entrepreneur is called to design strategies that allow its sustainability over time, and this is only possible when there is a significant group of customers loyal to the company. This is where NVivo software, by throwing data on the frequency of user interaction on social networks and their comments, allows the characterization of that audience, so that business strategies can be developed consistent with their requirements.

The foregoing is intrinsically linked to the geographic location of these clients, which is necessary for the execution of the strategies. It is here that software used in the SENA laboratory provides the geolocation of users, allowing the small business owner the coherent application of its strategy. This allows the user to define logistics and transport aspects necessary to quantify its commercial purpose and to determine travel times.
4. Conclusions

Today users/customers leave a mark in social media showing likes, dislikes, hobbies and affinities in relation to a brand, product and/or service. This mark is in some cases difficult to track if you do not have a tool that facilitates it. SENA laboratory allowed the user to capture these statistics, confirming how valuable it is to have the information on time for the company’s future decisions.

The management of the information that the clients give is an asset that cannot be neglected, since through this the company can be directed in a way that benefits both the company and the consumer.

The ease in presenting the information, where patterns and trends can be evaluated, validate the need and importance of analyzing data that are relevant for decision making. The analysis of the information provided by Sistemas Expertos clients in the interactions in commercial networks profiles, what identifies that its market segment is concentrated in the cities of Medellin, Bogotá and Villavicencio. In addition, the topics of greatest interest to them are those related to projects management from the application of the PMI (Project Management Institute). Also, it can be concluded that photographs of training events are those associated with the greatest interaction.

The specific analysis makes the decision from the marketing approach, clearly defining the market segment interested in “Sistemas Expertos SAS” services.

The information shown is invaluable, since it facilitates strategic and market decisions in time to respond to its target audience and to take a step ahead of the competition.

This is how the SENA laboratory, due to its free services, becomes an ideal technological place for the small business owner to continue expanding in the market while improving the ability to respond to their customers and prospects in social networks, managing to refine the most relevant data for the definition of its commercial strategy.

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