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# Can we sense shift in consumer behaviour in Portuguese retail companies due to the pandemic?

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Master Degree in Information Systems Management

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TECNOLOGIAS
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Department of Information Science and Technology

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Be proud, because thanks to you, I'm here!

## Resumo

A pandemia do coronavírus 2019 (COVID-19) tem efeitos nos mais diversos campos da sociedade, desde a saúde mental e estilo de vida, ao comércio e educação. Foi necessária uma enorme adaptação da população e reestruturação de hábitos para conseguir avançar nesta nova realidade, levando várias empresas a reinventar a forma como conduziam os seus negócios e a uma completa metamorfose dos respetivos planos de negócio.

Como tal, surgiu o interesse em realizar esta investigação para compreender como o comportamento do consumidor nas empresas de retalho portuguesas foi afetado pelo confinamento no país, tendo como objetivo identificar a mudança na intenção de compra dos consumidores a viver em Portugal e o que motivou essa mesma mudança, permitindo extrair informações que permitam auxiliar na tomada de decisão das organizações.

Assim, recolheram-se 15,000 comentários da rede social Facebook referentes ao período pré-confinamento, confinamento e pós-confinamento em Portugal. Em seguida, foram utilizados técnicas e processos de mineração de dados para limpeza do conjunto de dados recolhidos e extração de conhecimento. Ainda, realizou-se uma análise de mineração de intenções para avaliar os comentários recolhidos e extrair conclusões.

Por fim, os resultados deste estudo indicam uma evolução negativa na intenção de compra dos consumidores, verificando-se que a relação com a empresa deteriorou-se e problemas ao nível da *supply chain* aumentaram, indicando ser necessário redirecionar as estratégias para melhorar o serviço de apoio ao cliente e os canais de distribuição para ir ao encontro da satisfação dos clientes, podendo ser aplicável a outros países em contextos semelhantes.



**Palavras-Chave:** Pandemia; Mineração de Intenções*;* Mineração de Dados; Comportamento do Consumidor.

## Abstract

The 2019 coronavirus pandemic (COVID-19) has effects in the most diverse fields of our society, from mental health and lifestyle to commerce and education. A huge adaptation by the population and restructuring of habits was necessary to make progress in this new reality, leading several companies to reinvent the way they conducted their businesses and a complete metamorphosis of their business plans.

As such, there was an interest in conducting this research to understand how consumer behaviour in Portuguese retail companies was affected by the lockdown in the country, aiming to identify the change in the purchase intention of consumers living in Portugal and what motivated this same change, allowing extracting information to help organizations in the decision making.

Thus, 15,000 comments were collected from the social network Facebook referring to the pre-lockdown, lockdown, and post-lockdown period in Portugal. Then, data mining techniques and processes were used to clean the set of collected data and extract knowledge. Furthermore, an Intention Mining analysis was carried out to assess the collected comments and draw conclusions.

Finally, the results of this study indicate a negative evolution in the purchase intention of consumers, verifying that the relationship with the company deteriorated and problems in the supply chain increased, indicating that it is necessary to redirect strategies to improve the service of customer support and distribution channels to meet customer satisfaction and may apply to other countries in similar contexts.

**Keywords:** Pandemic; Intention Mining; Data Mining; Consumer Behaviour.

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## List of abbreviations

COVID-19 – Coronavirus 19

WHO – World Health Organization

E-commerce – Electronic Commerce

USA – United States of America

NLP – Natural Language Processing

AI – Artificial Intelligence

CRISP-DM – Cross-Industry Standard Process of Data Mining

API – Application Programming Interface

# Chapter 1 – Introduction

## 1.1. Study Framework – Consumer Behaviour and COVID-19

The word pandemic has always been present in our society, but it has only now gained a stronger tone and solidified its presence in the vocabulary of all people around the globe when on March 11, 2020, the World Health Organization (WHO) declared COVID-19 to be a pandemic (World Health Organization, 2020). The impacts reached the economy on a global scale, motivating the rethinking of several businesses and even the rethinking of daily life, with this, we must learn to deal with pandemic outbreaks to prevent and educate society to minimize the impacts that are felt (Donthu & Gustafsson, 2020).

In fact, even before the announcement that COVID-19 was considered a pandemic, there was already mass hysteria across the globe and consumption accompanied this same hysteria (Lufkin, 2020). With this, it was more than evident that a pandemic can perfectly illustrate that a contagious disease, or even the potential for a contagious disease, can provoke an emotional response capable of interfering with the purchase intention of consumers and, thus, influence their choices and decision-making (Galoni et al., 2020).

The same authors denote that the consumer responds with feelings of fear and repulsion to a situation of potential infection and the consumer's behavioural tendency is to reject this risk and isolate themselves. Most countries have decreed the limit at the level of social aggregations, up to the level of labour, leading industries that need physical products, especially serial labour companies, to be forced to minimize operations or temporarily close (Seetharaman, 2020).

Therefore, these effects of the pandemic led to the closure of several stores of retail companies in Portugal allied with an unprecedented freeze in commerce in virtually all sectors of the industry, putting retail face to face with short-term challenges in terms of safety and health, supply chain, consumer demand, sales, marketing, etc., putting many well-known companies in the industry close to bankruptcy as consumers stay at home and economies are shutting down (Tucker, 2020).

Currently, it is very unpredictable to deduce its long-term effects, it is evident that the consumer tendency is to lose interest in investing/buying in order to save the capital they have and prefer to use social media more to obtain information about products, make purchases or communicate with other people, even over physical interaction (Nowland et al., 2018). When,

at the same time, there was an exponential growth of online channels and the need to change the modus operandi of many businesses.

With the effects of the pandemic making themselves felt in society, companies felt extremely relevant impacts for their business, there was a reduction in goods for manufacturing and difficulty with business strategies and their adaptability during a recession, negatively impacting organizations, customers, employees, and all stakeholders relevant to the business (Crick & Crick, 2020).

This, in line with what everyone found, the lockdown promoted a colossal increase in the use of the Internet and social networks (Donthu & Gustafsson, 2020) and the exponential growth of online consumption, visible in the increase in online transactions in countries such as the United Kingdom (from 15.8% to 23.3%), China (from 20.7% to 24.9%), United States of America (USA) (from 11% to 14%), Australia (from 6.3% to 9.4%), Singapore (from 5.9% to 11.7%) and Canada (from 3.6% to 6.2%) (United Nations, 2021).

Likewise, a study carried out by Ageas Portugal and Eurogroup Consulting Portugal (2020) revealed that in Portugal, the consumption habits of 45% of Portuguese people changed during the pandemic, where 31% say that these new practices should remain. This motivated Portuguese companies to adapt to meet the needs of consumers, followed by a reinforcement of the diversity of digital channels and services and customer care teams, with the expectation that these new trends are to be maintained (Jornal de Negócios, 2020).

With isolation, these same senses were influenced by social networks and opinions/assessments that were provided by other consumers, making it extremely important to be aware of the type of interactions that are carried out in "our garden" and carefully analyse the influences triggered in the purchase intention of consumers, whether they are customers or potential customers.

### 1.2. Motivation and Topic Relevance

At the social level, it was found that there was not the slightest preparation to be able to deal with a global pandemic outbreak like the one we are seeing, there are fewer barriers than ever, with consequences in the most diverse sectors of society and to be affected in many ways, for example, people are losing their jobs at a rate that has not been seen since the Great Depression of the 1930s (Donthu & Gustafsson, 2020).

With this, it was realized that markets are too dynamic and susceptible to external inputs, and one should always try to predict what strategy will be sought to be developed to accompany

this same dynamism and avoid surprises (Vargo & Lusch, 2011). It is, therefore, important in the Portuguese Retail sector to understand how consumer behaviour is affected and how it intertwines with their purchase intention or lack of it. With the increased preference for the online channel and the use of social media promoted by the pandemic, the ideal scenario for the development of this study was created.

Thus, there are studies that focus on the variables that affect the purchase intentions of customers (Sijabat et al., 2020), seeking to understand from where consumers get information to make their decisions (Maity et al., 2018), others seek to identify human emotions in social media comments (Chathumali & Thelijjagoda, 2020) or understand how large companies react to negative comments on social media (Dekay, 2012). Even more recently, studies were carried out to understand the impact of COVID-19 in the business environment (Carracedo et al., 2021) and to understand whether consumers will return to their past habits (Sheth, 2020).

Consequently, this study aims to fill the gap in understanding the change that the consumer's purchase intention suffered with the pandemic of COVID-19, especially with the impact of the Portuguese lockdown. As such, there is the objective to understand the impacts on consumer behaviour and what motivated the changes in their purchase intention using Data Mining tools to extract this knowledge.

In order to achieve this objective, it's necessary to gather information about the consumer behaviour before, during and after the lockdown. For such, Data collection was carried out on the social media of four retail companies in Portugal, with the focus of the analysis on consumers living in Portuguese territory, thus allowing the analysis of the period prior to the lockdown in Portugal (5,000 samples), the period of the first lockdown in Portugal (5,000 samples) and the period after that same lockdown (5,000 samples).

With this, perform an Intention Mining analysis of the data obtained and, using Python, extract knowledge from the data that allows understanding how the brand image was affected in the minds of consumers and the consequent intention to make a purchase.

Finally, through the development of this study, there is the objective of obtaining results that allow providing pertinente information on where organizations should pay attention when making decisions and adjusting strategies taking into account the fluctuations that consumer behaviour feels with the impacts of a pandemic.

# Chapter 2 – Literature review

## 2.1. The Online Consumer

Studying consumer behaviour is something that includes having contact with elements of economics and social sciences, in fact, its understanding involves understanding the consumer's mind and their cognitive and emotional motivations that promote their decision-making (Kotler, 1965). The crucial role that emotions play in the minds of consumers is increasingly recognized as such a crucial role that they are even considered the central pillar, for example, in creating a relationship, developing and maintaining it (Andersen & Kumar, 2006).

It is important to point out that the motivations of customer loyalty intention are dynamic, that is, they change and evolve over time, and it is important to be able to perceive this same mutation and origin (Johnson et al., 2006). For example, since children, people are exposed to beliefs and values that will shape future character and behaviour and, consequently, decision-making, as evidenced by a study carried out by SIS International Research at the request of Martin Lindstorm (2011) which revealed that in a sample of 2,035 children and adults, 53% of adults and 56% of teenagers consume products from brands that were present in their lives as children.

Kotler and Armstrong (2007) indicate that behaviour can be influenced through small groups that an individual wants or aspires to be part of, but does not yet, it is important to note that a consumer seeks to purchase certain products to express their social position, serving as a way of presenting themselves to other individuals, therefore, the product that a consumer wants to purchase often corresponds to the closest image that the consumer has of himself (Lendrevie et al., 2015). The personal characteristics of an individual will directly influence the consumer's personality, differentiating individuals in the way they will react to an equal situation, thus allowing them to know the consumer and anticipate their behaviour and needs (Lendrevie et al., 2015).

According to Abraham Maslow, the unmet need explains the behaviour of individuals, and this need will guide each individual in seeking to satisfy this need, which may be physiological, security, social, esteem, or personal fulfilment, with a hierarchical progressiveness of need here. That is, the individual advances to safety needs when he meets his physiological needs, and so on (Figure 1).


Figure 1 – Maslow's Pyramid (Bridgman et al., 2019)

Consumer Behaviour is something that can change due to the learning that an individual has throughout their life, that is, the continuous act of learning can change the consumer's mind through their experiences (Kotler & Armstrong, 2007). Thus, it is understood the need to seek knowledge of consumer behaviour in more detail to add as much value as possible, corresponding to current needs and anticipating future purchase intentions.

The Statista Research Department (2020) estimates that globally around 85% of consumers shopped online, even reaching values close to 90% in certain regions (Figure 2), revealing the impact of the Internet's global presence. Currently, consumers seek to acquire as much information as possible to encourage their decisions, and it will be this combination of information obtained through the most diverse forms of media that will be made a decision (Maity et al., 2018). With this, consumers will access information and online offers through any type of device they have at their disposal with internet connectivity, making online shopping extremely versatile and complex (Wagner et al., 2020).

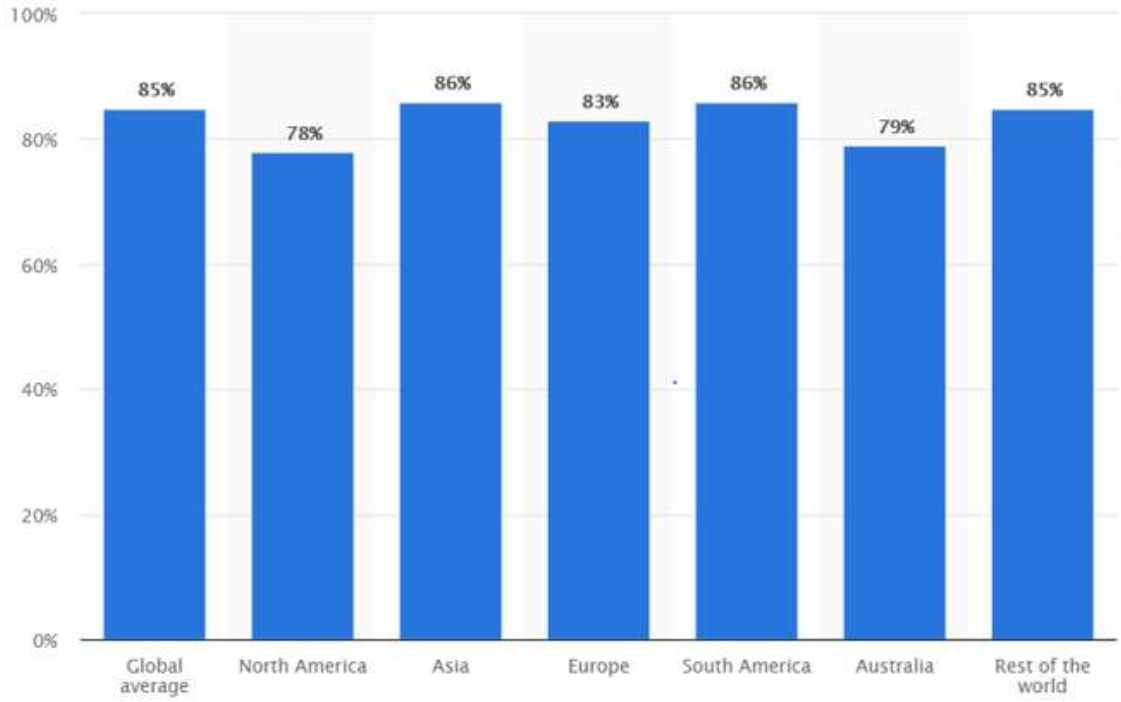


Figure 2 – Total Global Share of Consumers Who Shopped Online in 2020, by region.

Source: Statista (2020)

In fact, with the Internet playing a global reference role in the daily lives of consumers, the number of communication channels has increased exponentially, making it important not only to correctly select a mix of channels to interact with consumers but also strategies to generate content present in this mix (Maity, et al., 2018), allowing a correct framing with consumer behaviour.

Currently, consumers have revealed that online is ideal when there are alternatives to making a purchase, where satisfaction and loyalty with a brand positively affect the buying behaviour that revolves around the potential desire to increase their self-esteem and social inclusion (Darley et al, 2010). In addition, Darley et al. (2010) find that trust plays an extremely important role in online consumer behaviour and purchase intentions, where consumers appreciate the transparency of information, delivery guarantees, and ease of browsing and understanding the company's website that, allied to the company's reputation, it plays a very important role in this online consumer buying behaviour, Lendrevie et al. (2015) indicate that in the consumer's mind there is a process where sensations are selected, organized and interpreted, playing the crucial role of capturing the consumer's attention to the details of certain products and information acquired through advertising campaigns.

The great focus on the customer choice process, on the part of organizations, involves consumer involvement, boosting consumer satisfaction, loyalty, trust, and commitment. This is

intended to build a purchase intention and increase understanding of the entire social environment and, consequently, influence the consumer's purchase intention (Sijabat et al., 2020). This purchase intention will be directly associated with the interest in buying/purchasing something or the desire to have something, which, in turn, will be connected to the customer being impacted by the quality and information of the product that is communicated (Wibowo et al., 2020).

However, it makes no sense to address the issue of trust without addressing the issue of risk, building a relationship of loyalty, and, consequently, this perceived risk and trust becomes crucial for the rise of the trade in question (Guo et al., 2018). In fact, both sensations will considerably shape the consumer's behaviour and, consequently, their purchase intention. Here, trust online is the key to consolidating a relationship that will bring commercial benefits, and social media can play a crucial role in consistently guiding consumers in the decision-making process (Lăzăroiu et al., 2020).

Currently, it is estimated that in East Asia there are 1,07 billion active social media users, mostly in China, and approximately 330 million in North America (Figure 3). Still, it appears that observations on social networks work as a means of learning and these can affect consumers' decisions and their deductions (Lamberton et al., 2013). This same exposure, when associated with friends, leads consumers to have less self-control in their choices, resulting from the influence made, making the information and social characteristics of social media interesting, such as exposure to the opinions of other consumers, can influence and change the decision process and the purchase intention of consumers (Stephen, 2016).

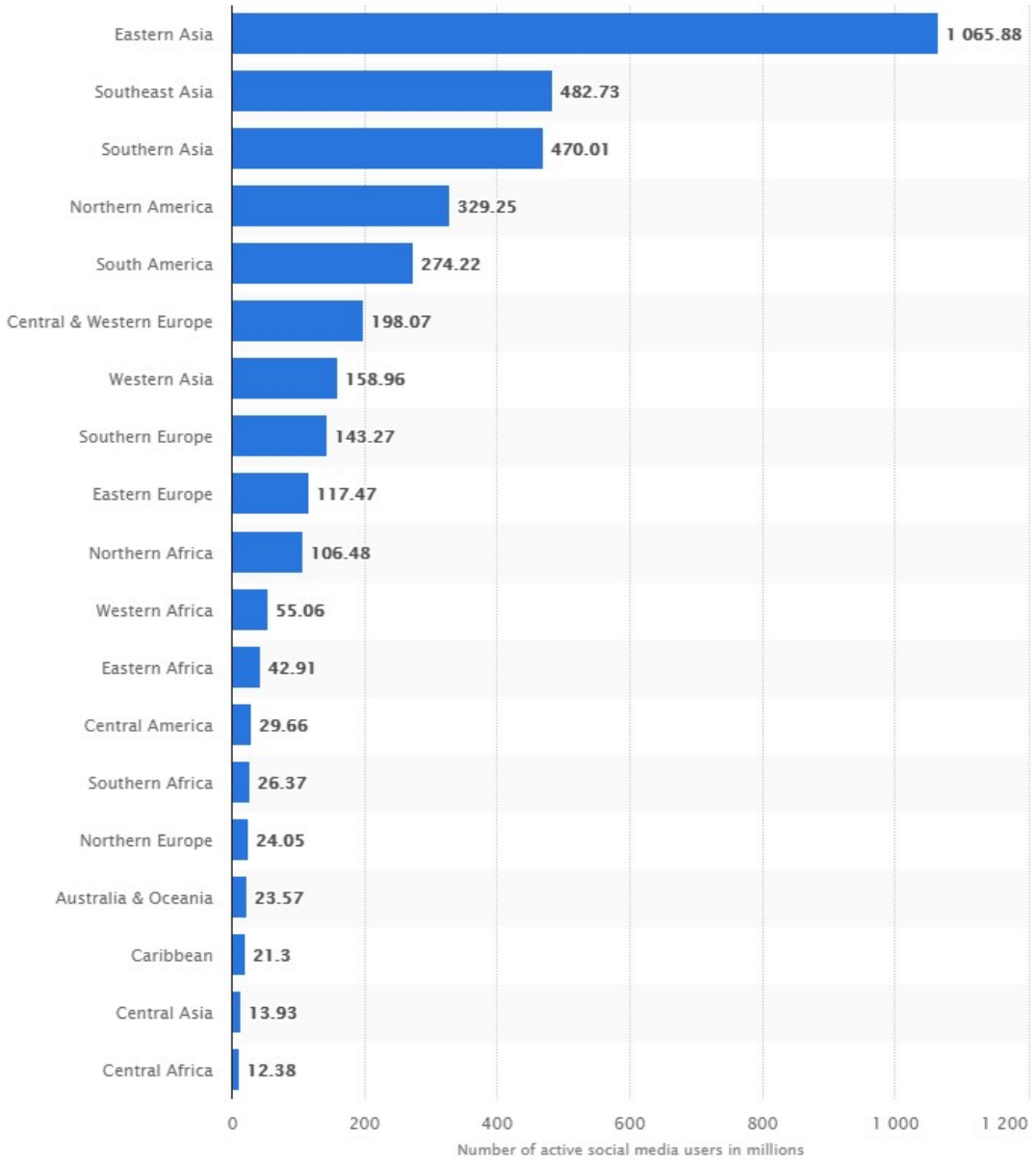


Figure 3 – Number of Social Network Users Worldwide in 2020, by region. Source: Statista (2020)

The power and relevance of the entire social media ecosystem were fortified due to values such as those represented above, however, its great prominence is due to its ability to connect, directly or indirectly, the online elements of the economy with its offline elements (Hanna et al., 2011). This is proven in the case of the Facebook platform, being extremely popular for product marketing, promoting brands, and managing relationships and communication with customers from the most diverse businesses (Chawla & Chodak, 2021).

Nowadays, consumers have had to change and adapt their behaviour to meet the new reality in society, with the increasing use of digital platforms and recourse to e-commerce to fulfil their purchase desires (Deloitte, 2020). The companies own communication followed

this change in consumer behaviour and directed their focus to purchases through digital channels or, in some cases, those that promote greater "omnichannelity" at the time of purchase (buying online and picking up in-store).

Thus, in order to be possible for consumers to respond to the stimuli they feel during the entire purchase moment, they seek a continuous acquisition of information to support their decision, promoting a constant and interactive presence on digital platforms and social networks linked to companies and its products (Jiaming et al., 2020).

### 2.2. E-commerce

We can characterize Retail as all activities of selling products or services directly to the final consumer, regardless of whether it is a producer, wholesaler, or retailer and regardless of whether the sale is in a physical store or online (Lendrevie et al., 2015). Retail has evolved significantly since its beginnings in the mid-nineteenth century when it emerged in small independent family businesses where customers requested the merchandise and negotiated the price with employees (Gauri et al., 2021), but it was in 1995 that retail actually revolutionized with Amazon selling the first book online (Gauri et al., 2021).

In fact, it was with this first step of the Internet in the Retail world that a new door was opened, emerging new business models and reinventing existing ones, making competition even greater and making technological evolution something crucial in the market and beneficial both for the seller as for the consumer (Grewal et al., 2017). Thus, Electronic Commerce (E-commerce) inevitably emerged as an evolutionary milestone in the retail experience, allowing the incorporation of online presence and digital channels for sales in a physical store or, even, the replacement of the entire physical store (Darley et al., 2010).

Consumers often look in physical stores and then buy online, consequently, the costs of ubiquity have increased immensely for the major retail players, allowing customers to access their product portfolio and respective prices from home, however, this allowed the emergence and presence of small independent-owned stores in virtually all types of sales of products and services (Gauri et al, 2021).

Currently, the future of retail is allied to technological evolution and the evolution of consumer behaviour, making omnichannel and the use of big data prerequisites to ensure market competitiveness (Grewal et al., 2017). The emergence of new forces will influence how consumers select their products and services and how they shop, with offline and online retail united more than ever due to the current COVID-19 pandemic. These forces will promote

innovations with the clear objective of assisting consumers in decision-making and increasing satisfaction and confidence in their decisions (Grewal et al., 2017), with retailers having the ultimate responsibility to promote these innovations and ensure that their business remains competitive, relevant, and attractive to consumers.

E-commerce transformed the prism of the business approach to the market, modified business models, and allowed the appearance of new models. The geographic barriers, that in the past limited several businesses confined to this same imposition, were overcome thanks to digital media. However, this "opening" of doors provided by digital forced retailers to increase their creativity and offer to be able to captivate the consumer and compete in the market (Lendrevie et al., 2015).

Currently, the retail market offers several types of channels where consumers can make their choices, leading to an increase in retailers integrating their sales channels in terms of delivery, enabling cross-channel delivery options (Weber & Maier, 2020). Thus, it will be the cost-benefit analysis that will determine which is the best and most useful choice for the consumer, which can generate several channel changes throughout the purchase process (search, purchase, and post-purchase) (Weber & Maier, 2020).

With the increasing exposure to the Internet, consumers tend to increase more E-commerce practices and online business owners gain autonomy to provide their products and services online (Nathan et al., 2019). Thus, a study carried out covering 19 countries and territories revealed that more than 95% of the 19.000 individuals involved in the study claim to have an online shopping experience, where more than half make purchases at least once a month (PwC, 2015).

Thus, online consumers have the advantage of obtaining potential benefits from their purchase, such as wider options, lower prices, and completely new products that were inaccessible before the existence of E-Commerce (Nathan et al., 2019). This demonstrates that consumers are currently impacted by constant information about goods and services, enabling retailers to connect with consumers by providing targeted information and seeking to offer value to stand out and gain the potential to create a deep engagement with their customers, thus meeting their needs that continue to guide their purchase decisions (Grewal et al., 2017).

As you can see, the Internet allows an organization to obtain the position that it considers most appropriate for its entire supply chain and its business. Over the years, several organizations with a presence for their online business have presented a set of unique proposals

that have allowed them to succeed in their business environment and seek to give consumers reasons to change their traditional purchasing behavior (Gauri et al., 2021). This is the case of Amazon, which currently allows its producers to display their products with multimedia content, making information about the products better for consumers to understand, or using augmented reality allowing consumers to perceive what a sofa would look like in their living room. be (Jiang & Zou, 2020).

Thus, changes in consumer environments will motivate companies to reconsider their marketing communication strategies at the level of social media, promoting an effort by the company to try to become more involved and seek to achieve its goals created based on the consumers (Yoon et. al., 2018).

Nowadays, technological innovation leads entrepreneurs and companies to easier communication with consumers, making this communication attainable through a data-driven culture focused on the development of new products and ideas (Cirlugea et al., 2020). That said, social media have a prominent role as they represent a huge source of data information relating to the interaction of consumers with the company (Dekay, 2012).

Social Media platforms are constantly seeking to update their algorithms in order to be able to present more and more relevant content to their users (Chawla & Chodak, 2021), thus becoming a vital channel for companies to reach their customers, increasing their relevance in the area of e-commerce, especially for the B2C relationship (Cirlugea et al., 2020). In fact, Facebook's marketing statistics show that there are more than 60 million pages alluding to active businesses on the platform and more than 2 billion users being reached through them, demonstrating the strength of the platform as a place for companies and their marketing campaigns (Chathumali & Thelijjagoda, 2020).

Currently, 79% of companies in the Fortune 100 use some form of social media to communicate with customers and other stakeholders, however, this same exposure to social media carries the risk of emerging comments focusing on criticism of companies or their products/services, being strongly recommended by marketing experts that these same negative comments be treated as opportunities to solve potential problems (Dekay, 2012). These types of comments are the mirror of what, currently, most social media users are extremely comfortable sharing their emotions on these same platforms (Chathumali & Thelijjagoda, 2020).

Thus, it is clear that companies must constantly monitor what customers are thinking about their products, allowing them to obtain consumer feedback and use that same feedback to make decisions and obtain more value for the company (Wibowo et al., 2020). This is in line with the advice from social media and public relations specialists to analyse the comments of users of Facebook pages with the utmost attention and care, although some comments can be classified as negative, they can represent a wide range of meanings, such as direct criticism of the product or the political or social positioning of a company (Dekay, 2012).

Currently, consumers have gone beyond the traditional concepts of passive recipients of information and started to actively engage with online companies, in turn, companies also spend more resources in efforts to operate on these platforms, defending the pages on social platforms media to improve marketing and/or financial outcomes (Yoon et. al., 2018).

Thus, it is understood that E-commerce fully enables the internationalization of companies that were previously limited to certain geographic barriers and, with this, allow their offer to reach and be known in the most diverse global markets and also obtain inputs about products and services, allowing feedback from diverse consumers and transforming that same feedback into competitive development for the company.

### 2.3. Impact Of The COVID-19 Pandemic On The Consumer And Business

Currently, the scientific community explores and investigates the prevention and cure processes for an immediate future and research for long-term recovery, as such, the economic and business community must do the same to combat the impact of the crisis of Covid-19 (Seetharaman, 2020; Carracedo et al., 2021). Stores, factories, and various types of businesses were forced to close the activity due to government imposition, drop in demand, or health concerns, and these temporary closures may become permanent due to the lack of capacity of the owners to cover current expenses severe impact on the global economy (Fairlie, 2020).

Evidently, retail was one of the industry sectors most affected by the pandemic, with many stores closing due to government-imposed measures and consumption of certain goods drastically decreasing (Burgos & Ivanov, 2021). In fact, the first economic impacts were in terms of supply and demand which, due to the generalized closure of companies to control the effects of the pandemic, suffered a drop in supply, while the reduction in consumption and investment led to a fall in search (Seetharaman, 2020).

A study carried out by Fairlie (2020) found that the number of active business owners in the USA dropped from 15 million to 11,7 million due to the 2-month window of February and

April 2020. Furthermore, there was a decline in activity between February and June 2020 at 8%, predicting a continued downturn in business activity, although companies are not expected to close again. Finally, he points out that business activity had a big drop in April, May, and June, representing falls in revenue that were too sharp to be recovered.

Thus, organizations were forced to seek to adopt new guidelines to be able to adapt to the new reality to try not only to tell the virus but also to be able to combat the economic consequences of the measures imposed with repercussions on production and employment, accompanying the accentuated impact on all branches of activity due to the drop in consumption (Carracedo et al., 2021).

It is understood that this pandemic has motivated several businesses to look for new strategic paths, requiring companies to innovate in favour of the challenges and offering new opportunities to achieve new business models that are favourable to today (Seetharaman, 2020). Thus, the survival of companies will depend on their ability to adapt to the markets shaped by the pandemic, having to reinvent themselves quickly to be able to be competitive in the unpredictable market, causing uncertainty in businesses where making the right decisions is fundamental for the competitiveness of companies (Carracedo et al., 2021).

The accelerated shift towards the digitization of processes in organizations was evident, representing the opportunity that was generated by the pandemic, for example, a business model focused on digital can easily be used by companies that aim to expand their markets, for this, companies must be agile and seek to develop capabilities that allow them to be competitive in this environment (Seetharaman, 2020).

The COVID-19 pandemic motivated mandatory social distancing and interfered with both purchasing and consumption habits, leading consumers to learn and improvise new habits (Sheth, 2020). People are more dependent than ever on their devices to be able to connect with others and to work remotely, without communication technology and electronics many people would not be able to work during the virus outbreak, increasing the consumption of electronic goods and overloading the supply chain in terms of supply and production (Coughlin, 2021). With this lockdown, consumers have adapted and tended to adopt newer technologies to facilitate work, study, or merely to socialize, motivating these same existing pre-lockdown habits, thus increasing the use of social media (Sheth, 2020)

Consumers changed their buying behaviour and increased consumption from home, putting immense pressure on companies' Supply Chain, creating immediate challenges. A study carried

out by Burgos and Ivanov (2021) found that the pandemic changed the quantities of demand, promoting changes in demand patterns and market composition, generating a reduction in production due to the closing or limiting of producers' production, generating scarcity. Furthermore, there were delays in transport and logistics caused by the immense consumption from home, leading to the adoption of new distribution channels. Finally, there was a significant increase in delivery times and in the number of orders that were impossible to satisfy. With this, it appears that supply chain, logistics, and storage operations represent extremely important functions in the development of the associations' business (Sheth, 2020).

This crisis brought about major changes in consumer consumption habits, with people avoiding physical contact as much as possible, motivating a transformation of business models in order to be able to assume this new reality. There is, therefore, a great need to try to adapt to new consumer habits, where e-commerce has gained great ground with a tendency to maintain itself (Carracedo et al., 2021).

Thus, organizations were required to look for digital substitutes or new ways to deliver their products and services, allowing companies to redesign their existing products, create new products, rethink their delivery channels, and seek to reach new strategic positions and partners for the new goals (Seetharaman, 2020). This is the case of the retail sector, converging its physical stores with its online purchases and maximizing the omnichannel promise, seeking to make its infrastructure, systems, and processes more resilient in the global process (Sheth, 2020).

It is evident, then, that the survival of organizations will depend on their ability to face this pandemic as a turning point, with a detailed analysis of the market and constant innovation within the company, bearing in mind that it is unprecedented globally and that requires additional analysis and efforts in all sectors of the economy (Carracedo et al., 2021).

Although everything is expected to return to pre-lockdown normality, it is inevitable that some habits of these habits never return, as the consumer in a blocked condition has discovered a more convenient, accessible, and comfortable alternative, having created significant changes in consumer behavior (Sheth, 2020).

It then becomes evident that the analysis of post-lockdown recovery during the COVID-19 outbreak is extremely relevant for organizations seeking to respond to the forced closure imposed on them and thus create resistance and new opportunities for the growth of their

business (Burgos & Ivanov, 2021). While the effects of COVID-19 (eventually) dissipate from the economy, opportunities for companies to adapt remain solid.

### 2.4. Data Mining & Data Analysis of Online Consuming

Data Mining will correspond to the process of analysing a huge amount of data from different perspectives, applying intelligent methods to find relevant patterns and obtain relevant information, being an interdiscipline that involves Database Systems, Data Warehouse, Statistic, Machine Learning, and Computing (Han et al., 2012). The Data Mining process will incorporate automated data extraction, processing, and modelling through various methods and techniques, depending on the situation. Classification or a Regression (Plotnikova et al., 2020).

Therefore, Classification algorithms will predict one or more discrete variables, based on other dataset attributes, while Regression algorithms will predict one or more continuous variables, based on other dataset attributes (Domingos, 2012). Still, it is pertinent to mention that the methods that are used in Data Mining can be considered supervised or unsupervised learning (Mosayebi et al., 2020).

In fact, Data Mining has become a concept closely associated with the ability to obtain quality information through raw data and, thus, acquire relevant characteristics to assist in correct decision-making. As such, a Data Mining methodology will specify tasks, outputs, inputs, and guidelines, and instructions on how certain tasks should be performed, thus providing a set of guidelines for performing a set of tasks to achieve the project's objectives. Data Mining in question (Plotnikova et al., 2020).

These factors ended up changing the way the data was analysed and the Data Mining process, involving multiple steps (Figure 4) and which integrates machine learning techniques, statistical analysis, and visualization, combined with intuition and knowledge of data analysis, it becomes possible to discover interesting and important patterns in the data that will aid decision-making (Bose & Mahapatra, 2001).

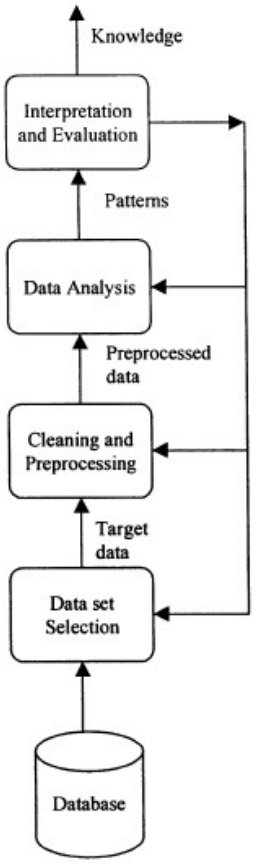


Figure 4 – Overview of the Data Mining Process (Bose & Mahapatra, 2001)

With this, it is understood that the existing steps of data processing, design of standards, and knowledge reach do not have a unidirectional flow, there is flexibility in the nature of the process (Witten & Frank, 2005).

The current growth of the digital world provides immense information and access to that same big data that, sometimes, is used in a way where the present meaning is not understood and, with a complete understanding of big data combined with a good vision and strategy to analyse with this data, companies will be able to create value and better marketing experience on social media platforms (Wibowo et al., 2020).

This data analysis becomes very important for companies because, nowadays, consumers are saturated with information and approaches to products or services, maybe they are not interested in spending money when purchasing a certain product, making it easily possible for a business is ignored if it does not remain competitive (Cirlugea et al., 2020).

A study carried out by Dekay (2012) where the pages of ten major companies in the banking, retail, software and services, and household & personal products sectors in the USA were analysed, revealed that the councils in analysing the comments of their communities they

were largely ignored by companies with Facebook pages, which they did not see as an opportunity to improve customer service and satisfaction. Furthermore, it was necessary to conduct additional research to understand whether negative comments contribute to a sense of community and that these same negative comments highlight the diversity of opinions which, in turn, stimulates discussions and promotes a greater volume of users on the page.

Another study carried out by Yoon et. al. (2018) revealed that the increase in the number of comments is linked to the increase in the company's revenues and that the analysis of these comments revealed that the more positive a comment is, the better for the company. Still, it revealed that the use of specific language will impact the financial results of companies, as consumers can talk about the same idea in a different way.

As already mentioned throughout this study, Facebook is the platform most used by companies to promote a product, as it can reach the target market effectively and efficiently, with the objective of transmitting information or reminding about the uses and benefits of certain products. Revealing that consumers who adhere to this platform become more engaged with companies and their brands or products and, as a result, present a positive change in awareness of the company, reinforcing their loyalty and consumption of products or services (Wibowo et al., 2020; Yoon et al., 2018).

However, most of the most successful marketing campaigns are driven by human emotions, seeking (this type of campaign) to touch the hearts of consumers and try to create a lasting connection with them, being important in the decision process of the consumer's mind (Chathumali & Thelijjagoda, 2020).

Here, it is important to analyse the comments referring to a campaign in order to understand its true impact and serve as a guide for future campaigns. To understand the meaning of these comments, Natural Language Processing (NLP) techniques should be used, which will search for the meaning of the words that were published in Facebook comments, performing a semantic analysis based on meaning and context (Chathumali & Thelijjagoda, 2020). The main task of NLP is understanding the natural human utterances in terms of speech or text, taking that as inputs and providing a proper output as a response, still, it would be impossible not to reference the text mining and text analytics techniques that are used practically hand in hand with the NPL processing task or applications (Masood Khan & Rahat Afreen, 2021).

## 2.5.Intention Mining

The definition of "intention" according to the Cambridge Dictionary is the "desire, purpose, will, ambition", reflecting the determination to act in a certain way or manner, yet, from a psychological point of view the intention is seen with our psychological scheme admits the intentions as a state of mind, allowing to characterize the actions as done intentionally or with a previously planned intention (Bratman, 1987). Initially, the concept of Intention Mining was considered when proposing a taxonomy of intentions used to classify intentions in developer email conversations, dividing into six specific categories, feature request, opinion asking, problem discovery, solution proposal, information seeking, and information giving (Di Sorbo et al., 2016).

Thus, Di Sorbo et al. (2016) highlighted the difficulty and challenge of using the information available in communications due to the heterogeneity and noise existing in these same data, but by understanding these intentions in communications, it becomes possible to add valuable information and, thus, perform various pertinent maintenance and evolutions of specific tasks. This same perceived difficulty is something that inevitably applies in all media in which Intention Mining can affect, a sentence may contain a mix of intentions that will compose this same challenge (Huang et al., 2018).

However, this taxonomy of linguistic intentions and patterns transcended the analysis of emails and became useful in analysing feedback from application users, understanding, here, the potential of the results that Intention Mining provided, allowing for classifying sentences to allow for more in-depth analysis (Huang et al., 2018). Thus, these generated intention models are important to represent the way of thinking and acting of individuals (for example, users of social networks), as they capture the human reasoning behind their activities (Khodabandelou et al., 2013). These results provided by Intention Mining acquire important applications in terms of marketing and business intelligence, however, an effective social media analysis also acquires important contours in the medical domain, artificial intelligence (AI), or stock-market, strengthening the use of these data (social media) for practical applications in real-world problems (Ahmad et al., 2020).

Social media enables all its users to share information, express opinions, and participate in debates on a global scale with huge amounts of text being generated, containing the emotions, opinions, and intentions of its users. Thus, using Intention Mining it becomes possible to proactively analyse, with a computational approach, these same data (Purohit & Pandey, 2019),

playing a fundamental role in understanding the needs, desires, and wishes of users/customers of companies, through their reviews, posts, and comments (Habib et al., 2018).

In fact, in recent times it has been possible to verify immense and diverse social movements on social networks that seek to address issues such as justice, inequalities, harassment, and stereotypes in the workplace, etc., which have also become platforms for exchanging information about situations of need and needs, and even promoting social groups to help rebuild communities and volunteer initiatives. However, social networks often have negative motivations that amplify negative feelings such as harassment, bullying, and the proliferation of false notifications with the intuition of manipulating public opinions ("phenomenon" of fake news).

As mentioned earlier, psychology defines intention as being a mental state that will reveal the desires, wishes, and plans for the future that an individual has. Thus Intention Mining will deal with the identification and analysis of the underlying intentions of the content that the user will create (comments, etc.), something that has attracted a lot of attention from organizations for the analysis of their customers' intentions, with a focus on improving the quality of their products or services and ensuring that they remain competitive in their business market (Habib et al., 2018). This is in line with the reality in which society and business focus, as online communities often express their intentions in relation to products, companies, brands, etc., on the various social platforms (Habib et al., 2018).

The collection of users' intentions will help in interpreting and predicting actions and potential consequences that may result from such segments, this is something that has already been investigated at the level of AI, where the intention recognition problem was studied to understand the behaviour of agents in the context of the recognition of goals and plan (Purohit & Pandey, 2019).

These data from the activity of social media users present high volume, variety, and speed (in terms of being generated) make computational Intention Mining approaches essential to provide a pertinent direction (Purohit & Pandey, 2019), as users can express desires and beliefs with some intentionality through the content of their messages or comments, where the intention can be expressed either explicitly or implicitly in the published content (Figure 5).

| Social Media Message | Intent [Implication] |
|---|---|
| M1. *I want to send some clothes for hurricane relief #sandy* | Offering Help [community rebuilding and trust for collective action] |
| M2. *I support what u said about shooting here in Florida, Ill stand with u at any time. I am a retired teacher* | Emotional Supporting [community healing for psychological support] |
| M3. *You can find the @user student Developer Pack here: URL* | Expertise Sharing [improving learning from experiences of peers and mentors] |
| M4. *it's better to start 3rd-world war instead of letting Russia & assad commit #HolocaustAleppo* | Propagandizing [group-specific beliefs leading to echo chambers] |
| M5. *hi @user, we sincerely apologize for your inconvenience, in order to regain access to your account, please visit: URL* | Deceiving [financial frauds and stealth of personal information] |
| M6. *One of the suspects (according to BPD) is Sunil Tripathi. The missing Brown student NEWS reported on in March URL* | Rumoring [creating uncertainty in situational awareness for poor decision support] |
| M7. *youre a despicable whore* | Harassing [affecting mental health and physical well-being] |
| M8. *We are a people whose true lives begin after their death. #hijrah #jihad #shahadah* | Manipulating [shifting public attitude towards radicalized outfits] |
| M9. *DONT EVEN ASK EM WHO DEY WIT JUS BLOW EM FACES* | Bullying [threatening and creating fear and insecurity in the society] |
| M10. *theres a new drink called Sandy, it is a watered down Manhatten* | Joking [creating junk for some sections of the community] |
| M11. *No luck needed to #SAVE up to 60% off! Visit URL details of #vacation package* | Marketing [spamming in the information ecosystem] |
| M12. *white women have lied about rape against black men for generations* | Accusing [giving an alternative, supporting narrative to stereotypical groups] |
| M13. *Theres no New Clinton, never has been. Shes same rape defending, racist, homophobic liar shes been for 70 yrs* | Sensationalizing [diverting from key issues and politicizing environment] |

Figure 5 – Messages without explicit intent (Purohit & Pandey, 2019

# Chapter 3 – Research Methodology

## 3.1.CRISP-DM

To answer to some gaps and needs in Data Mining, an industry-driven methodology called Cross-Industry Standard Process for Data Mining (CRISP-DM) emerged in the year 2000, as an alternative to its predecessor Knowledge Discovery in Databases, also known as KDD (Mariscal et al., 2010). This model describes the tasks to be developed in a Data Mining project, corresponding to six tasks (Figure 6) called Business Understanding, Data Understanding, Data Preparation, Evaluation and Deployment (Chapman et al., 2000), becoming the number one used model in the scientific communities and by the industry (Mariscal et al., 2010) and the model to that will be used in this study.

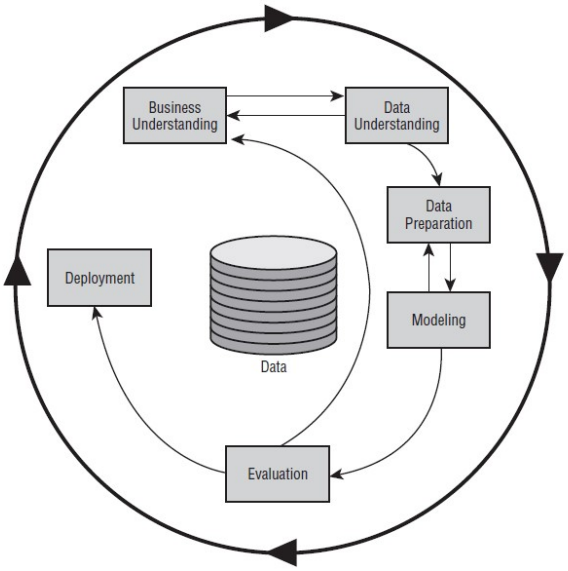


Figure 6 – CRISP-DM Phases (Chapman et al, 2000)

The first phase corresponding to Business Understanding meets the understanding of the project's objectives and requirements with the business on the horizon, converting the knowledge into definitions of Data Mining problems and, also, a relatively premature plan is elaborated to reach the previously outlined objectives (Chapman et al., 2000).

The second phase will be Data Understanding, corresponding to the initial collection of data and their understanding, seeking to identify existing problems with data quality (for example, the existence of Missing Values) and, through their understanding, obtain the first insights into the data (Plotnikova et al., 2020).

Then, the Data Preparation phase focuses on the final construction of the dataset based on the raw data that initially existed. At this stage, the tasks will most likely be repeated without any mandatory order. These include creating tables, selecting and registering attributes, transforming and cleaning data to feed the Modelling tools (Mariscal et al., 2010).

In the next phase, Modelling, several modelling techniques will be selected and applied, as a rule for the same Data Mining problem, followed by a calibration of the parameters, and many techniques have specific requirements, it becomes common to return to Data Preparation (Plotnikova et al., 2020).

The fourth phase, called Evaluation, corresponds to the phase quality from the perspective of data analysis. It's important to thoroughly assess and review all the steps of the model before its final deployment, keeping in mind the achievement of the proposed objectives and, thus, determining the use of the results (Mariscal et al., 2010).

Finally, the Deployment phase will be where the previously created models will be implemented so that the data can be used as a basis for the decision-making or business support, it's always necessary to organize the knowledge obtained and present it with utility (Plotnikova et al., 2020; Mariscal et al., 2010).

Thus, it's verified the flexible nature of the CRISP-DM methodology and the most important dependencies, where it's necessary to go back to previous phases to obtain the desired final model and with the result of a phase to determine the next phase to be carried out. This reveals that the path in Data Mining is not linear and that it's completely dependent on the data and knowledge you want to extract.

### 3.2.Business Understanding, Data Collection and Data Understanding

The problem of companies' lack of knowledge and preparation for a pandemic and its impacts and changes, and also the importance of studying and understanding consumer behaviour for the promotion and success of business strategies, were, in fact, the major promoters of this study.

With this, understanding the increase in the use of social networks combined with the exponent growth of interest in e-commerce by consumers, it was found that this is a little explored source of data analysis that can provide extremely positive insights to aid in making decisions.

Thus, it was proceeded an extraction of comments/interactions from consumers in publications of four retail companies in Portugal on the Facebook platform, which is considered the most popular platform globally in 2021 (Figure 7). With data samples from the period before the first Portuguese lockdown on March 19, 2020, the lockdown period (March 19 – May 1), and the post-lockdown period, is intended to explore the purchase intention of consumers living in Portugal and realize what is the impact of a pandemic scenario on your mind.

The four selected Portuguese retail companies operate throughout the national territory (including the islands) with stores in almost all parts of the country and ensuring deliveries throughout the territory, focusing their business on electronic products and entertainment (two of the selected ones) and DIY and furniture (the remaining two selected). These companies contain the largest communities of users on social networks and with more interactions in shared content, being another motivating factor for their selections as it allows for better data collection.

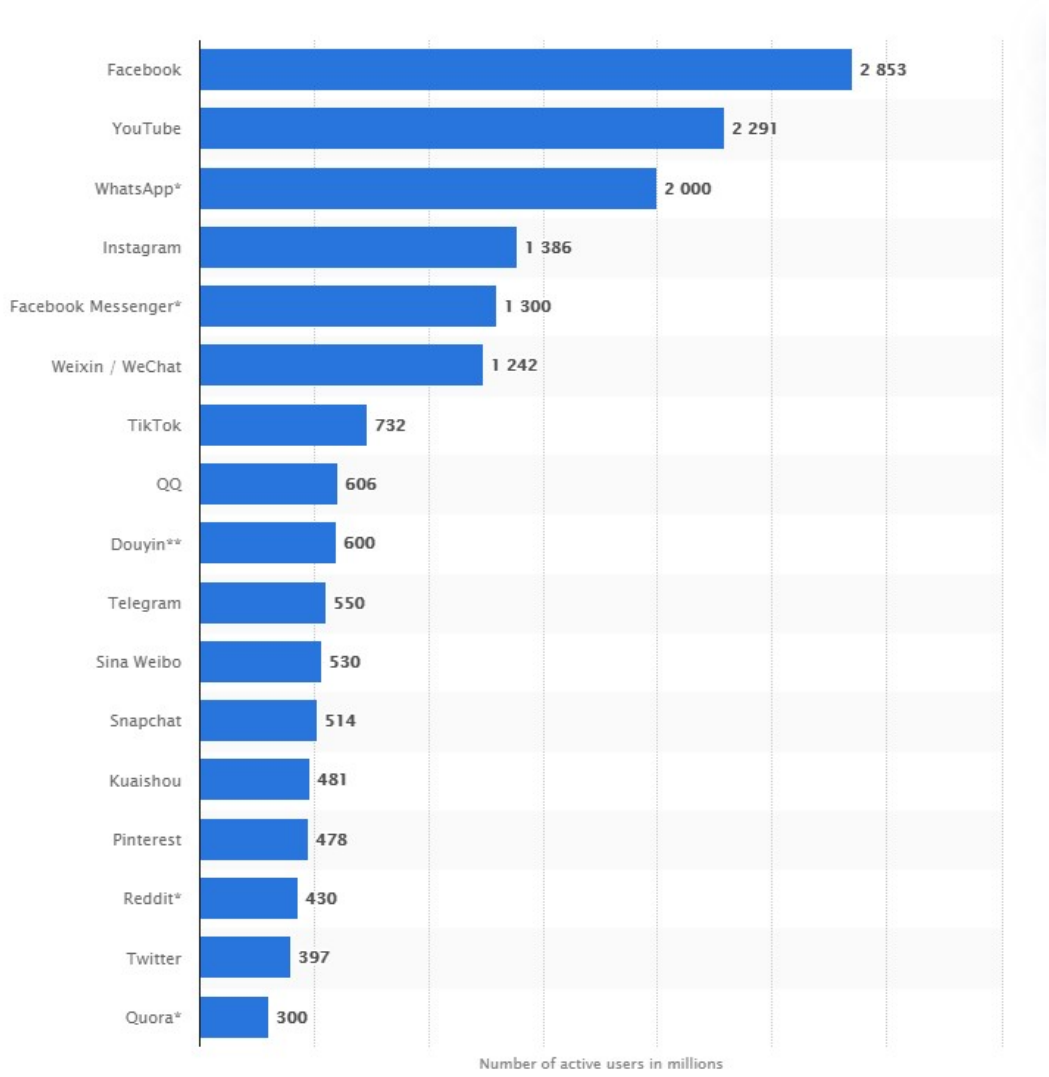


Figure 7 – Most Popular Social Network Worldwide as of July 2021, ranked by number of active users. Source: Statista (2021)

This collection was carried out using a web scraping tool called Octoparse (using version 8). This tool allows the extraction of public data from the web on a large scale, meeting the need for data collection for this study. It was then necessary to program the tool to be able to automatically start on the Facebook platform, enter the login data and collect the interactions in a loop, along with the publications of the pages represented by the companies under study (Figure 8), having been a similar workflow is performed for each of the pages.

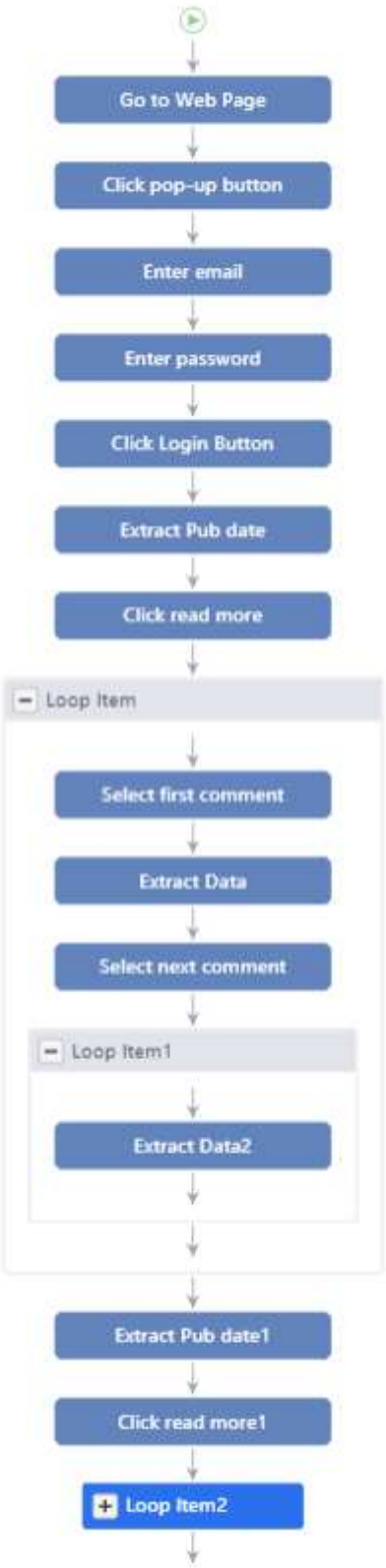


Figure 8 – Workflow sample from Octoparse 8 to extract comments from Facebook

The workflow represented in the figure above is the initial part of the workflow, it was extended until all the comments intended for analysis were obtained, being successively replicated, as can be seen in the figure.

Once the data collection phase was completed, 4 datasets were obtained from the 4 companies, respectively, with dates comprised between July 2019 and June 2021, resulting in a total of 15,000 comments collected. Inclusively, comments in Spanish, English, and Italian were considered (languages presented in the comments in addition to Portuguese) since they are consumers in Portuguese territory.

The datasets were then cleaned to eliminate irrelevant data collected for the study, such as comments with the "blank" word (comments with emojis or unrecognizable characters for the tool) and with "(GIF)" or "(IMG)" word (when comments were made with GIFS or when comments were made with images) and comments from people from other countries commenting the page by mistake (for example, consumers from Brazil or Spain), ending with a convergence of the 4 datasets in 1 single, containing 9.239 comments after this pre-processing. Finally, a header and data organization in each column was created for better understanding, filtering, and analysis of the dataset. (Table 1).

Table 1 – Final Dataset Sample

| Store | User_Name | Comment | Date | Historic Day |
|---|---|---|---|---|
| W | Pc Couto | Claro que sim. Fe | 04/06/2021 | 4 |
| W | Zéza Lemos | Bom dia para voc | 03/06/2021 | 5 |
| W | Teresa Martins | Pedalar só no gir | 03/06/2021 | 5 |
| W | Maria Santos | Não sei, andar ni | 04/06/2021 | 4 |
| W | Sílvia Afonso | Verdade | 04/06/2021 | 4 |
| W | Isabel Rodrigues | Cá por casa sim. | 04/06/2021 | 4 |
| W | Tina Miguel | Mesmo! | 03/06/2021 | 5 |
| W | Roberto Carlos | Yes | 04/06/2021 | 4 |
| W | Maria Joao Marti | Sim 4 a pedalar | 03/06/2021 | 5 |
| W | Fernando Paula M | Sim bateria | 04/06/2021 | 4 |
| W | Fernando Marque | Sim | 03/06/2021 | 5 |
| W | Maria Arminda Ci | Sim | 03/06/2021 | 5 |
| W | Jose Alberto Lour | Pôde ser bastaria | 03/06/2021 | 5 |
| W | José Santos | Pode ser uma hib | 03/06/2021 | 5 |
| W | José Costa | Ktm e bh e uma p | 04/06/2021 | 4 |
| W | Henrique Barnabi | Rodinhas... | 03/06/2021 | 5 |
| W | Rafael Parreira | Gosto dessa bici | 04/06/2021 | 4 |
| W | José Costa | Sim | 04/06/2021 | 4 |
| W | Paulo Jorge Peres | Sim | 03/06/2021 | 5 |
| W | Hélder A. S. Perei | Claro que sim , h | 03/06/2021 | 5 |
| W | Bruno Duque | Aqui pedala-se n | 04/06/2021 | 4 |
| W | Lauro Pais | Deve ser baratin | 03/06/2021 | 5 |
| W | João Carlos Ribei | Boas quanto fica | 27/05/2021 | 12 |
| W | Derekii Michael A | O As21 quanto fi | 27/05/2021 | 12 |
| W | Joel Jesus Santos | Anúncio top | 02/06/2021 | 6 |
| W | Rui Victor Pinto | ESTÁ PUBLICIDAI | 03/06/2021 | 5 |
| W | Mariana Viana | A Mariana adoro | 27/05/2021 | 12 |
| W | Sara Cunha Costa | Tens de ver Tom | 27/05/2021 | 12 |
| W | David Nóbrega Sa | Muito bom | 27/05/2021 | 12 |
| W | TZKaka | Halo adorei | 21/05/2021 | 18 |
| W | Cató Gomes | Queria era a con | 21/05/2021 | 18 |
| W | Pedro Neves | Bom artigo, sim s | 21/05/2021 | 18 |
| W | Nelson Silva | Anda... Tanto te | 21/05/2021 | 18 |
| W | Carla Bernardo | Qual o preço ? | 10/05/2021 | 29 |

In this dataset, the company associated with the page where the comment was collected for identification was added as the first column. The next column refers to the username who created the comment, followed by the date associated with the comment. This date refers to the date of the publication containing the comment and not the date of the comment itself, as the platform rounded the date of the comments after month n-1 and, to obtain an analysis feature with greater consistency, we chose to select the date of publication.

Also, regarding this feature, June 8, 2021, was used as "reference date" and the day referring to the publication was subtracted, for example, June 7, 2021, appears as "posted 1 day ago", or, on September 3, 2020, it appears as “posted 278 days ago”, thus creating a formula oriented towards this same feature.

(1)

$$K - Z = M$$

Where K corresponds to the reference date, Z corresponds to the historical day of the post and M corresponds to the date on which the publication was carried out.

Finally, it is worth noting that the native language of the comments was kept in order to have a correct analysis of the data since the expressions of feelings are often poorly translated into neutral expressions when the translation is performed, and also to avoid consistent errors in the translation of terms used in the native language (Mohammad et al., 2016). Furthermore, the Python programming language was used to extract information and creation of graphics from the intention results of the Lexalytics API and thus be able to understand the existing mutation and what motivated it.

### 3.3.Modelling and Evaluation

Once the data collection and cleaning of the final dataset is finished, it is ready to extract the knowledge it holds. So, to achieve our goal we resorted to the technology from Lexalytics, Inc. for categorization of all comments, as well as their polarity and intent. This technology aggregates text analysis and NLP processing techniques, transforming the various text documents into structured data throughout various processing phases (Figure 9).


Figure 9 – Lexalytics,Inc Technology Explained

After obtaining permissions to use the Semantria Application Programming Interface (API), we proceeded to load the final dataset into the tool for data processing. Then, an analysis of all the comments present in the dataset was carried out to extract the feelings associated with these same interactions and the consequent intentions of those same users/consumers.

We edited the existing model of the API through the API tools for an intention mining and sentiment analysis processing of the comments in line with what is desired for this study and allowing a better analysis of the results obtained.

Thus, the types of intentions were selected to the model ("buy", "quit", “recommend” and “sell”) were associated with positive polarity (with API model polarity score values greater than or equal to 0.501), negative polarity (values less than or equal to -0.45) and a neutral polarity (values between -0.449 and 0.5).

This made it possible to cover all the data from the final dataset, obtain an intention associated with each sentiment transmitted by the published comment, and, finally, by extracting knowledge from the results obtained, understand the consumers' intention before, during, and after the lockdown and the change that was felt.

# Chapter 4 – Results and Discussion

## 4.1. Model Evaluation

Following what was described in the previous section, the data were then processed and analysed according to the new model. After processing the data, a number was associated with each intention to validate the existing potential outliers, with the number 1 corresponding to the intention “recommend”, the number 2 to the “quit” intention, the number 3 to the “buy” intention, and the number 5 to the “sell” intention. Thus, it was possible to verify the existence of outliers for the “recommend” (433 results) and “sell” (347 results) intentions (Figure 10), keeping only the “buy” and “quit” intentions as features.


Figure 10 – Outliers

Then, after removing the outlier’s features, new processing of the described model was carried out, which combines the polarities of feelings with the intentions of the comments, thus obtaining the model shown divided in Figure 11 and Figure 12.

| User_ID | Source Text | Polarity |
|---|---|---|
| A Belchior Paula | [redacted]kea devia ser multada pelo mau serviço e problemas que presta aos clientes. | -0,600000024 |
| A Belchior Paula | por exemplo, roupas de cama tao necessarias.... | -0,400000006 |
| A Cândido Torres Alves | a tecnologia e s telecomunicações devem estar eternamente gratas à covid - 19!!!! | 0,100000009 |
| A Vieira Matos | gosto muit[redacted]erlin muito bom matrial e atendimentos | 1,01666677 |
| Aarab Sofia | não entregue ao dia de hoje e continuamos sem informação. No si[redacted]kea o status da encomenda está | 0,400000006 |
| Abat-jours AR | não temos, mas encomendamos, paga agora e recebe em casa, dito e feito, talao de compra nif da | -0,600000024 |
| Abel Duarte | O plural de TV é TV!!! | 0,050000012 |
| Abel Magalhães | 30 vezes a PlayStation 4! tenho ainda as 4 gerações da PlayStation com muito gosto. | 0,600000024 |
| Abel Rei | Acho fantástico um artigo custar menos antes do friday cenas!!!!!!!! | -0,800000012 |
| Abílio Carvalho | empresas oferecem a entrega dos produtos na habitação do clie[redacted]rkt Portugal cobra por | -0,800000012 |
| ábio Fernandes | Para quando um promo 3 por 2 em jogos ? | 0,400000006 |
| Abishek Bastola | I want Poco x3 how much discount price? | 0,400000006 |
| Neves | Os 20% desconto em talão podem ser usados em produtos Apple? | 0,400000006 |
| AC Maltez | Se é oferta tb quero, onde vou buscar? | 0,400000006 |
| Açucena Martinez | Tem o mesmo preç[redacted]en a máquina de café | 0,100000009 |
| Adalberto Sebastiao | Os tipo[redacted]erlin tratam de voces...levam a mesma dos[redacted] aki em torres vedras atinam logo | -0,400000006 |
| Adeildes Moreira da Silva | Lindo | 0,600000024 |
| Adelaide Barão | Até ama[redacted]kea Alfragide | 1,371875048 |
| Adelaide De Abreu | Muitos parabéns Marisa pelo o otimo trabalho . Beijinhos | 1,050000072 |

Figure 11 – Intention Model Sample (columns 3/6)

| Document_Sentiment | Intention_Type | Date |
|---|---|---|
| negative | quit | 30/09/2020 |
| negative | quit | 20/03/2020 |
| neutral | neutral | 01/02/2021 |
| positive | buy | 18/12/2019 |
| positive | buy | 26/03/2021 |
| negative | quit | 10/04/2021 |
| neutral | neutral | 06/08/2020 |
| positive | buy | 06/01/2020 |
| negative | quit | 08/06/2021 |
| negative | quit | 31/07/2020 |
| positive | buy | 24/10/2019 |
| positive | buy | 19/11/2020 |
| positive | buy | 31/10/2019 |
| positive | buy | 07/02/2020 |
| neutral | neutral | 24/11/2020 |
| negative | quit | 14/01/2021 |
| positive | buy | 05/03/2020 |
| positive | buy | 18/04/2021 |
| positive | buy | 23/07/2020 |

Figure 12 – Intention Model Sample (columns 6/6)

Thus, it becomes noticeable the change made to the model with the “quit” intention associated with a polarity (<-0.2) and the “buy” intention associated with a polarity (>0.2), between those values the user will be displaying an intention “neutral”. So, it is natural that there are intentions to acquire, or not, new products even if the existing feelings are in a more neutral spectrum.

### 4.2. Knowledge Extraction

This phase of the study meets the importance of being able to analyse with quality the results obtained through the model created to understand the mutation that impacted consumers in the lockdown. This knowledge extraction aims to provide insights that can help in the decision-making process and strategy delineation.

Thus, using the API, it was possible to see which words were most used during the three periods analysed and the polarities associated with them in the sentences where they were used during the period before lockdown, during the lockdown, and after lockdown, and it is possible to see these same words in Figure 13.

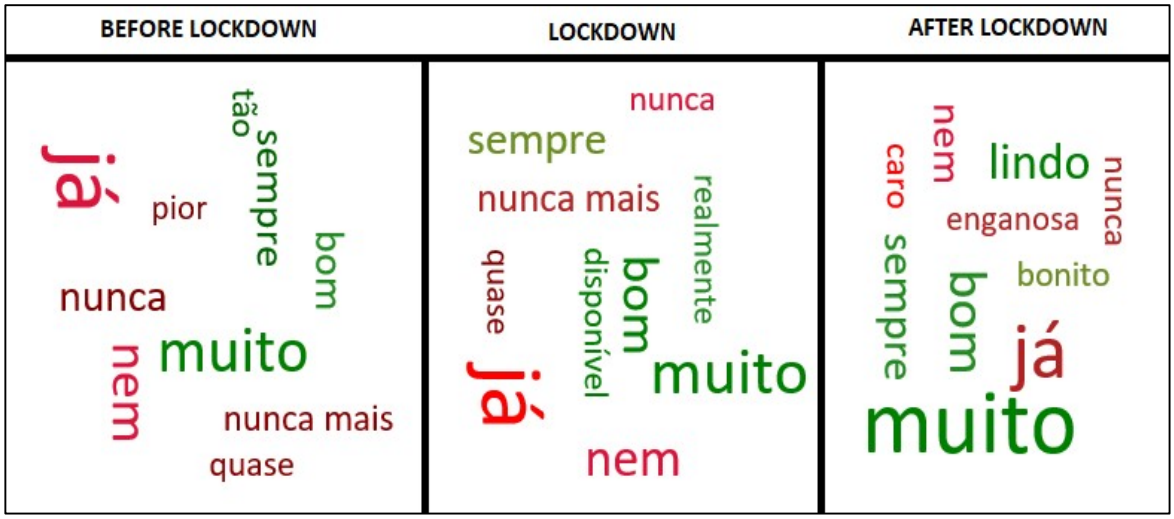


Figure 13 – Most Used Words in the Analysed Periods and Respective Polarity

Here, it becomes possible to identify the type of words most used when consumers want to express their intentions as buyers and as customers. It is highlighted, again, that the connotation of the words shown in the figure is relative to the context in which it is being used in the associated comment and not to the word itself.

Analysing the words with associated negative intention, it appears that the word "Já"(meaning already) persists throughout the three phases analysed, reaching greater negative intention in the period after lockdown, whereas the words "nunca" (meaning never) and "nem"

(meaning neither) maintain their negative intention throughout of the analysed periods. Still, the appearance of the words “enganosa” (meaning misleading) and “caro” (meaning expensive) in the repertoire of negative intention in the after-lockdown period stands out. This, in line with what is verified in the literature and the analysis carried out on the users' comments, the lockdown motivated a consideration to save more and reduce the consumption of certain products, thus leading consumers to consider that the products made available are expensive and unattainable, as, for the word "misleading" [it is constantly associated with the word "publicidade"(meaning publicity)], it is in line with the mistrust and irregular communication that the population felt throughout the lockdown and that was transferred to the consumer's mind in the post-lockdown period.

To understand this change in the purchase intention in the consumer's mind, an analysis of the same type of intention previously mentioned was carried out to understand how the consumer's mind changed with the lockdown based on the collected comments (Figure 14).

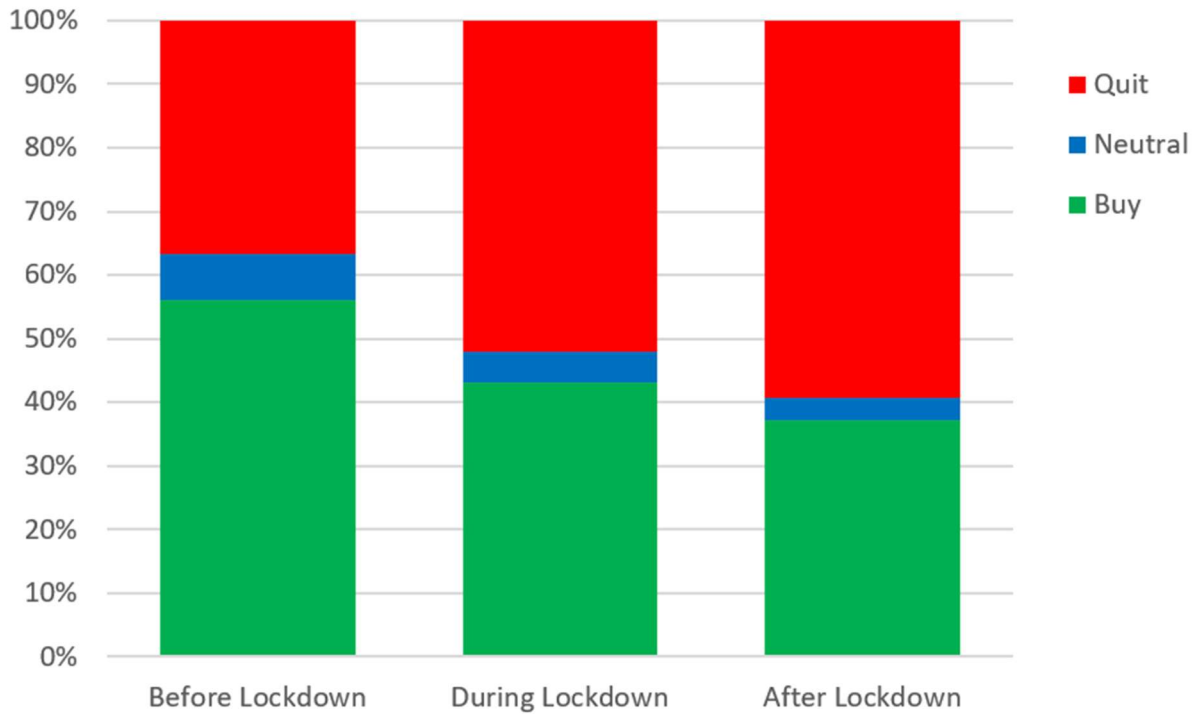


Figure 14 – Intention Evolution Through Time

With this, it is visible that in the minds of consumers there was a negative evolution in terms of the acquisition or consideration of purchasing new products, reflecting their intention to giving up on buying something, verifying in the opposite direction the reduction of the intention to acquire a new product or intention to make a new purchase.

It is, therefore, necessary to understand what leads consumers to have a negative purchase intention in relation to a product or service of a company and, therefore, to be able to understand what strategies to follow to mitigate these negative intentions and impacts that may jeopardize the business.

That said, an analysis of negative intentions was carried out in order to understand the most recurrent reasons that lead a consumer to give up or reject a purchase of a particular product or service. Figure 15 demonstrates this same analysis regarding the five most recurrent reasons that impact the consumer's mind and, consequently, their decision/purchase intention.

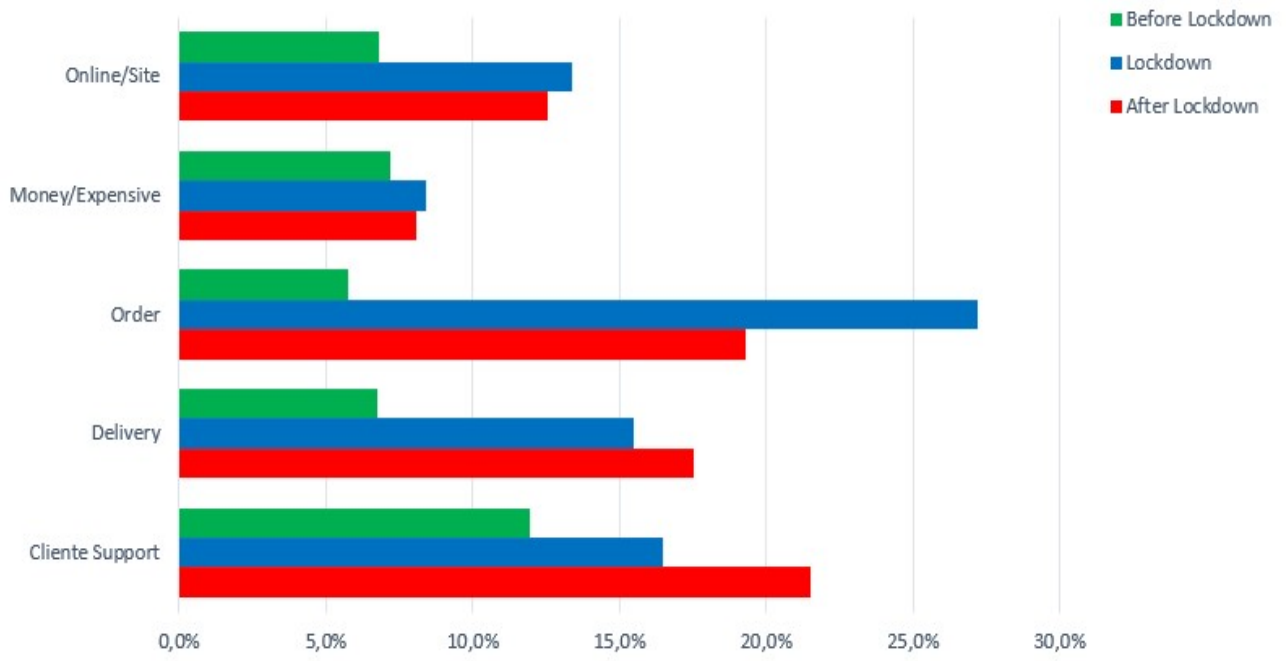


Figure 15 – Most Recurrent “Quit” Intentions

The generated model then demonstrates that before the lockdown, issues related to online purchases had a weight of only 6.8% in the intention of giving up or refusing to purchase new products, increasing to 13.4% during the lockdown and very similar values (12.6%) in the period after the lockdown, this is due to the increase in e-commerce traffic triggered by the lockdown which, as mentioned above, led to the closure of a large part of the stores and general lockdown of consumers.

It then revealed that only 7.2% of intentions were influenced by monetary issues or product prices before the lockdown, a figure that went to 8.4% during the lockdown and 8.1% after the lockdown. Thus, what is discussed in chapter 2 of this study is confirmed, where the intention

of people to avoid spending their capital was mentioned (Nowland et al., 2018) motivated by the pandemic and its effects on consumers and their income.

Next, the feature that had the greatest increase in comparison to the analysed periods is highlighted, and the remaining four features are issues related to an order placed. Issues with deliveries during the period before lockdown accounted for only 5.8% of a consumer's motivations to give up on a purchase or company, increasing to 27.2% in the lockdown period and 19.3% in the period after the lockdown, representing the greatest weight in the negative intentions of consumers in the period of lockdown and the second highest after that same period. This is in line with what was mentioned throughout Chapter 3 of this study, where the existence of impacts and issues that limited the proper functioning of the entire supply chain and the business itself was found.

As such, following the logic of the feature mentioned above, issues arise with the delivery of the order. In the period before the lockdown, the weight was 6.7%, increasing progressively to 15.5% during the lockdown and 17.5% after that same period. This increase is in line with the theme, however, in this case, the negative impact on consumers' intention is felt in the final phase of the ordering process, that is, problems with deadlines and the status of the goods delivered.

Finally, the last feature that motivates negative purchase intentions in consumers is related to customer support issues. This played a weight of 12% in the period before the lockdown, being the highest value in the period in question, increasing to 16.5% in the lockdown period, being the second highest, and reaching a maximum of 21.5% in the period after the lockdown, corresponding to the greatest weight recorded in the data analysed in the period in question.

It becomes evident, then, that the feature with the greatest impact on consumers' purchase intentions was "Customer Support", something extremely important, as it basically represents the customer's connection to the company, has been something that was degraded throughout the periods under review. Also, the “Order” and “Delivery” features should be highlighted due to the impact they have on the design of consumer purchase intentions and what they represent for the business itself.

Furthermore, an analysis of the evolution felt in each of the retail companies present in this study was carried out. To maintain data privacy, the letters W, I, L, and M were associated with each one of the companies for a better perception of the results obtained.

Thus, the period before the lockdown was initially analysed to monitor the evolutionary objectivity of this study, with the results obtained by company being visible in Figure 16, taking into account the analysed intentions.

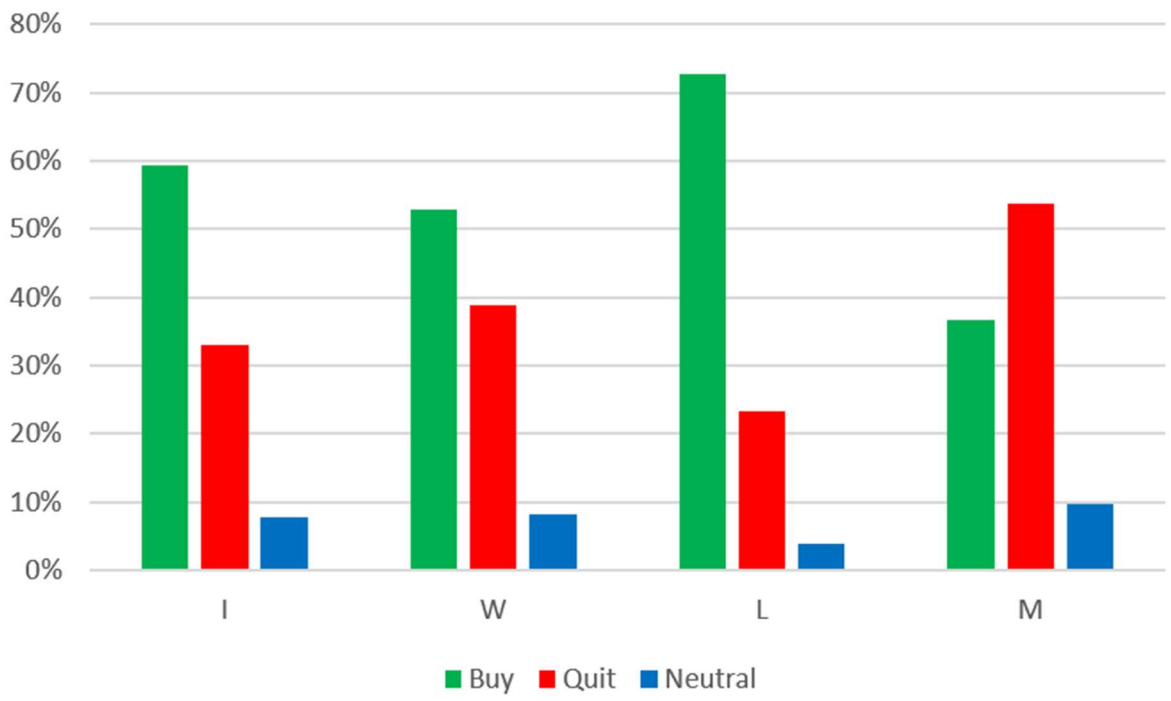


Figure 16 – Intentions per Company Before Lockdown

In company I, it was found that 59% of the analysed data demonstrate consumer interest in making a new purchase or considering purchasing new products, with 33% of the data revealing the opposite intention of the consumers and only 8% showing an intention in the neutral spectrum. The same happens with company W, showing a positive purchase intention in 53% of the data, a negative intention in 39% and, finally, a neutral intention in 4% of the data. Like the two previous companies, 73% of the data from company L revealed a positive intention before the lockdown, 23% of the data showed a negative intention and 4% a neutral intention, showing in these three companies the domain of the consumer's intention to make new purchases.

In opposite direction, data from company M revealed that 37% of consumers showed interest in making new purchases and 54% indicated an intention not to make new purchases or give up the thought of making new purchases, being the dominant intention in the company in question, ending with 10% of the data revealing a neutral intention of consumers towards company M.

Then, keeping in mind the same line of thought and objectivity, an analysis of the data obtained regarding the lockdown with focus on these companies was carried out (Figure 17).

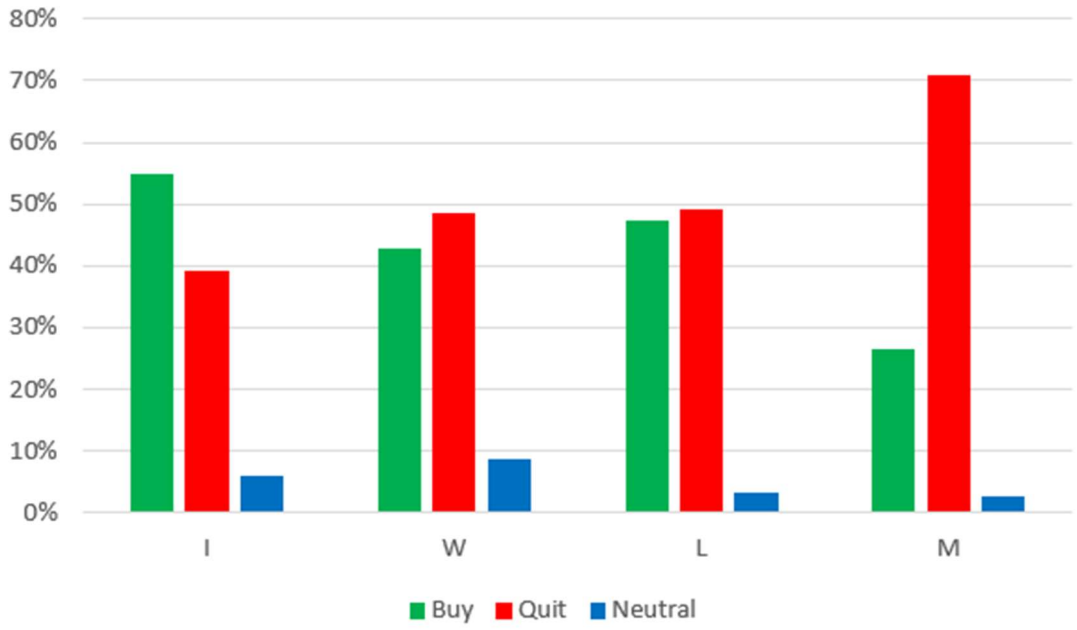


Figure 17 – Intentions per Company During Lockdown

Here, it's possible to verify that company I maintained the domain of the consumer's intention to make new purchases with the data values reaching 55%. Still, the data showed that 39% of consumers reveal an intention to give up on a purchase or not consider a purchase and 6% are in the neutral spectrum of intention.

Company W revealed a change in the purchase intention dominant, with the values of positive intention at 43% and negative intention increasing to 49% compared to the previous period analysed, also referencing the neutral 9%. Likewise, company L underwent the same change, making the negative intention dominant with 49% and the positive one dropping to 47%, the neutral intention remained similar with the value of 3%.

Finally, data from company M revealed a negative evolution of the results, with the intention of consumers to carry out a new acquisition or to consider such a decision to fall to 26% and the opposite intention to increase exponentially to 71%, revealing a value of only 3% concerning the neutral intention.

Then, the period after the lockdown was analysed (Figure 18).

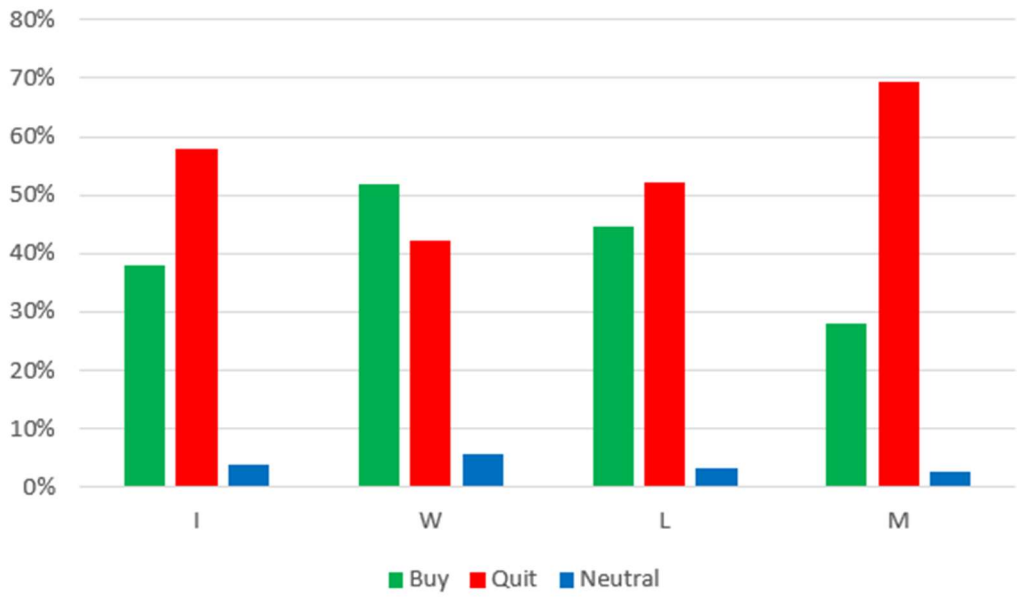


Figure 18 - Intentions per Company After Lockdown

This dataset revealed that the company I had a negative impact on its consumer's purchase intention, with the intention to make a new purchase falling to 38% and the opposite intention to become dominant, increasing to 58% after the lockdown. Neutral purchase intentions registered a value of 4% in the period analysed.

In the case of company W, there was a positive evolution with the impact of lockdown. The intention of consumers to make new purchases increased to 52%, becoming the dominant intention in the period in question and the intention not to make a purchase dropped to 42%, with the neutral intention of consumers registering a value of 6%.

As for company L, it continued with a negative evolution and registered a new drop in the values of consumer's intentions to make new purchases, reaching 45%. Consumer's intention not to make new purchases remained dominant, reaching a record of 52%, and finally, the neutral aspect of consumer purchase intentions registered 3%.

Finally, company M maintained its negative record in the purchase intention of its consumers, showing only a slight improvement in results. The positive purchase intention registered 28% of the values, while the negative one remained high with 69% of the results and, remaining the same, the neutral purchase intention registered 3% of the results.

Considering the results obtained, it is interesting to mention that companies W and M are both dedicated to the same type of retail, entertainment and electronic equipment, and companies I and L to the furniture and DIY trade.

# Chapter 5 – Conclusions

The lockdown and measures imposed to fight the Covid-19 pandemic had a huge impact on consumer behaviour, adapting to the prolonged period “at home” and motivated them to learn innovative ways to fulfil their desires as consumers and adopt new technologies that modified previously existing habits (Sheth, 2020).

The purchase intention can be influenced by the most diverse elements that encompass the entire purchase decision process and the environment adjacent to the consumer, but the focus of this study was the impact felt by the lockdown and the ramifications of this impact both on the consumer and on the business.

Thus, the objective of this study is to identify this same change in purchase intention and find the aspects that motivated this same change in the consumer's mind and thus be able to anticipate consumer loyalty and ensure business continuity. Providing important insights for future decision-making and delineation of goals and strategies for the future.

This study used the use of Intention Mining to obtain the desired answers, meeting the emerging attention that has been received by several researchers in this area since the understanding of intention is the answer to predict the goals of users in the online world (Shen et al., 2020).

In fact, the prominent development of AI has attracted more and more attention to Data Mining and its techniques, making it increasingly necessary to have methods that can efficiently identify what intentions are emerging in the consumers (Shen et al., 2020). As such, it was extremely important for the granting of this study in identifying the explicit and implicit intentions in the speeches of consumers on the pages of retail companies, revealing what currently motivates a consumer to abandon the intention to purchase a product or even completely exclude a brand or company. Thus, allowing to elevate the use of Data Mining and Intention Mining to other fields of study beyond marketing, enabling the understanding of an individual's speech and extracting from it what is really in the mind of the individual.

By cleaning the dataset, the Lexalytics API tool easily reads the dataset containing the comments extracted from the Facebook pages referring to the retail companies. Using Python, it was easily identifiable the corresponding outliers of the initial Intention Mining model and, with this, adapting to a new model for a better interpretation for the intended objective and, finally, coherently analysing the results obtained from the consumers' intentions and what

impacted his mind, more specifically, what motivated a customer to reduce or dismiss their intention to purchase a new product.

These results allow us to understand what are the real impacts of a lockdown on a consumer's purchase intention and what is the origin of this same change. When verifying the features of greater impact, it was understood that the major change compared between the periods before and after the lockdown was in issues related to the supply chain of the companies (orders and deliveries), verifying a feature of great importance in what it touches on the weakening of the relationship between the customer and the companies.

This is in line with the problems that have already been identified in some studies where the supply chain has suffered immensely, especially in the retail sector, calling into question the business of these same companies. With this, it is important to evaluate the impacts of the interruptions promoted by the pandemic in the business, evaluating the current situation with its partners, being recommended the analysis of reports in real time to be able to develop measures to stabilize the critical situations identified in the supply (Burgos & Ivanov, 2021).

Buying intentions with negative polarity demonstrated that the aspect of deliveries in terms of delivery times, stock, or condition of the goods should attract great attention from companies. To do this, ensure good contact and transparency with suppliers to avoid stock disruptions, avoiding problems for the end customer, yet, one should seek to meet the required technological innovation such as big data, blockchain, allowing the sharing of information in a transparent manner, fast, accurate and comprehensive, with these technologies playing an important long-term role in responding to the impacts of the pandemic (Burgos & Ivanov, 2021; Sarkis, 2021).

Another aspect to consider is due to the ability to ensure that consumers can carry out their entire purchase process successfully, that is, avoid losing focus after the purchase and monitor until the order actually reaches the customer's hands, minimizing, thus, the aforementioned risks and seeking to obtain greater customer satisfaction, as a bad response to a consumer's problem is always better than a non-response.

Still, one of the most critical aspects that occurred in the change in the purchase intention of consumers was the relationship between the customer and the company and all this interaction, where the analysis carried out in this study revealed a progressive degradation of that same relationship. To combat this aggravating factor, the CRM strategy must be improved as much as possible to maintain these relationships, seeking to integrate the focus on the customer in all the organization's operations in order to retain customers by delivering the right

products, to the right customers, with the right cost and through the proper channel (Asfahani, 2021). This strategy should address all aspects of customer identification, creation of customer-related knowledge and perceptions about their products, focusing on building and maintaining long-term relationships with customers (Reinartz et al., 2004).

However, it should be borne in mind that changes in customer decisions and purchasing patterns lead to changes in the CRM strategy, seeking to meet customer needs and thus becoming important to identify the ways in which these changes have changed with the COVID-19 pandemic for the CRM strategy to be able to respond with quality to these same impacts of the pandemic (Asfahani, 2021).

There is no doubt about the degree of impact derived from COVID-19, there were drops in demand and offers, promoted by the closure of several companies (supply drop) and reductions in consumption and investment by consumers when prioritizing essential goods over needs of the lower order of Maslow (demand drop), being required to many organizations that look in the digital world for ways to combat these same difficulties (Seetharaman, 2020). It becomes necessary for organizations to seek to develop strategies that increase customer engagement through digital systems, seeking to increase engagement and maintain customer relationships to increase their satisfaction and loyalty to the company (Asfahani, 2021).

However, despite the results obtained, some limitations regarding this study should be pointed out that should be considered for future approaches. The records obtained in the three periods were not coincident in terms of quantity distributed after data cleaning, as the data in question refer to a period much lower than the remaining two periods analysed. Furthermore, it would give greater robustness to the study if an analysis were carried out on only one specific type of retail and, even more specifically, on a single company.

For future research, it would be interesting to continue the study with the monitoring of data related to the second existing lockdown and adapt the model to this same reality, it is interesting to understand if a new lockdown motivated new changes in purchase intentions or if there is a common pattern that was introduced to this new reality.

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