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The impact of big data on customer experience

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ABSTRACT

Forecasting GDP is crucial for economic planning and policymaking. This study compares the performance of three widely-used econometric models—ARIMA, VAR, and Linear Regression—using GDP data from the UAE. Employing a rolling forecast approach, we analyze the models' accuracy over different time horizons. Results indicate ARIMA's robust long-term forecasting capability, LR models perform better with short-term predictions, particularly when exogenous variable forecasts are accurate. These insights provide a valuable foundation for selecting forecasting models in the UAE's evolving economy, suggesting ARIMA's suitability for long-term outlooks and LR for short-term, scenario-based forecasts.

Keywords: *Big Data, customer experience, digital transformation, technological evolution, social media data.*

I. Introduction:

« We consider our customers as guests at a party where we are the hosts. It's our job to make their experience a little better every day ».

By saying this, Jeff Bezos, CEO of Amazon, perfectly captures the current challenges businesses face. Offering a good product or quality service is no longer enough to stand out in the marketplace; it is necessary but insufficient. Now, it is essential to create a true experience for the customer, making them feel not like just another client, but a valued guest. Customers want to live, enjoy, and feel something during their purchase, not merely buy for the sake of buying. To achieve this, companies strive to learn as much as possible about their clients to provide personalized, memorable experiences that directly impact their emotions and feelings.

Alongside this rising emphasis on customer experience, a concept described as being capable of capturing, storing, and processing an enormous amount of data in minimal time has emerged in many businesses : Big Data.

An exceptional customer experience requires as much information as possible about clients; Big Data enables the processing of vast amounts of customer data. With this, companies quickly connect the two concepts to improve customer experience through Big Data. However, it is evident that among these companies, many have seen no improvement in their customer experience despite having significant customer data. It may seem, at first glance, that Big Data could significantly contribute to managing and enhancing customer experience, but at what level? What specific areas could it impact ?

In our thesis, we investigate the actions needed to enhance customer experience using Big Data, addressing the question, « What actions should be taken to improve customer experience through Big Data ? »

Before aiming to improve a phenomenon, it is first necessary to understand it in order to identify weak points. Therefore, in the first part, we will seek to understand Big Data and customer experience. Once this groundwork is complete, we will focus on the skills and technical solutions necessary to enhance customer experience through Big Data.

1. Literature review:

1.1. Big Data:

Big Data represents a significant technological shift, especially with the rise of connected devices and embedded sensors in daily objects like cars, refrigerators, and televisions. Over recent years, Big Data has been defined in various ways, but its central concept revolves around vast volumes of diverse data generated at high velocity, creating both opportunities and challenges for companies aiming to harness its potential.

Various industry definitions illustrate the complexity of Big Data. IBM, for instance, focuses on data sources, describing Big Data as the accumulation of information from sensors, media platforms, social networks, digital images, videos, online transactions, and GPS signals from mobile devices. In contrast, Gartner introduces the "3Vs" framework, defining Big Data by Volume (large quantities of data), Velocity (speed at which data is generated and processed, often requiring real-time capabilities), and Variety (different data types, including unstructured data from various sources).

The CNIL adopts a similar perspective, viewing Big Data as the immense scale of digital data, supported by expanding storage capacities and advanced tools for real-time analysis, and aligning with Gartner's 3Vs. Meanwhile, companies like Oracle and Forrester add a fourth V, Value, to highlight the economic and strategic insights derived from data analysis. Others, such as White, propose a fifth V, Veracity, which emphasizes the importance of data accuracy and reliability for generating meaningful results.

These definitions and perspectives underline the multifaceted nature of Big Data and set the stage for exploring how it impacts various sectors, particularly in the realm of customer experience.

1.2. Customer experience:

« Offering products or services alone isn't enough these days: organizations must provide their customers with satisfactory experience ».

Today, any company will confirm that it no longer wants to simply offer products or services to its customers but rather to provide genuine experiences. Therefore, it is essential for these companies to improve their customer experience. However, before seeking to enhance a phenomenon, it is crucial to define it precisely in order to assess its performance and compare it with others. Before attempting to improve this so-called customer experience, we will first explore the origin of this term and the various definitions that have emerged over the years.

Tableau 1 : Comparison table between a product, a manufactured product, a service, and an experience.

	Commodities	Goods	Services	Experiences
Economy	Agrarian	Indistrual	Service	Experience
Economic function	Extract	Make	Deliver	Stage
Nature of offering	Fungible	Tangible	Intangible	Memorable
Key attribute	Natural	Standardized	Customized	Personnal
Methode of supply	Stored in bulk	Inventoried after production	Delivered on demande	Revealed a duration
Seller	Trader	Manufacturer	Provider	Stager
Buyer	Market	User	Client	Guest
Factors of demand	Characteristics	Features	Benefits	Sensations

Source: Pine II B. J., Gilmore J. H. Welcome to the Experience Economy, Harvard Business Review, July-August 1998

Berry (2002) defines the term as « a set of cues that includes both functional and emotional elements » . Mascarenhas (2006) emphasizes that an experience depends on the customer and the context, and he is one of the first to highlight the difficulty of measuring and quantifying a good customer experience. According to him, « the customer experience encompasses both physical and emotional elements that arise at each stage of the value chain. It depends on the customer and the context because two identical experiences that occur at two different times do not have the same effect ».

In 2007, Meyer and Schwager define customer experience as « the internal and subjective response that customers have when they have direct or indirect contact with the company ». They are the first to point out that customer experience has a direct relationship with the contact between the customer and the business. It is not only the customer but the interaction between them and the business that is important While service offering tended to evolve.

from the « what » (what is the service offered to the customer?) to the « how » (how is it offered to the customer?), the experiential offering tends to evolve from the « how » (how is it offered to the customer?) to the « effect on the customer » (what is the effect produced by the offering presented to the customer).

Based on all these definitions, it is possible to summarize the important points stated previously in order to establish a clear and concise definition of customer experience, which will also help structure our research and interviews later on. Therefore, customer experience is the effect produced by the emotions felt (fear, love, joy, etc.) and the sensations experienced (the senses: seeing, hearing, touching, etc.) throughout the entire customer lifecycle. It is important to note that it is individual and unique: it depends on the customer and the context.

1.2.1. The benefits of paying attention to it:

Research conducted by Zaltman and published in How Customers Think: Essential Insights into the Mind of the Market in 2003 emphasizes that customers' preferences and choices are much more influenced by sensory and emotional elements than by the characteristics of products and services. It is therefore clear that customers value experience, and this is a distinct competitive advantage for companies that are able to provide it.

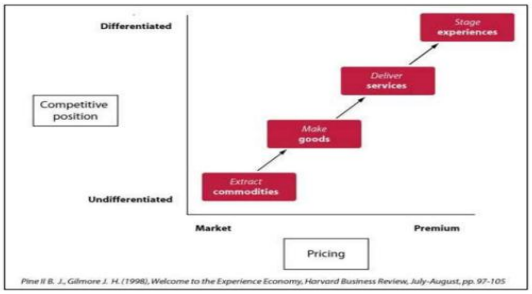

Figure 1: Diagram comparing different offerings based on price and competitiveness

Source: Pine II B. J., Gilmore J. H. Welcome to the Experience Economy, Harvard Business Review, July-August 1998, pp. 97-105

This was notably confirmed by a study conducted by Schmitt, which revealed in 2003 a real correlation between the value of the customer experience, the overall impression of the customer, and the intention to purchase.

Correlation between experience and consumer behavior		
	Consumer Impression	Purchase Intention
TV ads	0,51	0,59
Stores	0,75	0,84
Websites	0,81	0,76

Source: Étude Schmitt (2003), p.20.

1.3. Revue de littérature empirique

Author	Study	Problematic	Context	Methodology	Key findings
McKinsey Global Institute, 2016	The Age of Analytics : Competing in a Data-Driven World	How does the integration of big data analytics influence customer experience?	Industries using data-driven strategies.	Qualitative study using case studies across various sectors.	Companies that leverage data analytics report improved customer satisfaction and loyalty through personalized marketing and enhanced service delivery.
Ranjan & Read, 2016	Enhancing Customer Experience through Big Data Analytics	What specific aspects of customer experience are improved by big data analytics?	Telecommunications and hospitality sectors.	Quantitative analysis of customer feedback data before and after the implementation of big data strategies.	Significant improvements in customer service response times and satisfaction scores, directly linked to insights derived from big data.
Kumar et al., 2019	The Role of Big Data in Customer Experience Management	What are the implications of using big data in customer experience management?	Retail and service sectors.	Mixed approach combining surveys and interviews with industry professionals.	The effective use of big data enables a more personalized customer experience, increasing customer engagement and loyalty.
Chen et al., 2019	Big Data and Customer Experience: A Review and Future Research Directions	What are the current research gaps regarding the relationship between big data and customer experience?	Systematic literature review	Literature review methodology, synthesizing the results of previous studies.	Identification of a need for further empirical research on the ethical implications of using big data in customer experience.
Tsai & Wu, 2019	Big Data Analytics and Customer Experience: The Mediating Role of Service Quality	How does service quality mediate the relationship between big data analytics and customer experience?	E-commerce sector	Structural equation modeling based on survey data from e-commerce consumers.	High service quality enhances the effectiveness of big data applications, resulting in superior customer experiences and increased loyalty.
Ghosh et al., 2020	The Impact of Big Data on Customer Experience in Retail	How does big data analytics transform customer experience in retail ?	Online and physical sales environments.	Case analysis and customer surveys.	Retailers using big data to analyze customer behavior significantly enhance their personalization efforts, leading to higher sales conversion rates and increased customer satisfaction.

Source: Author

2. Research methodology:

2.1. Methodology, study population, and Data collection tools:

To address the problem of our work, a qualitative study will be conducted. Several methodologies exist, including individual interviews, focus group discussions, or observation. Several points are essential when deciding to carry out this type of study. It is, of course, necessary to prepare an interview guide that outlines all the topics we wish to discuss. We must also select individuals likely to provide the desired information, conduct the interviews,

and then analyze and synthesize all the information collected.

Furthermore, since the respondents are employees in the field of Big Data, it was more coherent to conduct individual interviews to allow them to express themselves freely and spontaneously during the discussions. This type of study enables the exchange to be personalized based on each respondent, with follow-up questions based on their responses. The qualitative study also allows for obtaining insights from professionals and a technical perspective.

Indeed, a qualitative study provides a deeper examination with high-quality verbal data, in contrast to a quantitative study, which would have yielded a large amount of data. A qualitative study allows respondents to provide open-ended answers due to the use of open questions.

Due to restrictions related to the Covid-19 pandemic, all interviews were conducted via Teams.

Semi-structured interviews were conducted, using a predefined guide with an average duration of 45 minutes. The advantage of this method is that the interview is structured, but there is also an exchange between the questioner and the interviewee, allowing us to ask for more details on a response if necessary.

These respondents will be employees of large multinational companies, without limiting ourselves to a particular industry sector. We decided to interview only professionals in the field of Big Data to ensure that the interviews provide answers to our inquiries and to maximize their value.

To engage with these individuals, we relied on both our personal contacts and private relationships, as well as the social network LinkedIn to reach out to other Big Data professionals, presenting our study project and the topic on which we would be interviewing them.

Here is the summary of the individuals interviewed for this qualitative study:

Tableau 3: List of participants

Participants	Position held	Experience	Company	Duration of interview
1	Data scientist	6 years	Disenyland	47 minutes
2	Developer	7 years	Amazon	52 minutes
3	Big Data Engineer	3 years	Saur	36 minutes
4	Business Intelligence and Big Data Project Manager	9 years	Capgemini	45 minutes
5	Big Data Engineer	3 years	Orange	38 minutes

Source : Author

The aim of this study is, first of all, to analyze the respondents' feelings regarding the impact of Big Data on customer experience. It will also seek to gather the respondents' suggestions for improving customer experience through Big Data.

We have therefore prepared several questions in our interview guide that will address three main themes for the interviewees:

• Experiencing Big Data and customer experience.

• Identifying the human skills needed for Big Data to translate into a favorable customer experience.

• Understanding the future prospects of Big Data for a favorable customer experience.

2.2. Presentation of field results:

Theme 1: Experimentation of Big Data and customer experience

- Could you tell me what comes to mind when you think of Big Data?

The results obtained from the first theme of the interviews allowed for the analysis and understanding of how these employees define the concepts of Big Data and customer experience and what connections they see between them. This provided essential information to understand each of their perspectives.

The first question revealed that the employees all share the same interpretation of Big Data, with similar points emerging in each interview. The respondents define Big Data as the management of an enormous amount of data quickly, with a volume that exceeds that of traditional software tools.

According to Abdourahmane, « I think of the processing of very large volumes of data that a traditional machine would not be able to handle ». Florian stated, « It's about managing a huge amount of data, while Anas remarked », « In the term Big Data, there is the word 'big,' which means a massive volume of data, and a massive volume of data implies data processing ».

For most respondents, the notion of the "5Vs" came up to define Big Data. Yacin mentioned, « For me, it makes me think of the rule of the 5Vs; the three most important are volume, because a Big Data infrastructure must be able to handle a large number of data, then there is variety—data today is no longer just text; it can be images, sound, etc. The third is velocity, which goes along with the first V, as with the volume, data needs to be processed quickly ». The respondents agree that Big Data is represented by the 5Vs rule, as these challenges encompass volume, variety, velocity, veracity, and value.

It was also expressed that Big Data is somewhat of a buzzword. Florian noted, « It was a term that has been a bit

of a 'buzz word' for the past ten years ». Virginie added, « Big Data has a very marketing aspect to it, meaning it became very trendy around 2016. For me, there are new contributions in terms of usage, but there has been a lot of hype around the communication and marketing surrounding it. Everyone had to implement their Big Data platform, even when there weren't necessarily any use cases that justified the implementation of Big Data ».

- Could you tell me what customer experience means to you ?

According to the study conducted, all respondents thought of the same thing when discussing customer experience: it encompasses everything that a customer can see and feel throughout their customer journey.

Yacin stated, « For me, it's about taking care of a customer; nowadays, many say that a customer is no longer just a customer but more like a guest, and the goal is for them to feel their best ». Virginie added, « It's the experience we have during our interaction with the company ».

The majority of the respondents also emphasized that customer experience is primarily about the ease of use of a product or service for the customer.

Florian remarked, « A smooth, 'user-friendly' experience, as we say. It should make you want to continue using an application—so really, fluidity and ease of use ». Abdourahmane echoed this sentiment, saying, « I am currently designing an application, and for me, a successful customer experience is when a customer can use it easily ».

- Could you tell me what Big Data and customer experience mean to you?

The interviewees unanimously agreed on this question, believing that Big Data enhances customer experience. According to Yacin, « For me, one improves the other. The more data we have on the customer, the more information we have about them, which allows us to meet their expectations and provide a good customer experience ». Anas added, « As I mentioned, to provide a good customer experience, we need to respond as much as possible to customer needs and provide quick responses to avoid customer frustration. Big Data addresses this issue by processing a large volume of data rapidly ».

Several participants highlighted that Big Data enables access to customer data and insights about customer trends, allowing them to adapt to customer expectations. Virginie stated, « When we interact with customers, we leave traces, so we have data, we have information, and therefore we can better understand the customer ». Florian noted, « We will use customer data but also conduct market research to gather current trends to understand what people are doing, what they enjoy, so we can incorporate that into our products and offer more suitable options ».

Theme 2 : Human skills

- In your opinion, are there key skills necessary for Big Data to translate into enhanced customer experience? If so, what are they?

This question revealed similar points among employees in the Big Data sector. The same skills were highlighted by the respondents, who emphasized a crucial aspect: the ability to effectively leverage customer data. This key competency was noted by most of the interviewees, with the phrase « making data speak » being frequently mentioned.

According to Anas, « You need to be able to analyze, find use cases to develop new business models, and create numerous use cases to address customer issues and interconnect the data to make it speak ». Yacin stated, « A key skill for me is knowing how to make data speak, meaning being able to transform raw data into behavioral insights. For example, if I have a website, I'll look for the average time visitors spend on it. If I see that the time is under 10 seconds, then I can conclude that the content in that area isn't interesting, so I'll change it and run tests ». Florian added, « Yes, Big Data allows for managing a massive amount of data, but you need to know how to effectively exploit customer data; just collecting data isn't enough ». Virginie concluded, « If we know how to leverage the data well, we can serve the customer better ».

Another competency highlighted by several respondents is the ability to know when to collect data and manage data flows.

According to Florian, « You need someone who understands what scalability means. When we talk about Big Data, we shouldn't expect a constant influx of data; there will be peaks. To optimize costs, we need to manage these data flows, meaning we need to know when to collect the data. Optimizing costs is very important because it allows us to better meet customer expectations since we will have the budget to do so ».

Abdourahmane added, « Rigor and perseverance are essential because sometimes we encounter data problems, so we need to know when to collect data ».

Another key skill mentioned was knowing what to do with Big Data. Virginie stated, « It's a tool, and we can do wonderful things with it or disastrous things, depending on what we choose to do with it. So knowing what we want to achieve with Big Data to enhance the customer experience is crucial. First, we need to think about what the customer experience is and how we could improve it, and then we select the tool accordingly; for me, it's fundamental to start from the business need ». Yacin echoed this sentiment, saying, « Big Data is just a tool for managing data. But it can be used for many things, so if we want to focus on the customer experience, we need to look at aspects that are relevant to that and understand why we want to use it ».

- According to you, are there technical solutions to transform the collection and processing of Big Data into a favorable customer experience? If so, what are they?

Several technical solutions were cited by the respondents, each more varied than the last. One of the technical solutions mentioned for transforming Big Data collection and processing into a positive customer experience is consumer preference selection. According to Florian, « There are selections of preferences for customers beforehand, before they start using the application. This allows us to gather information about the customer from them right from the beginning of their use of the application ».

Another proposed solution is A/B testing. Florian stated, « There are other techniques, notably A/B testing. For example, we will test a new feature only with a portion of users to analyze and see if the new feature is useful ».

Furthermore, there are other technical solutions, such as facial recognition. This technology enables the recognition of the customer, thus personalizing the customer experience. Virginie mentioned, « It all depends on the intent. For instance, if we seek a better understanding of the customer, I've heard of some stores using facial recognition that allows them to address customers by their names and understand their preferences ». Yacin added, « We have facial recognition, like at Amazon, which enables them to recognize their customers and provide them with a personalized journey ».

To transform Big Data collection and processing into a favorable customer experience, the use of predictive analytics for purchases is also an option. Virginie noted, « I think about predictive analytics for purchases. We have predictive models in industry, and now it can extend to predicting purchases, for example, if someone bought a particular item last summer, there is a chance they will buy another item next summer ».

Theme 3: Evolution of Big Data for a positive customer experience

- What technological innovations do you foresee in the future regarding Big Data that are likely to enhance customer experience?

Several technological innovations have emerged from respondents regarding Big Data that are likely to enhance customer experience in the future. These are mostly the same technological innovations that were mentioned.

They all see artificial intelligence as a future innovation. According to Abdourahmane, « In my opinion, the technological innovations of tomorrow in the field of Big Data are artificial intelligence, blockchain, and quantum computing ». According to Anas, « There's artificial intelligence, so everything related to machine learning and deep learning ».

Image recognition is one of the technological innovations in Big Data that could improve customer experience. According to Virginie, « There are advancements in artificial intelligence, such as image recognition, which allows for online fitting, for example ».

In terms of technological innovation, cloud computing is a significant advancement in Big Data that could enhance customer experience. Anas states, « The current innovation that I see a lot for the future is the cloud ». Virginie adds, « For me, there's the cloud; the cloud allows for much more flexibility without having to set up a large infrastructure, and there's cost efficiency ».

There are also technological innovations such as augmented reality and virtual reality, which could enhance customer experience. According to Florian, « There's augmented reality and virtual reality to offer something more immersive to customers ». Yacin notes, « The Metaverse will allow customers to be directly in an environment they appreciate ».

In terms of innovation, the term deepfake also emerged. Yacin explains, « There's deepfake, which allows for the personalization of videos or voices with existing personalities, and this could allow a customer to have an experience with a personality they like, thanks to this innovation ».

- In your opinion, what makes a successful customer experience today ?

According to the study conducted, all respondents perceived a successful customer experience in the same way : a satisfied customer. For Anas, « a successful customer experience is simply a happy customer ». Abdourahmane agrees, saying, « It's a customer satisfied with the service or product ».

Most respondents agreed that the customer journey should be as easy and fast as possible to achieve a successful experience. Anas commented, « It's about having a quick customer journey to respond as swiftly as possible to the customer's needs. The company should listen to the customer and respond quickly ». For Yacin, « It's about making the customer journey as easy as possible ». According to Florian, « The app must be smooth, lightweight, well-designed, and free of bugs ».

A successful customer experience is also about customer loyalty; it's about the customer coming back. Florian explains, « It's an experience where the customer wants to return to the app, use it regularly without feeling any frustration ». Virginie adds, « It's a customer who is so pleased with their purchase or service that they come back and also become an advocate ».

- In your opinion, what could the customer experience of tomorrow look like without technological and budgetary constraints?

In the case of customer experiences without technological and budgetary constraints, several examples were given. One vision for the customer experience of tomorrow is brain chip integration. According to Yacin, « Inserting a chip in the brain to understand what people think, what they like, and to influence certain things without lifting a finger—using this technology to truly understand the customer's expectations, what they are looking for, their needs, and especially their frustrations ».

Another possibility is virtual reality as an enhanced customer experience, allowing interactions to become even more tactile and visual. Florian explains, « Customers are looking for immersive and easy-to-use experiences, so making things more tactile and visual, for instance through virtual reality, would be ideal ».

A customer experience without technological and budget constraints could also include remote after-sales support, where the seller would be able to resolve an issue directly over a video call. Abdourahmane states, « In terms of after-sales service, for example, if a customer has an issue with a product, the company's technician could directly call with the camera on and a 5G video stream to handle the issue remotely ».

Most respondents highlighted that a customer experience without technological and budgetary constraints would be one without personal data regulations, as these regulations are currently seen as a major obstacle. According to Yacin, « A customer experience without technological and budgetary constraints would involve fewer restrictions on personal data regulation. However, the risk is that this can often lead to ethical issues, with potential for ethical drift ». Florian adds, « When comparing data regulation in France to other countries, it's not the same, and sometimes it prevents us from doing our utmost for the customer due to data restrictions. I think it's a barrier to the customer experience ». Virginie notes, « Personal data is a constraint, but at least it helps companies understand how to handle this data properly ». Anas explains, « There is certain data we can't migrate to the Cloud, which offers fast processing, due to personal data regulations. This can create frustration for the customer as it may delay our response time ».

2.3. Discussion of results:

We have thus seen that to understand customer experiences and know how to optimize them, it is essential to leverage data and analytics technologies. Tracking data on customers and their interactions with the company helps the brand understand its performance in terms of customer experience. It shows where the company excels and where improvements are needed.

We have also observed that data allows for personalizing experiences according to individual customer preferences and enables rapid responses, which is increasingly crucial in the digital world. Customers expect quick answers to their questions, and negative reviews can spread rapidly on social media. Various types of data can be useful for enhancing the customer experience, including demographic information, online activity, purchases, and customer support requests. It is also valuable to directly ask customers about their experiences. As noted, companies can collect, organize, analyze, and use this data to improve customer experience.

Theme 1: Big Data experimentation and customer experience

Through the field study, it was added that many perceive Big Data as a marketing gimmick. It is a term widely overused by companies without fully understanding its meaning. Big Data began trending heavily in 2016, viewed as a tool offering new possibilities in terms of use, leading to significant admiration and excitement around Big Data in marketing and communications. Many companies decided to implement a Big Data platform without having real use cases that justified it.

Customer experience was defined similarly in both the literature review and the qualitative study. It is characterized by the impact, emotions, and sensations experienced throughout the customer journey—that is, before, during, and after purchasing a product or service. It encompasses the result of all interactions a customer may have with the company.

The qualitative study also highlighted that ease of use of a product or service is crucial, sometimes even essential, in the customer experience. User experience and product ergonomics are key factors. This enables consumers to appreciate the product's usefulness and ease of use, fostering a connection with it. In some cases, certain products alone can build customer loyalty to a brand, conditioning the customer to rely on these products.

A connection can therefore be made between Big Data and customer experience. We have seen that Big Data represents the technological ability to analyze vast amounts of data almost in real-time. Today, the maturity of new analytics technologies enables processing of this increasing data volume, allowing for real-time trend visualization to gain a detailed and personalized understanding of customers. The use of Big Data transforms the relationship between individuals and companies, generating a surplus of information that can increase customer engagement and optimize operations.

Thus, Big Data could improve customer experience. The vast amount of data collected provides extensive insights into customers and current trends, helping companies better understand their clients and tailor their offerings to meet customer expectations as closely as possible.

Theme 2: Human skills

To enhance customer experience through Big Data, specific key skills are essential. The qualitative study helped identify the most important competencies needed.

Human expertise is crucial in interpreting data, making sense of complex analyses, and applying insights to create meaningful, customer-centric strategies. The study revealed that technical skills in data analytics and familiarity with data platforms are foundational, yet equally important are soft skills such.

- **Utilizing Data :**

We have seen that Big Data enables rapid collection of massive amounts of data. Today, Big Data is found in digital processes and social media interactions, systems, sensors, mobile devices—multiple sources generating data at an alarming speed, volume, and variety. Big Data is truly pervasive across all organizations, and information has become essential to business operations. Especially with the advent of the internet, unlimited mobile plans, and new technologies, data flow volumes have grown substantially, even massively. However, merely collecting information is no longer enough. Possessing data alone doesn't suffice; data must be « brought to life » by knowing how to use it effectively to create value. Data storage and analysis provide the added value and purpose of data collection. Effectively utilizing data is crucial to extract as much insight as possible. Data intelligence should therefore enable data analysis and utilization to uncover essential insights, such as consumer behavior, that drive business activities and specifically guide strategic decision-making.

This is connected to the concept of Business Intelligence mentioned in the literature review. Business Intelligence encompasses various practices related to collecting and leveraging business data. The analysis of this information serves as a foundation for strategic reflection and provides essential support for companies.

The goal of Business Intelligence is to « tell a story »With the gathered data. Raw data grids are often difficult to interpret and ineffective. This is why the use of visualizations, depending on data type and objectives, is essential.

These tools are generally divided into four components:

- Data retrieval
- Logical Data modeling
- Dashboard creation
- Sharing and distribution

- **Optimizing time and costs:**

However, it is crucial to collect data at the right moment, as data flow varies and is not consistent over time. Big Data allows for the collection of an enormous amount of data, and as previously mentioned, a solid Business Intelligence strategy is essential for effectively utilizing this data.

To achieve this, the company must clearly define its objectives, which will guide the analysis of Big Data in alignment with the company's goals and challenges.

More specifically, it involves knowing which data to seek, at the right time and in the right place, which requires excellent organization. This approach will not only yield more relevant insights but will also help optimize costs and time for the company.

- **Identifying the need :**

Knowing which data to search for implies that one must understand what to do with Big Data. One of the most important skills is to know why we want to use Big Data and which data is relevant to us.

Indeed, certain preliminary steps must be taken, starting with identifying the problem to be solved and determining at which point the customer experience needs improvement—whether it is before, during, or after the purchase, or at every stage. Data should remain a means to enhance processes, but Big Data is a tool; therefore, we should begin with the problem, analyze it, and see how it can be improved. Subsequently, we can use Big Data if it will help solve the problem or meet the company's expectations. This means specifying the type of data needed and defining business issues beforehand. A precise formalization of operational processes is necessary, identifying key data to be collected at each step of the process. However, many companies embark on a « Big Data » approach without going through this step.

Identifying the key data to collect goes hand in hand with a needs expression that should be pragmatic, simple, and concrete, along with predefined indicators to measure real gains throughout the implementation of the approach.

As mentioned earlier, the company should first state its objectives and issues, and based on that, guide the analysis of Big Data.

The results of the field study allowed us to obtain technical solutions to transform the collection and processing of Big Data into a favorable customer experience.

Theme 3: The evolution of Big Data

In the realm of technological innovations, certain advancements already exist, such as Cloud computing, facial and image recognition, and augmented reality. Other emerging ideas leverage mature technologies. One notable innovation is Deepfake technology, which involves creating fake content that appears credible and authentic through artificial intelligence. Generally, this involves a video of a person in which their face or body has been digitally altered to make them appear as someone else, often used to disseminate false information.

As we have seen, the more personalized a consumer's experience, the more satisfied they are likely to be and the more inclined they are to make a purchase. Deepfakes can enhance personalization at various levels and can be applied across numerous channels, including the internet, podcasts/radio, television, billboards, and chatbots.

Virtual reality is another technological innovation within Big Data that has the potential to enhance customer experience in the future. This technology allows a person to be immersed in a digitally created artificial world. With virtual reality, it becomes possible to immerse each consumer in a personalized virtual world that enhances their sensory perception. When utilized effectively, virtual reality can offer an emotional customer experience in a new way.

Today, successful customer experience would, of course, equate to a satisfied customer. To achieve this, a simple and quick journey is essential. To ensure an excellent customer experience, it is crucial to maintain a presence throughout the entire journey—before, during, and after the sale—across all points of contact.

Whether in-store or on a website, consumers must be able to quickly access services in case of questions. For example, offering proactive assistance from an on-site advisor or through a chat solution integrated into the website can enhance experience. Consumers should also have effective ways to contact the company and know where to go if they encounter issues after a purchase.

Successful customer experience also translates to repeat customers. This connects to the need for a simple and quick customer journey that fosters customer loyalty. Naturally, a customer who enjoyed their experience will want to return to relive it or have an even better one. Therefore, a positive customer experience enhances retention and builds trust with the customer.

When it comes to customer experience without technological or budgetary constraints, virtual reality emerges as a compelling option. Customers are increasingly seeking more immersive and user-friendly experiences, which calls for making things even more digital and visual.

Alternatively, one might consider the introduction of a chip in the brain to precisely understand what customers think, what they like, and to genuinely grasp their expectations, needs, and frustrations. This could enable companies to maximize their responses to customer needs and minimize frustrations, aiming for the most successful customer experience possible. However, the issue of ethics quickly arises, and the notion of operating without technological and budgetary constraints can lead to ethical dilemmas. On the flip side, personal data can also act as a barrier to achieving an optimal customer experience.

Conclusion:

Big Data creates a surplus of information that companies can leverage to enhance their strategies and operations. It can also transform customer engagement by improving the overall customer experience.

What we refer to as the customer experience encompasses all interactions a customer has with the company; it involves the emotions felt by a customer before, during, and after purchasing a product or service.

Therefore, if Big Data has the potential to enhance the customer experience, it indicates that it can influence these three distinct moments effectively.

That's why, in the context of this thesis, the objective was to address the following question: What actions need to be taken to improve the customer experience using Big Data?

To achieve this, a literature review was conducted to study and deepen the understanding of the two main topics: Big Data and customer experience.

Subsequently, a qualitative study was carried out with five employees working in the Big Data field to provide more precise insights and answers to our questions.

The aim of this study was to gain a clearer understanding of the experimentation with Big Data and customer experience, identify key competencies and technical solutions regarding Big Data that can enhance the customer experience, and understand the evolution of Big Data for an improved customer experience. The study highlighted various perspectives, as the respondents had diverse backgrounds in terms of their roles and experiences, allowing for a comprehensive view.

This study led to the following conclusion: There are different actions to take in order to improve the customer experience through Big Data. These actions can be divided into two parts : key.

The actions to be taken are numerous and varied across all dimensions of Big Data. In terms of key competencies, we identify the ability to exploit data, identify needs, and optimize time and costs, which are considered the most important skills. Regarding technical solutions, consumer preference selection, A/B testing, facial recognition, and predictive analytics on purchases are the most significant solutions for improving the customer experience through Big Data. All these solutions contribute to a better understanding and knowledge of the customer, the personalization of the customerjourney, the creation of an emotional connection, and the measurement of customer satisfaction.

Big Data represents a transformative shift in business practices, offering technical solutions and innovative possibilities to continuously engage customers by collecting valuable data on their experiences. This new vision likely presents opportunities to guide customers through the various phases of their consumption

experience, from initial engagement to becoming brand advocates. However, the success of Big Data largely depends on customer involvement and their willingness to provide information about their consumption journey, particularly regarding aspects that may enhance their emotional experiences. We are now left to consider whether the regulation of personal data could be a barrier to improving the customer experience.

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