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THE IMPACT OF BUSINESS INTELLIGENCE (BI) TOOLS ON THE EFFECTIVENESS OF MARKETING DECISION-MAKING PROCESSES IN ORGANIZATIONS

L'IMPATTO DEGLI STRUMENTI DI BUSINESS INTELLIGENCE (BI) SULL'EFFICACIA DEI PROCESSI DECISIONALI DI MARKETING NELLE ORGANIZZAZIONI

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ABSTRACT:
In a world where an immense quantity of data is generated on a continuous basis, businesses are facing the challenge of identifying effective methods to capture the potential value embedded within this data and to enhance their understanding of their own company, as well as of the competitive landscape in which they operate. This is made possible by the subjects of big data management and business intelligence (BI). Together, these two elements represent a system of both technological and organizational components which enable company to analyze data, in order to make prediction and to respond effectively to market changes.
A significant volume of research has been conducted in the field of business intelligence (BI). However, the subject of business intelligence is vast, and indeed, there are numerous gaps in the practical application of this system, particularly in the field of marketing. It is unclear what the process is from the data collection to the final decision and especially how practically BI tools influence this procedure. Therefore, the objective of this research is to examine this topic in depth, with a particular focus on elucidating the various facets of business intelligence and the role of business intelligence tools in marketing decision-making processes.
Therefore, the objective of this thesis is to address the following research question: *"How do Business Intelligence (BI) tools impact the effectiveness of marketing decision-making processes in organizations?"* In addition, it addresses two research sub-questions: *"What are the key factors that organizations consider when selecting BI tools for marketing purposes?"* and *"How do these factors contribute to the overall success of marketing strategies?".* These questions assist in understanding how BI is integrated into company's organizational systems and how it improves the marketing decision-making practically.
This study employs a multiple-case study design with a sample of five Italian multinational companies. The methodology is based on a qualitative approach, with data collected through interviews. The interviewees are employees working in either the marketing or business intelligence (BI) units of the companies, and the interviews were conducted in either Italian or English.
The results of the thesis demonstrate that the most prevalent BI tools in the sampled companies are Excel and Power BI. The factors that inform decision-making are the automation of processes and the subsequent increase in speed, efficiency, and effectiveness. These characteristics are of particular importance in an environment characterized by a high volume of data, which requires the ability to process and analyze it effectively. Finally, the BI system is a support for the human factor, with both working in conjunction and a high dependency between the two.

ABSTRACT

In un mondo in cui viene generata un'immensa quantità di dati ogni secondo, le aziende si trovano a dover affrontare la sfida per individuare metodi efficaci e per catturare il valore potenziale incorporato in essi e migliorarne la comprensione. Ciò è reso possibile grazie alla gestione dei big data e tramite l'utilizzo dei sistemi di business intelligence (BI). Insieme, questi due elementi rappresentano un apparato di componenti tecnologiche ed organizzative che consentono alle aziende di analizzare i dati, di fare previsioni e infine di rispondere efficacemente ai mutamenti del mercato.

Nell'ambito della business intelligence (BI) è stato condotto un volume significativo di ricerche. Tuttavia, l'argomento della business intelligence è vasto e, in effetti, ci sono numerose lacune nella sua applicazione pratica, specialmente nel settore del marketing. Non è chiaro quale sia il processo che inizia dalla raccolta dei dati fino alla decisione finale e soprattutto, come gli strumenti di BI influenzino concretamente questa procedura. Pertanto, l'obiettivo di questa ricerca è quello di esaminare in profondità questo argomento, con particolare attenzione a chiarire le varie sfaccettature della business intelligence e il ruolo dei suoi strumenti nei processi decisionali di marketing.

Al fine di raggiungere questo scopo la seguente domanda di ricerca è stata formulata: "In che modo gli strumenti di Business Intelligence (BI) influiscono sull'efficacia dei processi decisionali di marketing nelle organizzazioni?".Inoltre, due sotto-domande di ricerca vengono affontatate: "Quali sono i fattori chiave che le organizzazioni considerano quando selezionano gli strumenti di BI per scopi di marketing?" e "Come questi fattori contribuiscono al successo complessivo delle strategie di marketing?" Queste domande possono aiutare a comprendere come la BI sia integrata nei sistemi organizzativi aziendali e come migliori il processo decisionale di marketing.

La ricerca è un multiple-case study ed è condotta su un campione di cinque multinazionali italiane. La metodologia si basa su un approccio qualitativo, con dati raccolti attraverso interviste semi-strutturate. Gli intervistati sono dipendenti che lavorano nelle unità di marketing o di business intelligence (BI) delle aziende e le interviste sono state effettuate in italiano o in inglese.

I risultati della tesi dimostrano che gli strumenti di BI più diffusi nelle aziende del campione sono Excel e Power BI. I fattori che influenzano il processo decisionale sono l'automazione dei processi e il conseguente aumento di velocità, che porta a un'efficienza ed efficacia dei processi decisionali di marketing. Queste caratteristiche sono particolarmente importanti in un ambiente caratterizzato da un elevato volume di dati, che richiede la capacità di elaborarli e analizzarli in modo efficace. Infine, il sistema di BI è un supporto per la componente umana, esiste una forte dipendenza tra i due ed entrambi devono lavorare insieme per poter permettere al processo decisionale di attuarsi.

Contents

Figures

Tables

1 Introduction

1.1 Background of the Study

The “massive” generation of data in real-time can help organizations in optimizing their decision-making (Pigni et al., 2016, p. 5). In daily activities, humans generate data. For example, in a grocery store, each item purchased is recorded by the store's system, allowing the store to identify which items are the most frequently purchased, which are the least popular, and so forth. As evidenced in the IBM report, "Turning data into value: How top Chief Data Officers deliver outsize results while spending less" data and its use have become a necessity, rather than an option. The report notes that data is now “*the foundation for every business decision, strategy, and operating model, is no longer a mundane topic relegated to the furthest reaches of the IT department*” (IBM Institute for Business Value, 2023, p. 1). The rationale for this is that data are the primary means of developing novel solutions to customers' needs, facilitating integration across the entire supply chain, including suppliers and customers themselves, with the objective of establishing an ecosystem and expediting data transfer (IBM Institute for Business Value, 2023).

However, the challenge that companies are facing is not the collection of data. It is the transformation of data into useful information (Ahmed, 2021, p. 238). Information that can help improve the quality of input to any decision-making process within a company. The exponential growth in data generation presents a significant challenge for companies. By 2025, it is estimated that data will reach 181 zettabytes (181 000 000 000 000 000 megabytes). Even a small subset of this data requires substantial resources in terms of financial, temporal, and human capital (Statista, 2023). Hence, “Business Intelligence (BI) is emerging as a key enabler for increasing value and performance” in the companies these days (Watson & Wixom, 2007, p.

96). Business Intelligence defined as a system that embrace both technical and organizational elements to make better use of data, enabling users to make analyses, both historical and predictive, can support decision making at all hierarchical levels and departments of a company (Isik et al., 2011). Businesses use BI and its tools to improve relationships with existing clients, to meet the needs of new customers, and to support decisions at all levels of the organization (Negash, 2004). In particular, business intelligence (BI) tools can facilitate the prediction and identification of consumer preferences. This may be achieved by discerning the preferred items or distribution channels of a selected market, or by anticipating the trajectory of a product launched into the market.

Zaby and Wilde (2018) argue that today's businesses are becoming more and more dependent on Customer Relationship Management (CRM) as a source of competitive advantage. Rababah et al. (2011) define CRM as "building of a customer-oriented culture by which a strategy is created for acquiring, enhancing the profitability of, and retaining customers, that is enabled by an IT application; for achieving mutual benefits for both the organization and the customers" (p. 223). As a result, an organization can respond quickly to market changes by using data in the CRM process (Katsikeas et al., 2019 as cited in Del Vecchio et al., 2022). More specifically, these necessities can be fulfilled by the use of IT application such as Business Intelligence tools to personalize the offerings, to achieve improvements in brand reputation and loyalty creation as well as building stronger relationships with customers (Ansharietal.,2019; Del Vecchio et al.,2020; Hallikainenetal., 2020 as cited in Del Vecchio et al., 2022). However, according to Del Vecchio et al. (2022) the analysis of data is important but complex. The successful implementation of a customer relationship management (CRM) strategy requires the integration of multiple elements. BI tool users, such as employees, who utilize BI tools on a daily basis, must cultivate the appropriate attitude to develop the competencies and skills. The availability of technologies for analyzing large data sets, and consequently BI tools that align with the

company's needs—such as a user-friendly interface, rapid data analysis, and so forth—is also a prerequisite. As a result, new CRM-processes are emerging to manage consumer data and make marketing decisions, such as Marketing Intelligence (MKTI). Marketing Intelligence is an area of Business Intelligence that focuses on marketing decisions. In particular, according to Guarda et al. (2012) “The MKTI is a complex process that goes from the collection of data from the organizations environment, until the generated quality information to assist marketing and strategic decision making” (p. 458). Consequently, Marketing Intelligence aims to identify and collect relevant data for analysis, and to extract relevant knowledge to support marketing decisions.

Organizations must have a good understanding of the customer, especially in international markets where competition is fierce and intense. The presence of multinational companies has led markets to become highly internationalized, which has created new challenges (Steers et al., 2010). Moreover, managers are accountable for making use of their company's resources in a way that aims to achieve their organization's objectives (Drucker, 2012). The process of internationalization is, among other things, a requirement for organizations to expand into foreign markets and to be reactive to customer needs (Katsikeas et al., 2019 as cited in Del Vecchio et al., 2022). This requires companies to use large-scale data to take accurate decisions on how to manage international market uncertainty while maintaining a sustainable local edge. Therefore, the need for BI tools is even greater as international aspects increase complexity (Del Vecchio et al., 2022).

1.2 Research Gaps, research questions and objectives

The management of big data is a process that incorporates a series of stages, with the central objective of utilizing the data in question. The term "big data" is used to describe sets of data produced by people every second, which are large in size, generated at a high speed, and complex (Balusamy et al., 2021). As a result, determining which data are relevant for a company is a challenging task due to the characteristics of big data. Nevertheless, it is essential for companies to identify an effective approach to managing this substantial volume of data. Big data management is a process that assists companies in organizing and representing data in an effective manner. This enables the utilization of raw data to create information, which can then be employed to make the best decisions for the company. The steps of big data management include, first, the collection of data, which is gathered from a variety of sources. The second step is the cleaning of the data, which involves the elimination of incomplete or irrelevant data and the standardization of data formats and sizes. The third step is the integration of data from disparate sources to facilitate organization and enable representation to individuals without the requisite technical expertise (Qi, 2020).

Although theory of big data management helps to understand the majority big data management processes, it still has multiple research gaps, as argued by Fan et al. (2015). First, existing literature lacks in understanding about the methods for selecting the data as well as efficient tools for their analysis. For instance, Negash (2004) demonstrates the inconsistency in understanding how firms acquire real-time data practically, both for decision-making and infrastructure (p. 187). In light of the increased amount of data, it is essential to research the most efficient method for selecting the data to analyze, as well as the tools used to analyze it. Furthermore, Ain et al. (2019) advocate for the inclusion of new insight into the use of Business Intelligence tools and its domain in future studies. In particular the research lacks in taking into account the

effectiveness and efficiency of data exploration techniques and decision-making processes. For instance, Ain et al. (2019) underline the absence of useful insights in data exploration technique.

Second, there is currently no key metric that can be used to calculate the impact of implementing a BI system or adopting BI tools. Negash (2004) argues that a research issue is to measure the impact of BI on the company's processes. As a result, company performance does not explain whether a BI implementation has been successful or not. For instance, before installing a BI system, the challenge is to evaluate the return on investment (ROI). The initial cost of BI is high, as is the cost of maintenance of the BI system. Consequently, efficiency savings are only a small part of the return on investment, even though the cost of the information system is expected to be reduced through efficiency (Negash, 2004, p. 185). As a key measure of BI success, Ain et al. (2019) confirm that future studies should focus on the decision performance enabled by business intelligence tools.

Last but not least, there is insufficient research about BI tools in the marketing field and CRM in particular. It is possible to affirm that the current literature lacks practical use of the business intelligence tool in the marketing field. The authors argue that, given the increasing amount of data available, there is a need to consider how to select appropriate data sources for particular purposes. The wide range of current analytical methods does not allow timely processing of all available data. For marketing intelligence management, data selection is therefore a critical decision. Future research on the alignment of data and marketing intelligence objectives is needed to determine how to select data that can add the most value to business decisions (Fan et al., 2015). Despite the fact that customers generate a significant amount of data, it is a challenge to determine which ones to utilize and which to ignore. Consequently, CRM processes are a valuable source of data, but the challenge is the identification of which data are useful and which are not. Regarding the analysis of market and especially customer data, future research

could also take into account the importance of acquiring market knowledge for companies to be able to compete in international markets (Del Vecchio et al., 2022).

In light of the previous observations, the objective of this thesis is to address the existing gaps for a number of reasons. Firstly, there is no clarity regarding the processes by which companies elaborate data. Consequently, there is a lack of visibility into the manner in which data are analyzed and selected from the vast quantity of data available. Additionally, the practical aspects remain underexplored. Secondly, the extant literature provides an extensive and yet superficial explanation of the concept of Business Intelligence (BI), failing to focus on the BI tools themselves and their characteristics. This study aims to elucidate the reasons behind the selection of specific tools over others. Thirdly, while customer relationship management (CRM) is a valuable resource for companies, it is unclear whether they utilize it to import customer data from the CRM system or whether they rely on alternative sources, such as sales data, as the primary input.

The lack of transparency represents a significant challenge for companies seeking to fully leverage the capabilities of business intelligence (BI) tools. There is a scarcity of knowledge regarding the internal workings of BI tools and the prevalence of specific tools within the industry. These limitations should be addressed, as companies can thereby gain a more comprehensive understanding of their BI systems and the specific capabilities of their BI tools. This could entail identifying the principal attributes that contribute to the efficacy of a company's BI tool and its alignment with their distinctive requirements. Consequently, addressing these issues can assist companies in making informed decisions regarding the purchase of a license for a specific BI tool, which is widely recognized as being superior to others in accordance with the company's requirements. Moreover, integrating customer relationship management (CRM) into marketing

decisions can assist companies in acquiring a more profound comprehension of their customers, who may serve as the primary source of data.

To address the identified research gaps, this thesis raises the following research question: “How do Business Intelligence (BI) tools impact the effectiveness of marketing decision-making processes in organizations?”. This question aims to understand how BI tools are used in decision-making and how they affect the process of decision-making in marketing strategy of a company. Furthermore, the thesis will contain other sub-questions such as “What are the key factors that organizations consider when selecting BI tools for marketing purposes?” and “How do these factors contribute to the overall success of marketing strategies?” The findings generated from these sub-questions will help to understand what BI tools companies integrate and whether there are any major differences in the way they are used. Additionally, the objective is to understand the possible benefits from both an organizational in terms of agility and efficiency in taking decision and economic performance perspective.

Regarding the research methodology chapter provides an understanding of the approach used to answer research questions. For instance, the most used research approach is the quantitative one (Ain et al., 2019). Therefore, in order to gain different insights into the topic under study and hopefully fill in the theoretical gaps, the choice of a qualitative method can be helpful. In addition, Ahmed (2021) suggests that the study should be conducted in a different country from the US. Consequently, more European data is needed and to compensate for this lack, the sample is composed of Italian international companies.

1.3 Structure of the Thesis

The thesis has the following structure. The first chapter illustrates the initial background of the study, the research gaps of the current literature and finally the research questions are presented.

The second chapter deals with the theoretical framework, which summarizes the existing theories and literature on data and its management for creating value, with a special focus on the Digital Data Stream, Business Intelligence content, both its structure and the tools that are used for analyzing data, customer relationships and as a source of data creation, and finally the subject of Marketing Intelligence. The third chapter deals with the research methodology of the thesis. This section will illustrate the research method chosen for the thesis. The dependability, credibility and confirmability of the research method is the subject of discussion in this part. The results of the case studies carried out are discussed in the fourth chapter. Finally, the last chapter illustrates a discussion and conclusion of the results of the case studies. In order to write the thesis DeepL (https://www.deepl.com/en/translator and https://www.deepl.com/en/write) a tool powered by an AI has been used to translate the key terms or sentences from Italian to English and for proofreading sentences in order to ensure clarity and coherence in the text.

2 Literature review and Theoretical Framework

2.1 The rise of data

Internet and data are everywhere. It is possible to find them in daily activities like shopping or scrolling through social media sites like WhatsApp, Facebook, Instagram, Snapchats, YouTube etc. According to Domo's Data Never Sleep 10.0 report, the internet reaches around 5 billion people, 63% of the global population, and 93% of them are social media users (Domo, 2022). The infographic below is an illustration of the amount of data from social media applications and internet pages that was generated in one minute in 2022.

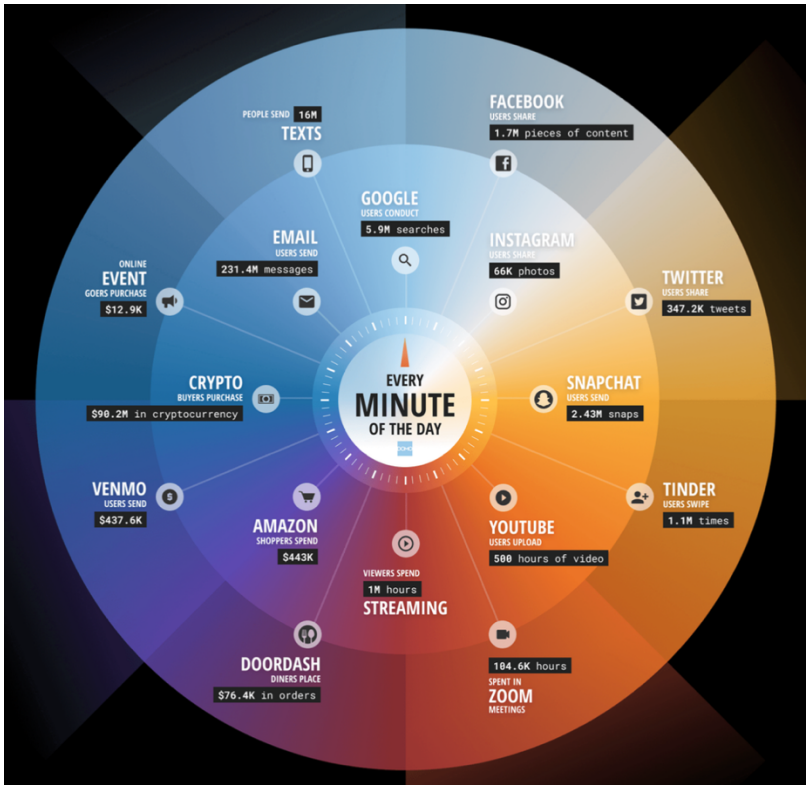

Figure 1: Infographic of data production in one day (Domo, 2022)

The Cambridge Dictionary (n.d., Definition 1) defines the terms “Big Data” as “very large sets of data that are produced by people using the internet, and that can only be stored, understood,

and used with the help of special tools and methods". However, the term "Big Data" refers not only to its size, but also its complexity and the speed at which it arrives and passes.

The concept of big data encompasses three distinct dimensions: volume, velocity, and variety. Also referred to as the 3Vs of big data (Balusamy et al., 2021). Firstly, the term "volume" refers to the significant amount of data that is produced every second. Figure 1 provides a clear example of this dimension. Exponential growth enables firms to capture and create value from data. The volume is measured in bytes, with big data starting from terabytes up to zettabytes (i.e. from 1000^4 to 1000^7 bytes). Gathering this vast amount of data presents an opportunity to improve customer service and gain a competitive advantage in business (ibid.). As discussed previously, social media and the internet in general are the primary sources of data production, for example Instagram users share 66k photos in only one minute (Domo, 2022). Consequently, it is possible to affirm that the amount of data generated daily by every action is enormous.

The second dimension of Big Data, "velocity", refers to both the speed at which data is generated and the rate at which it is processed and analysed. Due to the high speed at which data is created, capturing its value can be challenging. Furthermore, the analysis of it remains critical (Balusamy et al., 2021).

Furthermore, the term "variety" refers to the different formats of data, including structured, semi-structured, and unstructured data. Structured data is organized in chats and is typically handled by traditional database management systems. It is highly organised, and it can be easily analysed using data mining tools. Examples of structured data include employee records and bank customer records. This second category is considered semi-structured because it does not follow the formal data model of traditional databases, which is a table, but instead uses tags to organize fields within the data. This is data which has a structure but does not conform to a relational schema. Semi-structured data is organized, making them easier to analyse compared

to unstructured data. An example of semi-structured data is XML, which consists of a document that contains lines of code related to specific fields. Indeed, only those with coding skills can understand it. Finally, unstructured data, such as email messages, photographs and web pages, refers to data that lacks a definite structure and is considered raw. For instance, 80% of the data generated is unstructured (Balusamy et al., 2021). The graphical representation of the 3Vs of big data and their characteristics is shown in the figure below.

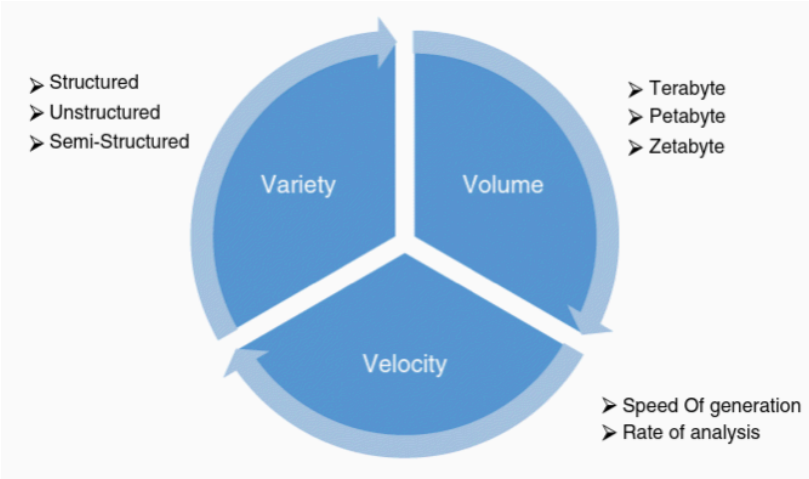

Figure 2: The 3Vs of Big Data (Balusamy et al., 2021)

It is possible to affirm that data production has increased exponentially in recent years. As a result, companies are trying to capture data and create value from it. Furthermore, the existing literature is centered on Digital Data Streams and their management, as explained in the subsequent paragraph.

2.1.1 Digital Data Stream (DDS)

In light of what has been discussed above, people generated a large amount of structured and unstructured data streams over the last few decades. The Digital Data Stream (DDS) is based on big data, but it has a different nature. Big data is large amounts of typically static data that

can be mined for insights. Piccoli et al. (2015) define Digital Data Stream (DDS) as the continuous digital encoding and transmission of data describing a related class of events (p. 929). DDS are dynamically evolving sources of data that change over time and have the potential to drive action in real time (Piccoli & Pigni, 2013). Consequently, organizations can use this data to make decisions (Pigni et al., 2016). DDS, in particular, is helping to increase both the amount and speed of data and is a driver of the Big Data trend (Piccoli et al., 2015). However, it is important to emphasize the nature of the Digital Data Stream, how it is composed and how organizations can use it to extract value. Real-time analysis is possible with DDS streaming. The DDS has the ability to represent the six elements that are commonly used to define an event, also known as the 5W+H of narrative (Pigni et al., 2016). The following table presents the elements in question.

Table 1. Digital Data Stream elements (Pigni et al., 2016)

Element	Description	Example
When	The time when the data segment was created	A timestamp with date, time, and time zone
Where	The location of the entity when the segment was created	Latitude, longitude, elevation
Who	The unique identifier of the entity that caused the data segment to be created	Person's customer number, RFID of a pallet, URL of a web site
What	The activity that caused the segment to be created	The identifier of an item in a sales transaction, the arrival of a ship in a port
How	The means by which the event was initiated, authorized, or completed	Credit card number for payment, status of arriving flight (e.g., safe landing)
Why	Motivation for the action related to data segment creation	Birthday gift, planned destination

According to Piccoli and Pigni (2013), the lifecycle of a digital data stream involves various stages, starting from its creation and ending with its utilization to generate value. This is illustrated in Figure 3.

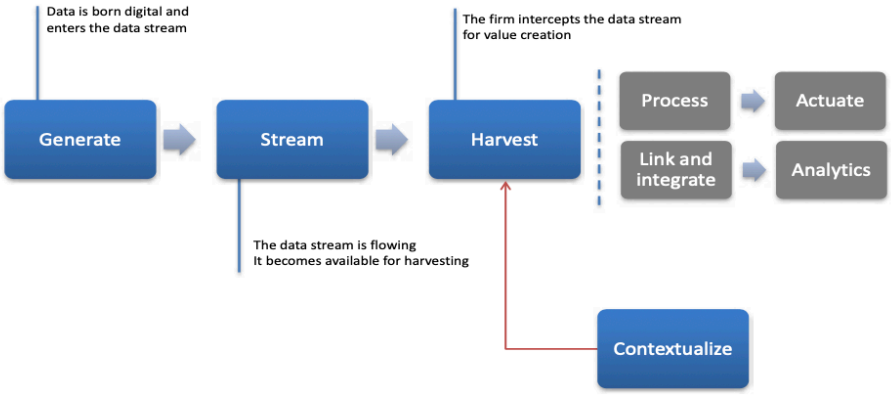

Figure 3: Three stages of a DDS (Piccoli & Pigni, 2013)

The first phase, called "generate" (as in Figure 3), begins with the occurrence of an event; this event is the starting point of a DDS. This phase is also commonly known as "Digital Data Genesis". A Google search is an example of an event that could activate this phase.

Following the previous phase, we enter the "stream" phase which pertains to the method and structure of data accessibility. By the end of this stage, the available data can be transferred to a continuous flow (i.e. DDS). According to Piccoli and Pigni (2013), the "stream" in this phase exhibits four distinct characteristics: the technology responsible for creating the channel such as application programming interfaces (APIs), the nature of the content being transmitted, the data source whether public or private, and the legal status of the data including the rights and sensitivity derived from its possible use.

Finally, the "harvest" phase is where a company can derive value from the streamed data. In this phase, data is transformed into useful information by adding context. This process is essential for companies to extract value from data and implement a data-driven strategy (Piccoli & Pigni, 2013, pp. 54-55). However, it is important to note that the information serves as the starting point for a strategy based on Big Data and, consequently, on DDS. In the light of the above, the generation of value from digital data streaming and data will be discussed next.

2.1.2 Creating Value from Digital Data Stream

As previously stated, a DDS can play a crucial role in creating value. Value creation, from a company's perspective, can be achieved by either increasing customer willingness to pay or reducing costs (Piccoli & Pigni, 2013, p. 55). However, taking action based on data may not always be immediate due to critical and latency issues that may arise between a business event and taking action (Hackathorn, 2002). Figure 4 presents a table that demonstrates the timing of a business transaction, its duration, and its conclusion. The transaction data is subsequently stored, analyzed, packaged, and shared within the company. Informed decisions can be made based on the analysis of this data. The action distance refers to the time required to react intelligently to the business transaction (Hackathorn, 2002, pp. 24-25).

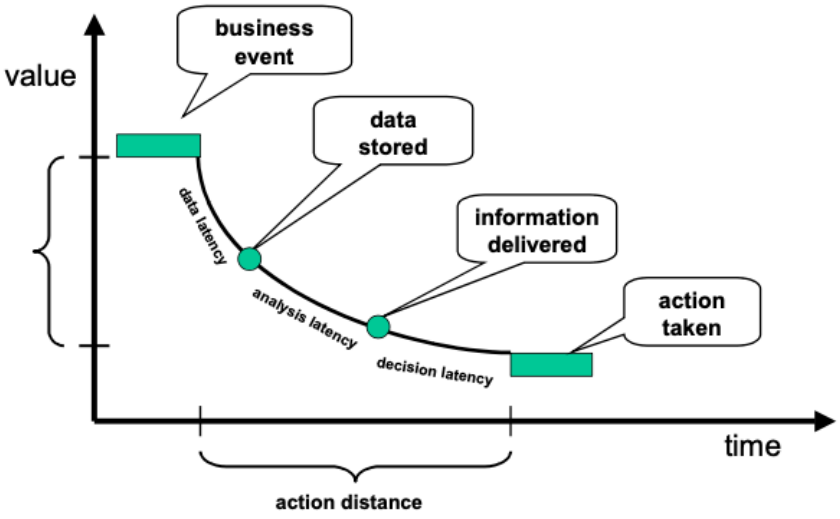

Figure 4: Value-Time Curve and response time latency (Hackathorn, 2002)

Figure 4 illustrates that action distance can be influenced by three key factors: data latency, analysis latency, and decision latency. Data latency refers to the time between the business transaction and when the data is ready for analysis in the warehouse. Analysis latency is the time it takes to initiate the analysis, package the results, and share them. Decision latency is the time it takes to analyze the information and make an appropriate decision. It is important to

consider that the final factor, decision latency, is the most significant contributor to the end result. The first two factors serve as the necessary infrastructure for the third. Although technological advancements are reducing data and analysis latencies, decision latency will continue to be a limiting factor (Hackathorn, 2002, pp. 24-25).

An organization's ability to reduce response latency, and thus improve the speed of decisions and actions, is the strategic advantage of a DDS. According to Pigni et al. (2016), organizations derive value from events in a DDS through either process-to-actuate or assimilate-to-analyze tactics. Process-to-actuate is implemented when a company generates value by taking action based on real-time DDS processing. The company assimilates current events into a DDS in order to alert customers who may be affected in a timely manner. The assimilate-to-analyze process involves extracting value by combining multiple data streams and databases and dissecting the composite dataset. The focus of this process is on the extraction of information, rather than on immediate action. Some companies have chosen to integrate external demand driven systems into their forecasting process to address the financial risks associated with planning errors. It is important to balance these opportunities with the needs of management and the business environment, while recognizing the potential of new DDSs to reduce response time latency (Pigni et al., 2016, pp. 10-12).

One possible way to utilize Digital Data Stream is by reducing response time latency. Organizations may create value through DDS by implementing the value archetypes, which represent different types of initiatives aimed at generating value through the use of DDS (Piccoli & Pigni, 2013). According to Pigni et al. (2016), by creating one or more streams of data, the Generation archetype adds value. Organizations that recognize events with a high flow capacity are the generators of these data streams. A stream can be created in two ways: either the data are intentionally collected, such as loyalty card data, or they are generated in the course of business,

such as sales. Until it is applied to a critical problem, generation creates a resource and can therefore be considered pre-strategic. Organizations adopting this archetype aim to apply a process-to-actuate approach to value creation.

The aggregation archetype occurs when a company collects, aggregates and re-uses streams of digital data in order to create value through information services. The platforms created by these companies provide access to DDS generated by other companies. In doing so, they exploit the perceived value in the fluidity of specific events with the potential for large-scale value generation. This approach resembles that of established financial data providers like Bloomberg. However, aggregation archetypes are still considered a pre-strategic action. Many aggregators are combining different data streams and making it usable for customers who are looking for ways of mitigating one of three risks: demand risk, inefficiency risk, and innovation risk (Pigni et al., 2016).

The next archetype, Service, deals with demand risk, and is used by companies that are merging and managing DDSs to provide new services or improve existing ones. It is useful for improving customer service and addressing demand risk through DDS analysis. For example, myTaxi collects GPS coordinates from customers and taxis via a mobile application to improve its services (Piccoli & Pigni, 2013).

The Efficiency archetype addresses the risk of inefficiency by optimizing internal operations or tracking business performance using internal and external DDS. Assimilate-to-analyze is applied in this case with the aim of reaping efficiency gains. The archetype aims for greater organizational efficiency that translates into customer value. Higher performance, lower prices and cost savings are examples of actions taken to achieve this (Pigni et al., 2016).

Finally, the Analytical Archetype uses DDS to improve decision making by generating superior insights through techniques such as dashboards, data mining and visualization. It creates value

through data analysis. These organizations innovate for value creation by exploiting the increased capacity for event flow. This archetype combines different streams of information to underpin high-value opportunities and reduces innovation risk (ibid.).

It is important to identify the archetypes of value creation and to implement them. However, companies also need to develop the organizational capabilities that will enable them to create value and, most importantly, to generate a profit from DDS. Piccoli and Pigni (2013) identify different information technology capabilities which a company should acquire to manage data-driven initiatives.

The literature defines the “Dataset” as a DDS strategy based on the ability to find valuable sources. In order to achieve this, a company needs to develop the ability to identify potential internal and external DDS. Secondly, once a company has found a reliable source, it needs to extract value from it. The term “Toolset” refers specifically to a company's ability to use appropriate tools to extract DDSs. Third, “Skillset” refers to the essential competencies required to coordinate complementary assets to create DDS-based value. Fourthly, “Mindset” is a critical capability because it refers to the willingness of the company to invest in data-driven initiatives. The focus is on the organization's mindset to embrace change, even if it is risky (Piccoli & Pigni, 2013; Pigni et al., 2016).

In conclusion, it is important to acknowledge that big data and its management are becoming increasingly significant. Organizations must consider all data-related strategies, competencies, and risks, particularly those related to DDS. Creating value from data can be a complex process, requiring organizations to utilize specific tools and develop their knowledge of Business Intelligence. This involves transforming data into useful information to inform decision-making. The section 2.2 will discuss Business Intelligence and its tools, which enable the extraction of valuable data.

2.1.3 A successful use of Digital Data Stream

Uber has implemented DDS successfully. In 2015, the company was valued at 50 billion dollars (Myers, 2015). The firm, which was founded in 2009, operates a ride-hailing platform that connects customers and drivers in major cities worldwide through a mobile app (Bowcott, 2017 as cited in Willis & Tranos, 2021). The app uses the user's smartphone GPS to geolocate nearby drivers in real-time. By simply tapping a button, it is possible to request a ride, with the cost being known in advance and the driver's arrival being trackable (Piccoli & Pigni, 2021, p. 72). Indeed, Uber's strength, which do not own vehicles, is the use of real-time data to match its drivers' cars with real-time demand for rides (Pigni et al., 2016). Mobile computing technologies such as those used by Uber can provide valuable insights into urban trading behaviors, social activity and road network dynamics, based on big data from GPS-equipped vehicles. It is worth noting that Uber has gained significant market share in the transport industry, surpassing that of traditional taxi companies (Zhou et al., 2016).

2.2 Business Intelligence

The use of Business Intelligence (BI) systems is necessary to capture the value of data and make rational decisions. As information has been acknowledged as a company's most valuable asset and a fundamental resource for its development, BI is playing an increasingly important role in different types of organizations (Tavera Romero et al., 2021). Negash (2004) provides a definition of the function of a BI system as follows: "BI systems combine data gathering, data storage, and knowledge management with analytical tools to present complex internal and competitive

information to planners and decision makers" (p. 178). Systems and BI tools play an important role in the strategic planning process of businesses. They allow the analysis of the current state of the business and its performance, as well as they facilitate the access to the information needed for day-to-day operations (Aaker et al., 2009 as cited in Guarda et al., 2012).

Negash (2004) states that Business Intelligence tools require both structured and unstructured data as input. Structured data is organized in tables and easily accessible, while unstructured data is not. Examples of structured data include Online Analytic Processing (OLAP), Data Warehouse, Enterprise Requirement Planning (ERP), and Data Mining (Negash, 2004, p. 178). For a thorough understanding of structured data, Piccoli and Pigni (2021) provide definitions for OLAP, data warehouse, ERP and data mining in the following list.

- Online analytical processing (OLAP) is a software application which allow knowledge workers to simply and efficiently retrieve and display data from an analytical database.
- Data warehouse is a software program for gathering and aggregating data from different input sources, both internal and external, to enable analysis.
- Enterprise Requirements Planning (ERP) refers to integrated and modular software solutions that connect all business units and are built on a single database.
- Data mining is a process that involves the automated detection of hidden patterns in extensive databases.

On the other side, conversations, movies, videos, web pages, graphics, and other similar items are considered "unstructured data", but when it is organized in folders or become easy to understand they can be considered semi structured, for example the e-mails themselves are considered unstructured data, but when they are organized into folders become semi-structured data. These systems, which provide both structured and unstructured data, are important because business intelligence naturally builds upon these previous systems. The aim of Business

Intelligence (BI) is to facilitate the decision-making process by offering pertinent and precise information (Negash, 2004). As a result, the architecture can be divided into two systems: one for analyzing structured data and another for analyzing semi-structured data. When considering structured data, such as the example shown in Figure 5, it can be said that BI architecture often involves a data warehouse. Internet browser technologies are used to extract and distribute data from operational systems. The data required for BI is downloaded to a data mart, which is then used by planners and executives. The outputs are obtained through the daily data push of data from the data mart and through the response to the queries of the web users and the OLAP analysts. The outputs can take a number of different forms, such as exception reports, routine reports and responses to specific queries (Negash, 2004).

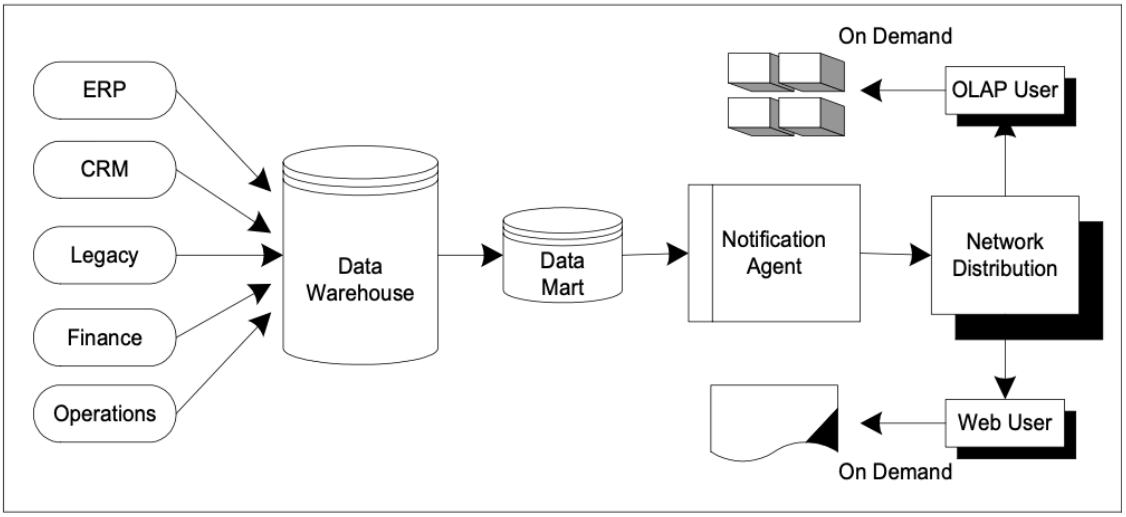

Figure 5: Structured Data BI architecture (Negash, 2004, p. 183)

On the other hand, an unstructured BI architecture may not be feasible, because unstructured data, if minimally organized, automatically becomes semi-structured. The architecture is far more straightforward and includes the Business Functional Model, Business Process Model, Business Data Model, Application Inventory and Metadata Repository (see Figure 6) (Moss, 2003 as cited in Negash, 2004, p. 184).

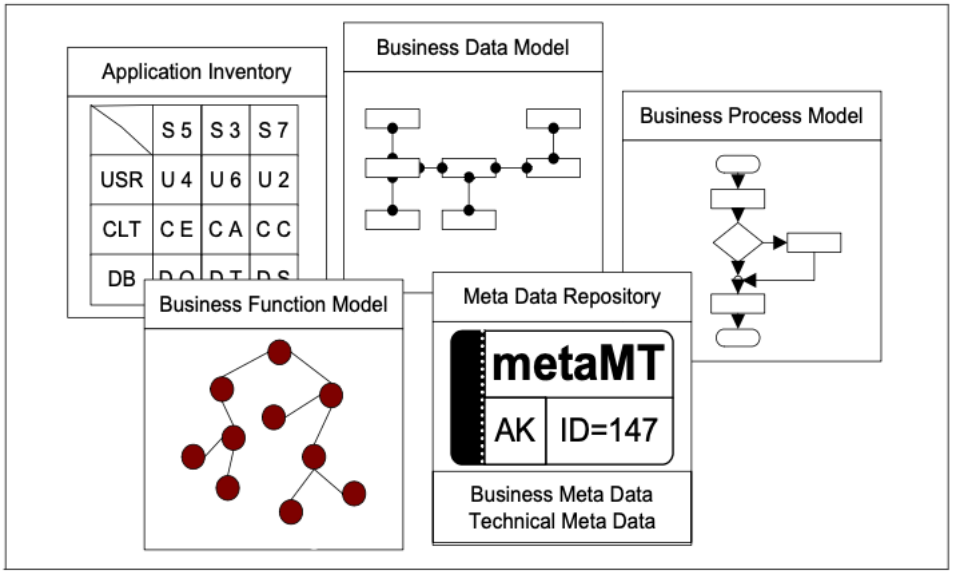

Figure 6: Semi-structured data Bi arichitecture (Moss, 2003 as cited in Negash, 2004, p. 184)

This complex structure generates various costs. It is indeed necessary to make a significant investment in Information Technology. According to Negash (2004) there are four main types of costs that should be taken into consideration when a company is implementing or improving a BI system. Indeed, it is crucial for a company to thoroughly evaluate all associated costs, including those related to hardware, software, and implementation. This will enable the company to make a rational decision. The hardware is a crucial component. As previously mentioned, it is necessary to introduce a data warehouse, which includes the cost of the intranet, servers, and computers. Moreover, it is worth noting that software, particularly BI packages, can be costly. The subsequent paragraph provides an analysis of various BI tools that a company may consider, each of which carries a certain price tag. Once a company has purchased the hardware and software, it should also consider the implementation costs, which include the cost of installing the software, setting up the hardware and initial training. Finally, there is the cost of personnel, which refers to the people who are going to start working in the IT department to support the BI system. These cover salaries, infrastructure and space for the division (ibid.).

Furthermore, according to Yeoh and Koronios (2010) suggest that the implementation of a BI system may lead to changes in a company's knowledge and approach, which may require a strategic reorientation.

Nevertheless, there are significant benefits to be gained from implementing a BI system in return for high costs. Moss and Atre (2003) highlight the benefits of BI in four specific areas of business activity: strategic objectives, business analysis, risk assessment and cost-benefit analysis. In terms of strategic goals and orientations, BI can help to understand and assess the business situation, facilitate the appropriate alignment of the organization with goals and objectives, and provide strategic paths for the future. BI also enables companies to assess the risk factors associated with your business and how to manage them. Finally, BI enables proper business analysis of various factors and dimensions, impacts and strategies. There are also a number of intangible benefits that can be gained, such as brand image, increased customer focus and improved relationships. According to Watson and Wixom (2007) BI has the potential to alleviate the workload of IT by eliminating redundant data collection processes. Additionally, it can enhance the efficiency of data delivery, thereby saving time for both data providers and users. Jafari et al. (2023) have expressed their support for the positive impact of BI on supply chain agility and integration. Moreover, as illustrated in Figure 7, the benefits of utilizing business intelligence for analysis and forecasting are enhanced. Nevertheless, measuring these advantages can pose a greater challenge when they shift from a local to a global scale (H. J. Watson & Wixom, 2007). The literature supports the previous claim. As noted by Cheng et al. (2020), while business intelligence (BI) may offer advantages to global companies or those seeking internationalization, it can be difficult to accurately assess its benefits due to the impact of other factors, such as dynamic capability, network alliances, and organizational agility. Moreover, Ain et al. (2019) suggest that future research should prioritize the measurement of decision-making performance and the potential impact of this on the benefits of BI. As Chen

and Lin (2021) point out, assessing the benefits of BI can be challenging due to their progressive nature, which makes it difficult to evaluate them in the short-term. Finally, this challenge is compounded by the influence of various factors on the benefits of BI.

Figure 7: BI benefits from local to global impact (Watson & Wixom, 2007, p. 97)

While there are certainly many benefits to using a Business Intelligence (BI) system or tool, it can be challenging to accurately quantify these advantages in economic terms. This is due in part to the fact that there is no single Key Performance Indicator (KPI) or metric that can fully capture the impact of such a system. The literature also acknowledges this trend. Negash (2004) argues that the benefits of a BI system extend beyond efficiency gains to the entire organization, but finding a metric to measure these benefits is difficult. According to Ahmed (2021), it can be challenging to determine the success or failure of a BI system implementation in terms of KPI, as there is no single measurement available (p. 241). Although Khare et al. (2023) did not analyze the metric for measuring the success rate of the BI, they conducted a simulation to evaluate the potential impact of a BI system on various aspects of a Japanese printed circuit board (PCB) company. These aspects included accumulated profits, net profit, production costs, number of goods produced, and revenues. However, it is important to consider all factors before making any decisions (Khare et al., 2023). The implementation of Business Intelligence (BI) was found to have a positive impact on business performance. Based on modelling and

simulation, a significant increase in net profit and cumulative profit was observed when the data processing rate was increased from 10% to 40%. BI was also found to have a positive and substantial impact on revenue and the number of goods produced. More specifically, sales can increase by 7.30% and the number of goods produced by 9.37% when the data processing rate is increased. It was also found that increasing the throughput by 40% can reduce the cost of producing goods by 25% (Khare et al., 2023).

While the above example is a simulation, there have been successful real-time business intelligence implementations, such as that of Continental Airlines (Anderson-Lehman et al., 2004). During the crisis, the company invested 30 million dollars in hardware and software over six years to implement its BI system to access and use real-time data. Continental Airlines' goal was to build a loyal relationship with its customers, especially those considered with high potential and high value. In order to achieve this, it was deemed necessary to implement a data warehouse capable of providing real-time data. This would enable customer-focused initiatives. In addition to providing management with clear dashboards to make informed decisions, the dashboard includes strategic actions such as calculating customized discounts per customer based on price and number of future bookings. The dashboard provides high-level views. These can be broken down to show details of customers or flights that make up various statistics or classes (ibid.). A significant investment was made in the data warehouse, which provided valuable insights, including customer value. These insights were then integrated back into the operational systems. The data warehouse received data from 25 internal operational systems and two external data sources. Some of these sources are loaded in real-time, while others are not, depending on the capabilities of the source and the business need. To underline the importance of the data warehouse, a team of 15 people was assigned to monitor it. Moreover, it appears that the access to data was distributed, leading to users accessing data through a variety of custom-built applications. Finally, thanks to this investment and effort. The company is in a

better position to support both tactical and operational decision making, by using a real-time data warehouse and BI. As a result, Continental has achieved over 500 million dollars in revenue growth and cost savings, for a return on investment of over 1,000% (ibid.).

In conclusion, it can be said that Business Intelligence is a field that demands considerable investment and effort from companies. The advantages are many, including economic benefits, as demonstrated in the Continental Airlines business case and the simulation of a Japanese printed circuit board (PCB) company, as well as organizational and strategic benefits, such as improved data delivery efficiency, supply chain integration, and streamlined decision-making for management (Anderson-Lehman et al., 2004; Watson & Wixom, 2007; Khare et al., 2023; Moss & Atre, 2003; Negash, 2004). A variety of tools are available for users and companies to apply the concept of BI in practice. In the following section, the thesis examines the most frequently recommended tools in current literature. It may be helpful to compare the literature with the case studies presented in Chapter 3.

2.2.1 Business Intelligence Tools

BI tools are software that combine data mining, process analytics, performance monitoring, and data visualization for optimal decision-making. These tools include a variety of applications, from the simplest and most common, such as Excel from the Microsoft Office suite, to the more complex and specific, like Sales Force's Tableau, SAP's BusinessObjects or even Microsoft's Power BI (Tripathi & Bagga, 2020 ; Eissa & Goyal, 2022). In this section, these tools are discussed to gain a better understanding of their function and usage in determining their real-life applicability.

Excel is a widely used spreadsheet program for both businesses and individuals. The program's versatility makes it a valuable tool for data management and analysis. It consists of a grid of cells organized into rows and columns, allowing users to enter and store data. With multiple functions and a user-friendly interface, users can create, edit, sort, analyze, summarize, format, and graph data. There are a variety of functions available, including the operational function, which can aid companies in monitoring investments, loans, sales, and inventory, as well as conducting What-If Analysis (Slager, 2016).

The Tableau suite from Salesforce is designed for data visualization and it comprises a range of software applications. Thanks to the visualization, users can discover patterns and relationships that may have been previously unknown. Tableau works without the need to pre-determine the format; therefore, it is a tool that offers users the ability to display their data in a flexible approach. The interface has been designed to be user-friendly and enables the merging of datasets with different formats, cleaning of data, and unification of the level of aggregation. Additionally, the visualization of data can be shared with other users. Furthermore, the system can be provided on a server or on a cloud (Loth, 2019).

The SAP BusinessObjects BI platform is a business intelligence system that allows users to perform predictive analysis which is platform is accessible both on-premises and on the cloud, providing flexibility and user autonomy (SAP, n.d.) . It comprises reporting applications for data exploration, report and dashboard creation, and analysis to gain business insights. The number of different applications allows the adaptability of the suite according to the different company requirements (Singh, 2019).

Microsoft Power BI is a suite of tools that can help users better understand their data. This suite is accessible both on-premises and in the cloud. The functions provided by this BI application are disparate and can be tailored to meet specific business needs. It can extract and connect data

from multiple sources, transform data, and create data models. Finally, the data can be presented in various formats such as dashboards, tables, graphs, and maps, which can be easily shared with other users (Sinha, 2021).

There are a variety of business intelligence tools available for companies to consider. One such tool is Excel, which can function as both a standalone BI tool and a source for other BI tools. As a result, it can be utilized for data analysis and as a spreadsheet source with raw data for other BI tools mentioned earlier. While these tools share common functionality and usage, they also have differences that may impact a company's decision to select one over the other. Tripathi and Bagga (2020) suggest that an effective business intelligence (BI) tool should be able to process large amounts of data from various sources. Therefore, the technical functionalities of the BI solution should be taken into consideration. However, Ahmed (2021) argues that the choice of BI solution is not solely based on technical characteristics. They state that users' perception of the ease of use of BI tools also plays a significant role in their utilization (p. 248). Moreover, the perceived usefulness is another parameter that can have an impact on the effectiveness of utilizing a BI solution Ahmed (2021).

In conclusion, it may be challenging to identify definitive parameters upon which a company should base its selection of one BI solution over another, particularly when processing customer data. However, BI tools can prove highly valuable when analyzing customer data, which is one of the largest and most complex data sources, as it is available in both structured and unstructured forms. The analysis of this data can have a significant impact on customer relationship management (CRM), as it provides valuable insights into customer behavior, preferences, and desires, which can ultimately lead to increased profits and added value. The next section will analyze CRM to identify areas where tools can be useful and explore how they can positively influence the relationship with the customer.

2.3 Customer Relationship Management (CRM)

Customer Relationship Management (CRM) generates a significant amount of data, particularly from customer touch points, such as when a customer searches for a product on the website or makes a purchase using their loyalty card. It is recommended that this data be analyzed using business intelligence (BI) tools to gain valuable insights into customer behavior and preferences. CRM is a critical part of today's business and can be a key competitive advantage when business intelligence (BI) tools are in place (Zaby & Wilde, 2018). There are different interpretations of CRM, but the main idea is that Customer Relationship Management is a process that focuses on building and maintaining profitable relationships with customers in order to generate value and satisfaction. The idea is for businesses to use customer information to drive loyalty and sales (Parment et al., 2020).

2.3.1 Customer Relationship Management and Business Intelligence

Analytical CRM utilizes BI tools to examine operational data and use the knowledge gained to continuously optimize operations (Zaby & Wilde, 2018). Negash (2004) suggests that BI can aid in the optimization of customer relations. According to Rababah et al. (2011), Customer Relationship Management (CRM) is not just a process; it involves cultivating a customer-focused culture. The aim of the CRM strategy is to increase profitability and retain customers.

The purpose of business intelligence is to gain a comprehensive understanding and processing of data. In this context, it is utilized to enhance customer relationships and their management (Kiron & Bean, 2013). An IT application has been identified as a facilitator of this goal

(Rababah et al., 2011). Therefore, it is recommended that the development of CRM be an on-going process that utilizes the knowledge generated by the BI system (Wilde, 2010 as cited in Zaby & Wilde, 2018). However, it is widely acknowledged that the analysis of CRM data holds considerable significance. As noted by Kiron and Bean (2013), the analysis of customer data is not always given priority by large organizations. Nevertheless, insurance firms, among others, are showing a growing interest in customer data analysis as it can enhance their competitiveness through a better understanding of their customers.

Based on the above, it seems that utilizing BI in CRM may have the potential to enhance performance, however, it is not a guaranteed outcome. It is important to note that the use of BI does not necessarily result in an improved customer relationship. According to Nam et al. (2019), business intelligence (BI) can act as a bridge between IT competences and enhanced customer relationship management (CRM) performance. However, it is important to note that the use of BI does not necessarily result in a direct improvement in CRM performance. To strengthen customer relationships, it is crucial to effectively manage data, especially through the use of analytics tools. The authors recommend that the emphasis should be on improving employees' data management capabilities, rather than solely acquiring IT competences. The authors suggest that it may be more beneficial to focus on improving employees' data management capabilities rather than solely acquiring IT competencies. According to Kamel (2023), there is no direct evidence to support the notion that big data analysis has a direct impact on market performance. However, it is suggested that BI-enabled CRM strategies can improve firms' understanding of customer demands. Hence, it could be advantageous to contemplate acquiring information via Business Intelligence tools and incorporating customization or personalization strategies to foster long-lasting and viable relationships with customers. It is imperative for companies to cultivate the necessary skills and abilities to adeptly utilize BI tools and technologies for analyzing customers while formulating their CRM strategies. It is

important to note that while the use of BI in CRM can be beneficial, it may not always guarantee improved performance on its own. It is recommended that organizations provide additional support to ensure success (Del Vecchio et al., 2022).

This prevalent way of thinking in the literature is exemplified in numerous practical cases, such as Harrah's Entertainment, Inc. (or Harrah's), which implemented Business Intelligence in its Customer Relationship Management with success. The following section analyses this business case and highlights various insights. By analyzing customer data, Harrah's was able to improve their market performance. Organizational changes were implemented, resulting in successful outcomes.

2.3.2 Harrah's Entertainment Inc., a successful utilization of Business Intelligence in Customer Relationship Management

Harrah's Entertainment Inc. (or Harrah's) is an excellent example of a company that successfully implemented Business Intelligence in its Customer Relationship Management. In the late 1990s, Harrah's fostered loyal relationships with its customers by utilizing customer data and implementing innovative marketing strategies. As a result, the company emerged as one of the leaders in the gaming industry. In order to achieve its goal, Harrah's placed a strong emphasis on customer knowledge. The company sought to identify its target audience and respond in an efficient manner to maximize profitability (Watson & Volonino, 2002).

The importance of utilizing customer data to generate knowledge and value has been recognized by the management. Customer data was collected from a variety of sources, including hotel system records, special events and tournaments, and Harrah's loyalty cards used at slot machines. As a result, the company implemented a data warehouse called "Marketing Workbench"

(MWB) to store customer details, including identification numbers and activity records (such as slot machine usage and bar purchases). This enabled Harrah's marketing analysts to analyze hundreds of customer characteristics, determine individual preferences, and implement new or modified services accordingly (ibid.). Moreover, Harrah's utilised “WINet Offers”, an algorithm developed by the company, to generate offers for customers via email. The algorithm tracked which offers were accepted and which were not, enabling ad hoc adjustments to the next campaign. In addition, Harrah's implemented “Total Rewards”, their own loyalty program, which tracked, retained, and rewarded 15 million customers regardless of which casinos they visited over time.

In conclusion, it can be observed that the actions taken had a significant impact. These measures led to the creation of the Harrah's brand, Total Rewards and cross-marketing, which resulted in a 72% return on investment in information technology. Additionally, the revenue growth increased by 14% in 1999, equivalent to 242 million dollars over 1998. These results could potentially be attributed to the frequency of customer visits. During that period, the number of visits per month to Harrah's casinos increased from 1.2 to 1.9 trips per month for the same customers. The utilization of data from a company provided a significant competitive advantage, which was further strengthened by the previous initiatives.

The following section discusses 'Marketing Intelligence', which serves as a link between data analysis through Business Intelligence tools and Customer Relationship Management (CRM). It involves the analysis of customer data to help management make rational decisions based on the information generated by the analysis.

2.4 Marketing Intelligence

Considering the growing amount of data generated by customers, companies have the opportunity to enhance their relationships with customers and boost their market performance by utilizing this information. Business intelligence tools can prove to be useful in achieving this objective. Nonetheless, it is important to address several research gaps that exist. This is why a new field of study has emerged to connect all these interrelated fields, known as "Marketing Intelligence". Kotler (2000) defines marketing intelligence system as a "a set of procedures and sources used by managers to obtain their everyday information about pertinent developments in the environment in which they operate" (p. 102). Marketing intelligence can be defined as a system that gathers the necessary information for business marketing decision-making (Hutt and Speh 1989 as cited in Mochtar & Arditi, 2001).

As Kotler (2000) posits, it is possible to enhance the quality of input and, consequently, that of marketing intelligence systems. Indeed, the initial step is to concentrate on motivation and training, with a particular focus on internal forces in order to gain new developments and external stakeholders to integrate and share the intelligence, that is, knowledge. Then, research on competitors about their strategy can provide significant information about the market or, alternatively, this information can be obtained from third-party suppliers. In practice, companies can establish a customer advisory panel comprising representative customers or the company's largest customers. This allows them to gain valuable insight into customer needs and fosters a sense of loyalty among customers who feel their opinions are being heard. Furthermore, companies should establish a marketing information center to collect and manage marketing knowledge. This helps managers evaluate new information and use it for marketing decision-making (ibid.). As previously stated in Section 2.2, the mean is employed to collate and organize the data into information and then transform it into knowledge. This is achieved through the use of BI tools.

Marketing intelligence is defined as a process and consequently it can be divided into five distinct phases: planning, collection, analysis, representation and projections as shown in

Figure **8** (Guarda et al., 2012).

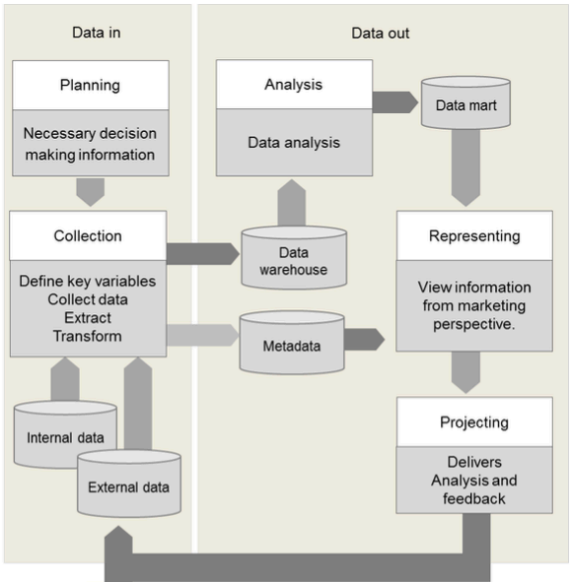

Figure 8: Marketing Intelligence process (Guarda et al., 2012)

Firstly, the planning process involves the management determining the objectives and the information required to make marketing decisions. Secondly, during the collection phase, external (from CRM, market, etc.) and internal data are gathered and transformed in order to prepare it for the analysis phase. As previously discussed in the Section 2.1, this phase is more complex and difficult than the others. Therefore, data scientists should look for common patterns, organized and coded information on the marketing data mart. Subsequently, the representation stage is responsible for presenting data from a marketing perspective. Finally, in the projection phase, the results are distributed for review and subsequent feedback, if necessary (Guarda et al., 2012). As outlined by Chern et al. (2015), marketing intelligence offers insights into current and

prospective customer preferences and requirements, market opportunities, and enables managers to enhance their marketing planning, implementation, and control strategies.

In terms of the key factors influencing the effectiveness of marketing intelligence, Lin et al. (2015) propose a similar argument to Kotler (2000), namely that the provision of training programs for both marketing and non-marketing staff can enhance the market orientation of the company and, thus, the responsiveness of marketing intelligence. Trim and Lee (2008) concur, suggesting that the knowledge and skills of the marketing intelligence officer can be employed to devise international and global strategies. Conversely, Lies (2022) posits that technology is the primary catalyst for enhancing the responsiveness of marketing intelligence, particularly in terms of customer satisfaction. The Internet, in particular, serves as an effective communication tool that can facilitate the development of CRM and marketing intelligence systems (Kursan & Mihic, 2010).

From a different perspective, marketing intelligence is capable of influencing and supporting various functions and marketing mix components. Indeed, Helm et al., (2020) argue that MKTI play a critical role in product development since helps marketers to understand the market and translating this knowledge into valuable solution and consequently, enhance a company's performance. Furthermore, it has been observed that the MKTI capabilities are significantly associated with pricing strategies. Companies that possess a high level of MKTI capability are inclined to opt for a pricing strategy that is based on market trends (Mochtar & Arditi, 2001). In conclusion, according to what we discussed previously, the management should utilize marketing intelligence both for predicting events that take place outside of the organization and for being able to display the events through company actions (Guarda et al., 2012).

2.5 Theoretical Framework

In light of the existing literature and the research gaps that have been identified, a theoretical framework has been designed (see Figure 9). It illustrates the interconnectivity between literature and its influence on the process in a circular manner. As previously discussed, customer relationship management (CRM) and, in particular, customer data, serve as sources of input that consequently increase the amount of data a company must gather, select, and analyze. The objective of these processes is to improve the CRM itself. In this instance, BI tools serve as a conduit between raw data and the decision-making process, whereby the practical knowledge generated by BI tools is utilized (Zaby & Wilde, 2018 ; Nam et al., 2019; Negash, 2004). Finally, this knowledge is selected through a set of procedures that are part of the intelligence marketing process, which is carried out by managers. Finally, they use the information that is relevant to make decisions and ultimately improve the CRM (Kotler, 2000; Guarda et al., 2012).

However, there are several areas where the existing literature lacks clarity. Firstly, there is inconsistency in the understanding of how companies actually acquire real-time data, as well as the methods and tools that are (Negash, 2004). To address this gap, this research explores "How do Business Intelligence (BI) tools impact the effectiveness of marketing decision-making processes in organizations?" Secondly, the benefits of business intelligence (BI) are challenging to measure, since there is no common key metric that can be used to assess them. Consequently, each company employs its own methodology to measure the success of BI implementation and the beneficial outcomes (Ain et al., 2019; Negash, 2004). To better understand this challenge, this thesis addresses the research question on "What are the key factors that organizations consider when selecting BI tools for marketing purposes?" Lastly, the literature lacks concrete examples of the utilization of Business Intelligence tools in marketing decision-making and the influence they exert on it. A specific mention of the interaction between Customer Relationship

Management and BI tools and marketing decision-making is absent (Fan et al., 2015; Del Vecchio et al., 2022). The objective of this thesis is to contribute to the existing body of knowledge by examining the potential advantages of business intelligence (BI) tools. To this end, the thesis poses the following question: "How do these factors contribute to the overall success of marketing strategies?"

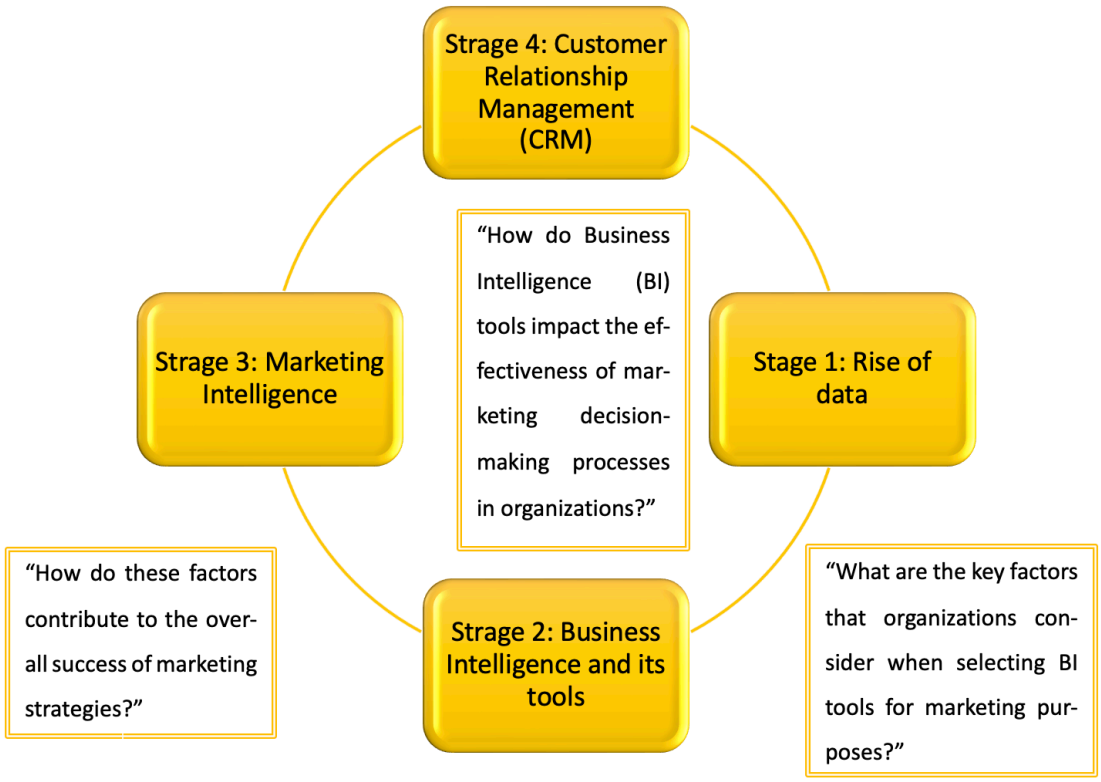

Figure 9: Theoretical Framework

3 Research Methodology

The following section presents a comprehensive illustration of the research methodology, delineating the various stages and procedures involved. It is crucial to recall the research "onion", presented in Figure 10, which elucidates the research methodology, and the decisions made to align with the research objectives (Saunders, 2007).

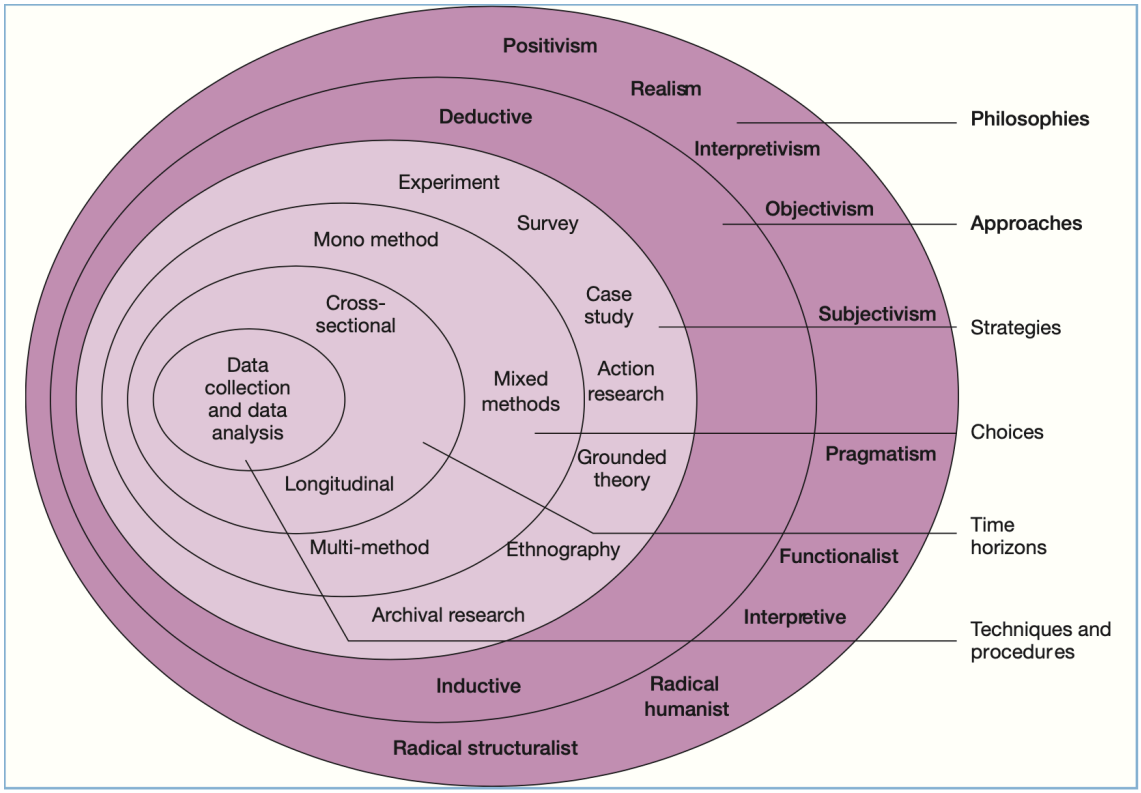

Figure 10: Research "Onion" (Saunders, 2007)

According to the research "onion", the methodology is divided into four sections: philosophical paradigm and research approach, research design, data collection, and data analysis. Firstly, it sets forth the underlying beliefs and assumptions about the nature of the research. Secondly, the selection of qualitative research methods is examined. Thirdly, data collection is pursued through the use of interviews with five Italian multinationals. In conclusion, the data analysis

section presents a comprehensive overview of the methods and procedures employed in the analysis of the interviews.

3.1 Philosophical paradigm and Research approach

According to Saunders (2007) “The research philosophy you adopt contains important assumptions about the way in which you view the world” (p.101). Therefore, the objective of this approach is to comprehend the means of expanding the body of knowledge pertaining to the subject matter under investigation. The primary research philosophies can be classified into three categories: epistemology, axiology and ontology.

The field of epistemology is concerned with the question of what constitutes acceptable knowledge within the context of a given field of study. Two distinct types of researchers can be identified within this category. The first, which we might term the "resource" researcher, adopts a more objective stance, seeking to maintain a clear separation between the reality of the facts and their own subjective judgments. This approach helps to ensure a greater degree of objectivity in the data collected. In contrast, the second type of researcher focuses on social phenomena and individuals and their realities. Consequently, the data are represented in narrative form, as opposed to the statistical representation employed by the "resource" researcher. The "feelings" researcher is more likely to adopt the interpretive perspective, whereas the "resource" researcher espouses the positivist position. In alignment with these assertions, the epistemology category was selected for the thesis because it is more consistent with the nature of the research, particularly the interpretive perspective (Saunders, 2007).

The predominant form of interpretivism is an emphasis on subjective and shared meanings. Indeed, the manner in which individuals and groups perceive and comprehend events and social

contexts is subjected to observation. Interpretive researchers assume that access to shared, changing, and individually constructed reality occurs only through social constructions. Consequently, interpretative research focuses not only on the content of empirical data but also on how the content is produced through linguistic practices. Qualitative research, therefore, focuses on human action and understanding, with interpretation forming an important part of any analysis of qualitative materials. The existence of disparate interpretations of a singular phenomenon is acknowledged without undermining the intrinsic value of the interpretations themselves (Eriksson & Kovalainen, 2016).

In accordance with the research philosophy, the research is conducted through a mixed approach. It employs both deductive and inductive methodologies. The deductive perspective is utilized with the objective of identifying patterns that are comparable to those that have been previously established within the theoretical framework. Nevertheless, the research results allow for the identification of new patterns, which can be used to reconstruct the theory. Accordingly, the inductive approach allows for the potential discovery of new insights through case study analysis (Saunders, 2007).

3.2 Research design

The research approach chosen for this thesis is the explanatory one. Indeed, the aim is to understand and try to find new insights on the use of Business Intelligence tools. According to this approach there was a search of the literature and a conduction of interviews from experts of the field. Consequently, this research approach is highly flexible and adaptable, ensuring coherence with the research conducted (Saunders, 2007). To conduct my research, the thesis uses a qualitative methodological approach with semi-structured interviews. As Hennink, (2020) asserts,

qualitative methods and in particular interviews offer greater flexibility than quantitative methods, making them particularly useful for understanding processes such as decision-making and focusing on people's perspectives, which are fundamental to the research presented in this thesis. Indeed, it is possible to give the opportunity to the interviewees to explain and to give their opinion (Saunders, 2007). This research aims to investigate the decision-making process, with interviews identified as the optimal method for data collection to achieve this objective. Additionally, the research seeks to understand the experiences and perspectives of the interviewees, which can only be fully understood through a one-to-one data collection approach (Hennink, 2020). Additionally, managers express their preference for having an interview rather than filling out a questionnaire, consequently the response rate could be significantly high (Saunders, 2007). Ain et al. (2019) posit that the quantitative approach is the most prevalent methodology employed in research within this field. Consequently, the deployment of a qualitative method may prove advantageous in facilitating the acquisition of diverse insights into the subject matter under investigation and the potential to address theoretical shortcomings.

3.3 Data collection methods

This thesis analyses five international Italian companies. The rationale for selecting Italian companies is twofold: firstly, Ahmed (2021) states that the study should be conducted in a different country from the US. This leads to the conclusion that to fill this gap, more European data is needed, and secondly, the author has a network of contacts in Italian companies, which facilitates access to potential participants in the study. The author obtained the contacts through both personal and academic networks. The companies were contacted via email or LinkedIn message. A total of 15 individuals were identified as potential participants, yet only five agreed to be interviewed. In particular, the focus is on the marketing and business intelligence departments

of these firms, given the growing importance of business intelligence tools in gaining insights from customers (Negash, 2004). The interviews were conducted via a video-call platform named Microsoft Teams, either in Italian or English, according to the availability of the interviewee. A total of five interviews were conducted, with one interviewee representing each company. This approach was selected to facilitate a comparative analysis of the diverse applications of business intelligence (BI) tools across different sectors and companies. By identifying patterns and similarities, as well as differences, this method allows for a deeper understanding of the nuances and complexities of BI usage in various contexts. The duration of the interviews ranged from 24 minutes and 47 seconds to 41 minutes and 41 seconds.

Saunders (2007) suggests that there are various stages involved in preparing for and conducting an interview. The initial step is to create an interview guide, which serves two purposes: to ensure that the questions are comprehensive and to provide a framework for conducting the interviews. Moreover, a summary of the subject of the interview is provided to the interviewee to ensure awareness of the topic. However, the complete list of questions is not shared. The objective is to elicit a comprehensive range of reactions and allow the interview to be conducted in a spontaneous manner, without the interviewee preparing a pre-determined response. Additionally, the interviews were recorded with the consent of the interviewee. Finally, each recording was transcribed, and tables were used to identify the most common patterns according to the existing theory and between the case studies (Saunders, 2007). Furthermore, in order to ensure the anonymity of both companies and managers, the firm's names are replaced with "Company A, B, C, D, or E," and the names and surnames of the interviewees are designated as "Manager of … in team …". The survey comprises two sections, one pertaining to the respondents' personal experiences and the other focusing on research-related queries. The former comprises four questions regarding the respondents' views on managerial roles and

responsibilities, while the latter comprises twenty-one questions pertaining to the research topic. All survey questions can be found in the interview guide in Appendix 1.

3.4 The Choice of the Companies

The companies in question are all headquartered in Italy and operate on a multinational scale. The companies in question hail from a variety of sectors, including digital marketing services, pharmaceuticals, luxury automotive, and fashion. The objective of the research is to gain a comprehensive understanding of the BI tool in a general sense, without a detailed examination of a particular sector or market. The research question is focused on the marketing of business units (BUs). It is important to note that, in general, different companies have different structures. The companies included in this study do not differ from this typical structure; consequently, not all departments use BI tools. Indeed, some companies have business units (BUs) that are specifically focused on the use of business intelligence (BI) tools, which are also utilized by marketing departments. The companies interviewed included individuals from various departments. This was due to the fact that not all companies had a general marketing department; rather, it was divided into different business units. For instance, the interviewee from Company A was part of the Marketing Intelligence BU, while the interviewee from Company D was part of the Business Intelligence BU, which collaborated closely with the Marketing BU. However, their department was responsible for managing the company's BI tools.

A total of one employee from each company has been selected for interview. This approach was taken because each employee utilizes the same Business Intelligence (BI) tool across the entire department. In the case of Company D, the same tool is used by both the marketing department and the employees under consideration for this study. Consequently, the use of the BI tool does

not differ significantly between employees in the same department. This justifies the decision to limit the number of interviewees to one person per company. As previously stated, the objective of this research is to gain insight into the general use of BI tools. The following list provides details regarding the company industry and the position held by the interviewee.

- Company A is a technology company with a core business in the "Drive to Store." Its objective is to revolutionize local shopping. In a more practical manner, the company reaches millions of users through its apps and websites, providing them with information on the offers and services of retailers and brands. Its primary advantage is to assist consumers in saving money and time when shopping in nearby stores.
- Company B's primary focus is the development, manufacturing, and trade of contrast agents, medical devices, and advanced solutions designed to enhance the diagnostic imaging process and, consequently, the quality of life for individuals. The company's objective is to advance existing medical and health technology tools and to facilitate the production of new ones.
- Company C is a historical Italian enterprise engaged in the production of automobiles, with a particular focus on the production of high-end and luxury vehicles.
- Company D is a global luxury fashion house headquartered in Italy. The company's product range encompasses various market segments, including clothing, accessories, cosmetics, and fragrances.
- Company E is an Italian multinational enterprise that occupies a dominant position in the global market for the manufacture, distribution, and design of ophthalmic lenses, frames, and sunglasses.

The following table provides an overview of each interviewee’s job position and the duration of their employment at each organization. It also includes the length of each interview and the language in which the interview was conducted.

Table 2. Interview information and alias

	Job Position	Employment duration	Alias	Interview duration	Language
Company A	Strategic Partnership Manager – Team Leader	2 years	Manager A	41m 41s	Italian
Company B	Global Business and Marketing Intelligence Manager	6 months	Manager B	24m 47s	English
Company C	Marketing Specialist	2 years	Manager C	36m 53s	English
Company D	Business Intelligence Analyst	2 years	Manager D	34m 24s	English
Company E	Global e-commerce and merchandising director	3 years	Manager E	36 m 06s	Italian

3.5 Data analysis technique

The analysis, which was conducted in accordance with both the deductive and inductive approaches, was thematic in nature. Indeed, as stated by Guest et al. (2012): "Thematic analyses move beyond counting explicit words or phrases and focus on identifying and describing both implicit and explicit ideas within the data, that is, themes. Codes are then typically developed to represent the identified themes and applied or linked to raw data as summary markers for

later analysis." (p. 10). Consequently, the data analysis process involved the following steps for each interview. The interview transcriptions were generated automatically using Microsoft Teams. The total number of pages of raw text transcribed from the interviews was 72. The distribution of these pages across the five companies was as follows: 13 pages for Company A, 15 pages for Company B, 16 pages for Company C, 15 pages for Company D, and finally 13 pages for Company E. Each transcript was then corrected using the video recording of the interview.

Subsequently, each interview was transcribed into a Word document and specifically into a table where the answers were divided, and codes were assigned with the objective of identifying common patterns and differences among the interviews. The codes were classified into three categories, corresponding to the three research questions: "BI use in decision making," "BI tools and their characteristics," and "Advantages and disadvantages of company BI tools." According to the categories, three colors were assigned, and the process entailed underlining part of the text, assigning a color according to its coherence with the category, and then assigning the codes. The following table presents an example of the codes assigned from the interview of Company A:

Table 3. Examples of coding

1. BI use in decision making 2. BI tools and their characteristics **3.** Advantages and disadvantages of company BI tools	Yellow Grey Light Blue
"I analyze specific categories, interactions, searches, I export the temporal or geographical part to actually evaluate if there is something I can communicate to my client, that it is also in harmony with its language, for example they have particular seasons, I want to	BI as a support to human decision

actually analyze whether that can be interesting for them or not. Of course, it's not Tableau that makes decisions for me, so in fact from Tableau, I process tables, process data that then still require processing that is totally human" (Manager A).	
"Data sources are created on an as-needed basis, so each data source answers a specific question, that data source is then inserted into the Tableau world and so in fact, we mainly use Tableau as a tool to read information" (Manager A).	Tableau
"So what is essential for us is to have a 360° knowledge of everything that happens within our platforms and, in relation to what are the activities that our customers acquire, therefore advertising activities mainly, therefore content related to products and services that they want to advertise" (Manager A).	Increase the knowledge about the company

The selection of the category, which may be defined as "themes," and the codes proved to be an effective approach for addressing each interview in a manner that was consistent with the research question, while maintaining focus on the objective of this research. Indeed, the use of the same codes for all interviews, with the addition of new codes, when necessary, facilitated the analysis by enabling the identification of patterns and differences. Furthermore, the repetition of a code allowed for the determination of its significance.

3.6 Quality of the data

In regard to the quality of the data, it is essential to highlight certain characteristics associated with the conduct of qualitative research. According to Guba (1981) the qualitative research should demonstrate the four pillars of the trustworthiness: credibility, transferability, dependability, and neutrality. This research adheres to these standards and, in this sub-section, illustrates how trustworthiness is ensured.

The term credibility pertains to the reliability of the findings and conclusions presented in a research study. In the absence of a hypothesis to be tested, it is challenging to ascertain the reliability of the findings. However, the rigor of the data collection and analysis can be evaluated. Data collection and analysis should be conducted with accuracy and the process should respect the preparation step, in order to prevent any lack of rigor and promote rigorousness (Saunders, 2007, p. 320). Indeed, the description of the methods should enable other researchers to utilize this information to understand the research process, findings, and reanalyze the collected data (Marshall & Rossman, 1999 as cited in Saunders, 2007, p. 320). For instance, this research presents a comprehensive account of the data collection process, including the interview guide and subsequent analysis. Furthermore, the interviews were recorded and transcribed to facilitate monitoring of the research process and to enable direct consultation of the recording.

The transferability of a study regards their comparability and generalizability. Nevertheless, the qualitative approach and semi-structured interviews are not without limitations in terms of generalizability, given that semi-structured interviews are shaped by specific situations, locations, times, and circumstances. Consequently, this type of research cannot guarantee perfect reproducibility without compromising its flexibility, which is its main strength (Marshall & Rossman, 1999 as cited in Saunders, 2007, p. 319). In order to overcome the generalizability issue, the qualitative study of this research should be replicable following the exact stage of the research.

Indeed, the research adheres to established procedures and employs recognized techniques and processes for analyzing textual data, as detailed in paragraph 3.5 of the methodology section Data Analysis Technique (Hennink, 2020, p.213). It is not possible to confirm the findings for the entire population due to the restricted sample size (Yin, 2003 as cited in Saunders, 2007, p. 319). Nevertheless, the importance of the study justifies the use of this method. The relationship between this research and existing theory is significant, and the findings have theoretical significance (Marshall & Rossman, 1999 as cited in Saunders, 2007, p. 328). This is demonstrated in the findings section.

Finally, neutrality of the process may be compromised by bias on the part of both the interviewer and the interviewee. To address this challenge, notes were taken during the interviews to document the rationale behind the research design, including the rationale for selecting the strategy and methods employed, as well as the data obtained. Furthermore, the interview guide was developed and followed during the interview to prevent any potential interviewer bias and ensure neutrality. Regarding, the credibility of the study is confirmed by including quotation of the interviewees and how they contribute to this study as Hennink (2020) suggest.

4 Findings

This section will analyze each company according to the following themes: (a) business intelligence tools in use, (b) the advantages and disadvantages of BI tools, and (c) the role of BI tools in decision-making. The objective is to identify common patterns and differences between the interview sample across these three themes and to ultimately answer the research questions.

4.1 Company A

Business intelligence tools in use. The business intelligence tool most frequently utilized by company A is Tableau, although it is not the sole tool employed. Indeed, the company also utilizes Redshift as a data accumulation platform. According to Manager A, this platform enables the cleaning and organization of data, which in turn facilitates the creation of data sources and the subsequent reading of this information on Tableau. Moreover, the company has integrated these tools with all the Microsoft Office suite and Google Suite. It should be noted that the company tends to rely more on the Google Suite, as it is more straightforward to share documents between collaborators. These tools are utilized company-wide due to Tableau's user-friendly interface and flexible design, which enables users to create dashboards tailored to their specific requirements. However, there are instances when Tableau requires an extended loading period due to the substantial volume of data. Despite the disadvantages, the interviewee from Company A asserted that the high cost is justified by the advantages it offers. In order to reduce costs, not all levels of the company have access to Tableau.

The advantages and disadvantages of BI tools. Firstly, despite the limitations of the CRM in terms of functionality and integration with Tableau, the interviewee asserts that the BI tool

serves as a central repository for data, particularly historical information, which has facilitated a comprehensive understanding of the company. Secondly, Tableau tool provides straightforward and accessible data access across all departments, enabling interconnectivity between disparate business units and facilitating the dissemination of information. Furthermore, the implementation of the BI tool necessitated a period of familiarization with the software by the employees, which was facilitated through external training platforms. The result of this introduction is an increase in efficiency and effectiveness, which has led to a reduction in time and employees. Indeed, as Manager A stated, "*activating Tableau desktop reduced our time a lot and they took away a team because it was no longer needed and we officially became part of that hybrid team that is called marketing intelligence*" (2024), these changes have led to an increase in the flexibility of the organizational structure.

The role of BI tools in decision-making. In general, business intelligence (BI) tools exert a relatively modest influence on decision-making processes. In the case of Company A, Tableau facilitates the collection, analysis, and presentation of data in a format that allows users to visualize the information. This enables the company to generate valuable insights, thereby enhancing its competitiveness and facilitating the conclusion of transactions with customers. In general, Tableau provides support for human decision-making processes. However, it is a significant intrusion into the workflow of Company A, as evidenced by the observations of Manager A (2024): "*All BI platforms are not made to create a finished product. They support you a lot up to a point, then if you need only to download data; So, it takes a bit of a time, but then they're perfect like that. Otherwise, of course, it still requires a mind that processes the information well and gives you a general picture, which is the data in itself cannot give you, then it depends on how you read it*". Consequently, while BI tools can facilitate decision-making, they cannot be the sole determinant of outcomes. Moreover, a review of the existing literature reveals that there is no established methodology for measuring the economic impact of Tableau. It is

similarly not possible to calculate the return on investment (ROI) of the business intelligence (BI) tool utilized by Company A. The only means of assessing its efficacy is through continuous human feedback regarding its performance or instances of malfunction.

4.2 Company B

Business intelligence tools in use. Company B has only recently introduced Power BI as the company's business intelligence tool, having previously relied on Excel for this purpose. Indeed, the company is currently undergoing a transitionary process, moving from a reliance on Excel to the utilization of the new tool. As it is still in its introduction phase, Power BI is used in a variety of contexts, but its application to dashboards is not yet widespread. The rationale behind the company's decision to opt for Power BI over other business intelligence (BI) tools lies in its flexibility and user-friendliness. The information is readily comprehensible, and the company's existing agreement with Microsoft for the Microsoft Office suite further influenced the decision to rely on a reliable provider. The seamless integration with the Office suite and the company's internal data lake are notable advantages.

The advantages and disadvantages of BI tools. Similarly to Tableau, Power BI has an accessible and shared interface, facilitating immediate data retrieval, which is not a feature of Excel. These features facilitate the flow of information, thereby increasing interconnectivity and alignment between disparate business units. Manager B illustrates the expediency of the meeting due to Power BI: "*So the idea of introducing BI tools that everyone can access the same set of data and information is that when you get to the meeting, you start you spend just five minutes in saying, okay, what I see from the report is that this is the situation and then we can talk about*

the future" (Manager B, 2024). Power BI permits the utilization of external sources, which are crucial for a company that aspires to establish connections with its providers. Nevertheless, the CRM, in company B, has yet to be integrated. The capacity to customize the dashboard enables the presentation of disparate perspectives of the dashboard itself. Power BI reduces the time required for processes, consequently enhancing efficiency. Furthermore, the enhanced accuracy of the dashboard increases the effectiveness of both the identification of company needs and the formulation of solutions by company B. However, the full utilization of the tool is limited by the fact that the training has been conducted through a process of learning-by-doing.

The role of BI tools in decision-making. Manager B asserts that Power BI is a foundational support that alters the manner in which work is conducted, particularly with regard to organizational structure. To implement this new approach, the entire company was required to alter its mindset, as evidenced by the assertion. "*I think that the real problem is changing mindset and changing your organization, because in order to make it easy to use a Power BI tool and you need to change all the structure of data on the organization*" (Manager B, 2024). Once more, the manner in which data is presented and visualized provides input to the human decision-maker, particularly in terms of the speed with which it can be processed. This has enabled Company B to enhance its competitive position in the markets in which it operates. Company B did not utilize a specific metric to assess the efficacy of Power BI. As Manager B observed, "*No, we don't have a structured metric, but it's quite easy to understand whether it's working or not. And for me, the way I measure whether something that I'm producing is working or not is asking people during key meetings whether they know some set of information*" (Manager B, 2024). This approach may prove an effective means of evaluating the performance of a BI tool in the absence of a defined KPI.

4.3 Company C

Business intelligence tools in use. Company C employs a range of business intelligence tools, including Power BI, Excel, and MicroStrategy. As previously stated in the thesis, Power BI and Excel have already been referenced; however, MicroStrategy has not. MicroStrategy, like the other aforementioned business intelligence tools, is a platform that enables companies to perform business analytics. It is a relatively mature tool, having been introduced in 1989. It is capable of performing basic reporting and also of creating dashboards and more specific analyses, including predictive analysis (Rivero, 2018). All of the business intelligence tools utilized by Company C are accessible across the various business units within the company. Power BI was selected for three key reasons: the favorable outcome of the negotiation with the provider, the user-friendly interface and the integration with Microsoft Office Suite. Conversely, MicroStrategy was chosen due to its competitive pricing, although according to the interviewee, it is not as accessible or straightforward to use. As stated by Manager C (2024), "*I don't think it's as user friendly as other tools and you know, I think some companies just buy it because it's a more niche product and it's cheaper*". Ultimately, Excel is employed solely for the creation of a new input and the administration of less structured processes. However, its capacity is constrained by the width of the dataset under management.

The advantages and disadvantages of BI tools. The advantages of centralizing all data in a single repository, including external sources, are numerous. By consolidating data from various sources, organizations can leverage both historical and real-time data, enhancing their ability to make informed decisions. Firstly, the company can provide access to different users, thereby facilitating the flow of information. Consequently, the structure becomes more flexible, and knowledge is diffused throughout the company. Secondly, Company C can reduce its costs and implement economies of scale, as confirmed by Manager C (2024) "*The usability from the*

different users allows some economies of scale and synergies with other tools or keeping the same vendor". Conversely, Company C gains in terms of efficiency and effectiveness. Nevertheless, Company C allows its own department to change BI tool. Thirdly, the training provided for the BI tools has been different. In the case of Power BI, the majority of the learning was achieved through a process of learning by doing, as the interviewee did not create the dashboard themselves and used Power BI only for data visualization purposes. In contrast, the training for MicroStrategy was more structured, indeed the interviewee affirmed "*I wouldn't say like proper traditional training, but there were manuals, instructions and people were very supportive in explaining you how it works. So, I would say, yeah, a little bit of training*" (Manager C, 2024).

The role of BI tools in decision-making. In alignment with the preceding two companies, Manager C corroborates that the BI tools are merely a means to facilitate human-driven decision-making processes. Indeed, both Power BI and MicroStrategy collect data and create reports and present data, thereby enabling employees to make decisions based on valuable insights. For instance, Company C has used them to conduct research on new car launches and to make distribution decisions, "*for example, to decide how to allocate the cars that are produced to different countries. Maybe you want to sell. You produce 500 cars in one month. You want to sell 100 to Italy 100 to Germany and then 300 to China. That's another example of how you would use some BI tools to make this decision*" (Manager C, 2024). Thanks to BI tools, automated processes can be automated. Manager C (2024) provides a practical example of their use. "*For example, if you think about the marketing intelligence domain, so analyzing competition and competition performance, sales performance for example in this domain you always want to have very up to date to data that tell you every month: how much the competition is selling, how much the market is increasing, your market share, a lot of KPIs to analyze the market and competition. This is like very repetitive over time because the way you analyze this data is very similar. The way you process this data is always similar because the shape of the data is always*

the same. So, when you can automate this through a using a BI tool". In order to assess the efficacy of Company C's BI tools, it is necessary to acquire employees' feedback.

4.4 Company D

Business intelligence tools in use. Company D has selected Power BI and Excel as its business intelligence tools. Power BI's user-friendly interface, flexibility, and ease of integration with other tools are the features that make it a popular choice among firms, including Company D. Moreover, Power BI is employed across the entire organization, "It's the only BI tool that we use" (Manager D, 2024).

The advantages and disadvantages of BI tools. To supplement the aforementioned observations, Company D has found Power BI to be a considerably more time-efficient alternative to Excel. Its capacity to incorporate and present disparate data sources, encompassing both historical and real-time information, as well as internal and external sources, is a significant advantage. Power BI enhances operational efficiency within the company. However, Company D engages in both B2B and B2C activities and collaborates with numerous providers. Obtaining their CRM data is not always straightforward, which has resulted in the CRM not being fully integrated with the Power BI tool. Manager D offers an explanation for this phenomenon: "*It's a little bit complicated. The boutiques and.com are managed by the fashion company, so we have the data and we have access to some of it, including CRM, so age of the customer, nationality, classic CRM data. So, for boutiques we have it and we actually see what the customer has bought from our direct retailers. Otherwise, there are two ways. For example, retailer X has a specific line in their contract where you need setup data, so they send us setup data, but it's only for our brand, so we don't see the market share and we don't have CRM data of the*

customer of retailer X, their information, and therefore we don't have it. Then the other way is panels where you buy data and so you see all the sales of the account for example". The upper level of the management of Company D made the decision to implement Power BI, and thus the entire company adopted the tool. This resulted in the distribution of access across the entire organization, which facilitated alignment and connection between business units and contributed to the dissemination of knowledge within the firm. Following the introduction of the tool, training was provided in the form of a basic course on an external platform, followed by a period of guided learning through practical application on the user-friendly interface. However, there are still some limitations to the tool's full utilization, as certain functions must be completed manually rather than automatically.

The role of BI tools in decision-making. Similarly, Power BI is a valuable resource that enables the creation of dashboards and reports, facilitating the visualization of data. The implementation of activities control is made possible by this tool. In the case of Company D, Power BI is utilized to assess the fulfillment rate "*I believe we have also some like operation dashboards relating to stock and production. We are working again on heavy, and I think it accessible on power BI and so for that team like having I'm having that available, it's very useful. For example, they monitor the is fill rate. For instance, they have a customer who orders 100, I give him 80 because I don't have that 20. I'm out of stock. I only have 80 so fill rate is 80%. Since there's a calculation behind the SAP. So, to sync from seeing it from SAP is very hard from like the actual ERP. So now that we have it in our power BI report, it's very easier to see how the operation is doing. So maybe you see about this specific product, if its rate is super low, What's wrong? What's going on? Why don't we have this product? Did we do the planning, right? The forecast wrong because we produced less than what the customer asked for or there is another problem, I don't know. So, and it's very useful also on this operation side*" (Manager D, 2024). It is important to consider the automation of numerous processes in lieu of manual

implementation. Ultimately, the absence of a primary metric for evaluating the ROI and performance of Power BI prompted Company D to employ an alternative measure in conjunction with human feedback. For instance, Manager D and their team assess the significance of a report and, consequently, the utility of the BI tool itself. They also monitor the number of times a report is accessed. While this approach may not be an exact substitute for a financial metric, it provides the company with a basic understanding of its BI tool's performance.

4.5 Company E

Business intelligence tools in use. The BI tools available to Company E included Power BI, Excel, and a BI tool that had been created ad hoc by the company itself. Manager E (2024) illustrated the function and utilization of internal BI, stating, "we start from a corporate BI that is the aggregator of some of the data. There are also dashboards that are created within this, this tool which, however, does not allow you to customize much; therefore, it often simply becomes a repository in a data archive that is then downloaded, and other tools are used, such as Power BI". It can thus be considered as a standalone business intelligence tool, although utilized as a data source for Power BI in this particular context. The utilization of Power BI is not universal across all divisions of the company. The software has been selected for its user-friendly interface, flexibility and customizability, integration with other tools, and artificial intelligence capabilities, "Copilot, which is the artificial intelligence part of Microsoft that is helping us" (Manager E, 2024). Moreover, it is peculiar within diverse domains. The existing agreement with Microsoft for the Office suite enables the company to select Power BI in preference to other business intelligence tools.

The advantages and disadvantages of BI tools. In addition to the aforementioned point, the introduction of Power BI enables employees to provide explanations of data and justify their assertions to others. The reduction in time required for analysis allows for a greater depth of knowledge to be gained about the company. In contrast, Excel has been partially supplanted as the dominant BI tool due to its lack of immediate intelligibility. Furthermore, the incorporation of Copilot, Microsoft's artificial intelligence, has facilitated a notable acceleration in operational velocity, thereby enhancing overall efficiency and effectiveness. Furthermore, the existing agreement with Microsoft facilitates the acquisition of new skills for employees. Manager E (2024) stated: "*Obviously among these and others we prefer those of the Microsoft package, because there is precisely a more extensive collaboration. So I'm not saying that they are forced choices because we could also use other tools, we have a facilitation because they are skills that come to us in quotes, free of charge through this, this partnership with them and therefore they help us and then there are skills, obviously internal to our company, that are somehow able to solve a series of problems and to give solutions to business problems through these tools, so surely this definitely adds, Copilot, which is the artificial intelligence part of Microsoft that is helping us*". However, given the company's considerable size and structure, there is a dedicated team solely responsible for CRM. Consequently, the CRM integration is incomplete. As observed by Manager E (2024): "*Data sharing [CRM data] is not always fluid because it is not data that is stored or structured within Power BI and therefore accessible to everyone, but it is stored and used by the CRM team, so it is always a bit to go to the request of this team to share what are their findings, but not their databases. I can't access theirs with my database, but I can access their findings, that is, they do analysis and then bring you the final output, which is obviously an output managed by them, so who do merchandising maybe look for things that they don't look for or maybe I see from the numbers something that they don't see and vice versa*". In regard to the training, Manager E posits that the company in question required

specific skills pertaining to business intelligence tools. Consequently, the process of learning by doing was facilitated by the interviewee's existing knowledge. However, Manager E also emphasizes the potential of soft skills, particularly curiosity, which can assist in identifying new opportunities and solutions.

The role of BI tools in decision-making. The assistance provided by Power BI to employees through the creation of dashboards and the visualization of data facilitates the generation of valuable insights and the comprehension of phenomena, which is beneficial for the company E. The automation of processes allows for the replication of best practices and the modification of the organizational structure, as some tasks that were previously performed manually and required an employee to complete them are now automated, thereby influencing the way of work and the workforce itself. The utilization of Power BI within the organizational structure of company E enables the implementation of continuous adjustments to the strategic plan in accordance with the insights provided by BI tools. In general, Manager E asserts that Power BI and data are the foundation of the role itself, "*I couldn't think otherwise, that is, I am used to my work, let's say the choices I make from a professional point of view derive from data, that is, I have to somehow read, know how to read the data. Give me an explanation and then justify it by others as well, because let's say I'm not isolated, I work in a team, my team works with other teams, so somehow when we propose solutions to specific cases, we often also have to justify, give an explanation to this explanation is the data. But in fact, everything comes from there, I couldn't think of a different world*" (Manager E, 2024). Ultimately, the question of quantifying the impact of Power BI on a company's economic performance remains unanswered. As Manager E (2024) confirmed "*It is also clear that measuring an ROI is a bit difficult, that is, today I would say, all our choices are choices based on numbers, so it would have a very high ROI, because all the choices of Luxottica's business are based on that it is a bit difficult to go and attribute that specification, the activity or business impact as it is then*

connected to the data that is taken from the tool, but I would tell you all". Nevertheless, in addition to the employees' feedback regarding the functionality of Power BI, the accuracy of the data itself is also crucial. If the data is indeed correct, then Manager E can assume that the BI tool is operating properly.

5 Discussion

In the following section, the various findings from different companies are correlated according to three categories: (a) business intelligence tools used, (b) the advantages and disadvantages of BI tools, and (c) the role of BI tools in decision-making. In addition, some literature references are provided for each key point.

5.1 Business intelligence tools used

The objective of this subsection is to respond to the research question, specifically "What are the key factors that organizations consider when selecting BI tools for marketing purposes?" The business intelligence tools most frequently utilized by the sampled companies are Excel and Microsoft Power BI. All of the companies included in the sample utilize Excel. Its prevalence across global companies is indicative of its versatility, which is a significant factor in its continued popularity. As Slager (2016) notes, Excel remains a valuable tool for data management and analysis. However, among the sample, it is the most common tool, though not necessarily the most efficient. This is why it is still employed for the collection and storage of data, but no longer for the performance of analysis. Company B has only recently introduced Power BI, and thus a considerable amount of analysis is still conducted using Excel.

However, the objective is to reduce the reliance on Excel in favour of Power BI. Indeed, according to Manager E, who was recently employed at Company E, Excel was previously utilized for analysis, but it required a significant amount of time. In contrast, Power BI has the potential to facilitate the completion of analyses in a considerably shorter time frame. On the other hand, Power BI is selected by companies for a variety of reasons, which can be classified

into two categories: the tool's characteristics and its integration. The first category of reasons relies on the features of the tool itself. Indeed, Power BI is user-friendly, flexible to the different needs of the company, and provides an immediate understanding. Manager E also notes that it is particularly peculiar, enabling users to delve deeply into a specific phenomenon. The findings align with the existing literature. For instance, Sinha (2021) asserts that Power BI, with its user-friendly interface, allows users to create various dashboards, graphics, and tables according to their needs. The second category provides an explanation for why companies rely on Power BI, namely, its integrability with existing Microsoft Office suites. The provider remains the same, which facilitates a more linear integration. Furthermore, a considerable number of the companies in the sample have already entered into an agreement with their existing provider, which facilitates the process.

Company A is the exclusive adopter of Tableau, which Manager A perceives as a user-friendly tool. Furthermore, some companies in the sample employ a BI tool, developed internally, which gathers data as a data lake and then enables the analysis of data through Power BI and Tableau. Company E is the only one within the sample that has not shared its business intelligence (BI) tool with other departments or business units. In contrast, the other firms within the sample have shared the same BI tool throughout the entire enterprise.

In regard to the marketing environment, companies selected their BI tool independently of the competitive landscape in which they operated. Consequently, there is no definitive optimal choice for use in marketing departments. In general, tools are employed for the analysis of sales data, and thus decisions are made on the basis of this data. To provide an example, Company C utilized sales data and a business intelligence (BI) tool to determine the optimal allocation of their products to different countries. Specifically, more machines were allocated to countries where sales were higher relative to population size. This approach enabled the company to make

the most informed decision based on the insights derived from the sales data, which was processed using Power BI. It is crucial to recognize that the selection of data is a highly specialized process. It is a fallacy to assume that all data is inherently useless; rather, different data are required for different objectives. For instance, sales data are essential for launching a product in a new market, whereas data related to brand awareness may be more valuable for communication campaigns.

In general, both Excel or Google Sheets and Power BI or Tableau are utilized in conjunction with one another in all of the companies included in the sample. The process and methodology of data analysis are broadly similar across all companies. For example, Company A utilizes Redshift, a data warehouse that stores all raw data. Consequently, the data are downloaded and updated on Tableau for data cleaning. This involves the deletion of all incomplete or superfluous data and the organization of the remaining data. Ultimately, a Tableau user or company employee can create a dashboard with data pertinent to a particular project or objective. This facilitates the visualization of data in a clear and concise manner, thereby facilitating informed decision-making. In other companies, however, there is no immediate connection between the data warehouse and the BI tool. Consequently, the process differs slightly. In this case, the user downloads all the data required for the project, which is determined by the user or the project group. The data cleaning is conducted in Excel, and the resulting data is uploaded to Power BI. Finally, the dashboard transforms the data into graphs, facilitating visual comprehension and decision-making. In both processes, the role of the human factor is significant. Initially, this is evident in the decision-making process regarding the selection of data for analysis, which enables a comprehensive understanding of the situation. Subsequently, the human factor is crucial in the interpretation of the presented data and the subsequent decision-making process.

5.2 The advantages and disadvantages of BI tools

The following sub-section is intended to address another of the research questions that are investigated: “How do these factors contribute to the overall success of marketing strategies?” All of the companies included in the sample demonstrate a clear alignment on the advantages of utilizing a business intelligence (BI) tool. These advantages are represented in the following list:

- The ability to consolidate all data in a single location facilitates the role of BI as a central hub for information. The combination of historical and real-time data enables more precise analysis and prediction.
- Furthermore, the sharing and accessibility of data promote the free flow of information and the diffusion of knowledge. Manager E believes that Power BI enables the company to reproduce best practises.
- In general, business intelligence (BI) tools enhance efficiency and effectiveness. Company C indicated that it is able to achieve economies of scale and cost reductions through the use of Power BI. Many tasks that were previously completed manually by an employee are now performed automatically by the BI tool, allowing the company to increase flexibility in its organizational structure and reduce employee numbers in some cases while enabling the creation of new teams in others. For example, the implementation of Tableau in Company A facilitated the establishment of a new business unit, designated as the "Marketing Intelligence" division.

The findings are consistent with the existing literature on the subject. The Business intelligence enable a better use of data which can help user to handle analysis both on historical and predictive. (Isik et al., 2011). Yeoh and Koronios (2010) suggest that company's knowledge and

approach may change after the implementation of a BI system. According to Jafari et al. (2023) BI ha a positive impact on company's integration.

In regard to the training associated with the business intelligence (BI) tool selected by the companies. The majority of these approaches begin with a learning-by-doing methodology, which has been demonstrated to be the most effective among the various techniques. In addition to the mentioned approach, some companies in the sample have the option of enrolling in external courses to further their understanding of the tool. However, an analysis of the existing literature reveals a discrepancy between the findings and the existing literature. The extant literature suggests that a more structured training program should focus on internal forces and take into account both marketing and non-marketing employees in order to integrate and disseminate intelligence, as proposed by Kotler (2000) and Lin et al. (2015).

The literature review demonstrated the significance of integrating customer relationship management (CRM) into the utilization of business intelligence (BI) tools. Indeed, Zaby and Wilde (2018) state that the integration of CRM with BI tools may be a critical factor in achieving a competitive advantage. Similarly, CRM can facilitate the acquisition of additional data and customer insights (Kiron & Bean, 2013). Nevertheless, in practice, all of the samples do not fully integrate CRM into their operations. Only two of the five companies have implemented a partial integration of CRM. This is due to two primary factors. First, all companies prioritize sales data over specific CRM data. Second, multinational companies are typically large and complex, with a business unit and one or more teams dedicated to CRM. However, Nam et al. (2019) suggest that business intelligence can serve as a conduit between IT and CRM performance. Consequently, companies must consider CRM data.

Nevertheless, the assessment of CRM data presents a number of challenges. Firstly, multinational companies are characterized by a high level of complexity, with numerous departments

and disparate operational units. The integration of these disparate elements is a challenging process. Business intelligence tools have facilitated communication between departments, but the complete sharing of data remains a significant barrier. For instance, the marketing department did not consider CRM data because in a competitive environment, decisions must be made quickly, and requesting CRM data from the CRM team can be a lengthy process due to internal permissions. Secondly, it is not always feasible to obtain customer data. For instance, company B collaborates with numerous boutique and retail establishments that do not disseminate their entire CRM data set. Instead, they only share data pertaining to company D, specifically customers who purchase Company D products in retail stores. Consequently, when evaluating customers of a retail store, the data of company D lose their significance.

The interviews revealed that business intelligence (BI) tools can facilitate the sharing of information throughout an entire company. Therefore, one of the initial steps to align business assets with marketing intelligence objectives is to utilize a single BI tool throughout the organization to facilitate the sharing of information. This approach also necessitates the establishment of a shared data warehouse where all employees can access a comprehensive range of data. For instance, a marketing professional can leverage CRM data for a specific marketing campaign. In addition, the companies interviewed highlighted the importance of user-friendly interfaces, which can reduce the time and costs associated with training, as well as the capacity to process vast amounts of data. For instance, Company A found Tableau to be relatively slow, particularly when dealing with large data sets. As previously discussed, the speed of processing is a critical factor in decision-making.

5.3 The role of BI tools in decision-making

This final section addresses the primary research question: “How do Business Intelligence (BI) tools impact the effectiveness of marketing decision-making processes in organizations?” Firstly, the findings highlight the fact that a Business Intelligence (BI) tool does not represent the "final product" in and of itself, but rather serves to enhance the capacity of the human component to make informed decisions, namely decisions based on data and information. Therefore, BI tools will continue to serve as a support system, as they are capable of generating valuable insights following a process of data collection, analysis, and visualization. Secondly, as indicated by the respondents, the advent of BI tools has profoundly transformed the manner in which work is conducted. The automation of numerous processes has led to a notable reduction in the time required for data analysis and the capacity to examine vast quantities of data in a matter of seconds. Thirdly, the capacity to create dashboards and reports enables users to elucidate and justify numerous organizational decisions. Consequently, companies are more competitive and are able to respond expeditiously to changes in the market.

A case study approach was employed to investigate the role of BI in facilitating diverse tasks across the firms under consideration. For example, Manager A asserts that in their company, Tableau facilitates the conclusion of business agreements with customers and the management of those relationships. In Company B, the BI tool facilitates communication and collaboration across all business units, which are distributed across different geographical locations. In Company C, the BI tool supports the management of distribution decisions between units situated in various locations worldwide. In Company D, the Power BI tool enables the monitoring of inventory fill rates and the oversight of operational activities. Overall, the Power BI tool allows Company D to track its activities and strategies, thereby facilitating the company's ability to adapt and respond to changing circumstances.

In this instance, the findings are consistent with those reported in the existing literature. Indeed, Negash (2004) defines BI as a system that comprehends the gathering and analysis of data, as well as the presentation of information utilized by decision makers. Similarly, Tavera Romero et al. (2021) argue that there is a need to capture data value and utilize BI to make informed decisions. Furthermore, the accessibility of information enables the effective functioning of day-to-day operations, as previously illustrated in the examples (Aaker et al., 2009 as cited in Guarda et al., 2012).

In regard to the research gap identified in the initial chapter, namely the absence of a metric to measure or regulate the performance of the business intelligence tool, it is evident from an examination of existing literature that it is not feasible to quantify the return on investment (ROI) of the aforementioned tool (Negash, 2004). Furthermore, a new key metric has yet to be established to achieve this objective. Unfortunately, the findings did not identify a novel universal key metric for evaluating the performance of business intelligence (BI) tools.

Nevertheless, some significant findings have emerged. Indeed, in order to assess the performance of a business intelligence (BI) tool, the entire sample relies on human feedback. Consequently, if the BI tool is not functioning optimally, the employees themselves tend to report the issue to the information technology (IT) department or the unit responsible for operating the BI tool. Only Companies D and E propose an additional approach. In order to assess the functionality of the BI tool and the quality of the reports generated, Company D employs a click-based metric. This approach quantifies the number of times a report is accessed by employees, thereby measuring its utility and performance. A report is considered effective and reliable if it receives a high number of clicks. Company E assesses the accuracy of the data, determining the precision and fidelity of the information and its alignment with the objects or events being recorded. High accuracy indicates that the BI tool is functioning as intended and performing optimally. It is

currently not possible to ascertain the return on investment (ROI) of Power BI. Manager E asserts that the ROI would be considerable, but it is challenging to identify the specific factors contributing to its profitability. The tool analyses a large volume of data from diverse sources, which makes it difficult to isolate the precise factors influencing its profitability.

Although the return on investment (ROI) cannot be quantified, the companies surveyed, as well as all others, could potentially benefit from alternative solutions. From an economic standpoint, it is feasible to determine the cost of implementation, licensing, and all updates associated with the enterprise business intelligence (BI) tool. In addition, the expense of any training programs must be taken into account, as well as the number of hours spent by each employee in learning how to utilize the tool. These are hours that are not contributed by the employee themselves. Conversely, it is not feasible to quantify the direct revenue generated by business intelligence tools. However, it is possible to capture the reduced costs incurred by the company. For example, one can quantify the number of hours spent on a process or task without the use of the BI tool and with the use of the BI tool. The efficiency gained through the automation of business intelligence tools can be expressed in terms of reduced costs incurred by the company. This would provide, even if only partial, insight into the impact of the BI tool on the company's economic performance.

6 Conclusion

This section will present the conclusion of the thesis, an analysis of its limitations, and a discussion of potential research directions for future studies in this area.

The objective of this thesis was to address the following research question: “How do Business Intelligence (BI) tools impact the effectiveness of marketing decision-making processes in organizations?” Moreover, additional sub-questions are posed, including “What are the key factors that organizations consider when selecting BI tools for marketing purposes?” and “How do these factors contribute to the overall success of marketing strategies?” These questions are introduced with the objective of acquiring a more in-depth understanding of the utilization of business intelligence tools within multinational Italian companies.

Firstly, in regard to the sub question, the extant literature reveals a number of gaps in the criteria for choice and the practical use of business intelligence (BI) systems. These include a lack of knowledge on how businesses acquire real-time data (Negash, 2004). The findings indicate that the most prevalent business intelligence (BI) tools are Excel and Power BI. As previously discussed, the numerous advantages of these tools make them a popular choice among the companies in the sample. The principal factors that companies take into account when selecting a BI tool for marketing are the user-friendly interface, the ease of access and sharing, and the capacity to interact with previous suppliers. Furthermore, the BI tool should possess the capacity to process a substantial amount of data and support the entirety of the data management process. As evidenced by the literature, business intelligence (BI) tools should possess robust technological capabilities and demonstrate the capacity to process vast quantities of data, as well as their efficacy (Tripathi and Bagga 2020; Ahmed, 2021). This is a quality that BI tools have consistently demonstrated in practice. It is evident that the disparate perceptions of users result

in firms adopting disparate tools (Ahmed, 2021). In the context of marketing, companies tend to select different types of data, particularly those related to sales. The utilization of customer relationship management (CRM) data remains limited. Findings indicate that there is no substantial or tangible use of CRM data. As previously discussed, the companies in the sample were large and complex organizations with constraints in communicating with departments exclusively responsible for CRM.

Secondly, with regard to the second sub-question, the aforementioned benefits, which include the capacity to assess business situations and facilitate prediction in order to inform decision-making and enable strategic adaptation (Moss and Atre, 2003), can be further elucidated. One of the primary benefits was the reduction of time and the automation of processes, which resulted in the elimination of redundant processes (Watson and Wixom, 2007). The findings align with the literature, indicating that BI tools primarily automate processes that were previously conducted exclusively by humans. Consequently, efficiency is enhanced due to the reduction in time required for data collection and analysis. One of the primary shortcomings was the absence of a key performance indicator (KPI) that could effectively gauge the impact of BI tools (Negash, 2004; Ain et al., 2019). The findings revealed that the majority of companies in the sample did not utilize a consistent or standardized metric to assess the efficacy of their BI tools. Some companies explored alternative approaches but were still unable to identify a metric that could provide the same level of accuracy and objectivity as, for instance, return on investment (ROI). Nevertheless, the solution, which was initially proposed in the discussions chapter, can be identified by measuring the difference in efficiency in terms of time, money, and resources with and without the implementation of a business intelligence (BI) system.

Thirdly, the primary research question, “How do Business Intelligence (BI) tools impact the effectiveness of marketing decision-making processes in organizations?" has been answered

through the analysis of the findings. Indeed, BI tools, and more generally, BI systems, are employed as a support mechanism, facilitating the translation of raw data into actionable insights and decision-making processes (Zaby & Wilde, 2018 ; Nam et al., 2019; Negash, 2004). In light of the existing literature, similarly the findings that BI tools serve to support human decision-making processes, rather than providing a definitive solution in themselves. Nevertheless, the contemporary context has rendered the interviewee's assertion implausible: the BI system is now a necessity. In particular, the tools are indispensable. BI has reached a pivotal point, as the sheer volume of data produced every second renders the system an indispensable resource. The ability to process and analyse data with a degree of accuracy that far exceeds human capabilities in a matter of seconds is a resource that companies cannot do without. The companies in the sample could not operate on a daily basis without BI tool systems. Likewise, BI tools without the human component that actually makes decisions would produce an incomplete product. In conclusion, the BI system and the human component are two indispensable components; one cannot function without the other.

6.1 Limitation and future direction

In light of the limitations of this research, a few considerations are crucial to the interpretation of the findings. Firstly, the sample is comprised of only five Italian multinationals. It would be beneficial to include a larger sample size that encompasses European countries in order to enhance the generalizability of the results to a broader population. Secondly, the sample could be expanded by conducting additional interviews within each company. Furthermore, focusing on a specific sector could reveal more specific patterns within one industry. However, the objective of this research was to provide an overview of business intelligence tools, which is only possible by considering different multinational companies from different industries. Thirdly,

multinationals are highly structured, and thus do not possess all the same departments or job positions. Therefore, a study that is designed to create a sample composed of respondents with the same job positions can facilitate the clarity of the findings and enhance their generalizability.

In light of the aforementioned contributions, there is the possibility of pursuing a different direction. The introduction of European multinationals, and not only Italian ones, is a further avenue for exploration. Ahmed (2021) posits that BI studies should consider other countries in addition to the United States, including European firms. Furthermore, additional research should concentrate on identifying a primary metric that can comprehensively quantify the influence of the BI tool on the organizational system.

The findings may serve as a point of departure for further direction, as evidenced by the case study conducted by Khare et al. (2023), which employed a simulation of a BI system to examine various aspects of a Japanese printed circuit board (PCB) company. The final objective is to establish a key performance indicator (KPI) or metric for evaluating the BI system and its constituent tools. However, the objective of the study was to provide a comprehensive overview of the business intelligence (BI) subject, which is a relatively specialized field.

Further studies could investigate additional related areas, such as marketing intelligence (MKTI) and customer relationship management (CRM). In the context of MKTI, Helm et al. (2020) assert that it has become a critical element in contemporary business operations, as it facilitates the acquisition and analysis of data that can be leveraged to gain insights into market trends and inform decision-making processes. The investigation of multinational corporations has yielded limited research on the linkage between business intelligence (BI) tools and customer relationship management (CRM). This is due to the fact that multinational corporations, which are often highly structured, frequently have teams or units that are responsible for CRM-

specific tasks. Consequently, an investigation into smaller companies or multinationals with a link between their CRM and business intelligence could lead to a deeper understanding of this relationship. Indeed, Moss and Atre (2003) posit that BI tools can enhance the customer relationship, whereas Zaby and Wilde (2018) argue that CRM is a critical factor for companies, conferring a competitive advantage through the acquisition of market knowledge, which in turn enables international market competition (Del Vecchio et al., 2022).

References

Ahmed, E. (2021). Utilization of Business Intelligence Tools among Business Intelligence Users. *International Journal for Innovation Education and Research*, *9*(6). https://doi.org/10.31686/ijier.vol9.iss6.3172

Ain, N., Vaia, G., DeLone, W. H., & Waheed, M. (2019). Two decades of research on business intelligence system adoption, utilization and success – A systematic literature review. *Decision Support Systems*, *125*, 113113. https://doi.org/10.1016/j.dss.2019.113113

Anderson-Lehman, R., Watson, H. J., Wixom, B. H., & Hoffer, J. A. (2004). Continental Airlines Flies High With Real-Time Business Intelligence. *MIS Quarterly Executive*, *3*(4).

Balusamy, B., Nandhini, A. R., Kadry, S., & Gandomi, A. H. (2021). Big Data: Concepts, Technology, and Architecture. In *Big Data: Concepts, Technology, and Architecture*. https://doi.org/10.1002/9781119701859

Cambridge Dictionary. (n.d.). *Big Data*. Retrieved February 19, 2024, from https://dictionary.cambridge.org/dictionary/english/big-data

Chen, Y., & Lin, Z. (2021). Business Intelligence Capabilities and Firm Performance: A Study in China. *International Journal of Information Management*, *57*, 102232. https://doi.org/10.1016/j.ijinfomgt.2020.102232

Cheng, C., Zhong, H., & Cao, L. (2020). Facilitating speed of internationalization: The roles of business intelligence and organizational agility. *Journal of Business Research*, *110*, 95–103. https://doi.org/10.1016/j.jbusres.2020.01.003

Chern, C.-C., Lee, A. J. T., & Wei, C.-P. (2015). Introduction to the special issue on "Data analytics for marketing intelligence." *Information Systems and E-Business Management*, *13*(3), 399–402. https://doi.org/10.1007/s10257-014-0270-3

Del Vecchio, P., Mele, G., Siachou, E., & Schito, G. (2022). A structured literature review on Big Data for customer relationship management (CRM): toward a future agenda in

international marketing. *International Marketing Review*, *39*(5), 1069–1092. https://doi.org/10.1108/IMR-01-2021-0036

Domo. (2022). *Data Never Sleeps 10.0*. https://www.domo.com/data-never-sleeps#data

Drucker, P. F. (2012). Management Challenges for the 21st Century. In *Management Challenges for the 21st Century*. https://doi.org/10.4324/9780080942384

Eriksson, P., & Kovalainen, A. (2016). *Qualitative methods in business research* (2nd edition). Sage Publications.

Fan, S., Lau, R. Y. K., & Zhao, J. L. (2015). Demystifying Big Data Analytics for Business Intelligence Through the Lens of Marketing Mix. *Big Data Research*, *2*(1), 28–32. https://doi.org/10.1016/j.bdr.2015.02.006

Guarda, T., Santos, M., Pinto, F., Silva, C., & Lourenço, J. (2012). A Conceptual Framework for Marketing Intelligence. *International Journal of E-Education, e-Business, e-Management and e-Learning*. https://doi.org/10.7763/IJEEEE.2012.V2.163

Guba, E. G. (1981). ERIC/ECTJ Annual Review Paper Criteria for Assessing the Trustworthiness of Naturalistic Inquiries. *ECTJ*, *29*(2), 75–91.

Guest, G., MacQueen, K., & Namey, E. (2012). Introduction to applied thematic analysis. In *Applied Thematic Analysis* (pp. 3–20). SAGE Publications, Inc. https://doi.org/10.4135/9781483384436

Hackathorn, R. (2002). Current Practices in Active Data Warehousing. *Bolder Technology, Inc.*, 1–38.

Helm, R., Krinner, S., & Endres, H. (2020). Exploring the Role of Product Development Capability for Transforming Marketing Intelligence into Firm Performance. *Journal of Business-to-Business Marketing*, *27*(1), 19–40. https://doi.org/10.1080/1051712X.2020.1713562

Hennink. (2020). *Qualitative research methods*. Sage Publications.

IBM Institute for Business Value. (2023). *Turning data into value How top Chief Data Officers deliver outsize results while spending less*.

Isik, O., Jones, M. C., & Sidorova, A. (2011). Business Intelligence (BI) success and the role of BI capabilities. *Intelligent Systems in Accounting, Finance and Management*, *18*(4), 161–176. https://doi.org/10.1002/isaf.329

Jafari, T., Zarei, A., Azar, A., & Moghaddam, A. (2023). The impact of business intelligence on supply chain performance with emphasis on integration and agility–a mixed research approach. *International Journal of Productivity and Performance Management*, *72*(5), 1445–1478. https://doi.org/10.1108/IJPPM-09-2021-0511

Kamel, M. A. (2023). Big data analytics and market performance: the roles of customization and personalization strategies and competitive intensity. *Journal of Enterprise Information Management*, *36*(6), 1727–1749. https://doi.org/10.1108/JEIM-04-2022-0114

Khare, I., Rodrigues, L. L. R., Gulvady, S., Bhakta, S. S., Nair, G. K., & Hussain, A. (2023). Impact of Business Intelligence on Company Performance: A System Dynamics Approach. *Folia Oeconomica Stetinensia*, *23*(2), 183–203. https://doi.org/10.2478/foli-2023-0026

Kiron, D., & Bean, R. (2013). Organizational alignment is key to big data success. *MIT Sloan Management Review*, *54*(3).

Kotler, P. (2000). Marketing Management, Millenium Edition. *Marketing Management*, *23*(6). https://doi.org/10.1016/0024-6301(90)90145-T

Kursan, I., & Mihic, M. (2010). Business Intelligence: the Role of the Internet in Marketing Research and Business Decision-Making. *Poslovna Inteligencija: Uloga Interneta U Marketinškom Istraživanju I Poslovnom Odlučivanju.*, *15*(1).

Lies, J. (2022). Marketing Intelligence: Boom or Bust of Service Marketing? *International Journal of Interactive Multimedia and Artificial Intelligence*, *7*(7), 115. https://doi.org/10.9781/ijimai.2022.10.001

Lin, W.-S., Hsu, J.-W., & Yeh, M.-Y. (2015). Developing the capability of marketing intelligence. *Benchmarking: An International Journal*, *22*(7), 1341–1359. https://doi.org/10.1108/BIJ-12-2013-0117

Loth, A. (2019). Visual Analytics with Tableau®. In *Visual Analytics with Tableau®*. https://doi.org/10.1002/9781119561996

Marshall, C., & Rossman, G. B. (1999). Designing qualitative research. 3rd edition. In *Thousand Oaks*.

Mochtar, K., & Arditi, D. (2001). Role of Marketing Intelligence in Making Pricing Policy in Construction. *Journal of Management in Engineering*, *17*(3). https://doi.org/10.1061/(asce)0742-597x(2001)17:3(140)

Moss, L. T., & Atre, S. (2003). Business Intelligence Roadmap: The Complete Project Lifecycle for Decision- Support Applications. In *Communication*.

Myers, C. (2015, May 13). *Decoding Uber's Proposed $50B Valuation (And What It Means For You)*. https://www.forbes.com/sites/chrismyers/2015/05/13/decoding-ubers-50-billion-valuation-and-what-it-means-for-you/#

Nam, D., Lee, J., & Lee, H. (2019). Business analytics use in CRM: A nomological net from IT competence to CRM performance. *International Journal of Information Management*, *45*, 233–245. https://doi.org/10.1016/j.ijinfomgt.2018.01.005

Negash, S. (2004). Business Intelligence. *Communications of the Association for Information Systems*, *13*, 177–195. https://doi.org/10.17705/1CAIS.01315

Parment, A., Kotler, P. , & Armstrong, G. (2020). *Principles of Marketing* (Scandinavian Edition). Pearson International Content. https://bookshelf.vitalsource.com/books/9781292355016

Piccoli, G., & Pigni, F. (2013). Harvesting External Data: The Potential of Digital Data Streams. *MIS Quarterly Executive*, *12*(1).

Piccoli, G., & Pigni, F. (2021). *Information Systems for Managers in the Digital Age with Cases* (Edition 5.0).

Piccoli, G., Rodriguez, J., & Watson, R. T. (2015). Leveraging Digital Data Streams: The Development and Validation of a Business Confidence Index. *2015 48th Hawaii International Conference on System Sciences*, 928–937. https://doi.org/10.1109/HICSS.2015.115

Pigni, F., Piccoli, G., & Watson, R. (2016). Digital data streams: Creating value from the real-time flow of Big Data. *California Management Review*, *58*(3). https://doi.org/10.1525/cmr.2016.58.3.5

Qi, C. (2020). Big data management in the mining industry. *International Journal of Minerals, Metallurgy and Materials*, *27*(2), 131–139. https://doi.org/10.1007/s12613-019-1937-z

Rababah, K., Mohd, H., & Ibrahim, H. (2011). A Unified Definiton of CRM Towards the Successful Adoption and Implementation. *Academic Research International*, *1*(1).

Rivero, E. F. C. (2018). Architecture - Installing and Configuring MicroStrategy. In *MicroStrategy Quick Start Guide: Data Analytics and Visualizations for Business Intelligence*. Packt Publishing.

SAP. (n.d.). *SAP BusinessObjects Business Intelligence*. Retrieved March 10, 2024, from https://www.sap.com/italy/products/technology-platform/bi-platform.html

Saunders, M. , L. P. and T. A. (2007). *Research Methods for Business Students* (E. G. Harlow. Financial Times Prentice Hall, Ed.; Fourth Edition).

Singh, V. (2019). *SAP Business Intelligence quick start guide: Actionable business insights from the SAP BusinessObjects BI platform*. Packt Publishing, Limited.

Sinha, C. (2021). *Mastering power BI: Build business intelligence applications powered with dax calculations. insightfulvisualizations, advanced bi techniques, and loads of data sources*. BPB Publications.

Slager, D. (2016). *Essential Excel 2016: A Step-By-Step Guide* (Apress L. P., Ed.).

Statista. (2023, November 16). *Data growth worldwide 2010-2025*. https://www.statista.com/statistics/871513/worldwide-data-created/

Steers, R. M., Sanchez-Runde, C. J., & Nardon, L. (2010). *Management across cultures: Challenges and strategies*. Cambridge University Press.

Tavera Romero, C. A., Ortiz, J. H., Khalaf, O. I., & Ríos Prado, A. (2021). Business Intelligence: Business Evolution after Industry 4.0. *Sustainability*, *13*(18), 10026. https://doi.org/10.3390/su131810026

Trim, P. R. J., & Lee, Y. (2008). A strategic marketing intelligence and multi-organisational resilience framework. *European Journal of Marketing*, *42*(7/8), 731–745. https://doi.org/10.1108/03090560810877123

Tripathi, A., & Bagga, T. (2020). Leading Business Intelligence (BI) Solutions and Market Trends. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3568414

Watson, H. J., & Wixom, B. H. (2007). The Current State of Business Intelligence. *Computer*, *40*(9), 96–99. https://doi.org/10.1109/MC.2007.331

Watson, H., & Volonino, L. (2002). *Customer relationship management at Harrah's entertainment* . 1–18.

Wilde, K. D. (2010). *Analytisches CRM*.

Willis, G., & Tranos, E. (2021). Using 'Big Data' to understand the impacts of Uber on taxis in New York City. *Travel Behaviour and Society*, *22*, 94–107. https://doi.org/10.1016/j.tbs.2020.08.003

Yeoh, W., & Koronios, A. (2010). Critical success factors for business intelligence systems. *Journal of Computer Information Systems*, *50*(3).

Zaby, C., & Wilde, K. D. (2018). Intelligent Business Processes in CRM. *Business & Information Systems Engineering*, *60*(4), 289–304. https://doi.org/10.1007/s12599-017-0480-6

Zhou, Z., Dou, W., Jia, G., Hu, C., Xu, X., Wu, X., & Pan, J. (2016). A method for real-time trajectory monitoring to improve taxi service using GPS big data. *Information & Management*, *53*(8), 964–977. https://doi.org/10.1016/j.im.2016.04.004

Appendices

Appendix 1. Interview Guide

INTRODUCTION

Good morning.

My name is Denise Larice, I am a master student at the University of Pavia. At the moment, I am enrolled in my final year of studies at the University of Vaasa (FI) as a double degree student.

During the interview, we are going to discuss Business Intelligence and its tools used for making decisions in marketing. The aim of my research is to answer the following research questions:

1. "How do Business Intelligence (BI) tools impact the effectiveness of marketing decision-making processes in organizations?"
2. "What are the key factors that organizations consider when selecting BI tools for marketing purposes?"
3. "How do these factors contribute to the overall success of marketing strategies?"

I would like to share some information with you about the interview which is going to take place.

During the interview, I want to explore your own experiences and the practices that the company integrates rather than right or wrong answers.

To ensure I don't miss any of your comments, I would like to audio record the interview with your consent. The anonymity of your identity and the confidentiality of your answer are guaranteed, since I will ensure that any information which I add to the report does not identify you as the respondent.

If I have not been clear, let me know and I will clarify your doubts.

TOPIC

The aim of the research is to explore the use of Business Intelligence tools in marketing decision-making. The study will also investigate which BI tools are commonly used in marketing business units and the benefits associated with their use.

Organizations can optimize their decision-making by generating data in real-time. However, the challenge they face is not collecting data, but transforming it into useful information. This information can greatly improve the quality of input to any decision-making process within a company. We understand that this can be a daunting task, but we are here to help you every step of the way. Business Intelligence (BI) is becoming increasingly important for companies today. BI is a key enabler for increasing value and performance. It is a system that incorporates both technical and organizational elements to better utilize data. This enables users to perform historical and predictive analyses, supporting decision-making at all levels and departments of a company. Businesses use Business Intelligence (BI) and its tools to improve relationships with existing clients, meet the needs of new customers, and support decisions at all levels of the organisation. In particular, BI tools can get important insights when it comes to predict and identify consumers' preferences. Based on this goal, it would be beneficial to explore the process of transforming raw data into valuable information for decision-making, specifically in the field of marketing. With customers generating vast amounts of data, it is important to consider how to determine which data is useful and which is not. It would be valuable to understand the process of transforming raw data into useful information. Moreover, the attention will be directed towards BI tools, with a particular emphasis on the selection of a tool (Excel, Microsoft Power BI, Tableau, etc.) and the rationale behind it, along with an evaluation of the pros and cons of each tool. These tools enable the company to recognize and articulate benefits, such as improvements in KPIs or metrics like ROI, or reductions in costs. The marketing campaign

appears to have been more successful and efficient, which may be attributed to the use of data and BI tools. This is how the company has been able to demonstrate it.

QUESTIONS

First of all, I would like to know more about you.

1. What is your current position in your company?
2. How long have you been in this position?
3. How long have you been using this BI tool?
4. How long have you been working in this area considering also other employment positions?

1. How important is the data to your business?
    a. How long does it take to analyze data?
    b. What specific types of data do you typically analyse using BI tools to inform marketing decisions?
2. What are the BI tools used in your organization?
    a. Is it the same tool throughout the company or just in the marketing department?
    b. Can you list the BI tools that your organization's marketing team commonly uses?
    c. What factors contribute to the selection of these specific BI tools for marketing purposes?
    d. In your opinion, what are the key advantages of incorporating BI tools into marketing decision-making?
    e. Are there any particular features or functionality of these tools that make them the tools of the company's choice?
    f. How long have you been using these BI tools?

3. Gathering data from customers is really important, and the decision based on CRM data at the end influence the CRM itself, how long does it take to make a decision?
    a. How does the BI tool influence your decision-making?
    b. Can you give an example?
4. Can you describe how your organization utilizes BI tools in the marketing decision-making process?
5. Could you provide examples of how BI tools have influenced recent marketing strategies or campaigns within your organization?
6. Can you explain what costs and issues your company has considered or should consider when changing a BI tool?
7. How do you know that a BI tool is working properly?
    a. Do you have a key metric?
8. How have BI tools contributed to improving the efficiency or effectiveness of marketing activities within your organization?
9. Can you share any success or positive outcomes that have resulted from the implementation of BI tools in marketing operations?
    a. Can you provide an example?

CLOSING

That was my final question related to the interview topic. Do you have anything else to share that I haven't asked you about already?

Thank you for your responses. We have now finished the interview. I would like to repeat that all your answers will be kept confidential, and they will be shared with the research team members only. Your feedback will be valuable in answering the research question and identifying common patterns in the Business Intelligence topic.

Your time and information you shared today are greatly appreciated.

If there's anything else you need, don't hesitate to get in touch with me.