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## **Abstract**

Digital Transformation has changed the world as we know it. The now global economy in which companies operate constitutes a volatile, ever-changing environment in which quick thinking, organizational agility and digital readiness are paramount for survival. The ways companies operate and create value has shifted towards the implementation of digital technologies in their business processes as a means to capture, develop and maintain a competitive advantage over their competitors.

It is worth noting that implementing digital transformation is not easy nor straightforward, however, as it requires a set of resources, both tangible and intangible. Companies that lack what's required to digitally transform may get left behind, while their competitors move forward toward a digital future. From a tangible perspective, resources include both financial and human resources, whereas on an intangible level companies and their leaders must possess the right attitude and open orientation to approach technological advancements in a proactive manner.

Thus, digital transformation is also to be considered a highly contextual phenomenon. In other words, the way companies approach their digital journey necessarily differs from one another due to several contextual factors, including but not limited to size, industry, and digital maturity. Hence the need for research to explore the multifaceted nature of digital transformation, by collecting empirical evidence on multiple different scenarios and companies.

Hence, the present collection of studies strives to explore the multifaceted nature of digital transformation by investigating multiple sides of the phenomenon, all grounded in empirical data. The goal is to investigate the ways in which companies enable digital transformation amid their business processes, what resources they need in order to do so and what barriers they need to overcome in the process.

The first contribution is based on an empirical case study drawn from a company operating in the automotive industry. More specifically, the case study illustrates how organizational agility and digital transformation interconnect with one another. In other words, we explore how the correct and proactive implementation of

technological advancements amid a company's business processes could act as an enabler for organizational agility. Throughout the study, additionally, we stress the importance of contextual factors such as digital readiness and strategic vision as means to smoothen the transition towards a fully digitized business model.

The second contribution takes a different qualitative approach and explores the perspective of companies with an extremely limited degree of digital readiness, in an attempt to highlight and investigate the barriers that are preventing them to digitally transform their business. The study is designed around a multiple case study methodology with purposeful sampling. The perspective of the study is on a micro and small scale, as those are the companies that notoriously struggle to digitize themselves the most, compared to large sized ones. The study takes a critical look at digital transformation literature by challenging the notion of Covid-19 being seen as some sort of catalyst for technological change, by instead refuting the claim and proving that it does not apply to companies with a low degree of digital readiness. The contribution has helped us determine a series of barriers to digital transformation that prevent companies from embarking on their digital transformation journey. Said barriers are both tangible and intangible, featuring economic constraints, lack of know-how required from modern technologies and negative cultural predispositions towards change.

Finally, the last contribution takes the corporate perspective, by exploring the ways in which large companies employ specific top management figures in an effort to address and manage digital transformation. More specifically, the attention is focused on the role of Chief Digital Officers, a new and rapidly emerging professional profile that has progressively found its niche amid top management. Through an analysis of a vast dataset of job postings, we find emerging tasks and competencies required from Chief Digital Officers and tie them back to digital transformation literature in an effort to better understand how they can help their companies in enabling digital transformation and drive forward strategic change.

Each of the three contributions find their positioning amid digital transformation literature and provide both practical and theoretical implications. More specifically and from a theoretical perspective, we find the following: digital transformation can act as enabler for organizational agility when the proper contextual conditions,



namely digital readiness, apply; contrarily to previous research on the topic, we find that Covid-19 does not act as a catalyst for digital transformation in companies with a low degree of digital readiness, while instead the pandemic has harshened the barriers that originally prevented them from digitizing themselves; finally, a theoretical archetype of Chief Digital Officers is provided from empirical data, illustrating how said professional figure can be responsible of driving forward the digital transformation process of their company.

Overall, the three papers presented in the collection strive to advance the knowledge of digital transformation by bridging specific literature gaps found in each stream, namely organizational agility, barriers to adoption of digital technologies and emerging managerial roles tied to digital transformation. Each come with specific limitations tied to their research designs and methodological approach.

Keywords: Digital Transformation, Agility, Enabling Technologies, Latent Dirichlet Allocation

# Chapter 1

## Mastering Digital Transformation in a Volatile World

### 1. Introduction

The effects of digital transformation are booming among businesses (Björkdahl, 2020). Regardless of their size, scope and industry, almost every company has had to start their digital transformation journey in an attempt to stay competitive in the digital era (Chierici et al., 2020). While we live in a so-called VUCA world, where disruptive technologies, ever changing market demands and constant uncertainty characterize every businesses' life, technological advancements represent not only a solution for these challenges (Elia et al., 2021), but sometimes a pure prerogative for basic survival (Faridi & Malik, 2020).

Given the importance of digital transformation among businesses, the attention from both the academic world and the practitioners' has been sharply increasing over the past few years. Several literature streams have been developed over time, as researchers have explored the multiple facades of digital transformation. Literature streams on digital transformation include topics such as organizational agility (Garbellano & Da Veiga, 2019; Lam & Law, 2019), impacts of digital advancements on business models (Del Giudice et al., 2021; Dutta et al., 2020), value creation of digitalization (Warner & Wäger, 2019), skill and competence development (Cannas, 2021), and more.

In regards to agility, scholars agree on it not being a standalone capability (Kesavan et al., 2021), rather a characteristic resulting from a cluster of organizational competences including adaptability, speed, innovation, sustainability and resilience (Levstek et al., 2018; Gunduz et al., 2021). While multiple definitions of agility exist (Lichtenthaler, 2020), it is generally accepted that agility is the ability to quickly sense and respond to environmental changes, which is an important determinant of organizational success especially amid the digital era. Speed and flexibility are paramount for agility, as well as the effective response to change and uncertainty: in modern times, companies are expected to provide customer-driven products and services in a timely and flexible manner, and often customizable as well. Amid the

aforementioned definitions of agility, customer agility is one that has received attention in recent research. It can be defined as the degree to which the firm is able to sense and respond to customer-based opportunities with ease, speed, and dexterity. The link between agility and digital transformation is yet to be fully explored, however research has been conducted on the ways in which digital advancements can be considered enablers of organizational agility (Rane et al., 2020; Troise et al., 2022). In other words, organizational agility is not easy to achieve. Instead, it requires several organizational traits in order to be implemented (li et al., 2021). A few studies have suggested that digitalization, in a way, promotes agility in organizations and it does so by reducing the risk of being stuck in rigidity traps. Under a different perspective, scholars have pointed out that digital technologies create higher value only when organizational agility is employed and developed in a continuous and meticulous way over the years (Karimi & Walter, 2021).

## **1.2 Digital Technologies and Organizational Agility**

Technological advancements are acting as disruptive forces amid global economies, which in turn are evolving at an unprecedented pace due to their highly turbulent and ever changing market dynamics (Kamal, 2020). The numerous advancements made possible by digital transformation have been explored at length by previous research, and more specifically in terms of productivity, efficiency, effectiveness and more. Additionally, the ongoing pandemic has emphasized both the market's turbulence and the need for companies to find alternative ways to maintain their productivity, as a means to get around regional lockdowns and limitations set by the pandemic (Boes et al., 2018; Ciampi et al., 2022).

Amid the aforementioned context, organizational agility is paramount for companies, as they strive to maintain their competitive advantage in troubled times (AlNuaimi, et al., 2022). What agility does is to allow companies to adapt to continuous environmental changes, which in turn guarantees them higher success rate than non-agile companies. While the benefits are evident, being able to successfully make use of organizational agility and implement digital transformation is far from being straightforward. Several studies have focused on determining what's exactly needed

for companies to drive agility forward. What has emerged from recent literature is the need for companies to strategically and concertedly align not only their digital capabilities, but also their technological infrastructure on the basis of their operational objectives. Specific tools, such as IT-based decision systems and data warehouses, help companies in avoiding rigidity traps (Shams et al., 2020), as instead they allow for a constant monitoring of emerging applications for digital technologies, in a skill development perspective that sees companies frequently adapting their core competencies to match those required from modern day's volatile market (Gergs, 2019).

The rewards from being both digital ready and agile are several. For instance, by successfully implementing digital transformation in their business processes companies tend to see their profit increase significantly on average (Shashi et al., 2020). Potential applications of digital transformation for organizational agility are rapidly increasing in numbers (Kohli & Johnson, 2011; Ukko et al., 2019; Zangiacomini et al., 2020), as they range from big data analytics allowing managers to constantly keep track of massive amounts of data and information, to Internet of Things allowing for significant processing power and high levels of accuracy and security (Guggenmos et al., 2022). While gray areas still exist, namely concerns in regards to phenomena strictly tied to digital transformation and hence unavoidable such as cyber-slacking, cyber-security threats and ethics issues, overall academic literature agrees on the beneficial effects of organizational agility and digital transformation in the modern marketplace.

What is yet to be fully understood, however, is the interplay between agility and digital transformation. More specifically, studies have adopted different approaches to determine the connection between said concepts. Some argue that successfully implementing digital transformation is a consequence of organizational agility, as agile organizations are by definition better prepared to respond rapidly and dynamically to market changes. On the other hand, some argue that digital transformation itself acts as an enabler for organizational agility, successfully exploiting emerging digital technologies leads companies to crafting a more flexible, open and agile configuration.

More specifically on the correlation between IT infrastructures and organizational agility, Lu and Ramamurthy (2011) illustrated how IT capabilities can positively influence the degree to which a company is considered to be agile, namely through market capitalization agility and operational adjustment agility. Additionally, Ghasemaghaei et al. (2017) also investigated the topic, focusing on the use of big data analytics among companies and how they can help improve organizational agility for those involved. It's worth mentioning that, however, not every author agrees on the positive influence of IT capabilities on organizational agility. Some have found mixed results (Roberts and Grover, 2012; Tallon, 2008), while others found no correlation whatsoever (Liu et al., 2013; Swafford et al., 2008).

### **1.3 Digital Transformation in SMEs**

Despite SMEs being by far the most numerically dominant portion of the global economy, few studies have explored the impacts of digital transformation in said contexts (Garzoni et al., 2020; North et al., 2020). The premise is that digital transformation is a unique phenomenon that is inherently constrained by several factors, namely industry, legislation, resources, digital readiness and stage of a company's life cycle (Scuotto et al., 2022). Generally speaking, researchers agree that companies can benefit from digital transformation and its implications for their internal organizational processes (Nasiri et al., 2020; Neirotti & Pesce, 2019; Soluk & Kammerlander, 2021). However, what we also know is that digital transformation is heavily contextual and as such, could lead to different consequences for different companies depending on the case at hand.

When it comes to SMEs specifically, difficulties may arise when they approach their digital transformation journey (Matarazzo et al., 2021). Several barriers need to be considered by SMEs owners (Müller et al., 2021), as digital transformation is not a mere technological upgrade of their current business infrastructure and configuration, instead it requires an all-round change in business, organization and strategy. Some may not be prepared for said change, which results in SMEs colliding with contextual barriers that prevent them from digitizing their business, despite their best effort and willingness to evolve (Peter et al., 2020). Barriers to digital transformation

are several and diverse in nature (Scuotto et al., 2020), but generally involve lack of clear strategic goals and practical paths, along with the necessary tangible and intangible resources to undergo the changes. This is where the contextual nature of digital transformation is more relevant, as companies with different availability of resources could see their digital transformation journey change significantly from one another (Crupi et al., 2020; Denicolai et al., 2021).

In recent years, several publications have explored the factors that could drive forward digital transformation in SMEs (Troise et al., 2022). The concept of digital readiness has emerged as one of the most important ones, as companies with a significant predisposition towards innovation and technological change are more likely to adapt to changes set by technological advancements (Butt, 2020) and through them, achieve a more competitive positioning in the respective market (Buer et al., 2021; Brock et al., 2019). In this regard, multiple studies have stressed the importance of SMEs owners, as they are the ones tasked with driving forward digital culture and a proactive approach to innovation (El Hilali et al., 2020; Han & Trimi, 2022). In broader terms, cultural barriers are extremely important when it comes to digital transformation in SMEs (Stentoft et al., 2021). Support from the top management team is crucial when it comes to SMEs' digital transformation efforts. Accurate planning, a clear strategic vision and an open mindset towards technological advancements all contribute to the avoidance of cultural barriers (Li et al., 2021; Muñoz-Garcia & Vila, 2019).

The availability of external resources is also a vital factor for SMEs trying to digitize their business, whereas their lack thereof could be a detrimental factor for most (Wan et al., 2019). Especially in times of global pandemic and deep economic crisis, SMEs struggle to keep up with their competitors. When bare survival is in jeopardy, it's often difficult to find specific resources for digital transformation. Digital transformation is a long-term and arduous journey to embark on and SMEs rarely get immediate economical returns for their investments, which again solidifies the hardships of the whole process.

## **1.4 The rise of the Chief Digital Officers**

In the context of larger companies, Chief Digital Officers are rapidly emerging as a new and increasingly relevant top management position. While Chief Information Officers have been notoriously managing everything that was related to digital transformation (and IT as a whole) up until recent years, now both the corporate and the academic world are gravitating towards Chief Digital Officers instead (Tumbas et al., 2018). This is happening as a result of the disruptive changes that are happening in the modern marketplace, which requires companies to react quickly to changes in market demand and make the most out of the technological advancements powered by digital transformation.

While it is fundamentally accepted that we are moving towards a fully digitalized world, where automated systems powered by big data and artificial intelligence will play a dominant role, it is still believed that the human factor will still be present (AlNuaimi et al., 2022). In fact, companies are actively prioritizing top managers who are able to clearly and efficiently transform their business vision into tangible competitive advantages for their companies (Muninger et al., 2019). This is true not only for pure management positions, but also for the more technical ones, such as the aforementioned Chief Information Officers and the Chief Digital Officers as well (Tumbas et al., 2020).

In fact, as years go by, the corporate world is starting to realize how raw IT skills are somewhat secondary when compared to business-related skills, such as strategic vision, leadership and market knowledge (Doonan, 2018). This shift has followed the one of companies, who are compelled to figure out not simply how technologies work, but how to turn their use into competitive advantage and strategic change. This sentiment is echoed by the sharp increase in publications related to digital strategy, digital transformation and, more broadly, on modern business models as a whole.

The current goals of both the academic and the corporate world is to understand how to successfully implement digital transformation into their core business processes as a means to achieve higher degrees of performance and returns (Li et al., 2021). And since, as we mentioned earlier, digital transformation is a multi-faceted phenomenon with no straightforward way to interpret it, the attention of both academics and

practitioners is shifting towards managerial positions with hybrid backgrounds and skill sets, who are able to blend in both technical and business leadership skills, as they drive forward the digital transformation of the companies they've been appointed to.

## **1.5 Conclusions**

The collection is structured as follows. Chapter 2, 3 and 4 will be dedicated to each of the three studies featured in the work. More specifically, Chapter 2 will discuss the topic of organizational agility and digital transformation via the analysis of a unique case study from the automotive industry. Chapter 3 will instead focus on micro and small enterprises, in an attempt to understand what barriers are preventing them from starting their digital transformation journey and whether or not the Covid-19 pandemic has indeed acted as some sort of catalyst for digital transformation. Finally, Chapter 4 will feature an empirical investigation built on topic modeling and latent Dirichlet allocation in an effort to profile a universally acceptable Chief Digital Officer archetype based upon worldwide empirical evidence. Finally, Chapter 5 will wrap up the collection by presenting both general conclusions that can be drawn from the three papers and some suggestions for future research based upon empirical gaps found in the literature.



## **Chapter 2**

### **Customer Agility in the Modern Automotive Sector: How Lead Management Shapes Agile Digital Companies**

#### **2.1 Introduction**

In recent years, the arrival of key disruptive technologies has probably changed our daily lives while significantly impacting the global economy. Thanks to the new technological advancements, companies have become more agile and connected while gathering, managing and storing massive amounts of data useful for their operations (Akhtar et al., 2017). In addition, combining volatility, uncertainty, complexity and ambiguity (VUCA) characterises today's competitive scenario (Bennett & Lemoine, 2014), and being agile is often crucial to either gain a competitive advantage over competitors or to simply survive in a difficult environment.

Brown and Agwen (1982) first defined agility as 'the ability to react quickly to rapidly changing circumstances', and their definition is also echoed by more recent studies (Vinodh et al., 2012; Cheng et al., 2020; Škare, & Soriano, 2021). Furthermore, Crocitto and Youssef (2003) proposed a theoretical model for organisational agility, strongly focusing on the human implications of the process. However, over the years, many studies have explored the connection between agility and information technology (IT) (Zain et al., 2005; Lucas & Goh, 2009; Lu & Ramamurthy, 2011; Chan et al., 2019). In that regard, technology is generally believed to be an enabler of agility, across various industries and contexts (Panda & Rath, 2018; Mandal, 2019; Liao et al., 2019; Fearne et al., 2021).

The agility required to adapt to said changes is progressively becoming a crucial aspect for the companies' survival (Fourné et al., 2014; Vecchiato, 2015; Torres & Augusto, 2020), although digitalisation requires specific skillsets, alongside the will to adjust the organisational structure around its disruptive innovations

(Holbeche, 2018; Trost, 2019). Furthermore, agility has also been explored regarding the quickness and effectiveness to which a company adjusts its value propositions to the ever-changing and hyper-competitive market (Zaheer & Zaheer, 1997; Cassell, 1999), especially in today's hyperconnected scenario (Bican & Brem, 2020; Gligor & Bozkurt, 2021). Customer agility, for instance, is a specific type of agility that sees companies take immediate action to meet their customers' expectations by swiftly adjusting their value proposition and overall output (Huang et al., 2021). More specifically, Roberts and Grover (2012) defined customer agility as the 'degree to which a firm is able to sense and respond quickly to customer-based opportunities for innovation and competitive action.'

Customer agility can enable survival and prosperity of organizations in turbulent times thanks to real time monitoring of customer data (Zhou et al., 2018; Huang et al., 2021), which is achieved via advanced IT infrastructures (Scuotto et al., 2017). Lead Management Systems (LMS) are a prime example of customer centric tools being enabled by IT infrastructures. They allow companies to track their potential customer, also known as 'lead', in every step of their customer journey (Monat, 201; Pullins et al., 2016). Effective use of LMSs allows companies to track their customers in real time, optimise their resources and be more quick and efficient in regards to their needs (Sakthivel, 2016; Billore & Sadh, 2015).

Previous studies have promoted the importance of agility as a means to avoid organisational rigidity (Shams et al., 2020), alongside the importance of constantly nurturing and developing an agile culture in digital times (Chan et al., 2018). Chen et al. (2014) revealed that we still knew very little about the strategic implications of agility back then, and this sentiment is echoed more recently by Shams et al. (2020), who highlighted how the field still lacks empirical research focusing on strategic agility-driven business models. Akhtar et al. (2017) also suggested how qualitative case studies could explicitly explain the relationship between Internet of Things (IoT) and organisational agility, especially for customer-oriented companies and their use of dynamic data from social media. As highlighted by the aforementioned authors and to the best of our knowledge, the theoretical aspects of the interconnection between digitalisation and agility, alongside the digitalisation drivers actively fostered by organisational agility, have been explored throughout the years.

However, there remains a noticeable gap in the literature stream regarding empirical evidence that supports said theoretical frameworks. Our study is meant to complement this literature stream by bridging the highlighted gap with an empirical field study on the matter.

Within this research stream, our goal is to expand on the existing theoretical contributions by providing empirical evidence from a unique success story to highlight the agility–digitalisation connection and how both elements have reshaped a company’s organisational structure to make it competitive and successful. Thus, our research goal brings us to analyse how digitalisation has affected the company at hand, how it has changed its core business processes and what impact agility has on the reshaping process. In particular, we ask ourselves whether agility has enabled and fostered the digital transformation process and how this interconnectedness has developed throughout the turnaround process.

Since our research strives to go in-depth within the interconnection between digitalisation and organisational agility, we decided that a case study approach would have been the most appropriate solution (Akhtar et al., 2017). In fact, the qualitative approach allowed us to conduct extensive interviews with key managers of the selected company and, hence, to track several implications of digital transformation and organisational agility. Thanks to this approach, we can better understand the complex scenario at hand and, thus, find more in-depth answers to our research questions. More specifically, the proposed case study addresses the following research questions:

RQ1: How can customer agility become the central focus in reshaping a company’s business model?

RQ2: In what ways has customer agility enabled the use of disruptive digital technologies?

We consider an automotive company that survived near bankruptcy and translated to the top spot in its sector, thanks to the efficient implementation of its own LMS, aided by an intense digital entrepreneurial spirit and organisational agility utilisation in response to disruptive technological innovation. The automotive

industry, in particular, appears to be an extremely lively and competitive sector (Simonazzi et al., 2020), in which technological innovation and organisational agility have advantaged more tech-savvy companies (Jadoon et al., 2020).

From a theoretical standpoint, we expand the literature on the importance of agility in customer-oriented companies and the implications of digitalisation on their strategy, organisational structure and operativeness. Furthermore, we strive to address the paradigm of digitalisation and agility by applying the theoretical drivers found in the existing literature to a case study and proposing empirical evidence of the topic. From a practical standpoint, we provide managers and practitioners with empirical evidence on the implications of digitalisation and customer agility. This was done by reviewing existing theoretical knowledge of the competitive drivers of digitalisation and agility and then applying them to a relevant, empirical case study, which we believe to be the best practice in its sector, given its success story and turnaround from a near-bankrupt state.

This paper is organised as follows. Section 2 contains the theoretical background, focusing strongly on highlighting the existing literature on the concept of agility in the automotive sector. Section 3 presents the research method alongside key quotes and references to the interviewees that we believe are particularly relevant. Section 4 contains the findings of this research, as we showcase the theoretical model extracted from this case study. Section 5 is dedicated to the discussion of our findings. The final Section 6 offers the conclusions, the theoretical and practical implications, alongside the limitations and possible future research related to the topic.

## **2.2 Theoretical Background**

### **2.2.1 Agile Companies in the Digital Era**

Over the years, numerous studies have explored agility, with multiple key definitions and perspectives on the whole topic. Burns and Stalker (1995) defined agility from a static perspective, focusing on how a company adjusts its structure regarding environmental changes, while Teece et al. (1997) offered a more dynamic

approach by highlighting how agility could have proactive implications, with companies actively shaping the competitive environment as a response to previous changes. Roberts and Grover (2012) overviewed the key definitions of agility that have been formulated over the years and attempted to find common elements across the over ten definitions found in the literature. The authors found three elements: agility viewed as an organisational capability; agility viewed as sensing environmental changes and responding to them; and finally, a fast-paced environment being seen as the ideal context for agility.

Definitions aside, agility is crucial to survive in a hyper-competitive, volatile and diverse competitive scenario (Bennett & Lemoine, 2014). Karimi and Walter (2021) highlighted the importance of open mindsets for entrepreneurial agility: companies must be willing to openly interact with their surroundings to successfully exploit the opportunities presented by the digitalised business environment (Mazzei et al., 2016). Oftentimes, a vision is all it takes for companies to adjust their organisational structure and strive in the era of Industry 4.0 (Bodwell & Chermack, 2010; Tajudeen et al., 2021).

Similarly, Warner and Wäger (2019) highlighted the importance of companies operating in a digital environment constantly being agile enough to adjust their business models to stay competitive in their ever-changing competitive landscape. Since digital transformation is constantly disrupting existing business models while revealing new opportunities for product development (Teece et al., 2016), companies must react quickly to these changes by staying fully agile (Ghezzi & Cavallo, 2020; Wirtz, 2019). From a practical perspective, companies that strive to digitise themselves should build their digital business models upon a scalable framework (Ross et al., 2016).

Among recent trends, one of them sees the focus of companies from multiple different sectors gradually shifting towards a customer-centric approach to cost management (Bonacchi & Perego, 2011; Orero-Blat et al., 2020), whereas historically speaking, firms have always tended to be product-centric (Shah et al., 2006). Today's accountants are faced with the task of managing and processing a very high amount of data (Heinzelmann, 2019), which requires them and their organisation to be agile enough to quickly implement, develop and use hybrid-cost

accounting systems tailored to the specific needs of the company (Becker & Heinzlmann, 2017).

Agility literature is no stranger to customer-centric approaches either. As depicted in the following section, multiple authors have explored the concept of customer agility, highlighting how agile companies use their agile infrastructures to better respond to their customers' needs.

### **2.2.2 Customer Agility in the Automotive Industry**

Agility has been viewed differently, not limited to the internal, organisational perspective. For instance, Huang et al. (2021) defined customer agility as the degree to which a firm can sense and respond quickly to customer-based opportunities for innovation and competitive action. The modern-day scenario requires companies to think and react quickly, as speed is becoming increasingly important for implementing new strategic initiatives (Langley & Rieple, 2021). Furthermore, speed's benefits are not limited to customer satisfaction; they also impact the company's overall performance (Kumar et al., 2021).

Over the years, studies have been conducted in an effort to find connections between customer agility and digital technologies, albeit with varying definitions and conclusions (Tallon et al., 2019). Roberts & Grover (2012) explored the importance of data management and how an effective IT infrastructure capable of sharing information across the company would allow for more efficient ways to respond to customers' needs. Furthermore, Chen et al. (2014), have investigated the role of IT as an enabler of customer agility. Furthermore, Zhou et al. (2018) highlighted the importance of online reviews and how reacting accordingly to them, could foster customer agility. Finally, Chatfield & Reddick (2018) explored the role of big data analytics and customer agility, suggesting that a strong IT infrastructure is mandatory when it comes to real time monitoring of customer data.

Agility has been investigated across multiple contexts, sectors and countries. Its relevance is continually growing, especially in highly competitive and technology-focused markets, such as the automotive industry (Azevedo et al., 2016;

Caridade et al., 2017). Given how complex automotive manufacturing can be, smartness and agility are key to surviving and thriving in this industry (Jadoon et al., 2020). In fact, the most successful automotive start-ups feature an ‘agile culture’ (Goncalves et al., 2020), which enables organisational agility and enhances digital innovation capability (Laurent Lim et al., 2014). Further, the automotive industry plays a major role in the digital landscape, as we know it. Automotive producers are becoming the top advertisers for the digital space (Dahiya, 2015), and overall, the automotive sector seems to be rapidly evolving, thanks to digital transformation, its challenges and opportunities (Phillips, 2011; Llopis-Albert et al., 2020). They are also investing a considerable amount of resources to create seamless digital experiences for their customers while developing agile organisational structures that integrate both traditional offline dealership experiences and digital online touchpoints (Bacher, 2020).

Previous agility studies concerning the automotive industry have explored the impact of agile manufacturing (Elkins et al., 2004), the connection between leanness and agility (Azevedo et al., 2016) and, generally speaking, the internal impact of agility on overall performance (Vinodh et al., 2012). However, regarding the automotive industry, Deloitte (2019) showed how disruptive innovation in technologies will induce major changes in the way companies interact with their customers. Customers require digitised solutions to their needs, including end-to-end online retail capabilities, while maintaining the features that they expect from their offline, traditional experiences. Similarly, McKinsey (2019) suggested that dealerships should offer a full-on digitised experience centred on the user. The future projections suggested by Deloitte and McKinsey are confirmed by emerging trends in the literature, as the authors claim that the automotive sector is moving towards a fully digitised future (Hagberg et al., 2016; Berger, 2015; Rastogi & Mehta, 2017).

Companies that are heavily centred on direct sales are also those that are more active in lead-generation tactics, and that include the car dealership sector (Świeczak & Lukowski, 2016). Moreover, for the entire automotive industry, digital interaction appears to be a growing trend in recent times, with mostly Gen Z and Y users demanding this rather than traditional business models (Brandtner & Freudenthaler-Mayrhofer, 2020). In the automotive sector, company–customer

touchpoints are progressively becoming increasingly digitised, especially regarding the initial phases of the customer journey, often referred to as the lead-generation phase (Bacher, 2020). This is true for the automotive industry and all digitized retail companies: given the increasing complexity of customer journeys in today's digital environment, their digital experience is often a critical factor for success and value creation (Tueanrat et al., 2021).

Regarding digital touchpoints, it is often crucial for a company to track its digital customer journey across its multiple steps. In fact, analytics tools are becoming increasingly prominent in digitized companies as they are a solid solution to the aforementioned problem. For tracking potential customers, lead management is the real-time consolidation, prioritisation, qualification and conversion of leads received from campaign management or other sources into first-time or recurring purchases (Geib et al., 2005). A successful implementation of lead management strategies allows firms to be more competitive in their market (Deshpandé, 1999). However, when these systems are disregarded, sales may be affected, leading to a potential loss in market share (D'Haen et al., 2016; Smith et al., 2006). When applied to dealerships, a digitised LMS allows for more precision, efficiency and overall performance, unlike the traditional methods, which tend to be manual and, therefore, more time-consuming, less accurate and not user friendly (Gurumurthy, 2016). The entire system works as follows. A potential customer contacts the company, either through the website, a social media page or any other touchpoint, digital or physical. The customer is given a score based on the probability upon which they will convert into an actual car sale. Demographics and behavioural characteristics influence this score (Phillips, 2017). For instance, those who bought a car from a specific manufacturer and were happy with it will be likely to buy a new one from the same manufacturer in the future. The evaluation comprises a probabilistic approach with fine-tuning of the indicators describing the predicted development of the customer (Duncan & Elkan, 2015), and it allows personnel to focus on those leads with a higher probability of conversion, which grants a higher degree of optimisation (Sabnis et al., 2013).



### **2.3 Methodology**

The case study approach was chosen because it is most suitable for finding answers to our research questions (Akhtar et al., 2017). The qualitative approach was chosen due to the novelty factor of the topic analysed, as the goal of this research is to present a rich description of a particular instance (Eisenhardt & Graebner, 2007).

The study focuses on StarCars, a car dealership operating in Piedmont, Italy. StarCars, globally known for its automotive excellence, competes in a regional district, thanks to renowned brands such as FIAT. Founded in 1973, StarCars employs over 100 people and has a yearly turnover of EUR 201.54 million. StarCars was chosen for this case study due to its role as the best practice in the field of digital transformation, alongside the importance customer agility has had in their success story. What makes StarCars' business model 'revolutionary', according to its CEO, is that its entirety is built around the digital customer experience. Rather than sticking to the traditional approach to sales, StarCars strives to transform the customer experience into an all-out service, providing potential customers with multiple ways to contact the company digitally, either through the website or social media platforms. Over 60.000 leads were captured throughout the first year of its implementation. Their efforts embodied customer agility as they sensed this upcoming trend brewing in the automotive industry and quickly adjusted their business model to meet these new found needs. A digital-friendly mindset is shared across every business function and is embodied across every employee as everyone works around the LMS infrastructure, regardless of their position within the company. This allows for a consistent and significant degree of customer agility, as they can react quickly to changes found in their customer base. This is because StarCars interacts with their customers constantly through every means of communication (Social Media, Website and even WhatsApp) and has developed a rich IT infrastructure, which allows them to constantly track real-time data from their environment.

The single-case study approach was chosen because it allowed us to analyse in-depth the digital transformation process that the selected company underwent through the years (Yin, 2003). StarCars has reshaped its business around the concepts

of agility and digitalisation, which has allowed it to become a pioneer in the district it operates, one of the most iconic automotive industrial districts and home to key players, such as FIAT. This also makes StarCars appropriate for the case study. Furthermore, LMS infrastructural implementation dates back to 2016 when only a few companies were investing in digital transformation technologies (Panizza & De Santis, 2019). In addition, the single case study allowed the researchers to devote more time to their investigation and the data collection process (Gerring, 2004).

Several interviews allowed us to explore the implications customer agility and digital transformation had on the company while providing empirical evidence to the existing literature on the topic and highlighting the key LMS factors identified by previous studies on inside sales performance (Kuruzovich, 2013; Ohiomah et al., 2016; Rutherford et al., 2014). The interviews occurred in 2018, 2019, 2020 and 2021 and fully involved many top managers and employees from each department, thereby enabling us to effectively analyse the situation (Myers & Newman, 2007). Key figures in the company were interviewed in a series of 60-minute sessions, featuring semi-structured interviews with the researchers. There were 27 respondents; 12 were department managers, while the remaining 15 were showroom personnel. Everyone was interviewed severally during the various sessions held from 2018 to 2020; 45 interviews were conducted and their length went from 30 minutes to 2 hours. The interviewees included the Marketing Office Director (#MOD), the Accounting and Control Office Director (#ACSSD), the Customer Support Service Director (#CSSD), the Business Development Director (#BDD), the HR managers (#HRM1 and #HRM2) and the showroom personnel (#SHP1 to #SHP15). Table I is meant to summarize the data collection process.

Table I - Data Collection Process

<b>Department</b>	<b>Personnel Interviewed</b>	<b>Overall Interviews</b>
Marketing	2	3
Accounting	2	4

Business Development	3	6
Human Resources	3	3
Customer Support Service	2	4
Showroom Personnel	15	25

Source: Authors' Own Elaboration

The goal was to gain an in-depth understanding of the interplay between the departments, as they all shifted their approach from a traditional product-centric approach to a customer-centric, highly digitised one. Moreover, the interviews centred on the topic of digital transformation and its impact on daily business operations. The impact of digital transformation on reshaping the company and its daily tasks and processes was prioritised. Furthermore, the semi-structured interviews were set to investigate the interactions and interlinks between departments and how the digitised LMS tied everyone's work together. In particular, the following content emerged from the coding analysis of the interview transcripts: a) customers and database profiling, b) customers and customer care, c) customers and lead tracking, d) data gathering, e) data analysis, f) lead tracking, g) social media and direct marketing and h) lead nurturing. The relevant codes were further analysed and grouped based on interconnections between topics.

Multiple sessions were also conducted with the accounting department, and data were gathered through a behind-the-scenes look at their custom IT tools. The open-ended nature of the questions was chosen to explicitly understand the process and map its key features, trying to understand the implications of agility and digitalisation in their company structure. Interviews were conducted in a way that allowed researchers to investigate each department at StarCars. Data collected from the interviews were then recorded and transcribed, as suggested by the literature (Sergeeva et al., 2017). The interviews' transcripts were analysed using ATLAS.ti version 9.0 to highlight keywords and quotes from the data collected.

Along with the collection of primary data, secondary data related to StarCars' history were also gathered through internal materials, including reports, institutional

presentations and files. The data were transcribed, added to the data analysis tool, and coded with the rest.

## **2.4 The Case Study**

### **2.4.1 LMS Implementation**

StarCars is an example of best practice in the digital transformation field and a successful turnaround story that shows how agility and risk-taking can considerably help in the automotive sector (Hernández-Perlines et al., 2020). Before 2011, the company was underperforming, and its management believed that a radical change in structure was necessary for it to survive the new decade and avoid stagnation (Shams et al., 2020).

The business model, adopted right from its establishment to roughly 2014, was based primarily on the traffic generated by traditional ways of promotion, such as radio messages, TV ads, newspaper columns and flyers. The fundamental issue with the older business model was the immeasurability of the traffic generated, as it comprised mass marketing that the MCS could not effectively track, besides the final sales volume and the showroom traffic, the latter one being made of actual customers that visited the site looking for a new car.

However, thanks to advancements in digital technology and their agile culture, StarCars implemented an extensive IT infrastructure built around an LMS tool, which allowed them to constantly track real-time data coming in and out of their systems (Singh & Kumari, 2019). Although social media data still features issues, such as biases or validity concerns (Olteanu et al., 2019), it ultimately proved to be very effective for StarCars in their goal of connecting with their customer base. Due to the new business model, the overall performance of the company has improved steadily since 2015.

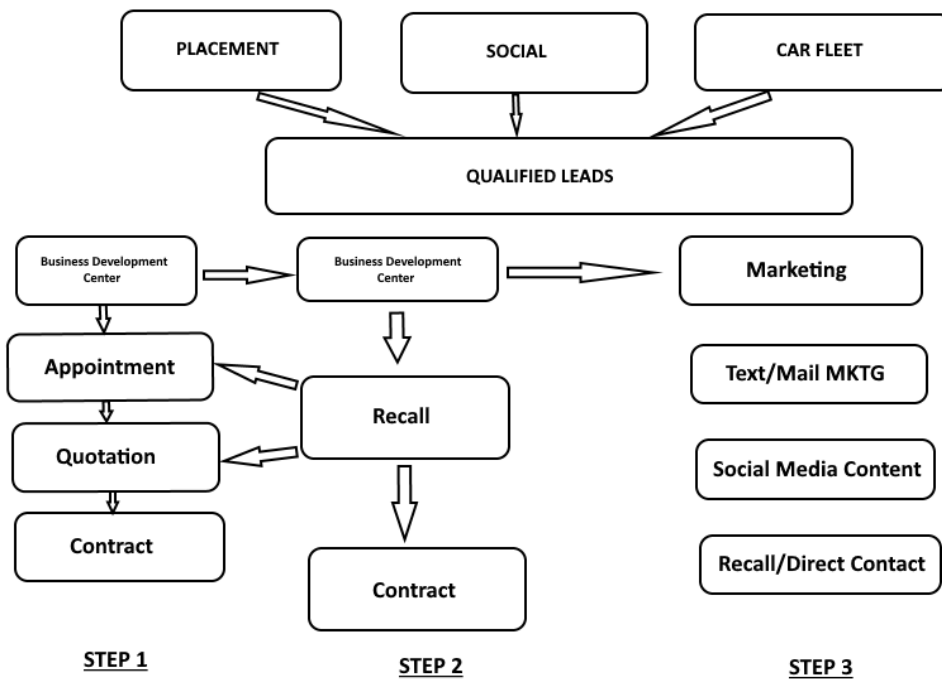
Their newly-found customer agility is exemplified by the concept of leads. More specifically, concerning LMS, there is no universally accepted definition of a qualified lead, as leads should be defined depending on the necessities of the businesses that track them (Świczak & Lukowski, 2016). The business model

adopted by StarCars was based on an LMS framework with every step built upon the data-gathering process that helped it profile their potential customers. The information needed was both biographical and behavioural, including their names, surnames, ages, the car models they owned and their general preferences in automobiles.

From a customer agility-focused perspective, StarCars went from mass marketing to targeted qualified lead management, which was a game changer, as it allowed the dealership to be more efficient in the selling process and react quicker to their customers' needs. StarCars relies on a specific department to capture, qualify and develop leads. The unit first gathers sufficient information on the potential lead, typically by leveraging off social media, which is effective in that regard. Once the data available has been gathered, the lead is contacted to gather information on their current situation and assess their potential interest in the product. After the first contact has been made, the second contact happens in the next 24 to 48 hours. Both interactions are meant to finalise a meet-up at the dealership and to set up a test drive with the buyer. During this phase, operators are asked to collect additional information on the customer, such as their car-buying history or the model they own. This is imperative because it allows StarCars to give each individual lead a score based on their conversion potential.

From Figure 1, regardless of whether or not the sale has happened within the first two contact attempts, the lead is then transferred to the marketing team who proceeds with direct one-to-one marketing, either via phone messages or calls, and with institutional marketing, powered by mailing lists and social media content.

Figure 1 - Lead Management Process in StarCars



Source: Author's own elaboration

From a managerial control perspective, customer agility induced a significantly different approach to cost control. #ACSSD noted that the new model had presented a different way of monitoring performance, in which everything was measurable and calculable. For instance, since leads were now fully measurable, controllers could tell how much individual leads would cost based on the KPI-related parameters set by the company.

Regarding measuring the cost of potential leads, differentiating between cold and hot leads is imperative. StarCars classifies cold leads as those with a lower-than-average conversion rate because they are obtained through social networks; therefore, they are more likely to be related to random internet users who stumble upon the company's digital advertising, often unintentionally. When interviewed, #BDD indicated that, in some instances, people would interact on social media out of boredom or inadvertently and may not be as interested in a car as someone who came to the showroom for a test drive.

Hot leads are those with a higher probability of conversion to an actual sale, as they are related to physical interactions with customers who visit the showroom in person. Since they take the time to travel to the showroom to meet the StarCars employees face to face, it is safe to assume that they are more likely to buy a car compared to someone who casually clicked on a recommended post on their favourite social media app. Both hot and cold leads are measured with the LMS, despite having different conversion rates. While leads gathered through social media tend to be easier to transfer onto the database, physical leads have to be manually inserted in the system. Once all the leads have been successfully added to the database, the accounting department steps in and analyses the data collected. While keeping tabs on how much money is spent on lead generation campaigns, the goal is now to track how profitable those leads are when compared to the overall revenue stream. For MCS and, in particular, for performance indicators, an LMS-oriented approach allows managers to monitor the individual impact of each lead on the overall contribution margin. A lead-based approach brings with it new indicators that are monitored in real time and strictly interconnected with the highly digitised nature of the company. For instance, it is now possible to calculate the contribution of each individual lead to the total value of the database. Said indicator is referred to as Net Database Contribution (NDBC), and its formula is the following: 
$$\text{NDBC} = (\text{Total Amount of Leads in Target Year} \times \text{Conversion Rate}) \times (\text{Unitary Gross Margin} - \text{Unitary Cost}) - (\text{Total Amount of Leads in Target Year} \times \text{Database Unitary Cost}).$$

The NDBC is used to track the impact of physical leads on the overall contribution margin. The database in question included the total number of leads generated from face-to-face contact in the showrooms. The percentage of acquisitions is the number of sales generated compared to the total number of leads generated in the database. The NDBC is one of the indicators implemented by StarCars alongside the new business model, as it allows a deeper view of the marketing costs and gives an accurate view of how well the overall business model is performing when every department is working together towards a common goal.

### **2.4.2 How Agility and Digital Transformation Changed Business Processes**

As depicted in the literature, agile companies must constantly question themselves, make changes to their organisational structure and, overall, react quickly to the world around them. In StarCars, customer agility induced major changes in every single department and business function, which was the leitmotif of our empirical study. Those major changes required time and money. This was affirmed by #HRM1 and #HRM2, who both stated that the process took almost three years and that while it sounded like a risky investment initially, it paid off in the long run. They both highlighted how an entrepreneurial vision and a digital-friendly mindset were the key elements in reshaping their business. Given the successful nature of the business case presented, our analysis approach focused on the coding of key elements that were crucial to its implementation. Recurring themes were merged into a theoretical construct, allowing us to explore which aspects of the digital transformation process combined with LMS adoption were more prominent.

Consistent with the literature, we approached our findings based on the three theoretical construct categories related to the observations. ATLAS.ti is a commonly used digital tool for qualitative research and the coding of large chunks of text. We used version 9.0 of the software and merged every single transcript of the multiple interviews we conducted and cross-referenced the text with inside data gathered from StarCars personnel, which included internal reports and documents. ATLAS.ti allowed us to clearly view the transcripts and look for interconnections between the documents we had at our disposal. The first analysis conducted was a bibliometric one to discover which word was the most commonly used across the transcripts. Figure 2 shows the Word Map visual tool powered by ATLAS.ti.



Figure 2 - Word Map



Source: Author’s own elaboration

In Figure 2, we clearly see which words are the most commonly used, as they are the ones that appear to be bigger compared to the rest. The keywords found through ATLAS were then cross-referenced throughout the transcripts during the coding process. This step allowed us to find relevant quotes from the interviews that we subsequently grouped into different categories depending on their common topic (database profiling, customer care and lead tracking). The codes were then grouped into multiple categories connected to the same topic. Tables II, III and IV show the analysis results.

Table II. Lead management codes by customer themes, analysed with ATLAS.ti 9.0 software

<i>Theme</i>	<i>Categories</i>	<i>Codes</i>
<i>Customer (N = 45)</i>	<i>DB Profiling</i>	<i>‘...The customer must be re-contacted to obtain the data we need, generally within an hour. We could not do it before, but, now, thanks to our IT systems, this is a possibility...’ (#BDD)</i>

		<p><i>'Instant messaging is the core of our profiling system as it allows for quick and direct interactions. The marketing campaign we launched yesterday is SMS-based, allowing customers to fill in the data required in their response or simply call us back...'</i> (#BIM)</p>
		<p><i>'Gathering data on our customers is something we did not do before. Now, hence, we can obtain a better understanding of their previous purchase history, behaviour, etc.... which allows for a better understanding of their needs'</i> (#BDD)</p>
	Customer Care	<p><i>'It is important for us to constantly inform the customer on how their transaction is going, how to conclude it, etc....'</i> (#MOD)</p>
		<p><i>'We establish multiple contacts with customers before they arrive at the dealership to ensure they are informed enough to conclude the buying process. This is done through multiple digital channels; this way, we can be at their disposal 24/7, thanks to the power of the Internet...'</i> (#MOD)</p>
		<p><i>'We use social media often to tell a story about our company and our products. In fact, we have multiple experts willing to produce multimedia content daily. When our customers interact with said content, it allows us to get more visibility across the net...'</i> (#MOD)</p>
	Lead Tracking	<p><i>'...they are not just numbers; every customer has a name and surname. They are all unique individuals;</i></p>

		<i>you know what I'm saying? They want a custom experience tailored on their specific needs, and we must be agile enough to adjust to their needs in real time' (#ACSSD)</i>
		<i>'...just like every message we sent out, they are all customised because we know their names, we have their profiles. We know how to track their customer experience...' (#BDD)</i>
		<i>'... we are with the customers every step of the way, from the moment they first contacted us, until the final purchase. We call them back if they go radio silent, and we try to gather enough information from them...' (#BDD)</i>

Source: Author's own elaboration

The customer-centric approach, alongside customer agility, seems to permeate every aspect of the new business model, as the sources suggest that it plays a major role in every department's daily life. StarCars employees react quickly to the customer's needs, at an almost instant, real-time pace. There is a strong focus on the lead-generation phase of the model when the customer data is collected for later use. 'Every instant message we send out is tailored to the customer because we have their individual profile for reference. We can always double-check on the fly whether or not the customer has interacted with us in the past, who they spoke with, etc. It is imperative for us to ensure the customer is always monitored throughout the process', said #BDD. Data suggests that customer profiling is used for measurement purposes and a strategic advantage to improve the overall probability of conversion to sale.

Regarding the impact of the LMS implementation on marketing strategy, #MOD indicated that he could get more specific information on customers' needs

and predict what they were likely to buy and a sense of their preferences and taste. This contradicted the previous analogic model, in which they only had sales volumes to work on. They highlighted how the current, more agile approach made them increasingly proficient and effective in their customer care process, as they can constantly access the customer profile in StarCars' custom IT database.

In the previous business model, the only way managers could monitor a firm's performance was to analyse total sales, as the volume of leads generated by traditional marketing was immeasurable and, therefore, could be considered an unreliable indicator. The customer agile IT infrastructure changed things by providing a new perspective for managers: they now have the tools to predict whether or not a specific customer, who was once nothing but a number, is going to buy a car from them, given the intricate framework of data management and gathering. This approach is, however, not free from practical limitations. Although StarCars invests only in fully measurable leads, there remains a small percentage of traffic that cannot be tracked right away. For instance, management control cannot predict the number of people who decide to randomly show up at the dealership despite never answering emails or promotional messages or interacting with social media content. Hence, there remains room for improvement. Regarding those types of leads, the business intelligence team indicated that predicting their behavioural patterns was more challenging. The customers typically would neither fill in the form that had been sent to them nor call back but would show up at the dealership without making any contact previously.

Offline leads (known as hot leads due to their face-to-face nature) and leads gathered from social media are similarly tracked and measured; however, offline leads require work to be profiled alongside the others in the database. Through the interview with #MOD, notably, hot leads were collected offline and there were expert staff, with full knowledge of the product, trained to stay in the showroom and conversed with customers.

Table III showcases the coding related to the data and its categories (data gathering, data analysis and lead tracking).

Table III. Lead management codes by data themes, analysed with ATLAS.ti 9.0 software

<i>Theme</i>	<i>Categories</i>	<i>Codes</i>
<i>Data (N = 27)</i>	<i>Data Gathering</i>	<i>'... we do what we can to gather data in a seamless way. When we talk with the customer on the phone, we ask generic questions about their previous purchase; it sounds like chit chat, but in reality, every bit of information counts...'</i> (#SHP4)
		<i>'... we are ready to gather data from multiple channels, as not everyone is willing to fill in the forms we sent them. The more digital channels we are in, the easier it is to profile them...'</i> (#SHP7)
	<i>Data Analysis</i>	<i>'We have to qualify the data we gather according to a managerial accounting perspective; we need to see the margin of each lead when compared to our stream of revenues... It's a</i>

		<p><i>tough job, but it also opens up possibilities that were not available to us before’ (#ACSSD)</i></p>
		<p><i>‘Obviously, when you pick a product, the biggest problem is to link the tool to the existing data management framework. That means, we have to find a common scheme and give data a common dimension so that everyone can interpret data for decision making...’ (#ACSSD)</i></p>
	<p><i>Lead Tracking</i></p>	<p><i>‘...we then list the preferences of the customers when they decide to buy a car. Our work is twofold; we analyse data, but we also perform technical tests, the focus is the product, not us. That’s where agility comes into play, as we already know which product is ideal for our customer based on their profiling’ (#MOD)</i></p> <p><i>‘... the next step is offline marketing I think, but</i></p>

		<p><i>currently, I don't see us change from online stuff. Instant messaging might be old, but it is still agile enough. We know how many people respond to our messages in real time and that gives us a performance indicator... ' (#BDD)</i></p>
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Source: Author's own elaboration

Concerning data management, the data gathered show three distinct patterns highlighted by the coding technique. The data gathering step was stressed multiple times during the interviews, as it appeared to be one of the pillars of the entire process. Moreover, it seems even more important considering that the new business model is built on the measurability of leads; therefore, the data-collecting process is vital.

This process happens constantly, sometimes even without the customer knowing or realising that they are being profiled. As #SHP6 mentioned, when customers enter the showroom, they try to ensure the conversation is sufficiently informal while ensuring that they get all the information they need, which considerably enhances the system.

The lead profiling process starts once the customer makes their first contact with StarCars. Then, the goal is to gather sufficient information to qualify the lead and assign it a specific score.

The customer-centric, agile, lead-based approach emerges when marketing is also involved. According to #MOD, every activity is conducted for amassing sufficient leads and sending them to the collective database. Even interactions with partners are often driven by the necessity of gathering extra leads for subsequent use. #ACSSD highlighted that, after that step elapses, the business intelligence

department steps in and evaluates the leads. They then tell the marketing department to contact those who have a higher chance of conversion. This way, time and money are not wasted on contacting people who are unlikely to buy the product.

The data flows throughout every department and is used by marketing, business intelligence and accounting, supported by seamless IT infrastructure that makes the data readily available. Accounting tracks the leads throughout their life cycle to control costs and measure company performance in real time. In addition, the NDBC, when integrated with the ROI, enables the accounting department to track business success compared to the competitors. Indeed, that indicator would not be calculable if StarCars lacked a seamless, interconnected IT framework that shared data across the entire company.

The third most impactful theme that was coded is related to social media (Table IV) with the categories direct marketing and lead nurturing.

Table IV. Lead management codes by social media themes, analysed with ATLAS.ti 9.0 software

<i>Theme</i>	<i>Categories</i>	<i>Codes</i>
<i>Social Media (N=15)</i>	<i>Direct Marketing</i>	<i>'...they find our values as important to our brand. It is important for us to maintain a constant connection with our customer base... this way, we can monitor their needs in real time and promptly meet them as they change' (#MOD)</i>
		<i>'Sharing content is free, it doesn't cost anything. We share what we like and what we don't like; people post 300 posts a year on average. It's like building a digital portfolio that never truly expires but keeps growing.' (#ACSSD)</i>
		<i>'...To me, customer agility means being able to interact with my customers daily. Sometimes, they comment on our social media posts with stuff that doesn't have anything to do with</i>



		<i>StarCars nor cars as a whole. They just wanna talk with someone and we are there for them. This is something only possible today.’ (#MOD)</i>
	<i>Lead Nurturing</i>	<i>‘How do we sell these cars? We need to monitor various transversal indicators. We need external and internal experts. We need young social media managers able to build real-time connections with our user base and keep them engaged over time’ (#MOD)</i>
		<i>‘What’s different in this business approach is that once a sale is concluded, it does not end there. The customer is now within our database, and we can contact them again in the future. If they were happy with their experience, they are more likely to re-purchase... People within our company must be trained to learn these new techniques and be willing to constantly reinvent themselves. This is our definition of agility’ (#MOD)</i>
		<i>‘Our new employees start from communication, but then, they learn the instruments a customer needs in order to sell, how to sign a contract, how to get inside the firm, etc. We call them social programme ambassadors, they promote and tell our story to our customers in many different ways, often through the Internet and via social media to keep them engaged...’ (#HRM1)</i>

Source: Author’s own elaboration

Social media has been chosen as the main means of promotion in the new digitised business model. According to the data gathered by our researchers, this choice was not made from a marketing perspective but rather from a control perspective. Social media allows users to control the analytics related to their posts,

content and pages, resulting in a never-ending interaction based on virtual content. Marketing indicated that the goal was to strengthen both social media and territorial presence.

From an accounting perspective, it emerged that these tools enabled employees to manage Excel files and use machine learning. While some might still think that social media is meant for fun and games, in reality, StarCars see things much differently. In fact, they use social media analytics to gather tons of important information on their customers, send the data to their IT infrastructure, and hence, they can think and react quickly to their customers' needs unprecedentedly.

The business intelligence department has its own share of work relating to handling the data. They must select leads and then contact individual clients based on their potential of conversion. They handle everything, from the showroom to special events; they track every name that is added to the database.

## **2.5 Discussion**

StarCars saw opportunities arising from digital transformation and reacted quickly to incorporate these advancements into a new and more competitive business model (Teece et al., 1997; Roberts & Grover, 2012). Their agility allowed them to rethink the ways they used to meet their customer's needs and reshape their structure around modern automotive industry trends (Berger, 2015; Rastogi & Mehta, 2017). The case study allowed us to deeply understand how digitalisation and agility interconnect with one another in reshaping a future-proof business in the automotive industry. The biggest takeaway from our findings is the importance of a digital mindset shared across every business function (Kane et al., 2015), as this leitmotif emerges from virtually every contribution. In a broader sense, we can also see StarCars as a prime example of a company that escaped a stagnant state, thanks to the combination of digitalisation and an agile mindset (Shams et al., 2020). In fact, StarCars sensed quickly how times had changed and how customers were to engage in customer agility through new means of communication (Langley & Rieple, 2021).

Customer agility has played a major role in the reshaping of StarCars. Every business function now operates with the customer's needs being their first priority, in a multi-stage IT powered environment (Langley & Rieple, 2021; Kumar et al., 2021). It all starts with the acquisition and storage of real time customer data, which allows for in-depth profiling of the user base along with their demographics and traits (Roberts & Grover, 2012). Furthermore, customer agility transitions to control implications, as it allows for a more efficient cost allocation and selective pursuit of leads that are more likely to convert into final sales (Monat, 2011; Pullins et al., 2016). Finally, customer agility reshapes side processes meant to keep the customer base engaged, such as social media storytelling, online reviews management and customer support (Zhou et al., 2018).

More specifically, we addressed the research questions as follows. For the first research question (*RQ1*), we have highlighted how StarCars first sensed the changes in their competitive environment, as the automotive industry was becoming increasingly modern (Dahiya, 2015) and then reshaped their company around the current customer's needs, which is the core of customer agility (Huang et al., 2021). Today's automotive industry requires companies to have a strong online presence; concurrently, online tools uncover various growth opportunities (Rastogi & Mehta, 2017; Wittmann, 2017). Customers are prioritised in each individual business process, starting from the marketing department, which strives to shape the digital customer journey around their needs, to the accounting department, whose LMS integration allows for the constant monitoring of data, cost optimisation and conversion rate tracking (Kuruzovich, 2013; Ohiomah et al., 2016). StarCars also features departments purely devoted to business intelligence, IT and data management, all of which had very different roles in the previous years, while their current tasks revolve around the company's LMS (Rutherford et al., 2014).

For the second research question (*RQ2*), our study highlighted the multiple ways in which agility and digitalisation are interconnected and, more specifically, how customer agility has enabled disruptive digital technologies within the company's new configuration. The inception of the whole turnaround was sparked by the digital-friendly mindset of the CEO of StarCars, which was then shared across everyone in the company (Kane et al., 2015). Subsequently, the willingness to adopt

a more competitive, future-proof and agile business model was at the core of the reorganisation of assets and human resources, who were willing to adapt to the current digital scenario (Doz & Kosonen, 2010). The modern-day automotive customer requires 24/7 access to digital content, wants to stay engaged with the company through digital storytelling in their social media pages, prefers to reach out at late hours or during the weekends and wants to be the centre of attention throughout the whole conversion to sale process. StarCars effectively sensed these needs from the current competitive landscape (Phillips, 2011; Llopis-Albert et al., 2020), adapted their resources around them (Jagtap and Duong, 2019) and strove in their current market, thanks to an added competitive advantage fostered by digital technologies and customer agility. The results confirm how IT tools interact with huge influxes of data much easier, both for collecting them and for the analytics themselves (Rapp et al., 2012). Our findings suggest that an efficiently implemented LMS, powered by a strong and reliable IT infrastructure, can boost a company's performance, confirming the concepts the literature provided us with (D'Haen et al., 2016).

Overall, the new StarCars business model is entirely built around the customers and their needs, allowing for quick real-time monitoring of their data, purchase history, preferences, etc. (Langley & Rieple, 2021; Kumar et al., 2021). Here, customer agility is continuously powered and fostered by digital transformation tools and advancements, allowing for the aforementioned possibilities that were unavailable in the past (Akhtar et al., 2018; Chan et al., 2019). StarCars shaped its resources in a way that allowed for constant monitoring of leads, from the inception phase right until the final conversion and, in most cases, even for future recurrent sales.

Building the management control infrastructure around the potential customer also reflects on the outside, as clients always feel connected at every step of the way up until the final conversion (Bonacchi & Perego, 2011; Orero-Blat et al., 2020). The effectiveness of the shift has been confirmed in previous studies; it makes companies more receptive and responsive to the market (Murphy 2005; Bonacchi & Perego, 2011).

## 2.6 Conclusions and Implications

Many important takeaways emanate from this case study regarding agility and digitalisation, both from practical and theoretical perspectives. Our findings show how IT technology has played the role of enabler of customer agility, as the technological infrastructure allowed the company to reshape its business model in an attempt to move towards a customer-centric approach (Chen et al., 2014; Chatfield & Reddick, 2018). Furthermore, our findings show how customer agility can be used not only as a blueprint for only a strategic turnaround, but also as guidance for a digital friendly management to restructure their company's processes around real time customer data processing. Finally, we have seen how LMSs embody customer agility from a practical perspective, analyzing in-depth how the customer is monitored in every step of their digital customer journey, so that the company is able to adjust their value proposition on the fly around their needs (Monat, 2011; Pullins et al., 2016). Aside from highlighting the benefits of customer agility and backing up the existing theoretical frameworks on the matter with practical evidence from a relevant case study (Huang et al., 2021; Langley & Rieple, 2021; Kumar et al., 2021), we can find both practical and theoretical implications.

From a theoretical standpoint, the research serves as a conceptual framework backed up by empirical research on how customer agility can be seen as the foundation for a company undergoing digital transformation. The case study presented serves as the best practice of how the concepts of agility and digital transformation synergise in creating a modern and competitive business model that is valid for the automotive sector. Our studies contribute to the existing literature stream on agility and digitalisation by testing the existing theories presented by previous authors and applying them to a relevant and successful turnaround story (Chen et al., 2014; Shams et al., 2020). Hence, our research backs up existing theoretical frameworks with empirical evidence that was requested by multiple authors, effectively attempting to, at least partially, bridge a theoretical gap in the agility literature stream (Akhtar et al., 2017). Regarding the theoretical implications,

this research also confirms recent trends in the literature that reveal that a customer-centric approach is increasingly efficient compared to traditional product-based approaches (Shah et al., 2006; Orero-Blat et al., 2020) in the LMS context. Finally, our study reinforces the concept of IT being an enabler of agility as a whole (Panda & Rath, 2018; Mandal, 2019; Liao et al., 2019; Fearne et al., 2021) and customer agility, specifically (Chen et al., 2014).

We also identify the practical managerial implications of our findings. From a practical perspective, the research offers insights into how the organisational structure of a company can be reassessed to benefit from a customer-centric approach enhanced by IT tools (Doz & Kosonen, 2010). In this regard, our empirical findings strive to deeply explore how companies can benefit from the synergies between customer agility and IT in key business processes, such as customer care, marketing and control ((Monat, 201; Pullins et al., 2016; Chatfield & Reddick, 2018).

The research also illustrates the key competitive factors that are characterising today's automotive industry and its customer base taken from a company that now plays a major role in its landscape (Rastogi & Mehta, 2017; Wittmann, 2017), as depicted in the LMS literature (Biondi et al., 2013). Finally, the research strives to promote the importance of digital transformation to policy makers and governmental institutions, in an attempt to illustrate its implications in a company's well being and encourage nation wide initiatives centered around digitalisation (Battisti, 2020). The case study presented should act as the best practice example for managers and practitioners, showcasing the key elements of the connection between agility and digitalisation and potentially adapting these core concepts to their own context.

## **2.7 Limitations and Future Research Directions**

The research presented, however, has some limitations. First, the case presented is limited to the car dealership sector and has some peculiarities that cannot be applied to every other SME or large business. Second, the investments needed to digitize the processes are time-consuming and financially significant. Finally, a successful implementation of an LMS requires enough IT skill and

knowledge for effective use, which is why it cannot be used as a universal benchmark but must be evaluated case by case, depending on the needs of a specific company. A further limitation is related to the qualitative tool used in the analysis, as ATLAS.ti allowed us to focus specifically on a set of codes while making other aspects of the company an afterthought.

This research leaves multiple scientific paths to be fully explored in the future. Notably, while our study strives to be fully universal, the automotive industry still features peculiarities regarding the customer base, products and services. It would be interesting to analyse and explore the implications of agility in different contexts and industries to further explain and highlight the ways in which the two concepts mutually reinforce one another.

## Chapter 3

### **Digital transformation: Is Covid-19 a catalyst for micro and small enterprises first steps toward innovation?**

#### **3.1 Introduction**

The current Covid-19 pandemic has dramatically affected many economies all around the world. Multiple different countries have utilised lockdowns to reduce the spread of Covid-19. Those lockdowns are now causing a global recession which is affecting all types of companies (Klein, Todesco, 2021). Despite them playing a major role in several world's economies (Truant *et al.*, 2021), small and micro enterprises are believed to be in a more vulnerable position due to their lack of resources and necessary know-how to endure times of distress such as the current pandemic (Klein, Todesco, 2021). The size of companies has been previously seen as a liability when it comes to the management of external and internal events that threatens the business (Broccardo *et al.*, 2017).

On the other hand, the pandemic has caused changes in customers behaviour, supply chain and markets (Ceylan *et al.*, 2020). The Covid-19 pandemic has highlighted the differences between companies which have embraced digital transformation and those who have not (DT) (Truant *et al.*, 2021; Giannetti *et al.*, 2021). The ability to adapt to an ever-changing competitive scenario is essential to long term survival (Bertei *et al.*, 2015; Del Gobbo, 2013). While multiple definitions of DT exist, the general consensus defines it as the use of information and communication technologies (ICT) to change business processes and models, in order to gain a competitive advantage (Bharadwaj *et al.*, 2013). However, while Covid-19 pandemic has accelerated the adoption of digital technologies (Baig *et al.*, 2020), the current literature on DT adoption fails to address multiple research gaps in relations to its implication for SMEs.

In fact, further research should be conducted to assess the impact Covid-19 has had on the DT of small and micro enterprises operating in different geographical areas to promote the collection of empirical evidence (Li, 2021). In fact, as suggested



by Li (2021), the effects of DT differ from country to country and, as such, empirical research is necessary to get a better understanding of this complex phenomenon. Similar sentiments are echoed in several other publications as well (Marcysiak, Pleskacz, 2021; Truant *et al.*, 2021).

Consequently, the goal of this research is to investigate the effect Covid-19 has had on micro and small enterprises by focusing on how the pandemic impacted the very first steps towards their digital transformation journey. Furthermore, the research explores the barriers that are preventing small and micro businesses 'digitalisation. Drawing on Truant *et al.* (2021), we have identified micro and small companies that can be considered at their earliest possible stage of DT. In other words, we purposefully looked for companies with a limited degree of digitalisation. Therefore, our research strives to find an answer to the following research question:

RQ: How is the Covid-19 pandemic impacting the digital transformation of Italian micro and small companies at the earliest stage of DT?

To achieve our research goal, we adopted an inductive qualitative approach while engaging in purposeful sampling, in-depth interviews and a multi staged coding process. We focused on a selected sample of micro and small enterprises at a very early stage of DT (Truant *et al.*, 2021). Our qualitative approach, grounded in coding techniques and aided with secondary data triangulation, deeply explores the very nature of said barriers, as we shed light on the impact Covid-19 had on DT in small and micro enterprises with a limited degree of digitalisation.

From a theoretical perspective, this research adds insights to the discussion of how the pandemic has impacted the barriers to SMEs implementation of DT. We build upon a literature review which focuses on SMEs' DT and its related concepts such as the barriers to DT and the impact that the Covid-19 pandemic has on SMEs' digitalization. Meanwhile, from a more practical perspective, we gather empirical evidence to investigate the impact Covid-19 has had on the DT journey of a selected sample of micro and small enterprises. Moreover, we identify and present the four main barriers that micro and small enterprises face when starting their DT journey during the pandemic. By doing so, practitioners and policy makers should have a better understanding of the necessary tools which need to be implemented to promote DT within small and medium sized businesses.

The paper is structured as follows. First, we present a review of the available literature on DT, its implications for Covid-19, as well as an overview of the barriers to DT encountered by micro and small companies. Then in section 3, we highlight the methodology applied in our research, with a strong focus on sampling techniques and interviews protocol. Subsequently, section 4 shows the results obtained through the coding process and it illustrates the key quotes gathered from the qualitative interviews. Finally, section 5 discusses the findings in relation to the available literature. The paper culminates with one section devoted to implications, limitations, and avenues for further research.

## **3.2 Literature review**

### **3.2.1. The Advent of Digital Transformation in small and micro enterprises**

The Covid-19 pandemic has forced SMEs, corporations, and public institutions to change the way in which they operate (Paoloni *et al.*, 2021). The different policies utilised by governments all over the globe to respond to the pandemic have impacted the volatility, complexity, and uncertainty of many businesses (Fletcher, Griffiths, 2020). Companies which are digitally mature have been able to quickly adapt, reducing disruptions caused by the Covid-19 pandemic (Jones *et al.*, 2021). However, empirical evidence reveals significant digital adoption gaps when it comes to small businesses (Soto-Acosta, 2020). For instance, many countries are still lagging when it comes to DT in SMEs. In countries like Greece, Hungary, Poland, Portugal and Turkey, the median share of employees with connected computers in small firms remains at or below 40%, while larger firms in frontier countries (Denmark, Finland, Sweden at about 80% or above) have shown substantial progress over the last decade (OECD, 2020). Despite various difficulties, SMEs worldwide have intensified the use of digital technologies in response to the Covid-19 pandemic. Data from PayPal (2020) revealed that 72% of online small business owners interviewed in Canada believed ecommerce to be a necessity. Furthermore, 75% of the United Kingdom SMEs have moved to remote working during the

pandemic and, as a result, had invested in digital technologies to run their business remotely (Riom, Valero, 2020).

Organizations fronted the effects of DT well before the Covid-19 pandemic (Chen *et al.*, 2016). In fact, DT has been explored at length over the course of the last two decades (Besson, Rowe, 2012). DT has been described as a complex process which includes a wide range of changes, including changes to business models, organizational culture, work habits, processes, delivery, and customer services, just to name a few (Marchini *et al.*, 2019; Alfiero *et al.*, 2018; Marchi, Paolini, 2018). One of the most comprehensive definitions of DT describes it as "... the profound transformation of business and organizational activities, processes, competencies, and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritized way, with present and future shifts in mind" (Digital Transformation: Online Guide to Digital Transformation, 2021).

DT has significantly increased its scope and relevance under Covid-19 (Gavrila Gavrila, De Lucas Ancillo, 2021). For starters, companies were able to implement remote working on a much broader scale (Wade, Shan, 2020). Consequently, they were able to get in touch with new and existing customers, as well as deliver their own products and services (Guenzi, Nijssen, 2021). In Italy, just as much as in the rest of the globe, the adoption of digital solutions under Covid-19 has increased exponentially (Galindo-Martín *et al.*, 2019). They served as a tool to respond and lessen the effects of potential economic losses resulting from the ongoing crisis (Crupi *et al.*, 2020). Furthermore, it is safe to assume that the digital economy is and will characterize the post-pandemic landscape (Gavrila Gavrila, De Lucas Ancillo, 2021). For instance, SMEs owners will be using digital platforms to sell and promote their products (Min, Kim, 2021). Broadly speaking, SMEs will be venturing into the new landscape powered by DT to expand upon the possibilities that were previously seen as necessities under Covid-19. DT represents a new frontier for business development and growth (Matarazzo *et al.*, 2021).

Amid Covid-19 times, DT is becoming an increasingly popular topic in literature and research. Nonetheless, the implications for SMEs are yet to be fully understood. This is partially due to the multi-faceted nature of DT and the need for domain

specific approaches to it. Implementation strategies and empirical research are hard to universalise (Korachi, Bounabat, 2020). On the other hand, the Covid-19 pandemic has inadvertently made DT more relevant within SMEs, as more and more small businesses were forced to implement digital solutions to overcome the limitations of restrictions and regional lockdowns (Hai, 2021).

More specifically, when it comes to small and micro businesses, research is still somewhat scant in terms of DT and its applications. Townsend *et al.* (2014) has pointed out that micro enterprises could benefit from an online presence. This could lead to an enhanced network, which in return could improve the company's visibility and sales. Moreover, Domazet *et al.* (2018) believe that DT can be a significant competitive advantage to micro and small businesses. However, several authors have stressed the importance of further research on the topic of DT. Especially when it comes to less explored point of view, such as the one of micro and small businesses (Marcysiak, Pleskacz, 2021; Truant *et al.*, 2021).

### **3.2.2. Barriers to the Implementation of Digital Transformation in small and micro enterprises**

DT has barriers that need to be overcome (Alrawadieh *et al.*, 2020). To make a smooth transition into the digital era, SMEs need a clear understanding of their digital strategy to make sure that every resource at their disposal, whether tangible or intangible, will come together in shaping their digital future (Ellström *et al.*, 2021; Lombardi *et al.*, 2021). A strong digital mindset is required from SMEs owners and management since they must be willing to approach DT with an open mind. Moreover, they must not get discouraged by the complexity of the new tools powered by Internet 2.0 (Eden *et al.*, 2019). "Digital Readiness" is a literature trend which has recently gained traction. It is meant to analyse the level of preparedness of SMEs when faced by the implications of DT (Bican, Brem, 2020).

The aforementioned elements, along with the need to adapt the existing business model to a new technological environment, are amid the toughest challenges of small and micro companies, as they approach the digital era. It is up to the enterprise to turn DT into significant competitive advantages, rather than being hindered by its

complexity (Galindo-Martín *et al.*, 2019). Governments from all around the world are taking unprecedented steps to promote DT and make sure that SMEs are getting ready to tackle the challenges arising from the digital age (Fleischer, Carstens, 2021), especially amid Covid-19 times (Klein, Todesco, 2021).

Barriers to DT prevent the adoption of digital technologies and can present themselves in a variety of ways (Tijan *et al.*, 2021). Firstly, a lack of awareness on how digital transformation affects the organization might lead to insufficient investments in SMEs' technological infrastructures (Ullah *et al.*, 2021). Furthermore, organisational barriers include a lack of management trust in innovation and DT adoption (Broccardo *et al.*, 2019; Santoro *et al.*, 2016). Previous research has investigated how events such as the global financial crisis affect small companies' barriers to innovation (Ausloos *et al.*, 2017; Bartolacci *et al.*, 2016). Although, DT research has mainly focused on large sized companies (Olanipekun *et al.*, 2021). Nonetheless, DT barriers do also apply to small and micro enterprises. Their limited size and resources often exacerbate DT barriers (Ramírez-Durán *et al.*, 2021). In addition, empirical studies seem to suggest that limited degrees of digital maturity, which are commonly found in small and micro enterprises compared to larger ones (Truant *et al.*, 2021), intensify the barriers to DT adoption (Masood *et al.*, 2020; Ramírez-Durán *et al.*, 2021).

Furthermore, Marcysiak, Pleskacz (2021) have pointed out that micro enterprises suffer from chronic lack of human resources, which consequently leads to poor performance in terms of financing, planning, control, training, and the adaptation of their information systems. The micro and small perspective has received limited attention throughout the years (Domazet *et al.*, 2018), despite them being a massive portion of today's economy (ISTAT, 2020). Therefore, several research gaps remain. More specifically, further research should focus on the importance of digital maturity when it comes to the barriers to DT adoption during Covid-19 (Truant *et al.*, 2021). Fletcher, Griffiths (2020) work suggests how Covid-19 has made DT obligatory for businesses of all sizes and sectors. However, empirical studies on small and micro businesses with a limited degrees of digital maturity are limited, as most of the academic discourse has been developed around digitally mature SMEs (Domazet *et al.*, 2018; Jones *et al.*, 2021).

### **3.3. Methodology**

#### **3.3.1. Background and Research Design**

The researchers adopted the Truant *et al.* (2021) definition of degree of digitalisation. Therefore, the authors purposely looked for SMEs at the earliest stage of DT, which can be defined as the “unknown phase”, since they are at the very beginning of their DT process and are not aware of what DT is and which benefits it could bring to the company. Drawing on this theoretical framework was meaningful as it allowed us to find common traits within our sample of micro and small enterprises. The theoretical framework allowed the researchers to determine which companies could or could not be considered at an early stage of DT.

We adopted an inductive multiple case study approach and engaged in purposeful sampling to select information-rich cases that met these criteria (Gerring, 2007). Purposeful sampling has allowed us to gather empirical data on a specific set of SMEs with the same level of digital readiness, while excluding those at a very advanced stage of DT. The researchers were able to investigate and highlight the existing barriers of DT that are holding back those SMEs. To answer our research question, we adopted a qualitative interpretive methodology (Cunningham *et al.* 2016).

#### **3.3.2. Research Sample**

The research focuses on micro and small companies at a very early stage of their DT journey. Additionally, the selected businesses are struggling to overcome the barriers associated with the implementation of technology. The sampled enterprises operate within different sectors from one another. To find our sample, we focused on Piedmont, Italy, whose economy is dominated by SMEs (Fasano, Deloof, 2021; Ferraris *et al.*, 2017). We focus our attention on small and micro enterprises (ISTAT 2020). Using data from the companies’ websites alongside the AIDA Italian company information and business intelligence database, we were able to identify

businesses that could fit in the micro and small definition provided by the European standards. More specifically, our inclusion criteria evaluated companies' size and yearly profits. In other words, companies had to feature less than 50 employees and a turnover of less than 10 million euros. Furthermore, we have performed several checks on their level of digital maturity to filter out those at an advanced level of DT implementation. More specifically, we made use of our theoretical framework to identify companies at the earliest degree of digital maturity possible (Truant *et al.*, 2021): enterprises had a very barebone website or no website at all, nor an e-commerce website; they did not have an actively maintained social media presence and they did not use IT tools in their daily business activities, such as computers or tablets. We verified this aspect both externally, by monitoring and reviewing their internet presence, and internally, by asking specific questions during the screening phase which will be further discussed in the following paragraphs. In addition to the aforementioned criteria, companies had to have experimented with DT as a response to the pandemic. In other words, we were interested in companies that were forced to step foot into DT due to the pandemic, either by setting up a website they never had before, by switching to smart working in some capacity due to lockdowns, or by intensifying their social media presence to make up for the lack of physical visitors, and much more (Catturi, 2021).

The above-mentioned sampling approach helped us identify 117 potential SMEs that could take part in our investigation. Out of the initial 117 potential SMEs, only 29 of them showed interest in taking part to the research. We then approached those 29 companies in an attempt to garner a more in-depth understanding of them. During this phase, we gained access to more information, which allowed us to apply a further level of screening. Additionally, the researchers were able to filter out those companies that did not fit the specified criteria, even though, at first glance, they looked as if they belonged to an early stage of DT and had intensified their efforts in response to the pandemic. Ultimately, we were left with 11 cases available for close examination.

### 3.3.3. Data Analysis

Every company in our final sample fell within either the micro or the small category. Overall, the sample was deemed representative of Italian's landscape, as roughly 80% of Italian enterprises are considered micro (9 or less employees) and, out of the remaining enterprises, 18% are to be considered small by the standards set by the European commission (ISTAT, 2020). We began by contacting and interviewing these ventures' entrepreneurial team members. Interviews were held in-person. The researchers aim is to detect common factors that might highlight the different nature of DT barriers (Palinkas *et al.*, 2013), and to enable heterogeneity between cases, we applied maximum variation sampling. Maximum variation sampling, also known as heterogeneous sampling, has allowed us to set up a varied sample (Creswell *et al.*, 2006). To accomplish this goal, we iteratively added cases by monitoring several characteristics of companies, including overall size in terms of revenues and employees, the sector they operate in, and the age and gender of the owner.

Researchers tried to create a heterogeneous sample while still maintaining the aforementioned inclusion criteria. The iterative process ended when researchers deemed theoretical saturation had been reached (Creswell *et al.*, 2006). In other words, based on the data that had been collected and analysed hitherto, further data collection and analysis was deemed unnecessary (Saunders, 2017).

The interviews were conducted with the following protocol. When possible, we have interviewed employees as well as owners, in an attempt to gather as much information as possible. Interviews were carried from July 2021 to October 2021. Most interviewees were spoken to multiple times, for a grand total of 49 interviews, off a sample size of 21 unique individuals. The interviews were conducted one-on-one by a researcher and lasted from fifteen minutes to sixty, for an average of twenty-five minutes per interview. Interviews were semi-structured with open ended questions, as we delved deeper into the concepts of DT, barriers to digitalisation, the struggles of Covid-19 and the post pandemic road to recovery. Table V displays the sample in detail.



To facilitate qualitative data analysis and the coding process, the interviews were fully transcribed (Miles *et al.* 2014). The transcripts were analysed in a multi-step iterative process, involving both interviewers and co-authors who were not engaged in conducting interviews. The coding process operated as an interplay between theoretical preconceptions influencing the analysis and inductive reasoning influencing conceptual development (Markusen 2003; Miles *et al.* 2014). To optimise validity via critical verification techniques (Morse *et al.* 2008), the coders cross-checked and enriched each other’s interpretation of the data. More specifically, qualitative data collected through in-depth semi structured interviews was analysed through the guidance of the Gioia method (Gioia *et al.*, 2012). The approach relies on researchers settling on a well-specified research question, which in our case consisted in determining the pandemic’s impact on smaller companies at an early stage of DT.

**Table V - Sample characteristics**

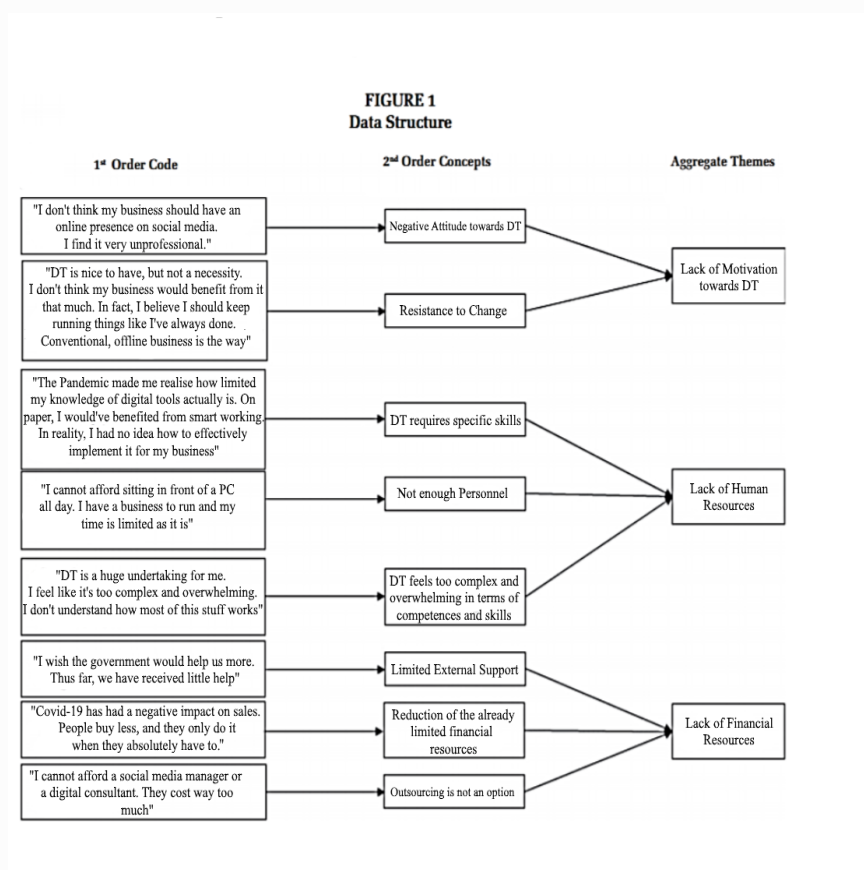
<b>Coding Reference</b>	<b>Business Sector</b>	<b>Personnel Interviewed</b>	<b>Company Size</b>	<b>Age Group</b>	<b>Gender</b>
#01a, #01b	Manufacturing	Owner, Accountant	Small	48–63, 26-47	F, M
#02a, #02b	Food, Beverage	Owner, Assistant	Micro	48–63, 26-47	M, F
#03a, #03b	Manufacturing	Owner, Accountant	Small	26-47, 26-47	M, M
#04a, #04b,	Manufacturing	Owner, Accountant	Small	26-47, 26-47,	F, F, F

#04c		nt, Assistant		18-25	
#05	Food, Beverage	Owner	Micro	26-47	M
#06	Food, Beverage	Owner	Small	26-47	M
#07a, #07b	Manufacturi ng	Owner, Assistant	Micro	26-47, 18-25	F, F
#08a, #08b	Manufacturi ng	Owner, Accounta nt	Small	26-47, 26-47	F, M
#09a, #09b, #09c	Manufacturi ng	Owner, Accounta nt, Assistant	Small	48-63, 48-63, 18-25	F, F, F
#10a, #10b	Manufacturi ng	Owner	Micro	48-63, 26-47	M
#11	Service Provider	Owner	Micro	26-47	M

The Gioia approach relies on interview protocols and informant quotes as a means to make sense of the data being collected, on the basis of similarities and differences between the categories. The first round of coding, also known as the open coding phase, was conducted by going back and forth between the empirical observations and grouping together codes deemed similar by the researchers. We then moved to a more abstract level of coding, also referred to as axial coding, in an attempt to conceptualize the codes found in the first phase and group them in several themes. This phase, which resulted in the second-order concepts, saw the authors discuss and

review their understanding of the codes several times over, until an unanimous consensus was reached. Throughout the analysis, the authors iterated back and forth between data and the relevant literature to see whether the findings had precedents and how the emergent themes aligned with or diverged from previous work. More specifically, authors made use of DT literature to make sense and group the codes into distinct categories, while cross-referencing the results with previous works mentioning the role played by the pandemic when it comes to DT (Truant *et al.*, 2021; Fletcher, Griffiths, 2020). This work ultimately led to the final round of coding, which consisted of the theorization of three distinct themes, also known as aggregate themes. Figure 3 features the data structure obtained from coding, while Table VI features representative quotes from the sample (Gioia *et al.*, 2012).

**Figure 3 - Data structure (Gioia *et al.*, 2012)**



*Source: Authors own elaboration*

**Table VI - Representative Quotations**

<p><b>Negative Attitude towards DT</b></p>	<p>“I believe social media presence to be unprofessional and childish. It is not meant for companies and businesses. I do not understand what the fuzz is about” (#09a)</p> <p>“I dislike how everything is hyper connected these days. I do not want my business to turn into some sort of Amazon, in which customers coldly buy products with no human elements involved in the transaction whatsoever” (#01a)</p>
<p><b>Resistance to Change</b></p>	<p>“My business has survived several financial crises. I would say I will stick with my conventional way of doing business, rather than following trends” (#02a)</p> <p>“I am proud of the way I do business. I want to be able to travel to my customers, show them my product and talk to them. I do not want to do all of that through a computer, pandemic or not” (#08a)</p>
<p><b>DT Requires Specific Skills</b></p>	<p>“Covid-19 made me realize I am simply obsolete when it comes to digital skills. I see everyone around me use computers like it is nothing. Meanwhile, I’m struggling for even the most basic things” (#02a)</p> <p>“DT for a manufacturing company is not that straightforward. We are talking about automation, robots, and advanced IT systems. Sounds great on paper, but who’s going to take care of it? Not me, for sure. I know nothing about any of that” (#04c)</p>
<p><b>Not enough Personnel</b></p>	<p>“I am understaffed, to put it bluntly. I already work long hours as it is. The pandemic made things even worse in a way, as I am forced to keep an eye out on</p>

<b>I</b>	several safety standards that weren't there before. I do not have the time to worry about anything else" (#09b)
<b>DT feels too complex</b>	<p>"When I think of DT, I feel overwhelmed. It is not just a matter of competencies. As a process, it requires a huge commitment to it, along with long term vision and planning, both things we don't possess in the slightest" (#06)</p> <p>"I feel like DT is more than just opening and managing a website, or a social media page. People around me do not always get it, but DT is going to affect every single aspect of a company, not just the online presence. As such, it is far from being an easy task to achieve" (#05)</p>
<b>Limited external support</b>	<p>"I wish we had more support from the government throughout the pandemic. I got 600 euros a month from them, yet I had to completely shut down production. Do you believe it was enough to break even?" (#10a)</p> <p>"I have heard there are incentives, but the procedure is far too convoluted for me to consider it a viable option. By the time I get the funds, the pandemic will be over for sure. I guarantee you that." (#04c)</p>
<b>Reduction of financial resources</b>	<p>"We were already barely scraping by. Covid-19 hit us hard and hurt the already limited resources we had. I genuinely cannot even consider the option of investing in anything, right now." (#01a)</p> <p>"I feel like I have been stuck in a financial crisis since the dawn of time. Covid-19 did not help either.</p>

	All I can think of is my day-to-day survival.” (#02b)
<b>Outsourcing is not an option</b>	<p>“I have asked for someone to make me a new fancy website. I felt like it could help draw new customers in. The prices, however, were simply absurd and I had to decline” (#02a)</p> <p>“Hiring external help is simply not a viable option. They cost too much, and we cannot afford it” (#10a)</p>

### 3.4. Findings

In the interviews, SMEs owners and managers discussed at length the barriers they have collided against when trying to digitise their company, amid Covid-19. Based on the analysis of the interviews, secondary data and the extensive, iterative, and multi-step process of coding, several sub themes emerged concerning the impact of Covid-19 in terms of the exacerbation of barriers towards DT for smaller enterprises. The themes will be discussed in the following sections.

#### 3.4.1. Lack of motivation and positive attitude towards Digital Transformation

SMEs owners see DT as a “nice to have”, rather than something essential. This includes social media presence, which comes off as unnecessary or even unprofessional by some. “Having a Facebook page is silly. This is a business company. I’m not an influencer, nor a Youtuber” (#09a), when asked on why his company had no social media presence whatsoever. “Our customers are always the same and we go way back with most of them.” (#01b) That was the reply when we pointed out that social media along with company websites are actively being used by SMEs all over the world to get in touch with new potential customers. “I know how Facebook works. But I don’t think anyone would ever reach out for us through Facebook. I think it’s not very professional for both parties (#03a)”. Younger

interviewees displayed a more positive attitude towards social media; however, they are still not quite convinced when it comes to its actual effectiveness. “Every company has a social media page nowadays; I see them all the time. But I don’t think we would get a lot of traffic from it. The way I see it, it’s not worth the hustle.” (#04c).

Some owners reject DT out of a mixture of spite towards the new generation of entrepreneurs and pride in the old ways of going about it. “Call me old fashioned, but a website will never be a viable option to me. Face to face conversation is mandatory. I cannot see myself ever selling a product on the Internet to an anonymous buyer. I want them to come here where I manufacture my goods, I want to know specifically what they want so that I can manufacture my products to meet my clients’ demands. This is something that I’m sure some will appreciate” (#08a). This type of cultural barrier turns the tables on the concept of DT itself. Instead of DT being “out of reach” due to internal limitations, entrepreneurs willingly reject it and reclaim the traditional way of handling business as their adopted approach.

### **3.4.2. Not enough human resources to handle Digital Transformation**

The second theme arising from our investigation is the lack of Human Resources needed to handle the digital side of the businesses. The interviewed SMEs showed signs of understaffing. Consequently, businesses could not devote a single individual to the management of a company’s website nor social media presence.

“It’s just me in the office. I work almost 10 hours a day and 5 on Saturdays. Where can I find the time to sit there and learn how a CRM works? That stuff takes time. Time that I personally don’t have.” (#02a). This sentiment is echoed in most of the contributions we have collected. Small and micro companies featured in our sample felt overwhelmed when it came to DT, as the whole ordeal felt too complex to handle properly.

In addition to the lack of time, small businesses owners claim there’s a severe lack of competences needed to fully implement DT in their everyday business processes. “Making use of IT tools is not simple. Personally, I wouldn’t be able to manage an online marketing campaign through social media. I’d have no idea where to start”

(#04c). Lack of Human Resources is not to be intended purely in terms of employees and time spent educating themselves on DT. Instead, as mentioned several times in DT literature, digital technologies require specific skill sets to get the most out of them, which is something not many small businesses have, nor have the possibility to get access to.

### **3.4.3. Lack of Financial Resources**

The lack of financial resources from an economic perspective is a significant barrier which emerged from our qualitative research. An interviewee said “I don’t have enough money for that. We are already in massive debt and barely scraping by. I can’t see myself spending even more money on websites, social media promotion and IT infrastructure (#04b)”. Furthermore, another owner claimed her company barely allowed her to get a salary for herself and her two collaborators. “Every single bit of money I invest in technology is something I put out of my own pocket, pretty much. I simply cannot afford it. And it’s not like I’m living a fancy lifestyle either. More often than not, I earn less than my collaborators because I try to pay them first and only if there’s enough money for them, I get my own check” (#06). The contributions from the rest of the sample were more or less along the same lines. DT is seen as something expensive and complex, while most of the interviewed small and micro companies struggle to simply keep their business afloat and, for that reason, can’t see themselves spending more money on it.

When confronted with the option of outsourcing their online presence to third parties professionals, participants showed a negative sentiment. “I barely have the money to pay my employees. And I consider myself lucky. In fact, most of my competitors had to shut down during Covid-19 pandemic. We survived somehow, but the money is a problem just like it was a problem prior to this whole pandemic” (#10a). While the company's website features somewhat accessible price points, outsourcing DT doesn’t appear to be a viable option overall due to limitations in economic resources. This point of view ties with previous dimension, as small business owners featured in our sample claim they are not able to afford external support on digital knowledge due to their limited financial resources.

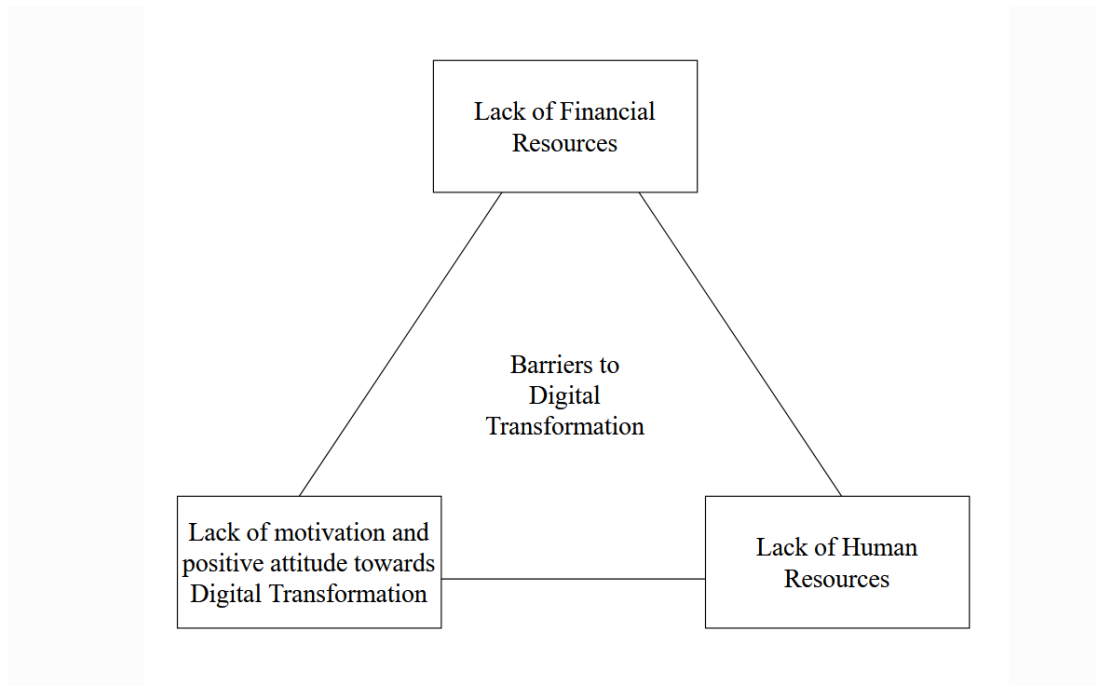


### 3.5. Discussion

The obtained empirical findings partially contradict the perception of Covid-19 being an accelerator of the DT process of micro and small companies (Gavrila Gavrila, De Lucas Ancillo, 2021). In fact, previous literature has generally referred to the impact of Covid-19 on DT as a driver of innovation (Subramaniam *et al.*, 2021). DT must be evaluated on a case-by-case basis due to the uniqueness of companies (Kurniawati *et al.*, 2021): what is true and relevant for digitally ready SMEs, may not apply to companies with a significantly smaller degree of digitalization (Truant *et al.*, 2021). The gathered data shows how the pandemic has sharpened the effects of DT barriers, rather than breaking them down (Klein, Todesco, 2021). SMEs all over the world were forced to make use of digital technologies in response to the Covid-19 pandemic (Crupi *et al.*, 2020). However, this study shows how the implementation of DT comes with specific challenges in terms of resources and knowledge. It is worth noting that in some cases, the pandemic has motivated SMEs to get around the DT obstacles to stay functional (Masood *et al.*, 2020; Ramírez-Durán *et al.*, 2021). However, the vast majority of the research sample suggests a different narrative. Those who saw Covid-19 as an opportunity to experiment with DT and discover new business horizons, generally showed a pre-existing digital friendly attitude towards innovation (Usai *et al.*, 2021), as well as a strong awareness of the benefits brought by DT (Eden *et al.*, 2019; Ellström *et al.*, 2021). However, our sample sheds some light on a set of micro and small companies who still choose to run their business conventionally, regardless of the contextual factors brought out by the pandemic. The presented findings are in line with the study conducted by Kurniawati *et al.* (2021), who highlight the difficulties faced by less digitalised SMEs when trying to adapt to the disruptive changes brought by DT and the pandemic. Contrary to previous research which indicates the pandemic as a driver of DT (Subramaniam *et al.*, 2021), we suggest that the Covid-19 pandemic does not positively impact the DT of micro and small enterprises operating in the early stages of their digital journey. Figure 2 displays the identified barriers for small and micro businesses amid Covid-19.

The empirical evidence obtained within this research indicates how micro and small enterprises at an early stage of their DT journey (Truant *et al.*, 2021), face multiple obstacles when approaching the DT of their businesses. Multiple entrepreneurs have indicated how the high costs and delayed return on investment (ROI) of implementing DT projects prevent them from adopting and executing digital technologies within their processes (Klein and Todesco, 2021; Kutnjak, 2021). The pandemic did not reduce the already existing need for knowledge constructs for DT (Kutnjak, 2021). The digital tools readily available to SMEs, such as social media and websites, often lack functionalities (Klein, Todesco, 2021) and are frequently perceived as redundant, unneeded, and irrelevant to SMEs success and/or survival. Due to the lack of knowledge and time, micro and small businesses' entrepreneurs often perceive digital media as additional adversities rather than new opportunities despite the potential benefits that these instruments carry (Pelletier, Cloutier, 2019). Ultimately, no evidence which indicates Covid-19 as a driving force of DT for micro and small enterprises who are at an early stage of digitalisation has been found.

**Figure 4 - *Barriers to Digital Transformation for small and micro businesses amid Covid-19***



In their work on entrepreneurial stagnation, Brush et al. (2009) mention that while no manager ever willingly decides to stop growing, factors such as management, marketing and financial aid actively affect stagnation. DT literature agrees that in times of stagnating productivity and increasing competitive pressure, the digitization of value creation serves to achieve lasting competitive advantages (Dallasega *et al.*, 2018). Our study synthesizes both statements by illustrating how a significant lack in financial and human resources, as well as an overall negative attitude towards digital change, leads to a state of digital stagnation, in which small and micro businesses can't keep up with their industry (Jones *et al.*, 2021) and, instead, decide to run their companies conventionally with little to no regards towards long-term planning (Kurniawati *et al.*, 2021).

As far as the age variable goes, the researchers have compared the gathered results to the ones previously discussed in the DT literature. Song et al. (2021) found that the Covid-19 pandemic accelerates the pace of digital technology utilisation but exacerbates the age-related digital divide. In our sample, we found older generations of entrepreneurs to be the ones showing a higher degree of resistance to change, despite the forced circumstances. In terms of gender divide, our empirical evidence does not highlight a significant correlation between gender identity and DT adoption (Grönlund, Öun, 2018; Rajahonka, Villman, 2019).

### 3.6. Conclusions

Even before the pandemic and the different lockdowns, DT has been imposing some challenges which are specific to SMEs (Klein, Todesco, 2021). Financial resources required to implement sophisticated IT systems often limit SMEs' ability to approach those technologies since it requires a conceived model with a satisfactory degree of fit resulting into a higher consumption of resources (Gianetti *et al.*, 2021). The pandemic did not improve companies' financial stability. Consequently, the obtained data shows how the DT adoption has not increased in companies in which DT literacy was missing. Together with the lack of financial resources, micro and small enterprises often lack the necessary knowledge to implement DT. Some of the entrepreneurs that we have interviewed have shown a negative attitude towards the use of digital tools such as social media and websites (Metushi, Fradeani, 2018). Furthermore, the obtained empirical findings highlight how micro and small enterprises often lack the necessary personnel to correctly implement DT. The necessary knowledge required is often costly. Finally, the lack of time that can be invested into the process of DT often affects smaller businesses, as they struggle to both handle technology themselves and ask for external help from professionals.

The research provides readers with both theoretical and practical implications. From a theoretical perspective, our research bridges a gap in the DT literature by analysing the other side of the DT spectrum and drawing theoretical conclusions on the reasons why it is not implemented in some micro and small enterprises. The study, which is exploratory in nature, draws from empirical data a theoretical perspective on DT barriers. Our investigation expands upon our understanding of the barriers and challenges to DT which need to be continuously investigated due to the unique setting in which SMEs operate (Kutnjak, 2021). More specifically, it allows multiple stakeholders to garner a deeper understanding on how the Covid-19 pandemic has affected SMEs' relationship with DT. Additionally, our study answers the call for future research posed by the theoretical framework of Truant *et al.*

(2021), by shedding light on the effects of Covid-19 in terms of digital adoption, which was yet to be fully explored.

From a practical perspective, the research speaks to owners, managers, practitioners, experts, and policy makers to inform them as to what is happening within small and micro businesses. Therefore, the aforementioned stakeholders can allocate the right resources and tools necessary to foster the creation of context specific structures, elements and culture which promote DT. Furthermore, the research also strives to provide practical and empirical evidence to highlight a less known aspect of DT, which relates to companies who are not able to gain its benefits by implementing it. In this regard, the implications for policy makers are several, as they could consider addressing these barriers to DT to bridge the gap between small companies with limited degrees of digitalization and those with an already well-established DT. This can be done through both educational and financial initiatives, aimed at educating and providing companies with the necessary resources, knowledge, and tools to correctly implement DT. Moreover, micro and small enterprises' management have a better understanding of the steps required so to firstly approach DT. Additionally, the paper informs readers of the need to adapt the company and owners' culture before approaching DT. Hence, our research on DT barriers further explores said issue and provides insight to better understand the analysed context.

Our study comes with limitations related to its research design, sampling procedure and context. Firstly, the research is limited by the sample pool utilised to gather data, which restrains the generalisability of the findings. While our sample is representative of a significant portion of Italian micro and small enterprises (ISTAT, 2020), we expect the results to be fairly different within enterprises with a higher degree of digital readiness. For example, the results obtained by Chamocho et al. (2021) suggests how Covid-19 can indeed act as a catalyst of DT in small companies with significant degree of digital readiness.

The study is also limited to the use of a qualitative interpretive methodology which prioritize the participants' experiences without quantifying the impact of every business choice. During said interviews we sought to gather qualitative data which would help us understand how the Covid-19 pandemic has impacted the DT within

small and micro enterprises, as well as discuss how their barriers to the adoption of DT have changed during the pandemic. Consequently, the adopted approach has its own limitations.

Further research around these topics is needed to provide additional empirical evidence. Future works should consider the dynamics between digitally friendly attitudes of owners and managers of micro, small and medium sized businesses. Moreover, additional research with a larger research sample is required to garner quantitative data aimed at assessing the correlation between the Covid-19 pandemic and DT adoption rate.

## **Chapter 4**

### **Empirical Identification of the Chief Digital Officer Role: A Latent Dirichlet Allocation Approach**

#### **4.1 Introduction**

The rise of digital technology has resulted in new opportunities for companies across the globe, but it has also led to an increasingly significant need for specific knowledge to make the most of technological advancements. To gain significant advantages over their competitors (Ferreira et al., 2019; Khan et al., 2021), companies often need to acquire specific skills from the job marketplace (Elia et al., 2021; Ferraris et al., 2018). In fact, new professional roles are emerging amid the current digital world (Muninger et al., 2019), as individual skills are deemed crucial to steer the digital transition of companies towards a successful future (Scuotto et al., 2022). While a multitude of skills are deemed relevant in the current digital landscape, including digital leadership (El Sawy et al., 2016), knowledge management (Alberti-Alhtaybat et al., 2019) and organisational capabilities (Muninger et al., 2019), the consensus is that digital transformation still revolves around a human component embodied by top management figures (Picone et al., 2021; Zimmerman et al., 2020).

Traditionally, companies have employed chief information officers (CIOs) and have made these individuals responsible for everything concerning the firm's information technology (IT) infrastructure (Peppard et al., 2011; Taylor & Vithayathil, 2018). Throughout the past decade, however, a new role specifically meant to address the challenges of digital transformation has emerged: chief digital officer (CDO) (Singh & Hess, 2017). CDOs are generally tasked with coordinating digital initiatives across departments and driving the digital transformation process of their organisations (Tumbas et al., 2018; Verhoef et al., 2021). Previous research has explored managerial roles and positions tied to digital transformation concerning the skill sets required by such positions (Singh & Hess, 2017; Singh et al., 2020), yet it is still lagging when it comes to the new and rapidly emerging CDO role (Firk et al., 2021; Singh et al., 2020).

The scientific literature undoubtedly lags when it comes to emerging managerial roles and their key personal characteristics (Mansfeld et al., 2010; Singh and Hess, 2017; Singh et al., 2020). While their importance is clear amid the digital transformation process of a company (Sousa & Rocha, 2019), little is known about their overall profile in terms of individual competencies and tasks. This is especially true for CDOs, as they have thus far only been investigated in limited exploratory studies with qualitative approaches (Singh et al., 2020; Tumbas et al., 2018; Tumbas et al., 2017); hence, the strong call for more empirical research on the matter has been echoed by multiple studies (Kessel & Graf-Vlachy, 2021). More specifically, in terms of research gaps, Kunisch et al. (2022) claim that individual characteristics of the CDO are yet to be fully understood. In other words, according to Kunisch et al. (2022), we still do not know the answers to the following questions: What does it take to become a CDO? Which capabilities are required? What career paths have they followed? What individual characteristics do CDOs have in terms of their backgrounds, prior experience and personalities? Similarly, Firk et al. (2021) called for future studies to explore the coordinating role of the CDO to understand both their expected key personal characteristics and their need to possess more general management skills. Finally, it has yet to be determined whether CDOs play a distinct role compared to CIOs (Singh & Hess, 2017; Singh et al., 2020) or whether they are simply a ‘new coat of paint’ over a well-established managerial position (Gerth & Peppard, 2016; Taylor & Vithayathil, 2018).

Our contribution finds its positioning amid the literature concerning new managerial roles that are emerging in response to digital transformation (El Sawy et al., 2016; Singh & Hess, 2017). More specifically, our research seeks to identify a CDO archetype grounded in empirical evidence to deliver a comprehensive understanding of this emerging managerial role and, in doing so, address the research gaps that have yet to be explored. More specifically, the research questions driving the present study are as follows:

RQ1: What capabilities are required by organisations for CDO positions?

RQ2: What are the tasks required of CDOs by their organisations?



Drawing on the CDO and digital transformation literature, the present study examines the current demand for CDOs worldwide by collecting and analysing publicly available data on CDO job postings scraped via Python scripts from LinkedIn, Indeed and several other sites (Khaouja et al., 2021; George et al., 2016). To address the research gap mentioned above, our research implemented Bayesian statistics and LDA across a large comparative sample of CDO job postings to find common emerging themes via topic modelling (Debortoli et al., 2014). LDA topic modelling has been used in past business research when attempting to profile emerging professional roles on large chunks of textual content; hence, we deemed it an effective choice in terms of research design (Gurcan & Cagiltay, 2019; De Mauro et al., 2018).

This research provides three main theoretical contributions. First, it sheds light on emerging managerial roles and positions by highlighting the expected key personal characteristics and capabilities (Mansfeld et al., 2010; Singh and Hess, 2017; Singh et al., 2020). We contribute to the literature exploring the individual aspects of digital transformation by highlighting the human component at the core of organisational change (Zimmerman et al., 2020; Tabrizi et al., 2019). Second, although several papers have begun to explore the role of CDOs, most have employed an exploratory and qualitative approach (Singh et al., 2020; Tumbas et al., 2018; Tumbas et al., 2017). As the scientific debate on the role played by CDOs amid digital transformation continues, we advance the literature by complementing previous exploratory research with large-scale quantitative data that both reinforce existing knowledge on the topic (Kessel & Graf-Vlachy, 2021) and shed light on several unanswered questions formulated by previous contributions (Kunisch et al., 2022; Firk et al., 2021). Third, the present study takes an individual perspective on digital transformation, investigating the role of single actors, namely CDOs, amid technological change (Barney & Felin, 2013). By profiling the archetype of a CDO position, our study enriches the literature by providing an in-depth focus on new skills and competences development for digital strategies (Al Nuaimi et al., 2022; Muninger et al., 2019), the coordinating role of CDOs among the corporate structure (Firk et al., 2021), and individual characteristics such as previous career path, prior experience and personal traits (Kunisch et al., 2022). Additionally, from a practical

perspective, our results can help guide practitioners to better understand current market requirements and for companies aiming to hire external CDOs or develop internal training that meets present and future digital transformation skills (Picone et al., 2021; Zimmerman et al., 2020).

The current article is structured as follows: Section 2 provides a review of the literature on CDOs and illustrates how the position was created before detailing its evolution. Section 3 presents an overview of the methodological approach implemented, highlighting the LDA technique and the reasons why it was chosen for this article. Section 4 presents the results as we go through the common themes and trends emerging from the LDA analysis of the sample. Section 5 ties the findings with the literature and highlights divergences and agreements. The study then concludes with a discussion of the managerial and theoretical implications, as well as limitations and directions for future research.

#### **4.2.1 Digital Leadership: Market-Driven Competencies for the digital era**

A global marketplace raised customer expectations and the disruptive impact the Internet has had on organisations has all contributed to significant changes in both the job market and the skills required from top management positions (Bresciani et al., 2021; Vasconcelos, Kimble, & Rocha, 2016). In times of unprecedented uncertainty and digital disruption, top management is required to react quickly and thrive off technological advancements by turning them into competitive advantages (Fitzgerald et al., 2014; Foss & Klein, 2014; Weber et al., 2022). More specifically, companies are required to invest in skill development to react quickly to market changes (Bharadwaj, 2013; Ostmeier & Strobel, 2022), to appoint technology leaders who are also well informed on business issues (Foss & Klein, 2014; Taylor & Vithayathil, 2018) and to acquire or develop capabilities related to digital agility (Rane et al., 2020), digital networking and big data analytics (Verhoef et al., 2021).

Regarding top management positions in the modern era, El Sawy et al. (2016) defined digital leadership as ‘doing the right things for the strategic success of digitalisation for the enterprise and its business ecosystem.’ Definitions aside, previous research seems to agree on the skills required for digital leaders, namely

digital literacy, business strategy savviness and strong, digital transformation-oriented leadership skills (Zeike et al., 2019; Benitez et al., 2022).

Regarding digital literacy, often associated with life-long learning, it is a broad ‘digital’ concept, which encapsulates the combination of digital knowledge, cognitive knowhow, practical knowhow, competence and digital attitude, all essential in the digital age (Canina & Orero-Blat, 2021; Zeike et al., 2019). In terms of business strategy savviness, Benitez et al. (2022) mentioned how important it is for digital leaders to effectively understand their market, product and customer to create business value through their actions and decision-making. Finally, digital leaders are required to possess sharp leadership skills, most notably in terms of being able to obtain and maintain the trust of their peers and organisation (El Sawy et al., 2016; Weber et al., 2022), while assuming the responsibility of driving forward a strategic vision built on technological advancements (Muninger et al., 2019; Sousa & Rocha, 2019).

While it is generally believed that CIOs fall within the definition of digital leaders due to their tripartite nature made of business, technological and leadership skills (Gerth & Peppard, 2016; Taylor & Vithayathil, 2018), little is known about the emerging managerial roles, CDOs included, and whether they possess the skills required for them to be labelled as digital leaders (Mansfeld et al., 2010; Singh & Hess, 2017; Singh et al., 2020).

#### **4.2.2 The origin of the chief digital officer role**

In response to digital transformation, organisations have introduced a new leadership role—the CDO (Rickards et al., 2015). Because this role is still emerging, it currently means different things to different organisations. However, CDOs belong to top management positions and are tasked with managing the digital transformation processes of their companies (Tumbas et al., 2017; Kunisch et al., 2020). Although, they differ from other digital executives because their roles are cross-functional across multiple business units rather than confined within strict functional limits (Kunisch et al., 2022).

Companies started using the job title CDO in 2005, but its relevance grew more significantly from 2010 onward, rising in parallel with the technological advancements of the past decade (Singh & Hess, 2017; Kunisch et al., 2020; Seeher et al., 2020) and progressively replacing CIOs in top management positions (Barnes et al., 2021). The first known CDO was hired by MTV Networks in 2005, and the number of CDOs has roughly doubled every year until 2015 (Grossman & Rich, 2012). Between 2015 and 2017, the number increased even more rapidly, especially in the manufacturing, construction, finance and insurance industries. Recent studies have found that CDOs are especially popular in Germany and France, whereas fewer CDOs are appointed in the United States or the Netherlands (Firk et al., 2019). Major companies have progressively appointed a CDO in their ranks: McDonald's did so in 2013, Nike in 2016 and Novartis in 2018.

Although research has been carried out in an attempt to understand the transition from CIOs to CDOs, it is still unclear whether the CDO is both a distinct figure compared to the CIO and a natural successor to that role (El Sawy et al., 2016; Singh & Hess, 2017), or whether the CDO is merely a new 'coat of paint' over the already established role of CIO, and maintains its core archetype tasks in terms of skills and tasks (Gerth & Peppard, 2016; Barnes et al., 2021). What we do know is that both figures share the tripartite blend of digital, business and interpersonal skills (Benitez et al., 2022), yet a comparative interpretation of the two roles through the theoretical lens of digital leadership is still missing.

#### **4.2.3 Chief digital officers in terms of competencies and responsibilities**

Even though the literature on CDOs is still in its early stages, several studies have explored its scope and features, albeit mostly with exploratory approaches. Qualitative research has been conducted to determine the role played by CDOs in large companies. Singh et al. (2020) found that CDO positions are not strictly predetermined when it comes to their tasks and embeddedness within the organisational structure. Instead, they are shaped around the company's needs in terms of digital transformation and its technological strategy. This theory has been supported earlier by Doonan (2018), who suggests that companies could not only

benefit from a top management figure specifically devoted to digital transformation implications, but also that the CDO role should be adjusted according to the company's digital strategy.

An important literature stream refers to the impact that CDOs have had on multiple organisational outcomes, such as digital innovation, customer engagement and strategic change (Singh & Hess, 2017; Singh et al., 2020; Tumbas et al., 2017). As noted by Dumeresque (2014), CDOs are indeed agents of change and play a major role in driving the company's strategic vision towards its digital transformation future. Finally, Singh et al. (2020) further stressed the coordinating role played by CDOs in companies, linking their effectiveness directly to the firm's digital strategy. CDO competencies include proficiency in data analytics and customer engagement, along with an understanding of digital innovation (Tumbas et al., 2017). Although the literature on the topic of CDO-related skills is scarce, the authors agree that CDOs must possess unique capabilities that are distinct from those required for other top management positions (Dumeresque, 2014). However, as echoed by Kunisch et al. (2022), the CDO literature currently lacks systematic, large-scale evidence of the nature and determinants of the CDO position because questions such as 'What does it take to become a CDO?' and 'Which capabilities are required?' remain unaddressed.

As far as CDO tasks are concerned, contradictory evidence has been found in recent research. On one hand, the results of exploratory studies suggest that CDOs play a coordinating role across departments as they drive forward the digital change of the company (Tumbas et al., 2017; Al Nuaimi et al., 2022). In doing so, CDOs seemingly maintain their own distinct identities compared to CIOs and other senior IT professionals (Tumbas et al., 2018). Kunisch et al. (2020) stressed the specific importance of CDOs amid top management, as CIOs may lack the strategic vision and leadership skills needed to manage digital initiatives. However, the boundaries between the two roles appear to be blurred; oftentimes, job descriptions for CDO positions mirror the ones for CIOs (Gerth & Peppard, 2016). Additionally, there is still little evidence of the role they play in stimulating a digital culture within their company (Firk et al., 2021). Hence, further research is needed to properly define the

boundaries of the CDO position, both in terms of skills and tasks (Kessel & Graf-Vlachy, 2021; Kunisch et al., 2022).

### 4.3. Methods

#### 4.3.1 Research design

Researchers in the social sciences have used computational tools to extract information from numerous online data sources (Berger et al., 2019; Scarborough & Crabbe, 2021). LDA is considered a highly efficient method for handling big data to extract information from job postings and identify specific professional profiles in terms of skills and competencies (De Mauro et al., 2018; Gurcan & Cagiltay, 2019). LDA helps when the data are sparse and high dimensional (George et al., 2016), as it is used to extract latent topics thus reducing the dimensionality of large sets of data (Banks et al., 2018).

Common themes, which will be addressed as ‘dimensions’ in the present study, are latent constructs distributed over a vocabulary of words that employers have used to describe CDO job openings (Tirunillai & Tellis, 2014). In our analysis, job openings are referred to as a sequence of  $N$  words and as ‘documents’, while a  $D$  number of reviews, also known as documents, forms a corpus. We assume that we will be able to identify  $K$  dimensions across the corpus, comprising all the CDO job openings found in our study.

Figure 5 provides a graphical representation of the LDA algorithm. Nodes denote random variables; edges denote the dependence between random variables. Shaded nodes denote observed random variables; unshaded nodes denote hidden random variables. The rectangular boxes are ‘plate notation’, which denotes the overall corpora made of a predetermined amount of documents (Blei & Lafferty, 2007). The interaction between the observed documents and the hidden topic structure is manifested in the probabilistic generative process associated with LDA—that is, the imaginary random process that is assumed to have produced the observed data.

To better comprehend how LDA works, we provide an example as follows: Let  $K$  be a specified number of topics,  $V$  the size of the vocabulary,  $(\vec{\alpha})$  a positive  $K$ -vector,

and  $\eta$  a scalar. Let  $\text{DirV}(\vec{\alpha})$  denote a V-dimensional Dirichlet with vector parameter  $(\vec{\alpha})$  and  $\text{DirK}(\eta)$  denote a K dimensional symmetric Dirichlet with scalar parameter  $\eta$ . For each topic, we draw a distribution over words  $\vec{\beta}_k \sim \text{DirV}(\eta)$ . For each document, we draw a vector of topic proportions  $\vec{\theta}_d \sim \text{Dir}(\vec{\alpha})$ . For each word, we draw a topic assignment  $Z_{d,n} \sim \text{Mult}(\vec{\theta}_d)$ ,  $Z_{d,n} \in \{1, \dots, K\}$ . Finally, we draw a word  $W_{d,n} \sim \text{Mult}(\vec{\beta}_{z_{d,n}})$ ,  $W_{d,n} \in \{1, \dots, V\}$

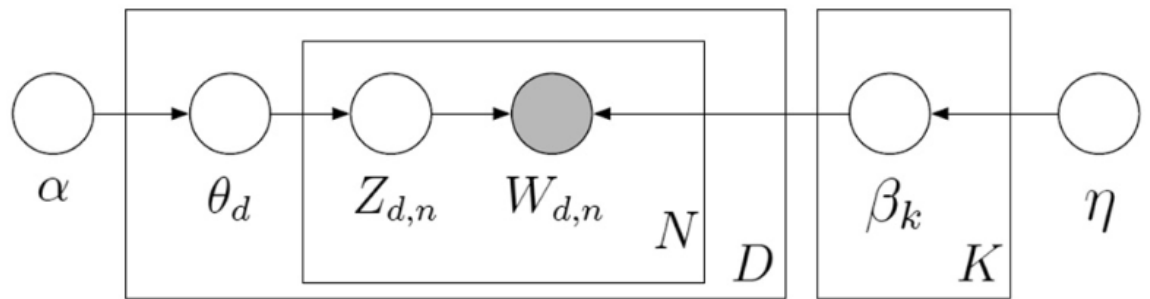


Figure 5 - LDA generation (Blei & Lafferty, 2007)

To better contextualise the applicability of LDA to our research, we consider job postings as K dimensions with probabilities. Each may contain a set of attributes required from CDOs along with the tasks they will be asked to perform. The LDA algorithm allows us to first identify the core topics emerging from the corpus, which here will refer to the core competencies required, along with descriptions of their roles. Subsequently, we can determine the degree to which each document contributes to a set dimension. Ultimately, we can profile the role of CDOs across the world in terms of both their skills and their roles.

Although multiple textual analysis methods exist, we opted for LDA modelling for several reasons. First, LDA does not come with preassumptions regarding the structure of large bodies of text (Gurcan & Kose, 2017; Khaouja et al., 2021). This makes for a solid choice when analysing a large amount of data while trying to map the heterogeneity of the dimensions between our samples. For instance, this has allowed us to find the differences between countries and search engines when it

comes to CDO positions. Furthermore, LDA gives us a clear understanding of the frequency with which words have been used in the corpus (Barnes et al., 2021), which allows us to find common recurring patterns in job postings and establish which core characteristics appear in CDOs worldwide.

### **4.3.2 Data processing**

Because LDA is an inductive methodology, the selection of a corpus that can convey the profile of CDOs is highly important. Drawing on previous research (Gurcan et al., 2019; Barnes et al., 2021), we built a corpus of 518 job postings using LinkedIn, Indeed, Glassdoor and other job search websites from January 2021 to December 2021. Because the goal of the research is to understand what it takes to become a CDO and what types of tasks CDOs perform during their tenure, job postings are the ideal source of information because they feature both the skills required from employers and tasks meant to be performed by newly appointed CDOs (Khaouja et al., 2021).

The preprocessing stage is crucial when conducting LDA analysis because it allows researchers to improve the quality of unstructured data to make it readable for algorithms. Drawing on previous research (Gurcan & Kose, 2017; Barnes et al., 2021), we have applied a preprocessing method divided into several subsequent steps. The first step was meant to harmonise the data in one unique target language because a portion of the sample (n=57) was written in a language other than English. Previous LDA studies featuring a multilanguage sample either used corpora combining monolingual texts stemming from different countries (Rahmani et al., 2018; Perez-Encinas & Rodriguez-Pomeda; 2019), computed one topic model per language (Chen et al., 2018) or translated documents into one target language (Lucas et al., 2015). We used the third option, and with the help of language experts, we were able to translate the corpora into English.

The next step was to remove punctuation, web links, private tags and meaningless characters, along with stop words, to reduce the word space. The R package<sup>TM</sup> was used for these steps. To preserve the meaning in the text content, the stemming process was not applied because the dataset contained technical jargon along with



job-specific terms. The results of the preprocessing phase led us to reduce the word space for the dataset from 172,494 unique words to 28,971, while the number of job postings was equal to 518. Regarding the LDA equation, each job posting represented an individual vector, while the word space of 28,971 unique words referred to the size of the word vector for each posting. A topic modelling tool, the Machine Learning for Language Toolkit (MALLET), was used to analyse the content of the job postings. MALLET is a Java-based command line programming tool that has often been employed in LDA-based studies (McCallum, 2002). The corpora were run through MALLET to identify topics.

Several tests were run to verify the validity of the extraction (Sinha & Larrison, 2020). Further details on goodness-of-fit testing have also been included in section 4.6. Finally, qualitative, human-assisted methods were also implemented to reach a unanimous level of agreement between the authors. To confirm the validity of the model, we examined the interindividual interpretability of the topic model solution (Scarborough & Crabbe, 2021).

### **4.3.3 Validation**

Two distinct qualitative validation techniques were implemented, namely qualitative coding with human raters (Tirunillai & Tellis, 2014) and semantic analysis powered by the Leximancer tool (George et al., 2016). Human coders were asked to independently perform manual coding techniques on a set of 100 job postings picked at random from the overall sample and to apply a rigorous, three-step coding protocol. This ultimately led to coders finalizing a set of dimensions related to CDOs' nature to be compared with the results derived in the automated analysis. In this way, the authors were able to calculate the reliability of the automated analysis and highlight possible skewness in the results.

The second step involved the use of semantic analysis via Leximancer (Dann, 2010; Malik et al., 2020). Leximancer software has been widely implemented in social science and business research to explore concepts across large datasets through both qualitative and quantitative semantic analysis. The tool works as follows: It iteratively builds up a thesaurus of associated concepts through intelligent

proprietary algorithms, resulting in a thematic view of the relationships between concepts indicated by their proximity to the resulting conceptual map. By creating two distinct samples for both skills and tasks, the authors aim to validate the automated results obtained through topic modelling via the qualitative interpretations that can be made based on the algorithmic analysis powered by Leximancer. Results of the qualitative validation process are found in the Section 4.6.

#### **4.4. Findings**

In the following subsections, we illustrate the results of our research. The first subsection is dedicated to explaining model fit statistics that have been performed in an attempt to identify the ideal number of topics to be analysed. Then, we discuss the dimensions of both tasks and skills subsequently by illustrating the common topics emerging from the empirical data sets and pointing out their distribution across the corpora. Finally, the dimensions are discussed in terms of the probability of occurrence, which lets us identify so-called ‘top topics’ amid the acquired data and determine which dimensions are the most prominent. Then, cross-country analysis will be presented because we analyse the emphases each country puts on each dimension in terms of percentage.

##### **4.4.1 Topic extraction and coherence scores**

Model fit statistics from the LDA of CDO job postings suggest that the required tasks can be described in five distinct topics: leadership role, strategic vision, operations, IT and coordination. Meanwhile, the requirements to become CDOs can be brought down to four main dimensions: seniority, business savviness, tech savviness and soft skills. In accordance with previous research, we have conducted several tests to adequately identify the ideal number of topics to be extracted. We have specifically looked for the overall coherence scores because they allow us to best represent the interpretability of topics (Röder et al., 2015). We have run several consecutive models with different numbers of topics to see which one had the highest degree of coherence. In other words, the ideal number of topics depends on

how coherent the model is: models with higher coherence have a lower degree of shared words between topics. Task-wise, we ultimately decided to opt for a five-topic model for better manual interpretation of the data. Skill-wise, we agreed that four dimensions were the ideal size. The model fit statistics and qualitative validation, along with a more detailed look at topic coherence, are shown below. Figures 2 and 3 provide an overview of the coherence scores for both corpora.

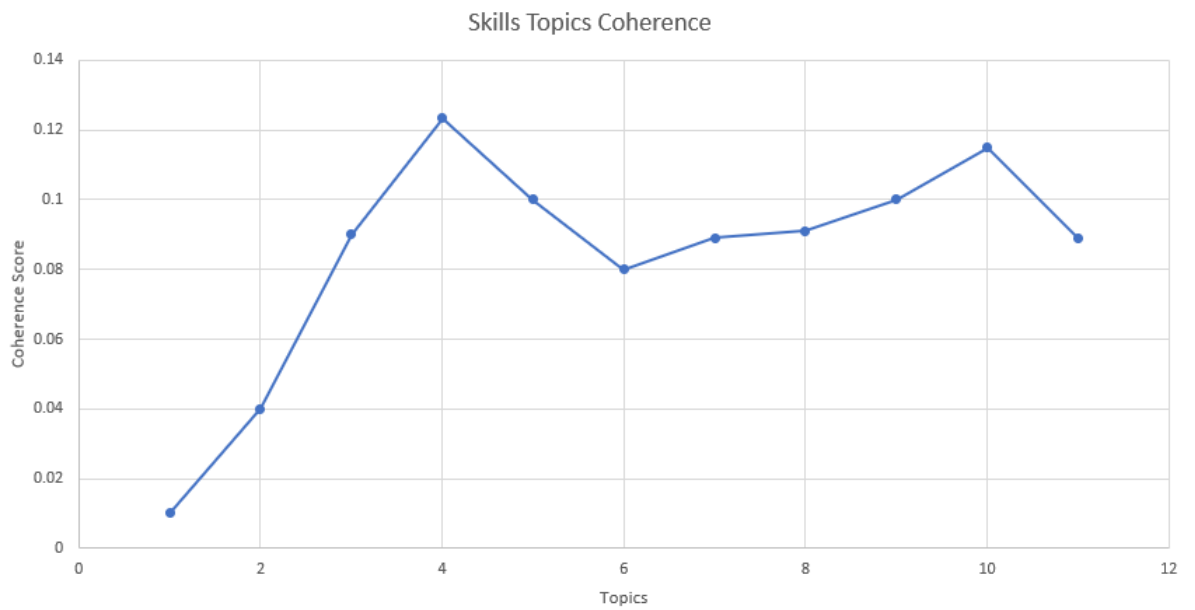


Figure 6 - Skills coherence scores

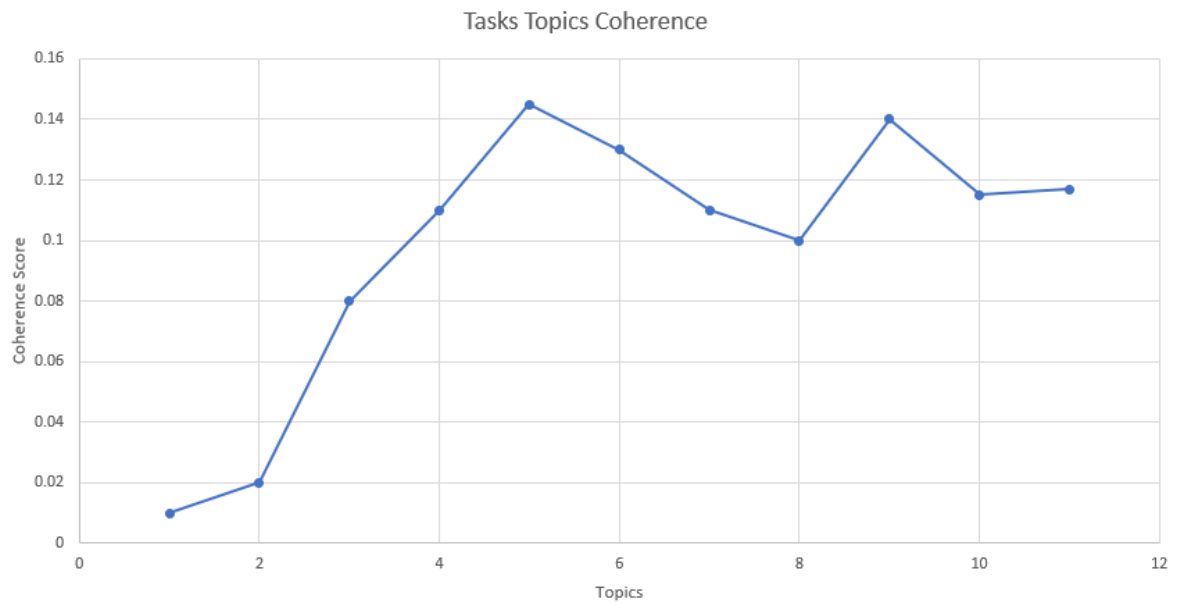


Figure 7 - Tasks coherence scores

High coherence scores mean that the topics are better representative of the overall corpora. In other words, when a model is coherent, there is less confusion as to where each term belongs because they are more unanimously distributed. The above figure illustrates the ideal number of topics for each corpus, which coincides with the highest coherence score reached in both tests.

Regarding CDO skills, we have performed the same iterative process, albeit on a distinct corpora made of ‘profile’ sections or equivalent ones found in the job description. In this case, the model with the highest coherence score was a four dimensional one. We have once again performed over 20,000 iterations for each model, as suggested by previous LDA studies on job postings (Gurcan & Kose, 2017; Barnes et al., 2021). We have found that the coherence score was not significant enough in models with five or more topics. After manually reviewing the four dimensional model, the researchers agreed on its effectiveness in summarising the large amount of data available. Model fit statistics were performed and added to Section 4.6.

Finally, Figure 8 shows the nine total dimensions, along with the most recurrent words for each topic. The words are in order of relevance, with the top words being the most recurring.

Figure 8 - Highest-ranked word stems for each dimension

Leadership Role	Strategic Vision	Operations	Information Technology	Coordination	Seniority	Business Savviness	Tech Savviness	Soft Skills
Chief	Innovation	Management	Digital	Team	Experience	Digital	Knowledge	Skills
Leadership	Digital	Product	Technology	Growth	Digital	Business	Data	Ability
Services	Change	Development	Develop	Group	Technology	Leadership	Years	Communication
Solutions	Business	Clients	Tools	Ability	Degree	Strategy	Profile	Team
Manage	Strategy	Responsible	Online	Strategy	Years	Vision	Project	Lead
Management	Future	Customers	Data	Social	Profile	Change	Strong	Growth
Transformation	Path	Market	Transformation	Communication	Work	Understanding	Development	Strategic
Technology	Opportunities	Process	Build	Report	Projects	Customer	Software	Level
Reporting	Transformation	Knowledge	Software	Responsible	Data	Transformation	Tool	Report
Figure	Organizational	Systems	Technologies	Data	Leading	Drive	Field	Marketing
Responsible	Focus	Data	Development	Information	People	Innovation	Process	Interact
Team	Key	Online	Code	People	Solutions	Market	Opportunities	Sales
Communication	Opportunity	Services	Marketing	Understanding	Managing	Opportunities	Technology	Required
Solution	Data	Internal	Opportunities	Communicate	Top	Support	Experience	Performance
Business	Technology	Infrastructure	Information	Vision	Team	Services	Excellent	Working

## 4.4.2 Topics related to CDO tasks

### 4.2.1 Leadership role

The first topic, which we refer to as ‘leadership role’, includes several terms referring to the formal role played by CDOs within organisations. We find both terms related to their high ranking (‘chief’, ‘leadership’ and ‘manage’) and terms related to the technical nature of their task (‘technology’, ‘services’, ‘solutions’ and ‘transformation’). This dimension puts emphasis on the essence of CDOs, who are mostly considered to be at the same level as other executives, though their scope is focused specifically on digital transformation and technological solutions.

### 4.2.2. Strategic vision

The next topic is referred to as ‘strategic vision’. Similar to the previous topic, this one still contains terms related to technology (‘innovation’ and ‘digital’), yet it features them in a broader context along with others related to strategic vision (‘future’, ‘change’, ‘business’ and ‘strategy’). This topic illustrates the hybrid role of CDOs because they do not limit themselves to the technical aspects of digital transformation; rather, they are asked to use their strategic vision to practically implement said technological advancements into the core business of the company and make the most out of digital initiatives. Several job postings stress the importance of the hybrid nature of CDOs because companies are looking for

candidates who are both tech savvy and business savvy to make the most out of both worlds.

#### 4.2.3. Operations

The third topic is addressed with the word ‘operational’ because it features words related to the practical tasks performed by CDOs worldwide in their day-to-day lives. The difference between this topic and the previous one lies in its scope. Although the strategic vision embraces themes that are broader in scope because they refer to the general business strategy of the company, this topic specifically focuses on internal processes both in terms of go-to figures (‘responsible’, ‘management’, ‘clients’ and ‘customers’) and in terms of business processes (‘product’, ‘development’ and ‘sales’). What emerges from this topic is the embedded nature of the CDO role: they are deemed responsible for their projects, and as such, they are expected to constantly engage with clients while monitoring the firm’s internal processes.

#### 4.2.4 Information technology

The fourth topic is tied to the technological tools used by CDOs in their daily activities. It features high frequencies of words tied to Industry 4.0, such as ‘data’, ‘technologies’ and ‘digital’, along with more practical ones such as ‘tools’. The terms ‘develop’ and ‘build’ are a testament to the proactive nature of CDOs because they actively oversee the development of tools, software and technological architectures meant to make the most out of digital transformation. Some might argue that the term ‘build’ can stand for both a specific software version and the verb ‘to build’. Unfortunately, this is a limitation of the LDA approach: it does not allow researchers to define the context upon which terms are used. Despite these limitations, the overall sample of the topic is clear enough for us to determine its nature, which was briefly described above.

#### 4.2.5 Coordination

The fifth and final dimension can be described as ‘coordination’ because it contains several terms meant to describe the way in which CDOs interact with the people around them. More specifically, this dimension features terms such as ‘communication’, ‘team’, ‘social’ and ‘group’, along with developmental terms such as ‘growth’ and ‘ability’. Going back to the second topic for a moment, having a strategic vision is not enough to become a successful CDO. In fact, the job postings often stress the importance of being able to effectively communicate said vision to their team and drive towards their goal.

### **4.4.3 CDO skill topics**

#### 4.4.3.1 Seniority

The first dimension when it comes to CDO skills is related to seniority. As expected from senior positions, CDOs are required to have several years of experience. This dimension features career-related terms such as ‘experience’, ‘years’ and ‘degree’, which indicates the need for CDOs to be well educated and possess a strong CV overall. Job postings often refer to the experience of managing projects from beginning to end, which is testified by the word ‘project’ being labelled in this dimension.

#### 4.4.3.2 Business savviness

The second dimension is dedicated to the generic managerial skills often required from CDOs. This knowledge is referred to as the ability to drive organisational change through means of digital transformation while being able to identify a clear strategic vision, communicate it to the team and peers and later translate it into action. This dimension includes broad business terms such as ‘leadership’, ‘strategy’, ‘vision’ and ‘innovation’, but also marketing-specific ones like ‘customers’ and ‘market’. This dimension illustrates the need for CDOs to have tangible business skills and to not limit their scope to the technical aspects of digital transformation.

#### 4.4.3.3 Tech savviness

The third dimension is tied to the digital roots of CDO positions. Although they must possess business knowledge, as mentioned above, CDOs cannot stray too far from their technical nature. We see plenty of references to computer science–related knowledge in job postings. More specifically, this third dimension features technical terms such as ‘data’, ‘technology’ and ‘software’ but also more operational ones such as ‘processes’, ‘solutions’ and ‘development’. What this dimension is showing is that CDOs need to be able to translate their tech savviness into concrete actions, actively drive their team to an objective and know how to optimise internal processes as a result of technological advancements.

#### 4.4.3.4 Soft skills

Finally, as per many job openings, CDOs are required to possess several soft skills, which in the eyes of the employer could prove beneficial to the firm. Terms like ‘communication’, ‘team’ and ‘interact’ show that CDOs need to be able to work in a team-based environment because they constantly interact with people they are in charge of and drive them towards organisational goals. CDOs are required to be enthusiastic about their role and the change they are agents of, meaning they need to possess a proven track record of being strong communicators and collaborative leaders. Several postings stress the importance of keeping stakeholders engaged and happy with progress, which calls for open communication and integrity.

#### **4.4.4 Top topic distribution**

Figures 5 and 6 show the distribution of the top topics for both tasks and skills. The topic topics are those with the highest probability of appearing in the sample, as per Bayesian statistics. This emphasises the importance of the specific skill sets that are in high demand, along with the CDO tasks that are the most essential according to employers. Figure 9 shows how seniority is the most important trait to possess when it comes to CDO candidates, which is to be expected given the scope of their position



and high level of responsibility connected to it. The most interesting takeaway, however, is how core business competencies are in higher demand compared with technical IT knowledge.

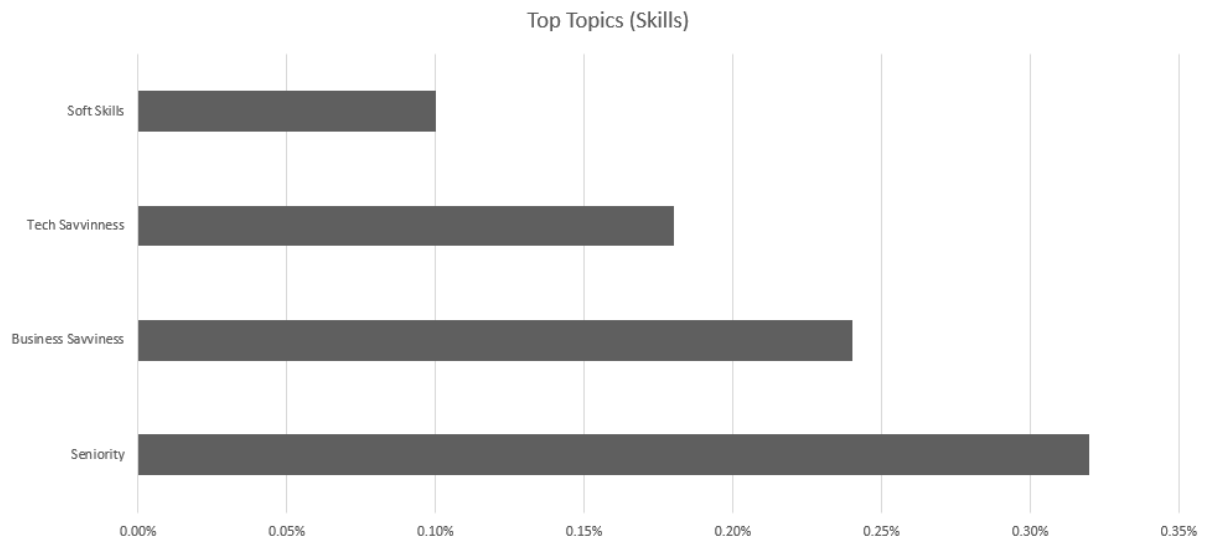


Figure 9 - Top Topics in the Skills Corpora

Similarly, when it comes to the tasks more likely to be required from newly appointed CDOs, we see how the dimensions of strategic vision and leadership assume a predominant position compared with the others. Worldwide, CDOs are required to play the role of protagonists in the digitalisation of their companies and drive it forward, as guided by their strategic vision. On the other hand, technical roles related to business intelligence and data management appear to be less prominent, which suggests that they are most likely assigned to CIOs or CTOs rather than CDOs.

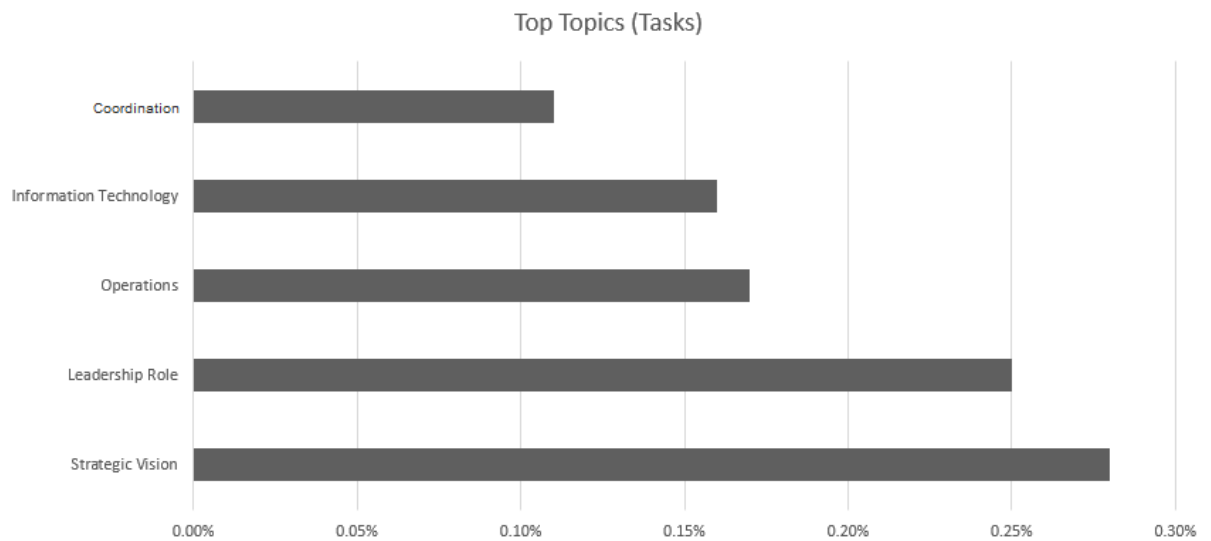


Figure 10 - Top Topics in the Tasks Corpora

#### 4.4.5 Cross-cultural topic distribution

The application of LDA topic modelling has allowed us to identify several dimensions across CDO job postings, both in terms of skills and competencies and in terms of tasks to be performed within the workplace. What makes this approach different from the other types of topic modelling is that LDA does not divide the cluster into discrete categories. In other words, the dimensions found earlier are heterogeneously distributed across the countries that are a part of our corpora. Each country contributes to each dimension in a percentage, which can be interpreted as a continuous variable. Figures 7 and 8 show how each country contributes to the dimensions of CDO tasks and skills, respectively. For example, CDO job postings from the United States contain significant emphasis on the tasks related to the leadership position played by CDOs, while there is little in terms of strategic vision and business strategy when compared with other countries' postings. Furthermore, job postings from the UK stress the importance of soft skills the most when compared with other countries, while they put less emphasis on business and technology savviness for future CDOs.

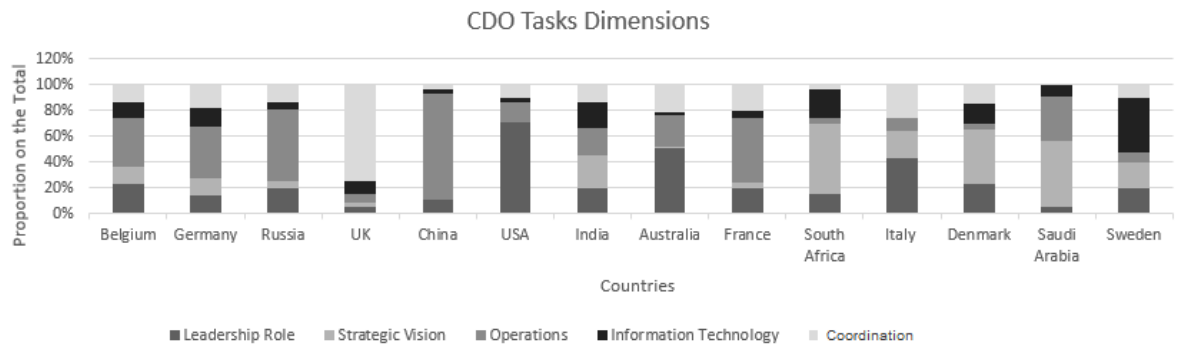


Figure 11 - CDO tasks dimension

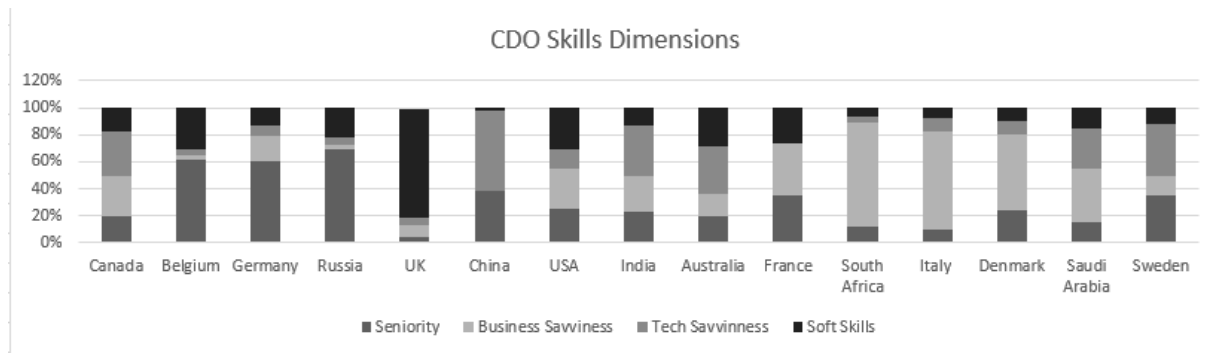


Figure 12 - CDO skills dimension

#### 4.4.6 Validation

In the main text, topic coherence was reported to determine the number dimensions contained in CDO job descriptions as calculated from LDA. For the purposes of this study, coherence is the most useful fit statistic because it best represents the interpretability of topics (Röder et al., 2015). However we have also included the log-likelihood of individual words being found in the assigned topic. Results can be found in the charts below.

Figure 13 - Topic Coherence

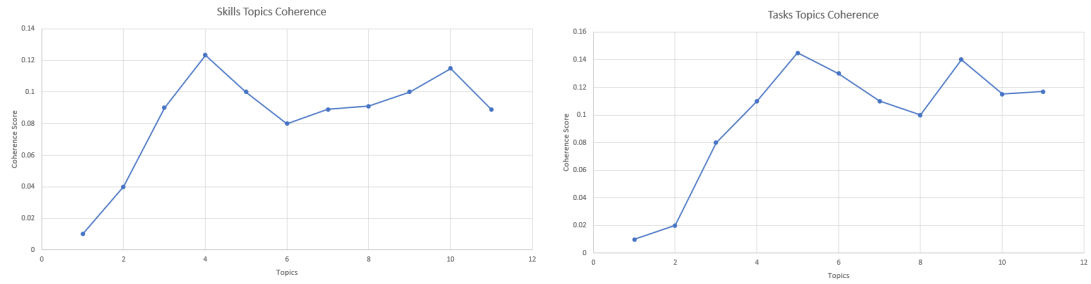


Fig. 14 - Log-Likelihood (Skills)

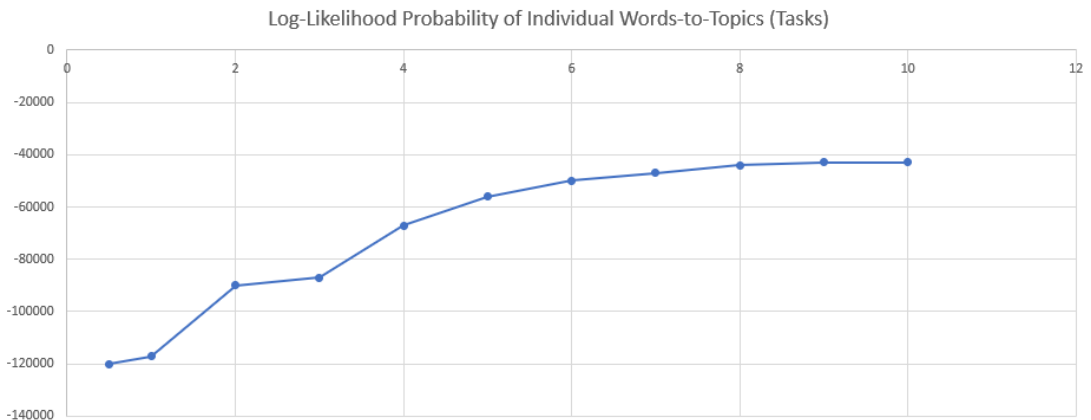
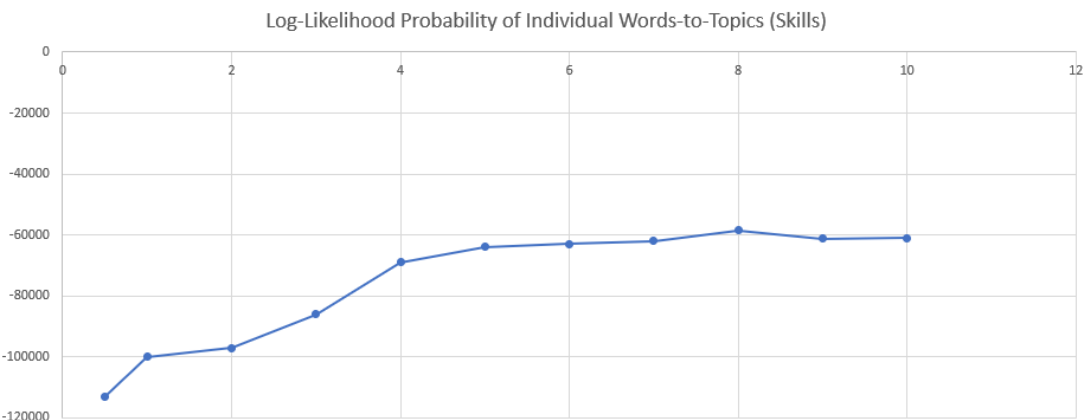


Fig. 15 - Log-Likelihood (Tasks)



Computer-assisted qualitative data analysis software, such as Leximancer, can be used to conduct research on large datasets and help minimise the researcher’s bias that could present itself when manual coding is involved (Malik et al., 2020). In other words, the Leximancer algorithm drives the emergent key words, themes (clusters of words) and patterns, rather than categories predetermined by the

researcher. In this way, the authors can compare the results obtained from both techniques and highlight possible differences between them.

Two distinct analyses were carried out. One included sets of documents related to CDO skills, and the other included documents on tasks. Figure 16 illustrates the results of the skills corpora of the documents. Although Leximancer's thematic map shows more than four topics, we can clearly distinguish the themes that emerged through the LDA analysis. On the top right, we see both the communication and leadership skill sets, with recurring keywords such as 'communication', 'ability' and 'reporting' that were found previously through LDA. Still consistent with LDA, we find the red bubble automatically labelled as 'strategy' to be inclusive of all business-related skill sets. The one discrepancy found between LDA and semantic analysis is tied to the construct of 'seniority'. While through LDA, the construct emerged as a clear-cut dimension, here it is merged with several other topics, and most notably with the keywords related to business skills.

Figure 16 - Semantic analysis of the skills corpora

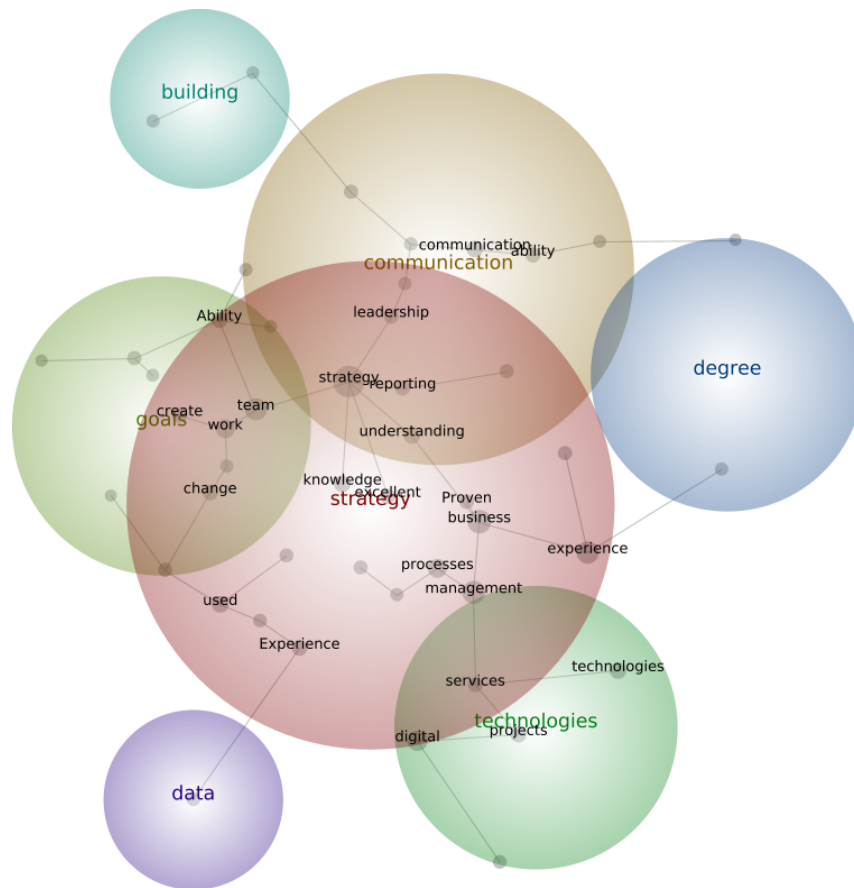
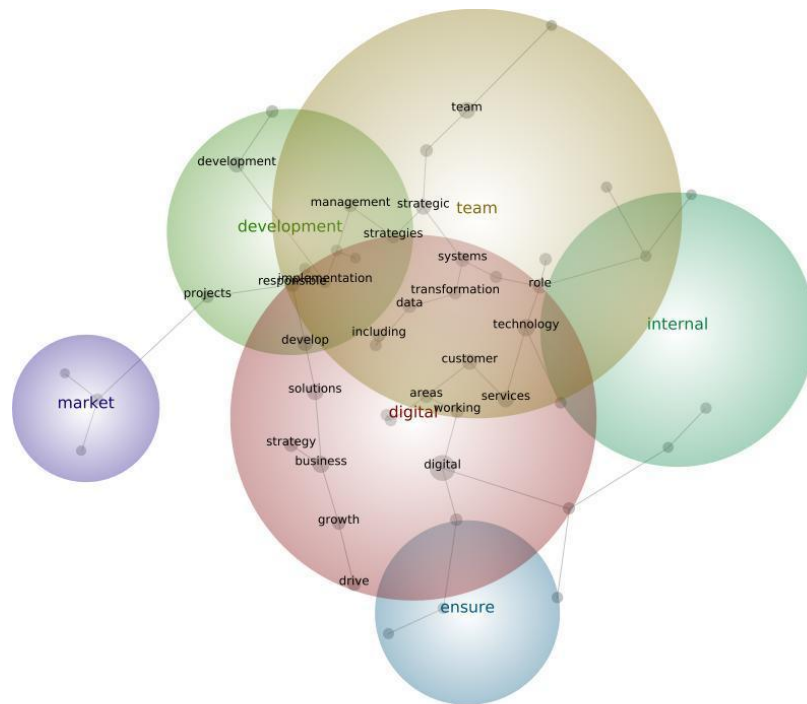


Figure 17 illustrates the results of the tasks corpora. Here, the tripartite nature of the CDO is clearly shown as three major themes emerging from the semantic analysis: the business development side, the core technical side and the coordinating role of a leader. While the LDA technique has led us to keep the concepts of leadership and coordination distinct despite their similarities, here we find them grouped under the same bubble, which is labelled ‘team’. What we labelled ‘operations’ via LDA can be found in the green ‘development’ bubble, while ‘strategic vision’ and ‘information technology’ appear in the red bubble, which is expectedly most prominent. More specifically, we find IT terms closer to the ‘development’ bubble, almost bridging the two themes due to their interconnection between strategic change and project delivery. Meanwhile, the strategic portion of the sample was scattered throughout the remaining areas of the red bubble.

Figure 17 - Semantic analysis of the tasks corpora



Following the semantic analysis, a three-step coding protocol was applied. Coders analysed a selected sample of 100 job postings randomly selected from the sample. Adopting Corbin and Strauss's (1990) approach, we coded the content of the job postings to identify the zero-, first-and second-order categories demonstrated in the recent literature. After an initial analysis of the content, double checks were made through discussions of each coding result. Where diverging positions arose, a third person was introduced into the discussion to provide a different point of view. More specifically, during the first step of coding, coders grouped up statements with similar intentions into so-called zero-order categories. Subsequently, patterns between zero-order categories for axial coding were identified and grouped into first-order categories. These categories were triangulated with secondary data, including corporate consulting reports on CDOs. The final step was to conduct selective coding to regroup the first-order categories into second-order categories. A multistep reliability test was conducted following the coding of the content. The first step was to check for internal consistency, which was achieved by integrating the independent coding sheets of each researcher (Uлага & Reinartz, 2011). Inter-rater reliability was tested by employing three academic scholars who were not involved

in the study yet had a relevant background in research on topics related to business and digital transformation. We measured their agreement with the coding results to calculate Cohen’s kappa (Cohen, 1960).

Ultimately, the coding process led to the results shown in Table VII. Nine first-order codes were identified: strategic change, business development, vision, project management, digital literacy, communication, team leadership, coordination and seniority. To measure the reliability index, we adopted the threshold of 0.70 set by Rust and Cooil (1994). Our score was 0.82 rounded up; hence, it was statistically significant enough to indicate substantial agreement. Finally, in the last step to ensure content validity, we constituted a panel of nine experts with backgrounds in social science, business administration, digital transformation and organisation research. We asked them to read and review the coding of our sample and suggest changes. Their suggestions were ultimately incorporated into Table VII, which can be seen below.

Table VII. Coding results

Zero-Order Concepts	First-Order Concepts	Second-Order Concepts
CDOs are expected to turn technological advancements into competitive advantages In today's volatile market, CDOs need to react quick to changes In CDO profiles, business strategy expertise is most prominent compared to other top management positions	strategic change	
A CDO is expected to create business value and development CDOs are asked to envision a future for their company and drive it forward through digital transformation Thanks to their hybrid background of skills, CDOs are expected to use creativity when envisioning the future	business development vision	Business
Customer-oriented attitude is essential when delivering goods and services A strong IT background is needed for CDO positions Despite being more business oriented than CIOs, CDOs are still expected to operate in a high tech environment	operations digital literacy	Technical
Soft skills are vital for CDOs as they are expected to effectively communicate their vision to the people around the CDOs are top managers and, as such, they are expect to lead a team by example CDOs are expected to be brilliant leaders and help people around them work together towards a digitized future Organization wise, CDOs often play a coordinating role between multiple departments CDOs are expected to keep tabs with both customers and management, hence the need for coordination	communication team leadership coordination	Coordination
Much like every top management position, years of relevant experience are needed to become a CDO	seniority	Seniority

From a comparative point of view, the coding results fall in line with the results found through LDA analysis and semantic analysis via Leximancer, albeit with minor differences due to the qualitative and interpretative nature of the methodology being applied. What has emerged from the analysis is the tripartite nature of CDOs, being able to mix business, IT and leadership skills. First-order concepts are comparable to the dimensions found via LDA, with the only difference being that



coders opted to analyse both skills and tasks comprehensively, rather than keeping the distinct. Overall, coders were able to clearly determine the tripartite nature of CDOs, the relevance of their coordinating role and the predominant business-related soul of their role.

#### **4.5. Discussion**

We empirically examined the role of CDOs in terms of skills and tasks to profile a universally acceptable archetype. In doing so, we are among the first to respond to several calls for more research on CDO positions (Firk et al., 2022). Our results show that, on average, newly appointed CDOs are expected to be digital ‘triathletes’ (Gerth & Peppard, 2016; Taylor & Vithayathil, 2018), as they simultaneously embody a versatile blend of technical, business and soft skills (Tumbas et al., 2018). In fact, the complexity of digital transformation naturally requires a broad range of competencies for CDOs, as they are asked to drive forward the digital transition of their companies and translate technological advancements into strategic business opportunities (Zeike et al., 2019; Muninger et al., 2019; Sousa & Rocha, 2019). We found that IT knowledge is a requirement for CDO positions (Canina & Orero-Blat, 2021; Zeike et al., 2019), but it should accompany the full skills expected from digital leaders, including strategy development, change management and communication. Consequently, our study depicts CDOs as digital leaders (Zeike et al., 2019; Benitez et al., 2022), as they fit the criteria of digital literacy, business strategy expertise and strong and digital transformation-oriented leadership skills the same way their natural predecessors did (Gerth & Peppard, 2016; Taylor & Vithayathil, 2018).

The results of both LDA topic modelling and control methodologies unveil the hybrid nature of CDOs, as they mix business, IT and leadership in one role (El Sawy et al., 2016) regarding the tasks to be performed and the skills required. Our findings strengthen the position of those who claim the CDO is not really a new figure compared to the CIO; rather, it is a formal change of label (Gerth & Peppard, 2016). In fact, when comparing our results to those formulated by Barnes et al. (2021), we noticed how CIOs and CDOs share the same hybrid nature. However, by looking

deeper into the quantitative data, we see that the incidence of the business-side nature of the CDO profiles is much more prominent than that of the remaining two. This assumption is backed by the LDA analysis of the dataset. This evidence ultimately backs the theories of those who considered CDOs and CIOs as distinct entities (Singh & Hess, 2017) by reinforcing the assumption that CDO is progressively assuming its own identity amid the top management hierarchy (Benitez et al., 2022). Finally, on an individual level, our empirical findings address several gaps left unexplored by previous research (Dumeresque, 2014; Tumbas et al., 2018). Kunisch et al. (2022). Our analysis found that, along with seniority, which is essential for top management positions, job descriptions put a more significant emphasis on business development skills compared to IT skills. This evidence suggests that companies prioritize business skill sets when appointing IT leaders (Foss & Klein, 2014; Taylor & Vithayathil, 2018) to be able to react quickly and proactively towards the disruptive changes put forward by digital transformation (Kamal, 2020). Additionally, our findings shed light on the coordinating role of CDO, which has been a point of discourse for the scientific literature (Firk et al., 2021). Our evidence shows that CDOs are only expected to coordinate several actors and business functions (El Sawy et al., 2016; Weber et al., 2022).

The sample also provides an answer to how CDO job postings are distributed throughout the world and what country-specific differences arise in postings (Firk et al., 2019; Kessel & Graf-Vlachy, 2021). Firk et al. (2019) mentioned that CDO positions are noticeably more relevant in France and Germany than in the rest of the world. However, we notice that CDOs are also popular in the UK and Spain. In the Americas, both Canada and the United States have the highest number of CDO job postings. Meanwhile, in the Asia-Pacific region, Australia has the highest number of postings, as Russia and China are still somewhat lagging Western countries, as suggested by previous research (Chhachhi et al. 2016; Rozanova 2019). Most notably, Scandinavian countries are still dominated by CIO postings, and the same applies to Russia, China and Japan (Firk et al., 2019).

In conclusion, our study addressed the following research questions: Regarding *RQ1*, we identified several key competences required from CDOs. We confirm the exploratory findings of Tumbas et al. (2017), reinforcing the hybrid nature of CDOs

and the importance of strategic vision as a means of successfully implementing digital transformation. Our study shows the need for CDOs to combine business administration knowledge with IT technical knowledge (Bresciani et al., 2021; Vasconcelos, Kimble, & Rocha, 2016), along with the communication skills and seniority needed for a top management coordinating role (Foss & Klein, 2014; Taylor & Vithayathil, 2018). This finding effectively bridges the gap identified by Kunisch et al. (2020).

Regarding *RQ2*, our study identified a series of recurrent tasks required by CDOs. Our research confirms the findings of Singh et al. (2020) and Doonan (2018) regarding companies' tendency to seek both managerial and technical competencies in newly appointed CDOs. We find the need for strategic vision (Dumeresque, 2014), strategic change and innovation (Singh et al., 2020; Tumbas et al., 2017), leadership (Tumbas et al., 2018) and coordination among departments (Tumbas et al., 2017). Additionally, our study demonstrates that coordination among multiple actors is at the core of several CDO job postings (Tumbas et al., 2017; Al Nuaimi et al., 2022). In doing so, we answer the questions posed by Firk et al. (2021) on whether CDOs tend to assume a coordinating position among companies. Furthermore, our study finds the managerial soul of CDOs to be predominant over the technical one, unlike CIOs (Gerth & Peppard, 2016) and how the job market is gradually shifting towards leaders who are well informed on business issues (Taylor & Vithayathil, 2018). Overall, what we found links back to digital transformation literature by corroborating the importance of problem solving, flexibility and agility in today's volatile and ever-changing market (Bresciani et al., 2021; Vasconcelos, Kimble, & Rocha, 2016; Sousa & Rocha, 2019). This finding gives a more comprehensive look at what CDOs are expected to do, effectively filling the research gap noted by several authors (Dumeresque, 2014; Kessel & Graf-Vlachy, 2021).

#### **4.6. Theoretical and Managerial Implications**

Our study contributes to the literature on digital transformation and CDOs in several ways. The main theoretical contribution of the research is to provide an empirical archetype of the CDO position in terms of both skills and tasks (Kessel &

Graf-Vlachy, 2021). In doing so, we answer the call for quantitative approaches to investigate the emergence of CDOs (Singh et al., 2020; Tumbas et al., 2018; Tumbas et al., 2017). The empirical identification is grounded in the digital transformation literature and contributes to the stream of individual aspects and key capabilities required to master the phenomenon (Kunisch et al., 2022).

A second theoretical contribution of the work is to the discourse regarding the differences between CIO and CDO positions (Gerth & Peppard, 2016) and digital leadership literature (Mansfeld et al., 2010; Singh & Hess, 2017; Singh et al., 2020). Aligning with the recent work of Kunisch et al. (2022), we propose that CDOs are developing a unique and distinct identity despite sharing significant common ground with CIOs (Barnes et al., 2021). Therefore, the findings of this study suggest that, while CDOs share with CIOs their tripartite nature made of business, IT and soft skills, the way these three aspects are distributed is significantly different compared to CIOs (El Sawy et al., 2016; Singh & Hess, 2017). In fact, the IT background of CDOs is often taken as a mere prerequisite, whereas job postings stress the importance of business-related skills and tasks, such as strategic vision, management expertise and more. This result partially contradicts the results of Gerth and Peppard (2016), among others, and reinforces the previously published literature on CDOs, which stressed their distinct nature.

Additionally, our findings also contribute to digital transformation literature (Fitzgerald et al., 2014; Foss & Klein, 2014; Weber et al., 2022) by highlighting how essential it is to feature technology leaders who are well informed on business issues (Taylor & Vithayathil, 2018), able to drive organisations forward (El Sawy et al., 2016; Weber et al., 2022) and that can meet the criteria set for digital leaders (Zeike et al., 2019; Benitez et al., 2022; Verhoef et al., 2021). Our study also answers the question posed by Firk et al. (2021): CDOs are, in fact, coordinating figures amid top management and ensuring that their leadership and soft skills coordinate several functions and actors around them (Mansfeld et al., 2010).

From a practical perspective, the insights of our study offer several implications for managers, ownership, practitioners and management. First, our study strengthens the validity of LDA topic modelling in job posting analysis (Gurcan & Cagiltay, 2019; Debortoli et al., 2014), while providing a clear, transparent and replicable research

protocol that could be adopted by practitioners worldwide when in need of analysing different managerial (Tirunillai & Tellis, 2014).

Second, our study suggests that major differences emerge when comparing job postings from different countries (Chhachhi et al. 2016; Rozanova 2019). This implication can be useful to managers interested in applying for CDO positions, as it clearly demonstrates how the role is tailored to the company's needs and could vary significantly on a case-by-case basis.

#### **4.7. Limitations and Future Research**

There are some limitations that could be addressed by future research on CDOs. The main limitation is the limited sample size at our disposal. As the years go by and the CDO role matures, future studies could implement a longitudinal approach to better understand the evolution of the position over time. Longitudinal studies would benefit from a larger sample size and more data. Second, the present study features the limitations of LDA as a methodological approach. Although LDA has been successfully applied in several studies in the past, it does feature some intrinsic defects. For instance, the LDA algorithm is unable to discern the context within which words are used—only their frequencies with other words (Erosheva et al., 2004). This could potentially lead to small discrepancies in the results.

Finally, future research could explore the discrepancies found across countries to better understand the reasons why CDOs are not evenly distributed. Cross-cultural analysis could help identify the reasons behind this phenomenon, providing us with useful insights (Firk et al., 2019). A cross-cultural study could not only explain the discrepancies found in our results, but also highlight the importance of culture as a factor influencing those differences (Ferraris et al., 2020). Additionally, future research could interpret the data through the use of different theoretical lenses, such as knowledge-based view and dynamic capabilities theories, in an effort to gain a different perspective on the topic (Forliano et al., 2022). Similarly, future research could apply the same comparative logic to cross-sectional studies in an effort to identify which industries are leading the charge when it comes to CDOs. Finally, qualitative research based on semi-structured interviews on a panel of CDOs could

help strengthen the findings of the research and possibly add further insights on the theoretical contributions of the study.

## **Chapter 5**

### **Conclusion and implication for further research**

#### **5.1 Conclusions**

Several conclusions can be drawn, which will be separated into three distinct ones and discussed both in terms of practical and theoretical implications.

The main conclusion that can be drawn from our studies is that digital transformation in itself is a multi-faceted process that comes with different results depending on the context in which it develops (Dehnert, 2020). In other words, while it is generally believed that digital transformation has exclusively positive effects on the companies willing to digitize themselves, this statement comes with a few caveats. In fact, what has clearly emerged from our manuscripts is that several barriers need to be overcome in order to make the most out of digital transformation and companies do not always have what is necessary to make it happen.

A company's size has certainly emerged as an important factor in terms of digital transformation. We have seen how large corporations can afford hiring specific professional figures (namely CDOs), specifically and exclusively tasked with driving forward the digital transformation process of their companies. On the other side of the spectrum, we have seen smaller companies lagging behind digital transformation due to being short-staffed and unable to hire resources specifically tasked with managing digital transformation.

Additionally, we have also seen how a company's internal culture could make a significant difference when it comes to digital transformation (Kappelman et al., 2019). Companies that are naturally agile, flexible and digital oriented are more inclined to approaching technological advancements with a positive and proactive mindset. This is often amplified by the company's leader, similarly to what happens in larger enterprises. On the other hand, companies' whose leader shows strong signs of resistance to change, either due to cultural barriers or lack of motivation, inevitably suffer from lack of a clear and open digital predisposition. While these conclusions can synthesize the three studies and find a common red thread among

the three of them, several conclusions can be drawn from each one individually as well, and then connected to different study's conclusions.

Starting from the first contribution on organizational agility and digital transformation, we have seen how both concepts act as enablers of one another in more than one way. For starters, we have seen how the company featured in the case study provided has benefited from technological advancements and has used them to make their business more agile, as means of being able to respond to market change and volatility in a more effective manner. This implication ties back to the study on Chief Digital Officers, as we see the topics of organizational agility and, more broadly, flexible and proactive mindset, being featured at large in job postings. Chief Digital Officers are asked to, in a way, embody organizational agility in their own role, in a twofold fashion: first, they are asked to feature a hybrid blend of competencies, showcasing both IT and business skills, which is at the core of agility. Second, they are asked to drive forward the change made by digital transformation, by turning the opportunities provided by technological advancements into concrete and tangible competitive advantages that can differentiate their company from their competitors. On the complete opposite side of the spectrum, we have seen how micro and small businesses who are suffering from lower degrees of digital readiness and are close to rigidity traps (Koch et al., 2021), have the hardest time in digital transformation due to said barriers they are facing.

Additionally, another transversal conclusion that can be drawn from the sample ties back to individual characteristics of digital transformation and how said traits are both expected from top management and essential to effectively drive forward digital transformation. For starters we have seen how the lack of core digital competencies is what has undeniably set back a lot of micro and small enterprises, that have been struggling to keep up with the unrelenting pace of digital transformation and, at the same time, have little to no external financial support, hence they cannot hire help in that regard. From our investigation, we have noticed how the very same competencies that are lacking in small to micro sized businesses, namely lack of long term strategic vision or the inability to properly convert digital opportunities into competitive advantages, is roughly what has allowed StarCars to successfully



perform a turnaround and what is expected from newly appointed Chief Digital Officers.

## **5.2 Future Research Directions**

The works presented in this collection leave the room open for future research over three distinct research avenues, which will be illustrated in detail below.

In regards to organizational agility and digital transformation, our study has highlighted the importance of a company leader who is digital friendly and open to the idea of adopting technological advancements into their business (Gupta & Bose, 2022). While our case study suffers from limitations in terms of replicability, much like any other research that was to adopt our same methodology and design (Fukuzawa et al., 2022), future research could be built upon our findings and test them on a larger scale, maybe with the use of quantitative methodology. Additionally it is worth noting that our conclusions arise from a case study of a company from the automotive industry, which features peculiarities that other industries might not possess (Dahiya, 2015). Hence the need for further empirical research to strengthen our results, for instance by exploring topics that have yet to be explored in depth, such as cybersecurity in regards to digital transformation (Guggenmos et al., 2022).

In regards to the barriers to digital transformation found in small and micro enterprise, several research avenues have been deemed worthy of being investigated further. For starters, we have found that digital transformation literature as a whole has often disregarded small sized businesses (Dehghani et al., 2021; Kamble et al., 2020) and as such, further contributions are definitely needed, especially considering how relevant small companies are in modern economies. Additionally, while main literature on digital transformation has vastly depicted the phenomenon in a mostly positive light, the need for a more critical approach to it is also needed. The so-called dark side of digital transformation is yet to be fully explored (Aditya et al., 2021b), and that includes the barriers to digital transformation, ethics dilemmas of automation in production and more (Aditya et al., 2022). Finally, our study has illustrated how the Covid-19 pandemic has not been a catalyst for digital

transformation, contrarily to what's been in the main digital transformation literature (Rupeika-Apoga et al., 2022).

Several future research directions can be taken to explore the role of Chief Digital Officers amid major corporations and medium to large sized companies as well. Due to the novel nature of the managerial role, there's still a lot to be explored and discussed, which leaves plenty of room for future contributions.

One interesting line of research could explore the diffusion of Chief Digital Officers over time. Previous positions such as the Chief Information Officers did not last very long and instead, have been progressively vanished from the job marketplace. It'd be interesting to monitor the popularity of Chief Digital Officers overtime, to see whether or not they'll be able to find their own stable niche amid top management and solidify their position, much like Chief Financial Officers have done over time.

Similarly, little is known about cultural differences when it comes to appointing Chief Digital Officers. Our research has provided a short glimpse at the distribution of job postings through several major countries, yet at the current time of writing this contribution we have no concrete explanation as to why Chief Digital Officer listings differ so much from a country by country perspective.

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