Rajeswari Jothiramalingam

The role of big data and dynamic capabilities in formulating organization strategies and business decisions

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Author: Rajeswari Jothiramalingam
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ABSTRACT

The primary purpose of this study is to explore the role of big data in formulating the organization's strategic decisions, thereby enhancing its dynamic capabilities. The main framework used in this study is the Dynamic Capabilities framework. In the era of big data, scholars have widely used dynamic capabilities to discover how big data systems affect the organization's strategies and decisions. The empirical part of this thesis consists of a case study of a small-scale consulting firm that specializes in providing big data and analytics consulting services. A total of 10 people, including consultants, business experts, executives, and customers, were interviewed to gather data. The data is then analyzed using content analysis. The analysis from the study highlights the crucial role big data plays in shaping an organization's decision-making processes and helps enhance the organization's dynamic capabilities. By leveraging big data, organizations can precisely sense emerging opportunities and threats, seize actionable insights, and transform workflows to align with evolving market demands. However, analysis reveals that the full potential of big data can be unlocked only through robust organizational collaboration, seamless communication across technical, business, and leadership teams, and the establishment of a unified data strategy. These elements ensure that the data initiatives do not run as isolated efforts but in an integrated fashion to drive agility, innovation, and resilience and ultimately help the organization gain sustained competitive advantage in the dynamic market conditions.

KEYWORDS: big data, dynamic capabilities, strategic decisions

Table of contents

List of Figures

List of Tables

Abbreviations

DC **–** Dynamic Capabilities

AI – Artificial Intelligence

ML – Machine Learning

IoT – Internet of Things

MDM – Master Data Management

1. INTRODUCTION

1.1 Motivation for the study

Data is being generated at an unprecedented rate from every business sector, resulting in organizations leveraging the big data stream and creating value from it (Constantiou and Kallinikos, 2015). The rapid increase in data volume, velocity, and variety has led to tremendous advancements in terms of technologies that enable the storage, analysis, and visualization of big data. Though there has been a massive surge in investment on the big data front in many organizations, there has been significantly less literature on how it brings tangible business value (Mikalef et al., 2018).

The ever-growing competition and globalization require every business to start being agile and need the top executives and managers to take the best decisions. Technological advancements in the data field and analytics platforms help exploit the large volume of data, which has become a common trend these days (McAfee and Brynjolfsson, 2012).

In every possible sector, big data exploitation has been a game changer and become an important component of the decision-making process at every level within the organization (Davenport, Barth, and Bean, 2012). Additionally, the managerial process has undergone tremendous changes over the years by adopting data-led strategies and adapting to the changing market demands and business functions from a broader perspective (Davenport, 2014).

As in every other technological field, the big data field also has this critical relevance in that the people involved in development ensure it matches individual organizational needs and, specifically, the individuals within the organization (Orlikowski, 2000). Despite the practical relevance, more understanding is still required to capture the value

of big data relevant to managers, executives, and the entire organization in devising strategies. This also requires anticipating the need for organizational change – including the organizational structure, resources, and capabilities, thereby emphasizing the role of dynamic capabilities in adapting to and leveraging big data efficiently for strategic decisions.

1.2 Research gap

In the past decade, there have been several advancements and growing interest in big data and its implications on strategic decision-making. When we look deeper at the research papers, we see that more studies have been carried out on business intelligence, machine learning, artificial intelligence, and other advanced analytics and their role in strategic decision-making. However, relatively minimal research has been done on the emphasis of the data itself, which forms the foundation for the other streams on which many studies have been made. Much of the existing work builds upon other branches of big data without exploring the foundational data part in depth. It was surprising to note that the angle of big data and its relevance in the strategic decision-making process is less explored. A deeper understanding of this emphasis is essential, as it helps shape how big data drives strategic decision-making and influences broader organizational transformations.

Out of the studies made on this topic of interest, one paper published in the Journal of Business Research explores and discusses big data and the big decision, i.e., the board-level decisions that can be carried out by tapping the potential of the big data which can help the senior management to make decisions faster and enhance the capabilities to address the dynamic environment (Alessandro et al., 2018).

Various scholars in this field have evaluated and investigated the value the dynamic capabilities framework could bring to strategic decision-making. However, examining

how big data can enhance organizational dynamic capabilities and the impact on strategic decision-making in constant market conditions is worthwhile.

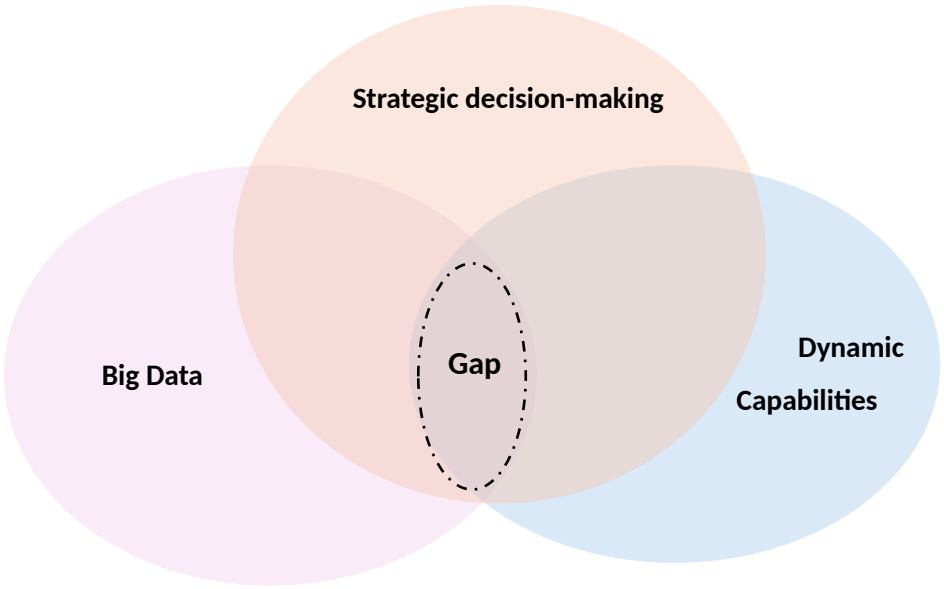

Figure 1. Research Gap

1.3 Research objectives and contributions

The data is ever-growing in all business areas, and the organization needs to tap its full potential and utilize it in its decision-making processes. There is a constant change in the market dynamics and competition, and the organization's dynamic capabilities, in particular, play a crucial role in this topic.

Despite the practical relevance, more analysis and understanding are still required to understand big data's value in managing device strategies. Hence, this study focuses on big data and the organization's dynamic capabilities from the strategic decision-making perspective. The research question is:

- ***How does the industrial application of big data enhance dynamic capabilities to support strategic decision-making?***

Answering this research question required setting the research objectives to serve the purpose. Below are the research objectives:

i. Describe what big data is, what its potential is, and what the management perspectives are.
ii. Describing dynamic capabilities and their importance in the organization.
iii. Figuring out the practicalities of developing a framework on the interplay of big data, dynamic capabilities, and strategic decision-making.

This thesis contributes to the research on the role of big data in strategic decision-making by broadening the scope and adding more dimensions to the earlier studies using the dynamic capability framework as the base. Further, the study also tries to lessen the gap in the research area regarding big data and strategic decisions in the organization. The study also focuses on developing a framework based on the relevance of practical gaps in current data-driven decision-making. Empirically, this study provides information on the benefits, practical implications, and challenges of data-driven

strategic decision-making by analyzing the data gathered from the experts closely working with data from the technology and business sides.

1.4 Thesis structure

The structure of this thesis comprises five chapters. The first chapter consists of the introductions and motivation behind the thesis. The second part is the literature review on Big Data, Dynamic capabilities, and strategic decision-making. The big data overview, characteristics, and capabilities are discussed in detail, and next, the dynamic capabilities framework is discussed alongside the big data angle and its interplay and benefits. In addition, at the end of this section, a framework is developed based on the two areas discussed above.

In the third part, the methodology section, the choices concerning the research objectives are addressed. This includes the research methods, case company information, data collection process, and analysis. Finally, the validity and reliability of this study are discussed. The fourth section discusses the findings with a detailed analysis of the data gathered for this study. The final chapter introduces the theoretical and managerial implications and suggestions for future research.

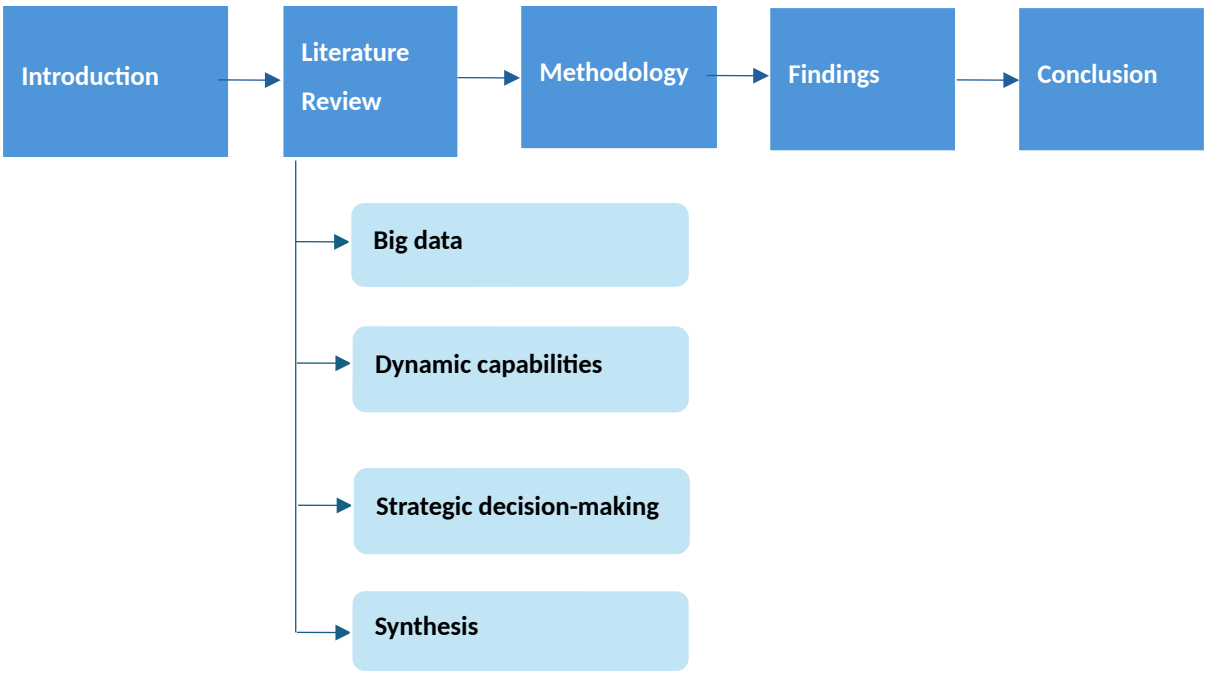

Figure 2. Thesis structure

2. LITERATURE REVIEW

2.1 Big data

The field of big data started to gain interest around 2011 since enormous amounts of data were available from various sources such as sensors, social media, and documents. In the following years, there have been tremendous advancements in technologies like the Internet of Things and Artificial Intelligence and the cost of storing and processing big data (Sena et al., 2019). Globalization and the high volatility in the business environment require executives and managers to make the best possible decisions, and big data plays a significant role in this perspective.

Big data have unique features that make them quite different from the traditional databases used to store data. From the operational perspective, big data refers to high-volume, high-velocity, high-variety data assets within the organization (Beyer and Laney, 2012). Some authors emphasize the other dimensions of big data, such as Veracity, which refers to the abnormalities in the data; Validity, which looks at the correctness of the data; and Volatility.

Big data goes through various phases or life cycles, and the organization needs to pay attention to this. The phases include data collection, which involves gathering data from multiple source systems following a data cleansing format, where any discrepancies are marked, and only qualified data is passed on to the next stage. The subsequent phases involve the classification of data, modeling the data in the format required, and publishing the data in the format required for further reporting or predictions.

Also, big data definitions and concepts vary with time and the industries where they are adopted (Manyika et al., 2012). Notably, the data variety brings various stage formats, such as structured and unstructured data produced in real or near real-time.

2.1.1 Background and overview

The various organizations use big data more proactively to exploit the data they hold to improve the customer experience. Over the years, big data has changed, and its built complexity has increased. Some challenges always pop up with the value-creation process from big data (Sena et al., 2019). The current growth of big data and its usage across industries has become a common theme that ties big data usage to the main factor of business and organizational success as the key goal. Big data technology has become an essential track in information technology and one of the main areas that foster data-driven decisions.

Gradually, big data has gained traction among scholars, who are also looking at how big data has helped transform businesses (Wamba et al., 2017). Academic research studies suggest that firms can improve their profits by delving deeper into their data (McAfee and Brynjolfsson, 2012). A few other researchers claim that big data exploitation has become an essential aspect of the decision-making and strategy-generation process, which spans every level within the organization (Davenport, Barth, and Bean, 2012).

Big data systems, frequency, and capabilities have harnessed the potential to allow managers and executives to access dramatically more information than ever (Mishra et al., 2018). Hence, big data systems may enable managers and executives to strategize organizational decisions better. Furthermore, big data and its technologies can provide numerous benefits, such as increasing organizational productivity, strategic positioning, better customer service, and enhancing product range and services if utilized efficiently (Jamie et al., 2017; Manyika et al., 2012). Additional advantages of using big data include improvising the automation process, such as marketing, gathering customer behaviors and patterns, and looking for trends and predictions.

2.1.2 Characteristics of Big data

Big data is characterized by data sets that are too large, either structured or unstructured, and too large to be processed in the traditional way of processing data (Lansley and Longley, 2016; Sestino et al., 2020). As the industry's business line grows and technological advancements play an important role in driving the businesses, the data points grow more than ever. The storage, security, and management of the data are crucial as the data grows within the organization, which has led to the boom of big data technologies (Boyd and Crawford, 2012; Wamba et al., 2015). There are various industries where we have terabytes of data gathered daily, and the velocity at which the data reaches the platform has tremendously increased. Many industries and businesses need data with low latency, which is becoming a primary requirement, and this part of data velocity is more crucial in many real-world applications (McAfee and Brynjolfsson, 2012).

The types of data the organizations gather have increased significantly with the growth of technologies. At a higher level, data can be classified into three categories: structured, semi-structured, and unstructured data (Kumar B, 2015). The data is from the web, tweets, social media, audio, video, and photos, to name a few. These have led to an increase in how data needs to be stored, processed, and managed for decision-making and to make the most out of the data. Veracity, which refers to the accuracy and the truth of the data, was introduced by IBM research (IBM, 2015). This becomes one of the most arguable points regarding big data, as there is incompleteness and uncertainty in big data (Kumar B, 2015). Big data with any of these characteristics has become a key enabler in exploring organizational business insights and decision-making processes (Gartner, 2016).

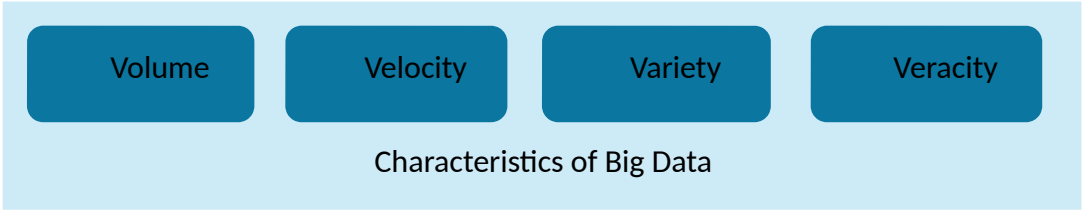

Figure 3. Big data characteristics

2.1.3 Benefits of big data from a business perspective

There is now greater traction toward data-driven decision-making, and big data addresses this by providing data available for organization-wide decision-making. The data is huge, and accessing high volume, velocity, and variety of data requires quick, efficient processes to ensure timely data for decision-making (Shamim S et al., 2020; Laney D, Laney D 2012).

Big data enhances organizational capabilities in business management and decision-making, helping management to operate and make decisions more efficiently (Wamba SF et al., 2017). The impact of big data on the organization is multi-faced. Establishing a streamlined and proper big data platform in a highly competitive environment helps the organization gain a competitive advantage and increase its operational and strategic decision-making efficiency (Akter S et al., 2020).

With the current advancements in the platforms, IT infrastructure, and technology side, it is quite proven that there are various data points available from all the departments in the organization, and the rate at which data is required for decision-making has also been demandingly increasing for bringing in disruptive changes in the business side and gain competitive advantage (McAfee and Brynjolfsson, 2012). The data has the potential to provide various data points that are essential for enhancing innovation, creating new products or services, building new business lines, and tapping new business opportunities. These could help the organization seize the opportunities and lead some transformational changes in the existing processes, thus leading to better organizational performance.

It is not just about the big data, IT platform, its management, and investment in these technological aspects that lead to the business's desired outcomes. Despite the

necessity of these platforms and technological advancements, organizations that use device strategies and management capabilities must reap the full potential and benefits from these investments in data platforms (Shamim S et al., 2019).

2.2 Dynamic capability

The aspect of sustainable competitive advantage, i.e., the organization's capability to adapt to the ever-changing environment in which it operates, curtails the dynamic capability approach to competitive advantage (McKelvie and Davidsson, 2009). Dynamic capabilities can also be defined as the organizations' capability to integrate, develop, and revamp internal and external resources to address the changing market demand in their respective business (Katkalo, Pitelis, and Teece, 2010). This dynamic capability requires the organization to sense, hold, and transform according to the needs to gain a sustainable competitive advantage (Teece, 2018).

There have been many arguments on the first-mover advantage from the resource-based view (RBV) perspective (Barney, 1991; Wernerfelt, 1984), but Teece (2018) argues that in the dynamic capability paradigm, sometimes the late adoption of the strategies and the business models might provide some incentives to the firms. This is because the technologies, practices, and standards might evolve, and the late adopters might reap the benefits of the more mature technological advancements. So, here, the main emphasis on the dynamic capability is on the changing organizational culture and how it responds to it (Harreld, O'Reilly III and Tushman, 2007).

Hence, the culture of the organization, analyzing and looking for threats and new opportunities, redefining and refining the business models, and seizing the opportunities play a vital role in the organization's success story (Teece, 2018). Along similar lines, it has been argued that information technology and data play a pivotal role in developing the firms' capabilities for customer, process, and performance

management (Easterby-Smith and Prieto, 2008; Mithas, Ramasubbu, and Sambamurthy, 2011).

2.2.1 Background overview

Dynamic capabilities are deeply based on the evolutionary view (Nelson and Winter, 1982), which boils down to path dependence, learning, and strategic innovation in the organization. Considering the importance of these various factors, knowledge becomes the key to supporting awareness of the environment, the perceived position of the firm, and the significance of change (Zollo and Winter, 2002). In addition, the knowledge underlines the quintessential part of the dynamic capabilities, which encompasses learning and innovation (Nelson et al., 2018). The organization's capacity to identify the values of new knowledge, comprehend it, and apply it to use is equated to the dynamic capabilities (Volberda et al., 2010; Zahra and George, 2002). Organizations, to a greater extent these days, foster knowledge identification, sharing, and facilitating a basis for integration and innovation (Nonaka, 1994; Zollo and Winter, 2002). The rapidly changing market demand, shorter product life cycles, complicated service development and delivery processes, and constantly changing business environments enable dynamic capabilities to be one of the most prominent research areas for strategic management.

Big data has specific capabilities that help harness and promote the organization's business and competitive advantage in the market. According to these views, data generates value if there are proper means to store, process, integrate, and automate it to provide meaningful insights. So, this angle looks at the value, heterogeneity, and dynamic nature of the big data capabilities (Bhatt and Grover, 2005). Big data can also improve the firm’s performance around innovation (Brynjolfsson and McElheran, 2016; McAfee et al., 2012) and enhance its dynamic capabilities (Teece et al., 1997).

The data availability and the insights from the data (from the internal and external resources that platforms can tap into) have led to the positive interplay between

dynamic capabilities, knowledge assimilation, and innovation. These are pivotal in enhancing the organization's performance (Bogers et al., 2018; Chesbrough, 2003). Internal knowledge and existing resources form the base for innovation in the organization, but in the current highly competitive environment, it alone cannot be sufficient for the organization to devise strategies. Hence, external resources and knowledge become integral to the strategy and decision-making. External knowledge and resources also aid in collaborations and help to integrate internal and external resources (Bogers et al., 2019).

2.2.2 Bigdata and dynamic capabilities interplay

Big data is more connected to dynamic capabilities because of its knowledge-centred properties (Ferraris et al., 2018). The gathering, storing, and processing of the big data plays a pivotal role in this, and in addition, the other technologies such as analytics and machine learning, when complimented on the big data, bring significant value to the firm from the underlying big data (Ciampi et al., 2022; McAfee et al., 2012). The big data and various technologies applied on top of it can significantly affect the type and quality of the decision and strategy within the organization, which can be leveraged across the firm for its competitive advantage (Erevelles et al., 2016).

Data-driven decisions in the organization not only help with strategic decisions but also help the organization in developing digitally enabled services and routines for capturing, seizing, and reconfiguring resources. As the organizations foster and master such processes, it helps them leverage the efficiency of the processes and guides them to stride toward product and service innovation. Additionally, big data provides direct inputs for the innovation process (Bresciani et al., 2021; Sultana et al., 2021), enabling the firm’s ability to look at the opportunities and realign the resources following the demands and the needs (Conboy et al., 2020; Mikalef et al., 2021).

Various studies show that dynamic capabilities bring together resource-based views and mention that big data acts as a resource that can tackle ad hoc activities, with a heavy

emphasis on its analytical capabilities (Mikalef et al., 2020). However, taking a deeper look, big data has helped improve the organization's dynamic capabilities via better prediction, decision-making, and responses, enabling firms to navigate change.

Another crucial aspect of leveraging the potential of big data platforms is finding the best fit between the firm's technological advancements and its business strategies (Sabherwal et al., 2019). This is quintessential to leverage the investment in big data platform technologies and enhance the organization's performance.

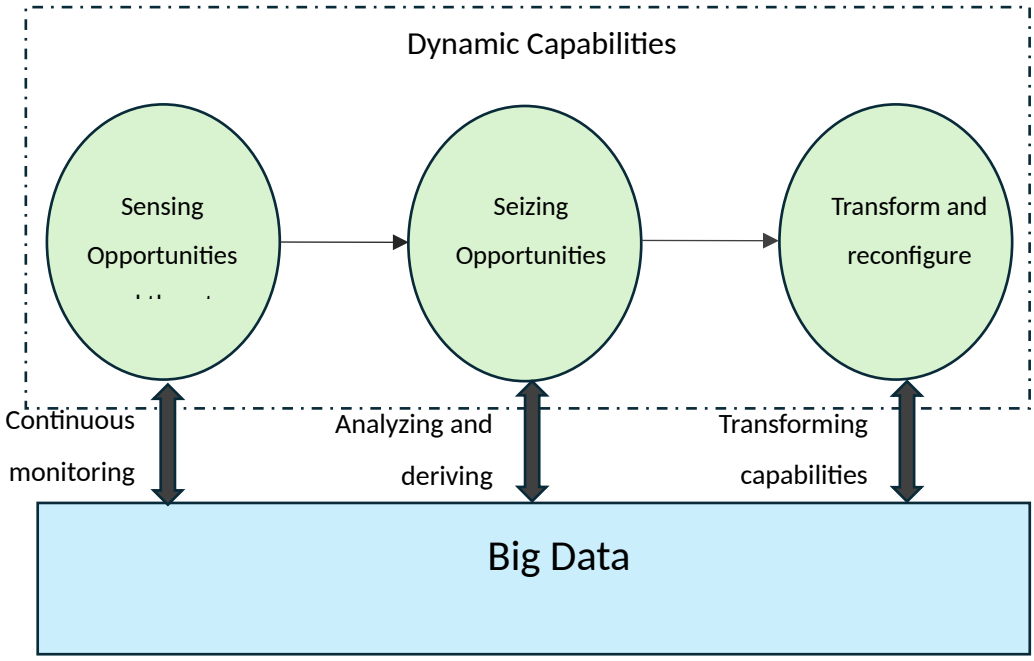

Figure 4. Big data and Dynamic capabilities (DC) derived from basic DC framework

Big data forms a foundation to aid dynamic capabilities by providing data points for sensing opportunities and threats by continuously monitoring and analyzing data trends, patterns, and customer behaviors. The base for these is the data points from customer data, customer interactions/ surveys, competitors' data, external third-party data, and market data. These datasets provide the base information.

Once the opportunities are identified, the big data platform helps leverage the information by analyzing and deriving insights from strategic actions. The platform also provides transformational capabilities by aiding data-driven insights that lead to operational changes in the organization and/or the business model advancements or remodeling, enabling adaptive decision-making and strategic reconfiguration.

2.2.3 Big data capabilities and DC from a management perspective

One of the main goals of many organizations is to gain a competitive edge in highly competitive and rapidly changing business environments. Every organization strives towards achieving its strategic position in the market by constantly upgrading and transforming its processes and infrastructure. This change is directly connected to their capability to sense the market dynamics, the opportunities, and the competition in the market and take necessary actions to grab the opportunities and enhance their processes while learning from their journey and others. In this area, big data fosters DC by providing meaningful insights into finding opportunities, threats, and competitions (Wamba et al., 2017).

The big data and technology platforms foster decision-making and performance by providing all the data points essential for deriving insights. Various studies acknowledge that big data can be associated with organization performance, innovation, and competitive advantage (Mikalef P et al., 2020). Though big data can provide the necessary information and insights from the technology perspective, management capabilities play a crucial role in planning, coordinating, and materializing it within the

organization. The business and the management resources play an essential role in imbibing and developing a data-driven culture within the organization (Popovič et al., 2018).

Big data can gather data at the speed of real-time, which is required for some cases where the organization wants to leverage the use cases within the organization and identify the opportunities available in the market environment. The heterogenous data helps the organization to unlock the areas previously unexplored. It is good to note that big data capabilities help foster and enhance organizations' decision-making from various angles, reduce ambiguity, and provide data-driven information with quality (Shamim et al., 2020). All these pointers of big data help enhance business performance at all levels.

A key factor in big data management and dynamic capabilities is aligning the strategies, i.e., the data, technology, and business strategies (Xu et al., 2019). This strategic alignment is essential so that data-driven decisions can be utilized to maximize organizational performance, innovation, and competitive advantage.

2.2.4 Industrial application of big data in enhancing dynamic capabilities

Big data has significantly impacted and revolutionized various industries by improving their ability to sense market opportunities and threats, seize competitive advantage, and transform their operations and processes to maintain agility in dynamic business environments. Big data is the backbone of advanced analytical capabilities, serving as the foundational layer for machine learning, artificial intelligence, predictive analysis, and other transformative technologies. This section explores the transformative role of big data across different industrial sectors like retail, financial services, manufacturing, transportation and logistics, health care, and forestry.

Industry sector	Sensing	Seizing	Transforming
Retail	The transaction history powers big data analytical tools; web activities allow retailers to detect emerging trends and consumer preferences. For instance, Amazon's various algorithms analyze vast volumes of data (petabytes) daily, forming the basis for a recommendation engine that provides customized suggestions (Rialti et al., 2019).	Advanced capabilities like dynamic pricing heavily rely on the real-time big data being generated and stored as the inputs to optimize the pricing strategies in response to demand fluctuations. Walmart uses real-time data to optimize sales and enhance customer experience and satisfaction (McKinsey, 2022).	The various applications like RFID tags and the Internet of Things (IoT), such as smart shelf technologies, have grown and become feasible only due to the integration of big data's ability to integrate and process the data in real-time. These innovations have reshaped the business to respond to the rapidly changing market trends and provide a digital customer experience in the retail industry (McKinsey, 2022).
Manufacturing	The data generated from the IoT sensors embedded in the machines provides real-time insights into the equipment performance. Considering an example, the Siemens platform ingests terabytes of data from sensors daily, enabling systems to detect anomalies before failure occurs (Siemens, 2024).	Big data platforms enable players in the manufacturing industry to optimize production supplies based on market demand and supply chain constraints. For example, Toyota employs predictive analytics to align its global production network, reduce lead times, and enhance the response time to market demands (Siemens, 2024).	Companies use the simulation process in the manufacturing processes to test the new designs or the workflows to improve the quality and reduce the time-to-market (Siemens, 2024).
Financial Services	Financial institutions leverage big data to analyze transactional data to detect fraudulent transactions and credit risks	Personalized financial products such as tailored loans and investment portfolios are designed using big data	The big data platform and multiple advanced analytical solutions help the organization improve operational efficiency

	early. The data platforms and advanced analytical solutions that run on top of data, such as artificial intelligence (AI), flag suspicious activities in real-time and prevent potential losses (Hajiheydari et al., 2021). Companies such as JPMorgan HSBC have been leveraging these to predict them better.	platforms and their insights. Many banks use customer data to recommend saving options or plans, enhancing customer engagement and service losses (Hajiheydari et al., 2021).	and generate insights to create new business products or avenues of loss (Hajiheydari et al., 2021).
Transportation and Logistics	The real-time data from the traffic sensors, IoT-enabled vehicles, and GPS allows companies like UPS to mitigate potential disruptions and use optimized delivery routes, which in turn minimizes the delays and enables strategic management in the supply chain and reduces risk (Tzika-Kostopoulou et al., 2024). The organizations can prioritize, plan, and invest in the high-risk routes or allocate more resources to emerging markets based on their data and insights.	Big data-based predictive analytics helps logistic companies like FedEx anticipate market surges in demand, allocate resources with agility, and meet customer demands during peak and unforeseen seasons (Jahani et al., 2023). This can help businesses design contingency plans and allocate budgets for expanding the logistics fleet in response to market demands.	The advanced technical solutions that use big data as the foundation, such as autonomous vehicle technologies, drones, and robot-driven delivery systems, are reshaping the logistics and transportation sector. The big data provides essential navigation inputs and guides through real-time decision-making. For example, the Amazon prime air drones are guided by AI systems trained on large datasets (Jahani et al., 2023). This helps the executives and the product owners determine the feasibility and the return on investment when adopting the latest technologies.
Health care	The advanced analytical solutions backed by big data platforms, such as predictive	Batko and Ślęzak (2022) argue that personalized medicines, diagnoses,	Predictive analytics transforms hospital management to streamline operations and

	analysis in healthcare, aid in the early detection of disease outbreaks by analyzing the available patient data and public health trends. Imran et al. (2020), for example, highlight that the big data platform enables healthcare providers to allocate resources effectively during flu season or the crisis. This helps the higher-level executives to develop and enhance long-term public health strategies and establish preventive care initiatives based on historical data.	and treatments driven by big data analytics enable care providers to improve treatment outcomes and patient satisfaction. This can help the hospital's upper management invest in precision medicine initiatives and AI-driven diagnosis tools, thereby gaining a competitive edge.	resources and reduce diagnosis and treatment inefficiencies. For example, the Mount Sinai Health system uses big data to investigate patients' needs, which has helped minimize readmission rates significantly (Imran et al., 2020). From a strategic decision point of view, executives can develop cost-effective resource allocation strategies that improve patient care and operational sustainability.
Forestry	In the forestry industry, big data can play a pivotal role alongside the satellite imagery and the IoT-enabled sensors that provide the quint-essential data which can be used to access deforestation rates, illegal logging activities, and any biodiversity threats. Global Forest Watch uses big data to sense ecological threats and assists governments in policy-making initiatives (Hafizudin, 2023), which are facts based on the data.	The predictive models driven by big data help the forestry sector's firms to plan harvesting schedules and ensure compliance with environmental regulations. For instance, the climate data and soil condition analysis enable reforestation efforts to align with sustainability goals.	Integrating IoT-led devices with big data platforms has helped revolutionize forest management, enabling real-time biodiversity and forest growth monitoring. This allows the NGOs and the governments to implement more effective climate policies and strategies for forest conservation (Hafizudin, 2023).

Table 1. Illustration of industrial application in the different sector**s**

2.2.5 Industrial implications and outcomes

Big data plays a transformative role across industries, enabling organizations to adapt to rapidly changing market conditions, improve the decision-making process, and drive continuous innovation across all the business units in the organization. Integrating big data into core operations enhances the organization's strategic agility to respond to opportunities and threats in dynamic environments. The vast volume of data collected from diverse sources, such as IoT customers, equips organizations with real-time insights to enable businesses to identify emerging trends. For instance, by monitoring trends, businesses can predict customer needs, competitors, and technological advancements. In the transportation sector, predictive analytics derived from big data allows logistics organizations to adjust routines dynamically based on real-time traffic and weather data (Tzika-Kostopoulou et al., 2024). Big data's predictive capabilities help identify risks such as supply chain disruptions in the financial sector, and fraud detection systems driven by machine learning models analyze the transactional data in real-time, ensuring trust and security (Batko & Ślęzak, 2022). Healthcare providers use predictive analytics and models to allocate resources efficiently during unforeseen events such as pandemics, ensuring continuity of care (Imran et al., 2020), leading to operational flexibility and enhancing decision-making.

Data-driven decision-making replaces the intuition-based approaches with facts and evidence-based strategies. Big data helps various industries by tailoring customer engagement strategies and providing optimized, personalized solutions. For instance, in the retail domain, big data enables dynamic pricing that adjusts the prices in real-time based on demand, competition, and inventory levels, thereby improving profitability. In manufacturing powered by big data, organizations stimulate various scenarios and test the outcomes before implementing changes in real-world processes (Forbes, 2024).

Big data provides the foundation by uncovering new opportunities, optimizing the processes, and enabling the usage of disruptive technologies there by fostering

innovation in the business processes and developing new business models. Big data powers autonomous vehicle systems and drone technologies in the transportation sector, enabling organizations to provide innovative delivery solutions (Jahani et al., 2023). For instance, precision diagnosis and treatment plans have revolutionized patient care (Imran et al., 2020). Building strategic agility of the organization to pivot quickly to the changes while focusing on the long-term strategic goals. Big data supports this by enhancing the speed in response to shifts in consumer behavior or external market demands. Improve precision in decision-making relies on the high-quality data within the organization to handle well-informed decisions and allow businesses to scale their operations dynamically.

Integrating big data into the organizations' processes goes beyond the capabilities of the operational improvements; it transforms business agility and helps navigate complex dynamic environments with data-driven facts. It helps organizations to remain competent and resilient, ensuring long-term success in every changing market and the data-centric business world.

2.3 Strategic Decision-making

Strategic decision-making is a crucial process that shapes an organization's long-term direction. Strategic decision-making is fundamental to the long-term success and competitiveness of organizations. It involves making high-stakes choices that shape the direction of a company, influencing its market positioning, resource allocation, and overall sustainability. Unlike operational decisions, which focus on routine activities, strategic decisions require a broader perspective, incorporating economic, technological, and competitive factors. These decisions often involve ambiguity and uncertainty, requiring business leaders to assess multiple potential outcomes and long-term consequences (Teece, 2007).

Unlike operational decisions, strategic decisions involve high stakes, uncertainty, and a significant impact on business performance (Mintzberg, Ahlstrand, & Lampel, 2005). These decisions require balancing risks and opportunities while considering external market dynamics and internal capabilities. Organizations must align their strategic choices with their vision, mission, and competitive advantage to ensure sustainability and growth (Porter, 1985).

Over time, decision-making frameworks have evolved to incorporate analytical tools, business intelligence, and data-driven insights. This shift has enhanced decision-makers ability to evaluate multiple scenarios, predict market trends, and respond to changing business environments. While traditional strategic decisions rely heavily on experience and intuition, modern organizations integrate technology and data analytics to refine their strategies (Eisenhardt & Martin, 2000).

2.3.1 Background Overview

Strategic decision-making is at the heart of an organization's ability to navigate complex and dynamic business conditions. These decisions shape an organization's long-term direction, influencing its market position, operational efficiencies, and sustainability. Unlike routine decisions, which are often structured and repetitive, strategic decisions require deep analysis, forward-thinking, and considering multiple uncertainties. Organizations that excel in strategic decision-making can anticipate changes, seize opportunities, and mitigate risks effectively.

A key aspect of strategic decision-making is its reliance on comprehensive market demands and conditions. Businesses today operate in highly volatile environments where rapid technological advancements and evolving consumer preferences constantly reshape industry landscapes. As a result, decision-makers must evaluate vast amounts of information from various sources to make informed decisions. Data analytics, machine learning, and business intelligence tools are crucial in filtering relevant insights from the

overwhelming influx of data, helping companies refine their strategic direction and gain a competitive edge.

Additionally, strategic decisions often involve trade-offs that impact multiple facets of an organization. Leaders try to balance financial performance with long-term innovation, align operational efficiencies with market expansion, and consider risk mitigation strategies while pursuing growth opportunities. This complexity necessitates a multidimensional approach incorporating qualitative and quantitative analyses to ensure well-rounded and sustainable decision-making. By adopting a strategic mindset that embraces adaptability, businesses can confidently navigate uncertainty and position themselves for long-term success.

In an era where data-driven approaches are becoming the norm, strategic decision-making has evolved beyond traditional methods. Companies now leverage vast amounts of data (big data), advanced analytics, and artificial intelligence to enhance decision accuracy. This transformation allows businesses to integrate fact-based evidence into their strategic considerations, reducing biases and improving overall outcomes. The ability to harness data for strategic purposes has become a competitive advantage, enabling organizations to adapt to emerging trends and maintain long-term viability.

2.3.2 Characteristics of Strategic decision-making

Strategic decisions are characterized by several key attributes distinguishing them from routine decision-making processes. One critical aspect is the long-term impact. Strategic decisions influence the future direction of an organization and often involve significant investments, making it essential for leaders to employ data-driven analysis to mitigate risks and improve decision quality (Teece, 2007).

Another key characteristic is cross-functional involvement. Strategic decision-making requires collaboration across multiple departments, including finance, marketing,

operations, and technology. This ensures that various perspectives and expertise contribute to well-rounded decision-making processes (Mintzberg et al., 2005). Furthermore, these decisions often entail irreversibility, meaning that once implemented, they are difficult to reverse. As such, leaders must conduct thorough planning and risk assessment to minimize the chances of failure (Eisenhardt & Martin, 2000).

Finally, strategic decisions necessitate significant resource commitment. Whether in financial investments, technological advancements, or human capital allocation, these decisions demand substantial organizational resources. Properly allocating these resources ensures the business remains competitive and aligned with its long-term goals (Porter, 1985).

2.3.3 Benefits of data-backed strategic decisions

The rise of big data and its branches, like analytics, has significantly improved the accuracy and effectiveness of strategic decision-making. One of the most notable benefits is improved accuracy, as data-driven insights minimize biases and reduce reliance on intuition. Organizations can make well-informed choices that enhance performance by leveraging data, statistical models, predictive analytics, and machine learning (Teece, 2007).

Another advantage is an enhanced competitive advantage. Companies that integrate big data into their strategic decision-making processes can identify trends, optimize operations, and stay ahead of competitors. Access to real-time information allows businesses to adjust their strategies dynamically and capitalize on market opportunities (Porter, 1985). Additionally, data-driven decision-making increases organizational agility, enabling businesses to respond swiftly to market shifts, consumer behavior changes, and emerging industry trends.

Data-backed strategies also contribute to better risk management. Data analytics help assess potential risks and develop mitigation strategies, allowing companies to navigate uncertainties (Eisenhardt & Martin, 2000) confidently. Furthermore, strategic decisions driven by data optimize resource allocation, ensuring that investments in projects, personnel, and technology yield maximum efficiency and return on investment (Barney, 1991).

By integrating data into decision-making, businesses gain deeper insights into market conditions and internal operations, fostering sustainable growth and innovation. The ability to combine strategic frameworks with real-time data analytics ensures organizations remain adaptive, competitive, and forward-thinking.

2.4 Synthesis: Framework on big data and DC for strategic decision-making

In the literature review section, two main parts are discussed that are relevant to this study, namely the big data and the platform and dynamic capabilities; this synthesis part combines both worlds. The central part of this section introduces a framework that seeks to answer the main research question, “In what ways does big data help in the organization's faster and better strategic decision-making process while responding to competition, threats, and opportunities?”

The theoretical part started with exploring big data's definition, background, features, and properties. In today’s world, organizations operate at a pace where the volume, variety, and velocity of the data are ever-increasing (Beyer and Laney, 2012). Harsh harnessing this data and driving actionable insights are essential for operational efficiency and achieving strategic agility given the dynamic changing market conditions. Big data, with its most important characteristics such as volume, variety, and velocity, serves as the foundational layer for businesses to derive data-driven decisions and create

advance analytics for the decision-making processes. Across various industries, organizations have leveraged big data to enhance their operations and gain competitive advantage. For instance, in many sectors like health care and retail, the insights from the data help provide personalized solutions and enhance customer experiences, increasing customer retention and helping organizations open up new avenues for operations. Despite these benefits, the organization also faces challenges regarding ensuring data quality, privacy concerns, and keeping pace with technological advancements to fully realize the potential of big data (Kumar B, 2015).

The second part explored the dynamic capabilities framework introduced by Teece et al. (1997), emphasizing the importance of the organization's ability to sense the opportunities and threats, seize the market potential, and transform the processes to adapt to the rapidly changing market conditions. Sensing the opportunities involves identifying the constant changes in customer demands and preferences, competition in the market, and the technological advancements they could tap into. Big data enhances this capability by providing insights that guide the strategic actions on this front. Seizing the opportunities involves the application of big data insights to make actionable decisions. This enables the organization to allocate resources and develop targeted strategies based on predictive analytics, advanced analytical solutions, or AI. For instance, retailers like Walmart use dynamic pricing models with data-driven market conditions to optimize sales and inventory. In healthcare, personalized treatment plans based on lifestyle data enable healthcare providers to enhance patient outcomes alongside reducing costs. These examples highlight some sample cases of how big data can empower organizations to act accordingly to seize market opportunities better. Transformation, the third segment of dynamic capabilities, aims to reconfigure and transform organizational processes and business models based on insights from big data.

This section aims to put together a practical framework that could help the organization realize the dynamic capabilities better using big data. As a first step, a theoretical framework is proposed that integrates the concepts into a cohesive structure that aids in

strategic decision-making. The framework consists of four interconnected layers – the big data foundational layer, data strategy, the dynamic capabilities layer, and the strategic decisions layer. The foundational layer, big data, provides the raw material for analytics through the data collected from varied sources. The data is then processed using advanced technologies such as AI ML to derive actionable insights. This engulfing second layer is also dependent on the most important factor, the data strategy, which focuses on aligning the organization's data capabilities with the organization's goals. Effective data strategy revolves around robust governance policies, investment in the right technologies, and fostering a data-driven culture within the organization. Dynamic capabilities form the third layer, enabling organizations to sense opportunities and threats, seize market potential, and transform processes based on the big data foundation layer. The feedback loops that ensure continuous refinement and enhancements strengthen the framework. The feedback loops work so that strategic decision-making leverages insights from all the preceding layers and feeds back into the refinement of the big data layer to address gaps, improve data quality, and expand new data integration. This cyclic flow ensures continuous learning and adaptation, enabling the organization to remain agile and responsive to the rapidly changing environment.

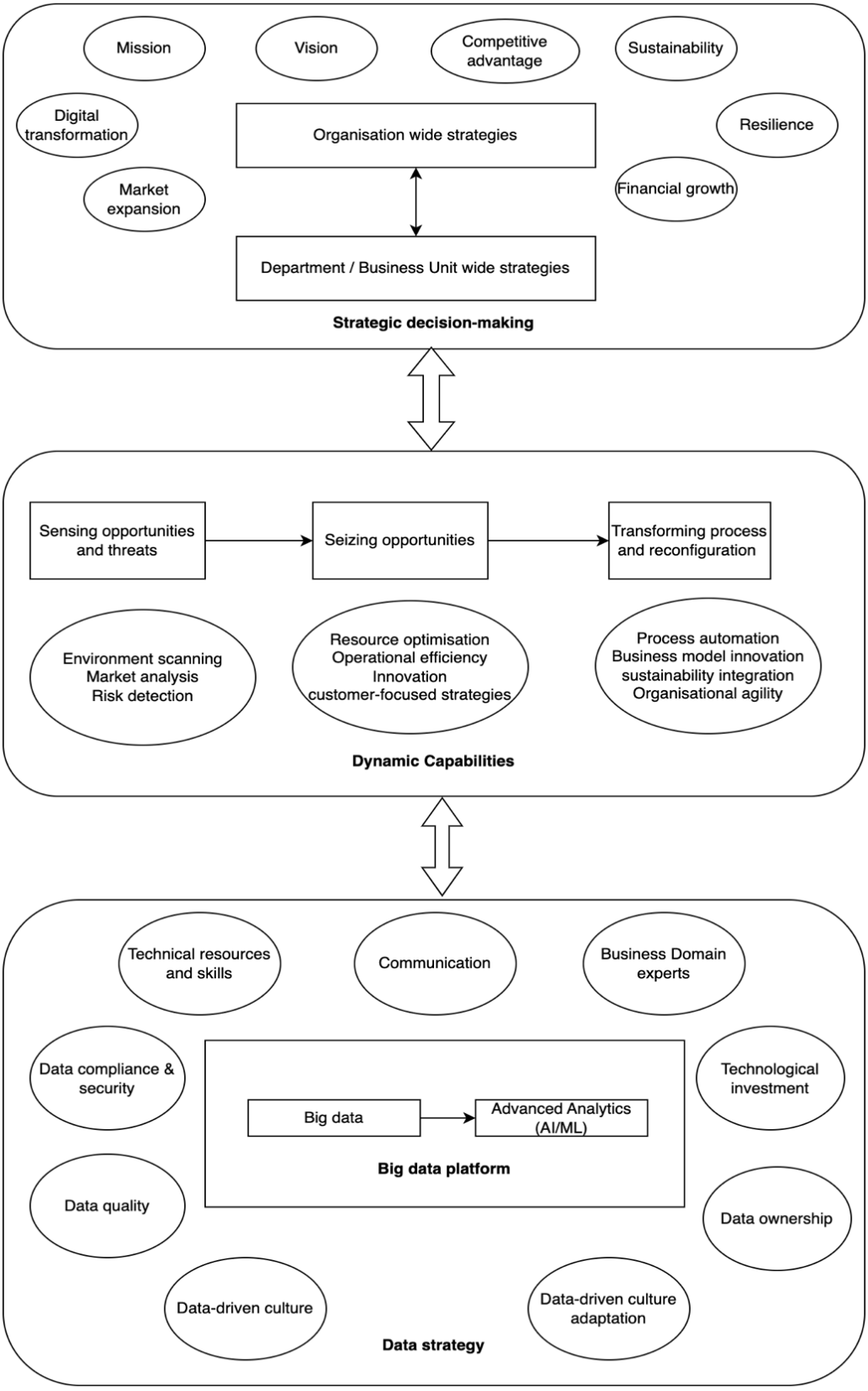

Figure 5. Theoretical framework based on big data and existing dynamic capabilities

To bridge the theoretical and practical dimensions of big data and dynamic capabilities, the practical framework below (Figure 6) helps the organization evaluate its position on dynamic capabilities and how it can utilize data better for strategic decisions.

The theoretical framework provides a good background on how various components interact and emphasizes the factors contributing to strategic decision-making. The practical framework canvas provides the opportunity for the organization to blend in the technology and the business aspects to make better decisions by analyzing from different angles, and this framework also extends and contributes to DC capabilities alongside the big data world.

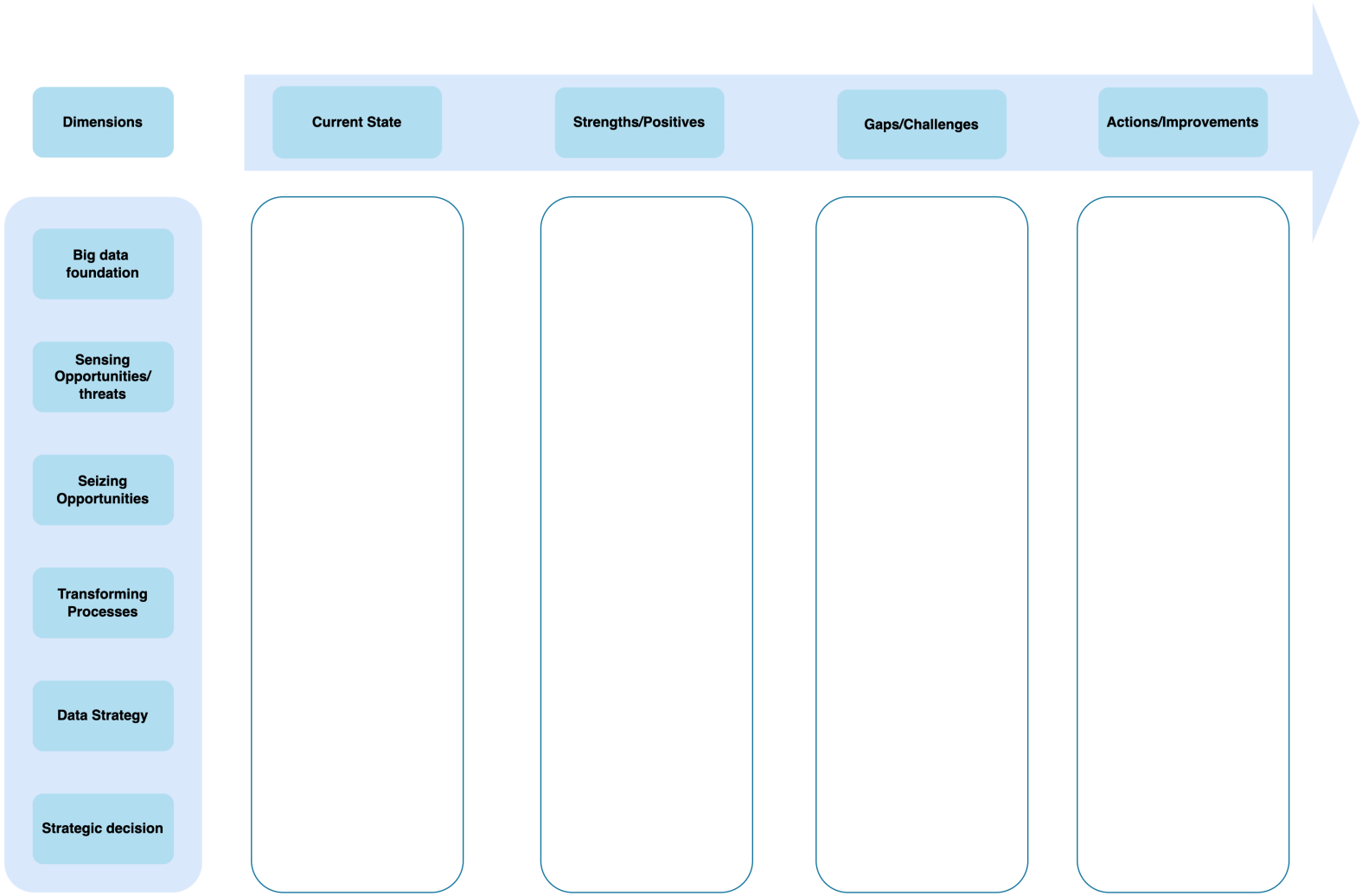

Figure 6. Framework canvas based on big data and extension of dynamic capabilities

3. METHODOLOGY

3.1 Research Methods

The research method used in this study is collecting data by following a qualitative research methodology. The qualitative research methodologies are designed to disclose the interviewees' perceptions regarding the study of interest. Qualitative methodology is the right choice for this research because it enables deeper and in-depth exploration of the topic, capturing insights that quantitative methods might overlook. Since the study focuses on understanding the perspectives, experiences, and underlying role of big data and dynamic capabilities in organizations' strategic decision-making, a qualitative approach provides flexibility to uncover diverse contextual details.

One of the key advantages of qualitative research is its ability to provide a holistic understanding of complex issues in study. It provides the ground for adaptability by incorporating emerging themes, trends, and insights into the study process. Additionally, it grounds the findings in real-word contexts, enhancing their relevance and practical applicability.

Notably, this thesis draws on a single-case study as a research method, where the volume of response is lower, but the individual responses have more responsibility for the overall result regarding validity and reliability (Saunders et al., 2016: 318 – 388). A single case study is the most suitable method for this study because it allows for a deep and detailed exploration with a closed group of experts instead of spreading the focus across multiple cases. This approach makes it possible to closely examine how big data, dynamic capabilities, and strategic decision-making interplay in the organizational context, providing a real-world clearer picture of the impact.

One of the most significant advantages of a single case study is its ability to provide rich, detailed information that can lead to meaningful insights. It captures the real

experiences, showing not just what happens but also the why part of it. This makes the findings more practical and valuable for organizations facing similar situations. Additionally, it offers flexibility to explore unexpected insights, adapting as new themes emerge. By focusing on a single case study, this method ensures a deep and contextually relevant understanding, making it a good choice for answering the research question.

Semi-structured interviews were used in this study. Semi-structured interviews are a great way to collect data because they provide structure and flexibility. They follow a set of key questions to keep the conversation focused and allow for follow-up and open discussions. This helps participants share their experiences in more detail, and this method encourages honest and thoughtful responses, making it easier to understand the reasoning from the interviewee's perspective. The semi-structured interview provides responses that make the results comparable and an opportunity to openly discuss the research questions and align them with the research agenda.

One of the most significant advantages of semi-structured interviews is that they provide rich, detailed, and insightful answers rather than yes-or-no responses. This method allows interviewers to ask for clarification or dive deeper into interesting points, making the findings more insightful. Because of their flexible nature, these interviews also uncover unexpected insights that lead to a deeper understanding of the topic.

Hence, in this study, we focus on in-depth interviews with the subject matter experts in this field, and qualitative research tries to understand the research problem or the topic of interest from the perspectives and opinions of the population being interviewed.

3.2 Case Selection

A single case study is carried out to serve the purpose of this research, which is to focus and bring correlation within the area of interest. It provides the opportunity to interview executives, sales leads, partners, lead consultants, and customers with strong knowledge

and real-time work experience in dealing with big data and derive insights from them to enable the organization to make strategic decisions.

In this study, purposeful sampling ensures that the selected case provides meaningful insights into the role of big data dynamic capabilities in strategic decision-making. As Patton (2002) explains, this method is specifically beneficial when the goal is to gain an in-depth understanding rather than a broad generalization. By selecting this single case, the study ensures that the findings are rich and relevant to the research question.

In addition, Saunders et al. (2012) outline five key approaches to sampling the case studies.

Sampling Strategy	**Description**
Extreme case	This approach focuses on unusual or exceptional cases, offering insights into the outliers.
Heterogeneous case	This approach selects diverse cases to capture different perspectives within a phenomenon.
Homogeneous case	Focuses on cases with similar characteristics, allowing for deeper exploration of a specific group.
Critical case	Those that are particularly important in testing theories or understanding key issues are covered in these cases.
Typical case	This approach considers cases representing ordinary or everyday situations, making findings more broadly relevant.

Table 2. Five main sampling techniques in case studies (Adapted from Saunders et al., 2012)

From the five sampling techniques, this study follows a critical case sampling strategy, which implies that the chosen organization's resources expertise is particularly relevant for understanding and delving deeper into this case study. This approach ensures that the study captures what happens in the data-driven organization, why, and its context.

This case company has been specializing in providing data-driven solutions, big data platform services, and analytics services to various organizations and enterprises for over a decade. Hence, this company would be an ideal candidate for research on this subject. The company is a small-scale Finnish consulting firm specializing in the latest data-related technologies, solutions, and services catering to customers across Nordics and Europe.

3.3 Company overview

Twoday Kaito is the case company that was selected for this research purpose. Twoday Kaito is a thought leader in data and analytics consulting services. It was founded in 2013 and has offices in Helsinki and Tampere. Twoday Kaito offers data and analytics services in Europe and the Nordic region, and it has a team of around 85 consultants. Twoday Kaito is a highly skilled and talented pool of data engineers, data scientists, analytics engineers, and businesspeople who understand data and provide high-quality, long-term solutions and services for the changing business climate for organizations and enterprises spanning various domains.

Twoday Kaito has been a consulting partner with multiple enterprises and organizations in domains such as Banking, Finance, Manufacturing, Retail, and forestry. Kaito consultants provide the required services and solutions during every phase of the data project, such as discovery and design, development and iteration, and support/maintenance. Kaito joins companies to offer joint data-driven services, enabling organizations to utilize analytics to create value throughout their ecosystem.

They provide sophisticated cloud-based services that help organizations tap insights from the large set of their datasets and make informed decisions in the longer run with the latest art of state technologies and analytical solutions.

Twoday Kaito also owns a data platform accelerator, which helps organizations to get their data to work for them. Kaito Fast Track is the accelerator with a proven way to make the data available on the modern data platform to derive insights from it. Twoday Kaito partners with various technology companies such as AWS, Azure, Google Cloud Platform, Snowflake, SAP, SAP, DBT, Aecorsoft, Ellie, Databricks, Dataiku, and PowerBI. These partnerships enable data-driven transformation in the customer organization according to its use case and needs.

Twoday acquired Kaito in September 2024, who is one of the leading digital transformation solution partners in the Nordics. With this acquisition, Twoday has over 700 data and Artificial Intelligence consultants. Kaito is now named Twoday Kaito until the end of March 2025, when all internal matters and integration are completed.

3.4 Data Collection

The data collection is rendered primarily by conducting semi-structured interviews. The interviews are conducted online with the executives, partners, sales consultants, and customers, and the meetings are recorded, which will help in the transcribing process. There are a total of 8 interviewees are involved in the interview and are part of the case study company and their customers.

The set of open-ended core questions is shared with the intended interviewees, which would help them get a glimpse of the interview and help them prepare in advance. However, more questions and discussions are held on their experiences and responses. The time is agreed upon with the interviewees, and a time slot of 90 minutes is blocked to interview each respondent.

The cameras were turned on during the interview to enhance the discussion and allow the understanding of the non-verbal cues, such as body language and facial expression.

All the interviews were conducted in English using teams. The interviews were recorded, and the transcripts were downloaded and used for the in-depth case study investigation.

Participant	Date	Duration (mins)	Position
Participant 1	03 Aug. 2024	60	Principal consultant Data Analytics
Participant 2	04 Aug. 2024	60	Principal consultant Data science and Analytics
Participant 3	15 Aug. 2024	90	Product owner and data domain expert
Participant 4	23 Aug. 2024	90	Principal consultant Data Engineering and Analytics
Participant 5	28 Aug. 2024	90	Product owner and data strategist
Participant 6	02 Sep. 2024	90	Senior project manager – Data Analytics
Participant 7	04 Sep. 2024	90	Senior consultant – Data science and analytics
Participant 8	17 Sep. 2024	60	Freelance Data and AI strategist
Participant 9	24 Sep. 2024	90	Director – Data & Analytics
Participant 10	11 Oct. 2024	90	Head of the department Data & AI

Table 3. Interview details

3.5 Data Analysis

The case research in this context of the qualitative data is analyzed through content analysis. In the content analysis approach, we gather and observe the data concerning the research focus (Weber, 1990). In this research context, it provides the opportunity to observe the case as an entity with different practices, which then are best analyzed through qualitative means.

In content analysis, the first step is transcribing (verbatim), and the second is condensing the data into meaningful coded units (Weber, 1990; Mills, Durepos & Wiebe, 2010). Then, the third step is to group the meaningful coded units into possible themes (Nag, Corley & Gioia, 2007, p.20). The content analysis helps interpret the data more effectively and in a more structured manner, enabling the intended outcomes and enhancing the connection between data and the findings.

As the study aims to elucidate the role of big data in organizational strategies, it is logical to view and analyze the data from different people's perspectives in various roles, from the data consultants and subject matter experts from the customer organizations. In this study, the case analysis is conducted by re-watching the recorded videos from the interviews and reading the transcripts. It is important to note that sensitive information is not reported for confidentiality, and the actual names of the respondents and their organizations are coded to guarantee anonymity. The information from the respondents is used in the finding section with in-text quotes. The figure below displays the overall aggregation of data points and results from the semi-structured interviews.

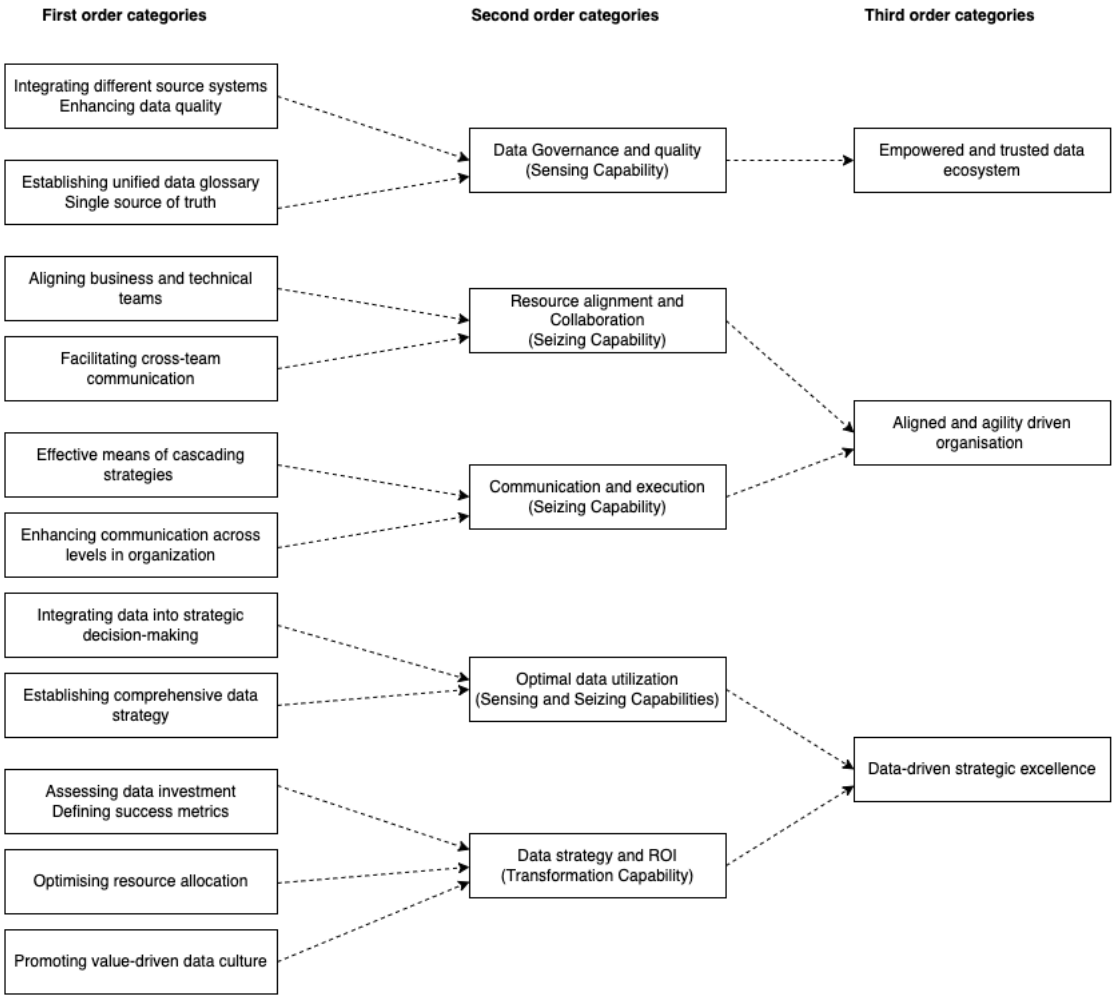

Figure 7. Content analysis of data

In the above analysis of aggregated data structure, the first-order categories stem from the data; the second-order categories are formulated based on the interpretation, which helps further describe the concepts, and the third-order categories are the aggregated dimensions. The cross-study analysis is carried out where the patterns and the contradictions are discussed and highlighted, and the findings are illustrated.

3.6 Validity and reliability

Validity and reliability are the metrics used to determine the quality of the research carried out. Validity corresponds to the ability to measure the intention of the research and its accuracy concerning data collection and analysis (Saunders et al., 2019). The reliability corresponds to the repeatability of the research, which means the same methodology should be able to generate similar results when used by other researchers.

Several well-established strategies are applied to ensure the validity and readability of this study. Data triangulation was used to strengthen the credibility of the findings by collecting information from different sources, such as semi-structured interviews, company reports, and industry publications. Drawing insights from various perspectives helps reduce potential biases and increase the robustness of the conclusions (Yin, 2018).

A clear and transparent research method was followed to establish validity. A sequence of evidence was maintained throughout the study, ensuring that data collection, analysis, and conclusions were systematically linked (Yin,2018). A structured case study protocol was developed and consistently followed to ensure readability. Using standardized data collection and analysis procedures helps minimize inconsistencies and allows the study to be replicated in different contexts (Yin, 2018).

Additionally, the document of all the research steps is maintained, including the interview transcripts, coding process, and framework formulation. This transparency strengthens the study's trustworthiness. In this study, the video recordings of the semi-structured interview transcripts generated are the data points that increase the degree of reliability of this study and serve as the means for interpretation.

Also, the likelihood of repeatability directly connects to the participants' observation and often depends on the researcher’s skill in the given area (Thompson, 2016). Along similar lines, Saunders et al. (2016) argue that repeatability is less achievable in the long run

because, in the case of the qualitative analysis with interviews, the data gathered throughout time are prone to change.

4. FINDINGS

This study explores the intersection of big data and dynamic capabilities, focusing on how organizations use their data-driven insights and culture to enhance their agility in the competitive environment. This section goes in-depth with the findings, which aim at linking the theoretical lens to the dynamic capabilities and the practical framework formulated, the opportunities and challenges the organization faces in its journey, and how the insights can be translated for strategic decision-making.

The theoretical framework (Figure 5) first empathizes with the big data foundational layer, the backbone for the organization to dive into data-driven decisions and advanced analytical solutions. In this layer, it is also important to consider the data strategy, which encompasses multiple essential aspects such as data quality, security, resources, technological aspects, data-driven culture, and other nuances. This is the base layer on which the business can leverage the strategic decision-making process. This helps provide insights and direction on the organization's dynamic capabilities in sensing the opportunities and threats, seizing the opportunities, and finally transforming and reconfiguring processes and business models within the organization. These then cascade to the strategic decision-making processes at the lower level, like business units or departments, which connect to the organizational broad strategies.

It is essential to note that each of these sections in the framework operates in a bidirectional or loop fashion. The feedback from the business allows the dynamic capabilities to mature and improve over time, which helps bring the data aspects together and enables the organization to have a stronger data-driven culture.

The practical framework canvas built on the background of the theoretical framework provides a lens through which the organization's current state can be recognized, the

strengths, the gaps, and the challenges can be identified, and the action points can be derived.

4.1 Case study analysis

The individual case study is briefly introduced and subsequently analyzed with the framework in this section. The dimensions of big data foundation, sensing, seizing, transforming processes, data strategy, and strategic decisions are then discussed relative to the four categories (current state, strengths/positives, gaps/challenges, and actions/improvements). In addition, the findings from the consultants' perspective are grouped and presented in the analysis framework. The grouping is done according to the experts' area of work. First, it is related to the technical side of the consulting firm on the data side, and next, it is related to the business domain experts. The exact wordings from the interview excerpts are mentioned in italics in this analysis part. At the end of this section, a synthesis is provided to highlight the industry practices based on the data analysis.

4.1.1 Technical Data Analytics consultants

This section concentrates on the analysis from the point of view of technical data professionals who work in varied data fields such as data engineering, data architecture, data analytics, data science, and AI. They specialize in the technical side and have a rich experience in the domain and the business they work with. It is also noticeable that they do not work in tandem but are in constant touch with the business and various subject matter experts from the business side and the executives as the needs arise. We will not analyze it with the help of the dimensions in the framework with the inputs from this group of experts.

Big data foundation

Over the years, the data field has evolved to a greater extent, and the rate at which data is generated in various business sectors has established the need for the latest technologies, such as cloud computing, to store the data and choose these sorts of platforms not only reduces the operational and storage costs but also on the resource allocation. Participant 5 highlighted, *"More importance was given to the data platform maintenance and spending a huge chunk of the budget"*. *However,* with the advent of newer technologies, cloud computing, and software as a service, the resources can now be invested in building solutions that can back the decision-making processes, help improve the business, and increase its competitive advantage in the dynamic market.

Big data is not a new technology; it has been here for more than a decade now, and "*it is not a technology that is in the hype in the current times,*" - quoted participant 5*; it* has become the base in many senses. Looking at what is big data differs from the angle it is looked at. It is not always the combination of volume, velocity, and variety that makes it difficult to process data using older technologies, but any of these factors can raise the need for big data. Participant 4 emphasized that it is also essential to note that "*big data always does not refer to semi-structured or unstructured data*" like images, videos, and other formats. It could be simple structured data from a financial transaction such as a banking system with the current digitalization, the transactions are created at an unbelievable level, and robust technologies are required to store and process the data. Organizations have developed numerous technologies, bringing game-changing results regarding how different market players see the data. These technologies have also helped reduce the timeframe for data development and the availability of decision-making processes at different levels within the organization.

It is a noticeable fact that the data is generated rapidly in various sectors, and it is essential to gather the data in real-time and near real-time in many scenarios. In many cases, the latency could considerably impact the business in terms of both monetary value and reputation. Hence, the data becomes the base through which the

organizations operate and rely on decision-making. It is highly beneficial when the organization can bring its data from various departments to a single place, a "*unifying data storage location*," explained Participant 1. It helps the organization analyze the data across various departments and take some actionable insights from it. The data silos within the organization many times results in "*data redundancy and a lesser unified process of doing things*," quoted by Participant 3. Reducing the data silos and unified storage space for the organization-wide data helps them to establish cross-functional data usage and align both the technical and the business teams.

Another important aspect, given the volume and the variety of the organization's data, is the Master Data Management (MDM), which, in simple terms, is like a single source of truth, a comprehensive approach to managing enterprise-wide data. Though the data is gathered, one of the important challenges is that "*there is no proper MDM in many organizations*," - highlighted Participant 1, which results in data not being utilized to its full potential by different departments within the organization. In addition, data governance and security are essential topics in big data. As many organizations are moving towards data-driven decision-making at different levels, the people in the organization must trust the data they use. This can be achieved with proper data quality, security, and compliance protocols. Participant 3 highlighted that "*data is often an overlooked area*." One of the reasons is that the business would like to see the data faster and realize its insights. The engineers do not access the data quality in the first place. This can result in skewness in the decision-making process.

The "*data glossary*" is another challenge in the big data world, highlights Participant 5. This often causes situations in which the technical team and the business personnel speak in different terms, resulting in disjointed conversations and gaps in understanding. This causes delays in development processes and gaps in providing prompt service to the business needs. When maintained, the business unit expansive glossary or the organization-wide glossary helps the organization from the technical team's perspective and helps in the turnaround time for decision-making processes to be in place.

From the resource's perspective, organizations must help technical resources upskill themselves with the latest trends and build scalable, reliable, and maintainable solutions over time. In many organizations, upskilling programs for different cloud computing technologies, machine learning, artificial intelligence, and big data tools are common, and they help organizations realize their potential from the data.

Sensing Opportunities and threats

This section explains sensing opportunities and threats from the point of view of technical data professionals. Data professionals are important in enabling organizations to predict market trends, find and identify risks, and adapt to dynamic market conditions. This process relies on the collection, availability, and quality of the data and the infrastructure it is based on, and the main challenge is rooted in the organization’s ability to derive actionable insights from the vast amount of available data resources.

The pivotal point here is understanding the importance and role of the data in the sensing part, i.e., gathering data from different source systems and organizing it in a manner that can reveal any hidden trends or patterns. In this section, it is essential to understand the importance of each resource segment that works together to realize the outcome. The data engineers and the data architects help build the robust data platform infrastructure and maintain the pipelines to bring the data to a location the organization can use. The traditional systems most likely concentrated on gathering the data in a batch process, like processing it once or twice daily. However, with the advent of the latest technologies, data is now processed in “real-time,” which helps businesses realize trends and patterns faster and derive actionable insights faster. Without a robust and trustable infrastructure, data availability for insights is severely impaired.

Next to look at are the Analytics engineers who play a key role in bridging the gap between the data and deriving insights from it. They constantly touch the business and

realize and model the data to align with the business needs and objectives. It is important to note that the data gathered should be reliable and available within the required timeframe for deriving and gathering insights.

The data scientists and ML / AI engineers help bring machine learning and analytical models for sensing purposes. Participant 7 highlights that the solutions help the organization to sense emerging market trends or threats "*like customer retention by leveraging statistical algorithms and detecting patterns*". Here, the noticeable factor is the importance of quality data and the computational infrastructure required for the data scientists to work on.

Though data professionals are at the forefront of sensing the opportunities and threats within the organization, they face multiple challenges that hinder their ability to provide the timely insights required for the business. One of the technical constraints is sometimes the existing "legacy infrastructure," which does not have enough processing capacity and power to process the insights in real-time, thereby impeding the sensing capabilities, as highlighted by a couple of data specialists. Nowadays, this is being addressed by many organizations as a first step toward upgrading the platform to cloud and related services. This is easier and faster for smaller organizations with fewer strings attached, but it takes years for multinational companies and larger enterprises to get this step in real action. Another challenge that Participants 9 and 10 raised is prevalent in "*many organizations are the data silos*". It is easy for each business unit or department to gather their data, bring the data they require from other data sources, and use it to gather insights and sense the opportunities at their unit level. However, the broader picture is always overlooked. This data silos causes data redundancy and causes more resources for storage of the data and processing the data across different places. This can be avoided by having a unified layer for data storage across the organization and providing the downstream business units with the required data. This brings uniformity of the data format storage and a faster turnaround for derived insights. One another common challenge in this part is the lack of predictive analytics tools across the

organization. Many organizations rely on historical data for their analysis rather than having a hold on the forward-looking capabilities. The data analytics engineers and the data scientists mainly highlight this limitation. It is important to note that business strategies can be more reactive than proactive without robust predictive analytical models.

The most important aspect of successfully realizing the sensing opportunities and threats is the collaboration between these resources across the organization. Each resource cannot help deriving insights alone; it must be done with a "*collaborative effort*" from each side, highlighted Participant 6. The technical team and the business team need to be in alignment with the success of the sensing side. However, challenges often arise due to misaligned team goals, communication gaps, and the prioritization of work in different teams. Bridging this gap is essential for ensuring the organization's sensing capabilities operate seamlessly. The collaborative effort enables the organization to take proactive measures in the decision-making process alongside the required technological investments in data platforms, technical and business experts, real-time and advanced analytical solutions, machine learning models, and computational capabilities. These can directly help enhance the organization's sensing capabilities, enabling it to remain agile and face dynamic market conditions.

Seizing opportunities

Seizing opportunities within the organization involves taking tangible measures and actions based on data-driven insights to achieve strategic goals. The technical data professionals – the data engineers, analytical engineers, data scientists, and data architects- aim to create the system, platforms, infrastructures, tools, and processes that bridge the gap between identifying the opportunities and implementing them effectively. Their roles focus mainly on deriving meaningful insights from the raw data that the business generates and building the infrastructure and platform that can foster the delivery of these insights on time—also ensuring that the decision-making

framework works without glitches and constantly enhances this process to maintain a reliable working solution. Participant 4 and Participant 8 highlighted that this requires "*alignment of tools, processes and workflows*" and a collaborative approach to ensure the organizations can move forward faster from the analysis to the actions phase in decision-making with precision and speed.

The ability to seize the opportunities relies strongly on the robust data foundation. Technical data professionals like data engineers and architects play a key role in ensuring that the data pipelines and platforms process and deliver the information in the required reasonable timeframe for the business to derive insights and take tangible decisions. Without these systems, organizations analyze untrustworthy and outdated data, diminishing their ability to act effectively and make decisions. The value of the data is realized only when it reaches the intended business personnel as quickly as possible. Ensuring the insights are delivered promptly is crucial for sensing and seizing the opportunities, as there can be sudden shifts in the market dynamics or customer behavior.

Technical professionals such as analytical and data engineers help translate the raw data into actionable insights by structuring the data in ways non-technical stakeholders understand, such as by often developing "interactive dashboards and automated reporting systems," mentioned Participant 7. These tools allow the business stakeholders and domain experts to monitor the critical metrics, identify the patterns, and make data-driven and informed decisions without relying much on the technical team's intervention. This ability to present the data at the forefront empowers business decision-makers to act swiftly, ensuring continuity and efficiency. The data scientists add another dimension to this section by applying advanced analytical models to predict outcomes and recommend optimal actions. The data scientists help in realizing beyond just describing what has happened to forecast what can or might happen next and how the organization can respond. For example, the predictive models can anticipate "*customer churn or identify customers for targeted campaigns*"- as quoted by Participant

4, so that they respond positively and realize the target campaigns have better potential. These developed models form an important layer for strategic decision-making, enabling the organization to allocate resources more efficiently, stay abreast of the market, and gain a competitive advantage.

Despite the technical team's critical roles, several challenges can hinder the seamless transition of the insights into actions. One major issue that Participants 3, 4, and 8 highlighted was the "*disconnect between the data teams and the business*" organization's leadership team. It is challenging to align the work with strategic priorities and business goals. This misalignment can lead to inefficiencies among the technical teams that develop tools or models that do not fully align and meet the needs of the decision-makers at a higher level. Another common challenge is that advanced analytical models take time to develop, and due to the sophisticated models that the technical people implement, they take time to be live and used by the business decision-makers. Participants 9 and 10 highlighted that "*Rigid IT systems and policies*" result in delayed deployments and reduce the relevance of the insights when deployed due to the timeline of the deliverables. In some organizations, the technologies are not centralized, which causes problems, such as business decision-makers not having cutting-edge tools and dashboards and relying on less efficient tools.

Though these challenges exist, automation and establishing scalability serve as a cornerstone for enabling strategic decision-making processes. Automation helps workflow and processes run with fewer manual interventions and helps realize the data faster for the decision-making processes. This also enables the business teams and the other stakeholders to generate insights and actionable items even in an ad hoc manner for a quick turnaround. Scalability is another essential aspect for seizing the opportunities, particularly in the large-scale organizations. The centralized systems, when it comes to data platforms and tools, enable a unified and trusted single source of truth and ensure that there are fewer silos, and help various "*… business operations to*

collaborate efficiently …," emphasized Participant 9, ensuring cross-functional decision-making in a scalable fashion.

It is essential in this step also to realize that this is not an isolated activity. It requires a collective and collaborative effort and involvement from the technical data teams, business experts, and the organization's leadership team. Also, this must be a cyclic iteration of the process with continuous feedback from the business to realize the full potential of the data. With all the aforementioned challenges, the evolution of tools, processes, and the collaborative process within the organization enables the organization's ability to seize opportunities and make impactful strategic decisions.

Transforming process and reconfiguration

This is one of the crucial steps so that the organization can remain agile and responsive to the constant market demands and the competitive business environment. This step not only concentrates on implementing new technologies and using a high-tech landscape but is also about strategically aligning these with the organizational goals, embedding actionable insights into operational items on the business side. This helps foster a system where decisions are data-driven and both proactive and adaptive.

The transformation capabilities and the processes are at the core, emphasizing data as the driving force for the decision-making process across the organization. This transformation step is not a standalone one; it is a flow process where the other two sections of the dynamic capabilities are the primary inputs for this step. As discussed in the earlier steps of dynamic capabilities sensing and seizing, the data professional also plays an important role here. They build systems and platforms that are highly reliable and provide scalable infrastructure for the decision-making process to flow seamlessly. In dynamic industries, for example, "*retail or finance real-time data processing provide insights*," where the conditions can rapidly change and require immediate actions to stay

abreast with the competition and retain the trust among the customers, highlights Participant 5.

Transforming and reconfiguring are the most vital steps for an organization that aims to stay competitive and adaptive in a rapidly changing environment. Transformation is not a single-time event; it is an ongoing process of evaluation and refinement. Also, we need to have a continuous and constant feedback loop between the data teams and the business professionals. The role of automation is also a key enabler for the process transformation that allows the organization to streamline the workflow, enable manual interventions, and "*automate the end-to-end process …*" highlights Participant 8, of generating insights from the data and constantly evaluate the validity of the insights from that and make changes to the base process as required.

Though this is a significant step, and there are numerous benefits from process transformation and reconfiguration, it comes with its challenges. One of the significant hurdles the data experts highlight is the "business and the upper management not realizing" the technology's benefits. Due to this factor, upgrading and reconfiguring take longer to realize and act. Also, explaining the long-standing legacy platforms to adopt new technologies and data-driven methods is difficult. There have been cases where certain business users and stakeholders are hesitant to move away from traditional ways of doing things and incorporating the data-driven approach in critical places; it comes down to "*… trusting data*," as highlighted by Participant 1. Implementing new technology and providing quality data are two of the steps. It is also important to gain the trust of business owners and executives to trust the data. Gaining trust is a crucial thing when it comes to reconfiguration.

In most organizations, where they take steps well ahead of the process transformation and reconfiguration, they start by "*implementing this process at one business unit level*" to gain the trust of the business team and the stakeholders, as highlighted by Participant 10 Then, they scale these new processes and workflows across all the departments to

ensure the entire organization is in the same line. All the departments reap benefits from this transformational change. The process transformation is at its heart regarding the strategic decision-making process, enabling smarter, faster, and more impactful decision-making. It is instrumental in this step that the technological solutions enable the simulation of various scenarios and predict the outcomes. The simulation gives decision-makers a clearer understanding of how process changes might affect the overall performance and the benefits and risks of different strategies. So, this step helps the data professionals to sense the actual realization of their work aligning with the strategic business goals. The continuous feedback and reconfiguration also enable organizations to maintain agility, drive innovation, stay ahead of the competition, take appropriate strategic decisions, and succeed in their business operations.

Data strategy

In the modern world, data strategy is a blueprint for organizations to align their data resources and capabilities with business objectives. From the perspective of Participants 8 and 9, "*data strategy is not merely data tools and infrastructure…*" it consists of a comprehensive approach to making data an integral part of strategic decision-making. Data strategy encapsulates various processes and elements, as illustrated in the theoretical lens (Figure 5). It comprises data quality, compliance, security, policies, resources, and skills that deliver actionable insights and help organizations navigate complexity, foster innovation, and maintain a competitive edge in dynamic market conditions.

A robust data strategy begins with developing a structured and scalable foundation, which involves setting up systems that can manage vast amounts of data effectively, ensuring data quality and the availability of analytical solutions for decision-making. The key to this foundation is ensuring that data is consistent and accurate. Participant 1 highlighted that "*data validation and data quality assurance process which are often*

overlooked" is essential and must be embedded into every stage of the data lifecycle from the collection to analysis. Data governance is equally critical in shaping data strategy. From the technical perspective, it provides the structure for managing data access, security, and compliance. This also ensures that sensitive information is handled appropriately, especially in industries with stringent compliance and data regulations. This process helps enforce access controls and data lineage to maintain transparency and accountability.

For empowering strategic decisions through data-driven insights, the data strategy helps transform the information from raw data from the source system to actionable insights that drive strategic decisions within the organization. Another important factor is the feedback loop, which ensures decisions are continuously evaluated against the outcomes, enabling the organization to refine its strategies over time.

A forward-thinking data strategy incorporates advanced technologies to enhance decision-making capabilities. AL/ML allow organizations to automate processes, uncover patterns, and gain insights that might not be visible through traditional analysis, such as reporting. For instance, Participant 2 mentioned that "*AI systems can help detect anomalies and trends*" in real-time, enabling organizations to respond swiftly to opportunities and threats. The cloud-based platform further amplifies the effectiveness of the data strategy by providing scalable storage and processing power that helps organizations handle the ever-growing data volumes without significant infrastructure investments and maintenance costs. These systems enable the team to access and analyze the data in real time, fostering collaboration and alignment across geographic locations.

For the data strategy to be effective, it must align with the organization's overarching objectives and goals. This alignment ensures that the technical initiatives directly contribute to the business outcomes. Participant 9 highlights, "*heads of the departments need to understand the importance of technology,* " which will eventually contribute to

data-driven business outcomes. Another essential element is the collaboration between the technical and the business leaders so that they define the priorities and design data solutions that enable ways to address the organization's strategic needs. For instance, if the organization prioritizes customer retention, the data strategy might focus on "*gathering and analyzing data to identify patterns of customer churn*," as highlighted by Participant 4. This can help the organization develop the required solutions to retain customers.

A successful data strategy also extends beyond the technical aspects and the infrastructure to foster a culture of data-driven decision-making. This involves educating teams about the data's value, providing the required tools and training, and encouraging transparency in how the data is used to guide decisions. According to an interviewee, the most challenging part in implementing data strategy is not the technological aspects but the people within the organization. Participant 5 explained, "*The hardest part is cultivating a data-driven culture within the organization*". Technical professionals play a key role in this cultural shift by designing systems that make data accessible and understandable across business units and stakeholders. They also focus on bridging the gap between the raw data and the actionable knowledge. In addition, data ownership, the data product owners, and the data stewards play a crucial role in enabling the data-driven culture within the organization. Data strategy also mainly focuses on bridging the gap and disconnect between the technical and the businesspeople regarding technology and resource perspectives.

Strategic decisions

Strategic decision-making processes are at the core of data-driven operations, where the insights derived from the technical systems are used to guide long-term organizational goals and priorities. From the point of view of the technical data professionals who contribute by building systems and solutions for data-driven strategic decision-making. The significant challenges faced by the technical professionals on the data side are the

“lack of interactions between the leadership and the technical team” and focusing on “specific use cases without a broader picture, " highlighted Participant 5. This can result in inefficiencies, missed opportunities, and underutilization of the potential of the technical expertise available within the organization.

One of the most frequently faced and cited challenges among data professionals is the difficulty in understanding how their work contributes to the overarching goals of the organizations. Data professionals like data engineers and architects build the base for supporting specific use cases, such as building a pipeline to process transactional data from the business to a new system. While these tasks are essential in the technical aspects, they are often disconnected from their strategic objectives. The absence of a comprehensive overview and organizational priorities limits the ability of the technical professionals to prioritize the tasks effectively. What happens here is that the technical teams without these “*focus only on the operational efficiency without much knowledge on the strategic value*”, says Participant 8. Often, this results in technical people not realizing the impact they create, i.e., “W*hat does our work create in line with the strategic goal of the organization?*” again highlighted by Participant 4. They know what helps at the near business level, but connecting the dots to the organizational goal level is often missed or overlooked. This can often lead to developed solutions and models that focus on the specific use cases and do not consider the overall functional or organizational objectives and goals.

The focus on the specific use case is valuable in addressing the operational needs and can create a tunnel vision effect that prevents data professionals from contributing to the strategic integrations. For instance, the earlier example of the customer retention model developed for a specific use case for a business unit creates an excellent solution for the specific business use case. However, this tool is not integrated with the broader organizational goal of providing improved customer experience or developing long-term retention strategies, resulting in a limited impact. Also, building foundations for the data platforms is mainly carried out to support a single project as a proof of concept, and it lies

in staying for longer periods rather than short-lived and proposing a robust and scalable solution. Often this problem arises because, in most cases, each business unit works in silos, their needs are not communicated with a broader audience, and the priorities are not interconnected in that sense. This causes a lot of disjoint and gaps in building and maintaining a robust solution that's scalable across different business units. Most interviewees feel from the technical perspective that having a long-term goal can help them design and build more robust solutions that cannot just suffice the current needs but also look further ahead.

Another recurring challenge quoted is the limited interaction between the technical teams and the senior leadership. Data professionals often work in several layers, keeping far away from the decision-makers in the larger organization. They often receive directions through intermediaries rather than communicating with those shaping the organization's strategy. It is not required for the base-level engineers to be in touch with the senior leadership, but proper product owners and business owners who are in constant contact with them and are part of the data teams who provide all the essential information for the development. This "*lack of direct communication can result in the misaligned expectation …*" quoted Participant 2. The absence of leadership interactions also limits technical teams from advocating for their priorities, such as the need for better data strategy and governance capabilities, additional resources or advancement in the tools, or what they call in the technical world working on the technical debts.

Organizations must foster stronger connections between the technical teams and leadership to overcome these challenges. This begins by repeatedly creating opportunities for direct communication. The technical teams can better understand organizational priorities and tailor their work to align with these goals by participating in these discussions. Also, the businesspeople in the team need to keep the technical team members informed on the value that the technical solutions they build help at the organizational level. Also, there needs to be cross-functional collaboration encouraged to prevent silos and promote the integration of solutions, and these collaborative

approaches ensure that technical solutions designed are with strategic integration and decision-making in mind.

4.1.2 Business and Domain Experts

This section concentrates on the analysis from the point of view of the non-technical stakeholders like the product owners, business domain experts, directors, heads of the department, and executives who are experts in decision-making processes. These people have a rich experience in the domain and the business area in which they operate. This section analyzes the data, focusing on the challenges, expectations, contributions, and recommendations. Each dimension used in the technical framework is covered in depth.

Big data foundation

From the perspective of business and domain experts, big data represents an underlying framework that "*enables the access, interpretation, and use of the data effectively for the decision-making processes*", quoted Participant 5. While the technical teams and the experts focus on developing and maintaining these systems, business stakeholders are more concerned with the delivered outcomes. They seek simplicity, reliability, and usability in their interactions with data as it directly impacts their role and the work they deliver in the organization.

One of the recurring challenges for business experts is the inaccessibility of the data due to the fragmentation of data systems or the silos of data that resides with each business unit. The data stored across the various platforms and systems without a unified structure makes it difficult for business users to gather all the necessary information. These disjoint arrangements of the platform delay the decision-making processes and increase the risk of data inconsistencies. Another key issue is the "*quality of the data …*" available within the organization. Business users often report challenges with

incomplete, outdated, or inconsistent data, which can " ... *undermine their confidence in the generated insights*," *quotes* Participant 8. This lack of trust in the data within the business team members can deter the non-technical users from fully adopting the data-driven practices and falling back to some traditional way of deriving insights based on intuitions or historical experiences.

From the usability perspective, non-technical experts expect data platforms to provide intuitive interfaces and standardized metrics. They value the systems that allow them to extract insights without needing to have extensive technical knowledge or support. It is essential to note that a minimal technical background can help the business provide valuable insights to the technical team and understand the capabilities that the big data technology platform can provide.

To address these challenges, organizations must focus on creating user-centric data platforms that cater to the needs of the business needs and non-technical users. Participant 5 says, "*It is essential that the technical users develop easily accessible solutions for business users*". It is essential to design interfaces with simplicity and clarity, implement robust data quality measures, and foster collaboration between the technical and business teams. Often, there is an underplay regarding "*data product owners* or *business domain experts being part of the data platform team*," highlights Participant 5. Many participants highlighted that there is always a gap in having essential business representatives regarding the data platform work. These roles are vital for the data teams to develop highly reusable and scalable products across the organization. This also helps reduce the disconnect between the technical and the business expert's communication.

Another key aspect discussed is the feedback loop, which can ensure that the systems evolve to meet the changing needs of the businesses as the demands and market conditions change. A constant push-and-pull prevails in business, and businesspeople must be on top of it. Many of them feel that these can also be predicted and forecasted

at an early stage by the development of robust data platforms. For this development, it is not just the raw data from the business operations that is required but also the expertise from the business team that needs to be passed on to the technical team to realize the full potential of the data.

The collaboration and communication between the data platform technical team and the business and leadership team are essential to highlight the needs and pain points with which the technical team can design and develop reliable and relevant platforms for the business to derive strategic decisions.

Sensing opportunities and threats

Sensing opportunities and threats is critical for organizations that aim to maintain strategic agility and respond effectively and promptly to dynamic market conditions. Participant 9 highlights that this process "*involves interpreting data-driven insights to identify the emerging trends*, *anticipate market risks*, *and align observations to the strategic goals*". In the previous context, from the technical developers' perspectives, they developed the infrastructure and models for sensing, and the business professionals and the leadership personnel looked at applying these insights within a broader organizational context. This capability has become a cornerstone for strategic decision-making and organizational resilience in this era of technological advancement and modernized data platforms.

For business professionals and executives, sense is not just about recognizing the patterns or the trends but understanding their strategic implications. Leadership teams often rely on the sensing mechanism to look at the "*shifts in the customer preferences or the demands of the competition dynamics in the market*," highlights Participant 8, and the technical advancements connected to the business side. In dynamic capabilities, sensing serves as the first block of agility within the organization to remain proactive and vigilant with their responses to external changes. This area is essential for avoiding curve

balls that could lead to missed opportunities or unanticipated threats. Big data amplifies the potential of sensing by offering real-time insights and predictive capabilities, allowing organizations to be well informed to stay ahead.

The domain experts and executives commonly highlighted a few challenges that fall under this area of sensing opportunities. These can hinder the potential to leverage these capabilities fully. One of the significant challenges is the "… *lack of contextualization* …" emphasizes Participant 6, while the data platform numbers and aggregates results on the information required by the business. Most of the time, it lacks explanations of why this trend or decline occurs. Without this context, it becomes challenging for the business to devise appropriate corrective actions. Another common issue is the delay in receiving the data; there could be multiple reasons why there is data delay for the real-time data analysis. This causes delays in responses and, in some worse cases, monetary loss for the organization. One final challenge that Participant 9 discussed is the siloed data: "W*e are unable to combine and derive insights from the data since they are not in a single place*." This can impair a more comprehensive and cohesive view of organizational performance.

They should go beyond basic data collection and analysis to sense opportunities and threats. They must provide clear, actionable, and contextually relevant insights that align with the organizational priorities. Business professionals and executives must expect big data systems to enable proactive decision-making processes. Participant 5 explained, "*For example, in retail, the logistics team uses these platforms to plan their deliverables promptly*". Also, leaders and business professionals highly value customizable tools to enhance the outcomes that these tools provide by changing the parameters and seeing the trends and the performance insights.

Business professionals, leaders, and executives are pivotal in shaping the sensing mechanism to ensure its relevance and usability. Their domain expertise provides the context needed to refine the sensing models and prioritize the metrics that matter the

most for the organization. It is also important to note that businesspeople can “contribute to *fostering a culture of the data-driven decision-making process*,” highlights Participant 10. By utilizing these big data tools and technologies and emphasizing their importance in strategic planning, leaders can encourage the teams to adopt and integrate these systems into their daily processes and workflows. They can also be a part of the important connections and discuss with the data teams to foster better collaboration.

Effective sensing mechanisms have profound implications for the organization's strategic decisions, bringing in over agility, realizing opportunities early, mitigating risks that cause irreversible damage, and adapting strategies to face the changing circumstances. So, for the business, it is essential to understand the value of the technology to foster strong collaboration and communication with the team, enabling the better use of technical expertise and running the business. It is also important for business professionals to invest in the training and adoption of tools and technologies and gain the confidence needed to use what has been developed by the technical data platform teams. This enables the realization of the full potential of the data world and all the relevant insights required for the strategic decision-making process.

Seizing opportunities

Seizing opportunities involves converting the insights into actionable strategies that deliver tangible outcomes. For the professionals on the business side, this is a crucial dimension in bridging the gap between the analysis and the implementation. While the technical teams develop the tools and the required models to identify the opportunities, the business stakeholders focus on accessing the feasibility, aligning, and executing them effectively. As discussed earlier, Participant 8 highlights that “*big data tools and technologies play a major role in offering insights and enable decision-making*".

For the executives and the business leaders, seizing opportunities is central to achieving competitive advantage, either expanding to new markets, launching new products, or optimizing operations in existing service areas. The ability to act swiftly and decisively determines the success. The interaction with Participant 10, a senior leader with a technical background at his earlier stage, highlights that "*big data can help in offering actionable insights that guide in strategic planning and resource allocation*," which is perceived as the key enabler in this dimension of dynamic capabilities. This concept of dynamic capabilities emphasizes identifying them and mobilizing the required resources to capture the value out of them.

Many challenges were discussed during the interview; a few can be tagged. As discussed in previous dimensions, the fragmentation of data insights or the data silos makes it difficult to develop strategies from a data-driven angle for executives. In many organizations, this results in data-driven decisions to stay at the business unit levels and not to be realized enterprise-wide. This misalignment hinders the organizations' ability to act comprehensively to identify the opportunities at the strategic level. The next is the resource allocation constraints. Business leaders often face budget, personnel, or time limitations, and these factors can dilute the execution of strategies.

From the business leadership perspective, effective seizing capabilities require insights to be actionable and well-aligned with the strategic goals. The insights should not merely identify the opportunities but guide how to act clearly in recommendations. The tools or dashboards showing essential data for data-driven decisions should show trends and action recommendations to enhance performance. Also, the business professional plays a vital role here by contributing the critical contextual knowledge that complements the technical insights derived. Their expertise helps evaluate the practicality of the proposed solutions or actions and align them with the organizational goals and objectives. Leadership plays a key role in driving collaboration across different business units by setting clear priorities and fostering communication among different divisions within the organization, thereby working towards a common goal.

To empower the business professional to realize the full potential in this dynamic capability stage, the organization and the various teams should focus on building highly "*interactive dashboards and solution …*" highlights Participant 6, which are systems that consolidate insights from different angles and business areas, offering a view of opportunities and implications. For instance, during the interview, Participant 8 highlighted, "*In sales, the business team can assess whether a pricing strategy is feasible given the market conditions and market conditions with the use of internal and external data*". Also, in the case of seizing opportunities, it is essential to help and equip the decision-makers with tools that allow them to test different approaches and choose the best and the most effective strategy that can help them make informed decisions and actions.

Transforming processes and reconfiguration

Transforming processes and reconfiguring workflows are vital for maintaining the organization's operational efficiency and strategic agility. For business professionals, this dimension is about rethinking how the organization can better align with the "*changing market demands, technological advancements, and strategic goals,*" highlights Participant 2. It is pivotal for the organizational leadership to look at this dimension from all these angles and use the tools and data to support the transformation while focusing on aligning these changes with organizational priorities. The most important factor is bringing alignment within the organization and enabling smooth "*adoption of the change in processes across the teams and business units,*" highlights Participant 8.

Process transformation is a technical exercise and a strategic initiative to improve efficiency, reduce costs, and enhance customer experience and satisfaction. This dimension is of prime importance for executives in achieving a competitive advantage in fast-changing market conditions. Dynamic capabilities emphasize the importance of adaptability, and transforming processes is a key component of this adaptability process.

For the leaders, this means creating systems that can evolve alongside the market conditions, enabling the organization to remain agile and responsive.

Though this step is quite an important one, there are multiple challenges that the organization would face. Participant 5 from the business side highlighted these challenges: "*Resistance to change and integrating data-driven processes to existing systems*". The first significant barrier is the resistance to the process of transformation. Businesses or end users often hesitate to adopt new workflows and processes. It could be due to a lack of clarity or the lack of benefits or disputes over some established routines they follow. Another challenge is the integration of data-driven processes into existing systems. Business users may struggle to incorporate new tools or metrics into their decision-making workflows, especially if they are not well-aligned or intuitive with their needs and objectives. Participant 10 pointed out that "*oftentimes insufficient coordination across the teams*" can result in challenges to implement the new systems and process, which could be beneficial. As discussed in other dimensions of the dynamic capabilities, communication and collaboration across different business units involved in the process change is important. At the same time, involving business personnel and end-users early during the design or brainstorming phase is essential to consider.

For a smoother enablement of the strategic transformation within the organization, the business professionals and the leadership expect the initiatives to be well-planned, consider minimal disruption, and align clearly with the organizational priorities. Clear communication benefits business users and technical teams by realizing their work faster. Participant 5 highlighted that "*having a business-oriented person in our team made much difference when it comes to implementing change*". It helps bridge the communication gap, clarify the requirements at an early stage, and provide feedback as needed during the whole process of the transformational journey. Another important factor is the Most Viable Product approach, which works at the bare minimum, asks for feedback, and incrementally implements the change process. This can help minimize the disruptions and adapt gradually.

In this stage, the business leaders and domain experts contribute to the transformation efforts by identifying existing process inefficiencies and suggesting practical improvements that could help enhance the business front. The leadership plays a key role in securing the buy-in from the respective stakeholders, ensuring that the necessary support is available at all levels of the organization. Collaborative planning, continuous monitoring, refinement, and feedback are essential for successful transformation and reconfiguration.

Data Strategy

For business professionals, executives, leadership teams, and domain experts, the most critical aspect of data strategy is its alignment with real-world opportunities and challenges. According to Participant 8, business teams expect the data strategy to *"focus on delivering data-driven and fact-based solutions to their pain points"*. While the technical teams design, develop and manage the processes, the business users perceive the data strategy as a bridge between the data potential, the tangible impact on the business outcomes, and the advantage the business gains from it. So, here, the emphasis is on accessibility, usability, and alignment with the business priorities, ensuring that the data not just supports the operations but also contributes and drives innovation and growth, thereby being a precursor for strategic decision-making processes.

The common point highlighted from the conversation with different business experts is the need for practical alignment regarding the data strategy. The domain professionals expect that the data strategy focuses on delivering solutions that address the business gaps and needs and that they are aligned across the data teams and the various departments involved. The key expectation regarding data strategy is clear communication and what it aims to serve. The business experts also have concerns or challenges regarding data initiatives presented in overly technical terms, making it difficult to understand how these initiatives contribute to the broader organizational

goals. Clear communication and building a culture where the data and business teams can speak the language that each other can understand is key. Using terminology or glossary that spans the business landscape. It is also essential for the technical team to understand and communicate the initiatives in a way that could highlight the values they could bring to the business. Participant 5 highlighted that "*the product owners and the data stewards can do this*".

One significant challenge faced by the business user and the leadership team is the distributed and fragmented nature of the data initiatives. As the technical experts highlighted, the business experts highlighted that often, due to various reasons like business priority and other factors within the teams, data projects are treated as isolated efforts within the individual departments. This tries to downplay the data strategy's main aim, often realized as a unified effort. Another challenge is the persistent resource allocation across different departments and organizations. Business owners find it challenging to secure the budget for technological advancement and resources from within the organization and bring in consultants who can help develop higher-end solutions that can help bridge the gap.

Some of the key expectations of the data strategy from the business perspective are data security, quality, and compliance. It is essential that the data that the business teams and leadership use are of high quality and trusted for the decision-making processes. This can be fostered by constantly delivering solutions that show realistic problem-solving data solutions. Participant 10 highlighted that "*multiple initiatives that the data team has accomplished and those directly had an impact on the business helped gain trust*". Trusting the data as the base for decision-making is an ongoing process, not a one-off initiative. The data ecosystem's value should integrate seamlessly with the business's existing workflows. Considering the strict regulatory and compliance policies regarding data, it is essential to have stringent policies that abide by and fulfill those following the state and the central government and when considering the EU laws concerning customer data usage.

One of the recommendations for achieving a business-focused data strategy is developing a centralized governance and security framework that aligns with all the data initiatives within the organization. Participant 10 highlighted the importance of having a centralized team that could "*develop*, *maintain*, *and provide centralized tools and platforms*" that empower business and different business units to explore and utilize them independently and to "*regularly review and update the data strategy*" to ensure it evolves with changing market, organizational needs, and strategic decision-making process.

Strategic Decisions

The data-driven strategic decision-making is the culmination of all the data-driven efforts within an organization, where the insights are synthesized to serve the long-term goals, objectives, and priorities. The process involves interpreting data within their expertise and ensuring that the decision aligns with the business unit objectives and then overarching to the organizational strategies.

From the business perspective, strategic decision-making is about analyzing and transforming the data into actionable insights and strategies. Domain experts, product owners, business owners, and business unit leaders often interpret the data. During the interview, Participant 10 said, "*With the well-established data foundation*, *business leaders contextualize insights in their teams and ensure alignment and better business decisions are derived*". It is crucial that the data is being rendered to a level that it can deliver the right amount of information for the leaders to make informed decisions.

Even in larger organizations with "advanced data platforms and reliable data, seeing strategic decisions made from data is quite minimal," highlighted Participant 5. Even though many organizations have well-established data platforms, one key factor to consider is alignment. In many organizations, the data-driven decision-making process is

limited to the department-wide or cross-department-wide, and scaling up long-term business goals is not that dominant in many cases. Participant 5 mentioned that "*intuition and experience-based strategic decision-making with supported reasoning*" is seen in organizational-wide strategic decision-making. This could happen because of the gap in the collaboration and communication between the technical data experts and the leadership team, and each department is looking at its objectives and goals and not considering the overall picture. Here, the most important factor to be considered is trying to limit the solutions specific to a use case, considering them from a broader perspective regarding the actual implementation, and establishing strong collaboration between the technical and the business teams.

Diving deeper into the collaboration and the context is important at this point. A strong collaboration between technical and business experts is quintessential for strategic decisions to be impactful and stem from data-driven solutions. The domain experts provide the context to interpret the data accurately and align with the organization's objectives and priorities. Similarly, business leaders play a key role in bridging the gap between the data insights and the organizational execution. Advocating data-driven strategies from the leadership team can help different departments within the organization to buy in and adopt data-driven decision-making, which can then stem up to organizational-wide strategic decision-making.

Business experts, leaders, and executives are important in establishing strategies to inculcate a data-driven mindset and culture within the organization. Training and informational messages must be sent to different teams within the organization to spread awareness of its importance. Participant 4 highlighted, "*I have seen frequent use of data-driven tools and reports in the department-wide presentations but not in town halls and executive level presentations*". This boils down to the fact that there needs to be tools and systems that can provide inputs for the organizational level performance and then the ability to drill down to the lower levels. The leaders on the data side must take

the initiative to bridge the gap in taking data-driven decision-making to the next higher levels.

Participant 8 highlighted the importance and need of "*speaking in terms of Return on Investment (ROI)*." When data-driven tools and solutions need to be presented at a higher level, the technology aspect is one part, but the most important factor is the return on investment that the business would get from this work. This falls under the purview of data leads and data strategists, who want to present their solutions and ideas so the leadership can see their value and emphasize the benefits they can bring to their day-to-day work.

So, from the business experts' and leaders' perspective, it is not just the bare need of the technology and model development by the data professionals; it requires that they understand the value that it can provide and sell it to the intended audience and strive to inculcate the data-driven culture from their end as well.

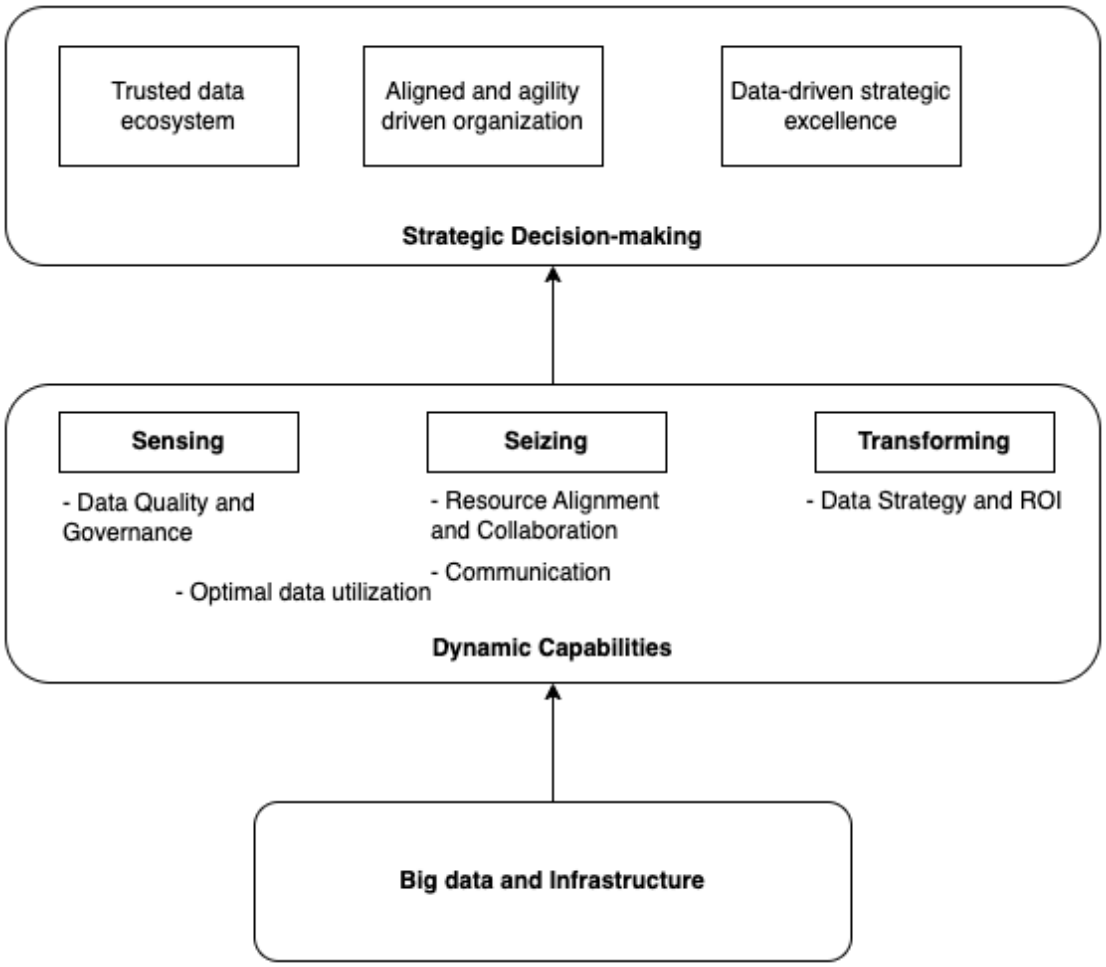

Figure 8. Theoretical framework derived from data structure (Figure 7)

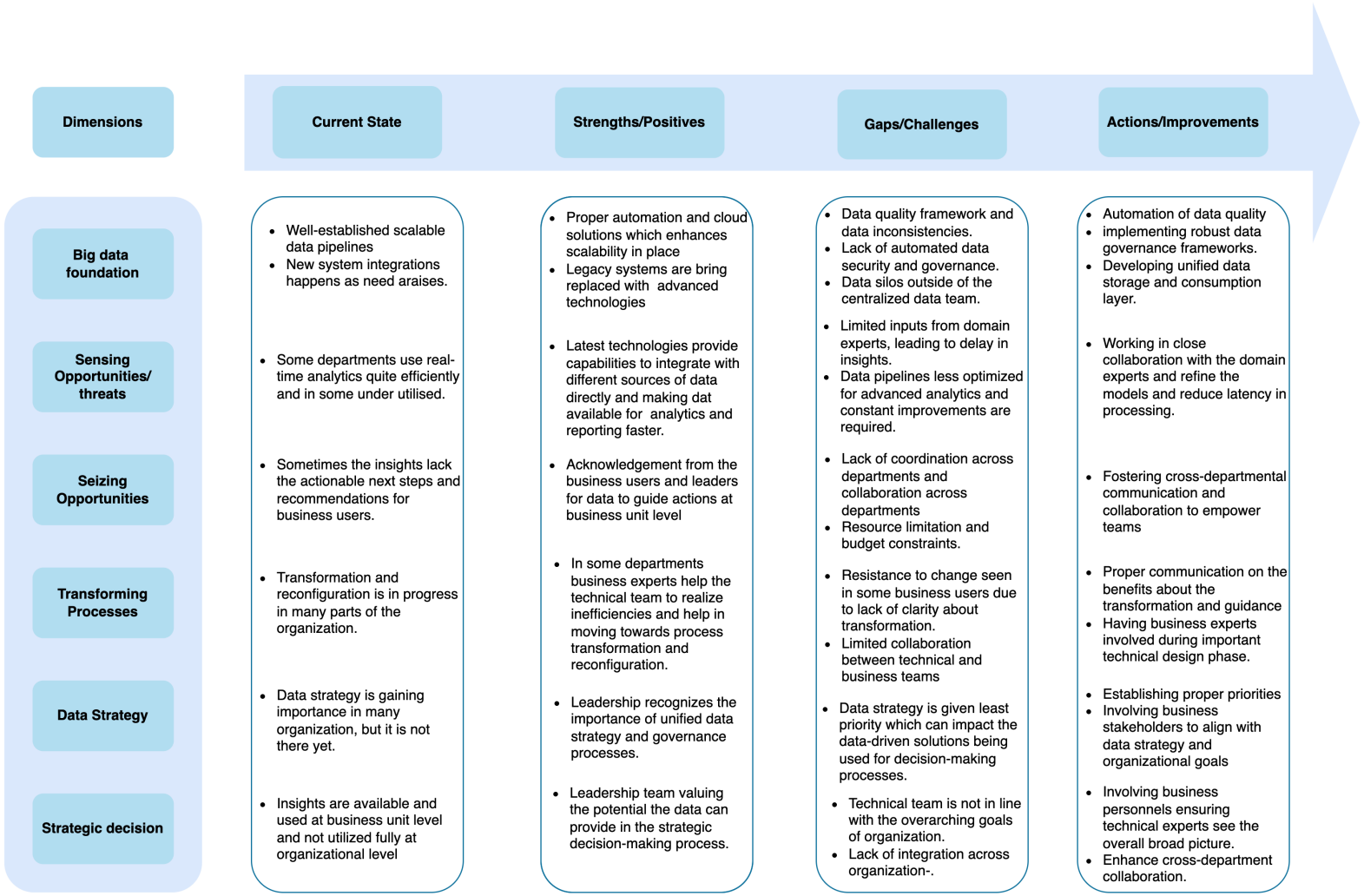

Figure 9. Filled framework canvas from the responses during the interview

Figure 8 represents the practical framework developed from the extension of the dynamic capabilities framework with big data as the foundation layer that supports strategic decision-making. In practice, each business unit can use this framework to see where they are regarding each dimension. Each dimension is essential in the current technology stack to serve the business needs better. Moreover, this can then be spiraled up the ladder to the cross-department and the organizational level.

This is not a one-time activity that is carried out but rather a reoccurring activity that can be carried out following each team's needs. It is essential that the action points and improvements are recorded in the JIRA or any tool or documentation platform the team has, and the progress can be updated and monitored. Also, it is essential to involve the businesspeople and technical people concerned during this activity so that all the team members are well informed on their activities and goals.

These meetings should be a platform where the technical and business teams can speak on their achievements, roadblocks, gaps, what needs improvement, and how they plan to move towards it. This also helps bridge the knowledge gap on what is expected from the technical teams and opens venues for further discussions and enhancements that can be carried out and developed for the business to stay ahead. The main goal of this activity is to find out how the current big data system is providing support in the strategic decision-making process, what the strengths are, what the challenges are, and what actions need to be taken. Also, build a platform for everyone to voice their opinion and collaborate efficiently. In the long run, these activities can help businesses strive towards a robust data-driven strategic decision-making process and enhance their dynamic capabilities in dynamic market conditions.

5. CONCLUSIONS

This study highlights how using big data in industrial settings helps organizations strengthen their dynamic capabilities, leading to better strategic decision-making. By ensuring data quality and governance, companies can make better sense of the changes in their environment, identifying patterns and emerging trends that otherwise might go unnoticed. At the same time, collaboration, communication, and strategic execution allow businesses to act on these insights efficiently, making data a core driver of decision-making rather than just an afterthought. It also does not stop there; organizations must adapt and transform continuously, ensuring that their data strategies align with the long-term business goals and market demands.

A strong and trusted ecosystem is the foundation for the shift, enabling businesses to become more aligned, data-driven, and proactive in their strategic choices. Instead of leaning more towards intuition, companies that try to embrace big data to gain the ability to make informed and well-supported decisions can improve their business efficiency, agility, and long-term success. In short, big data is collecting information and using it to anticipate change, take decisive action, and build a sustainable competitive advantage.

5.1 Theoretical implications

This study contributes to the theoretical work by addressing the critical gap cited at the beginning of the paper on the research gap, i.e., the foundational role of the big data itself as opposed to more research carried out on the analytics, AI/ML, which are derived from it, in enabling better strategic decision-making. While reviewing existing literature, it became evident that much of the focus has been predominantly focused on how analytical tools, business intelligence, and other technologies aid decision-making processes (McAfee & Brynjolfsson, 2012; Wamba et al., 2017; Akter et al., 2020), while

less attention has been paid to the foundational aspects such as big data, data quality, governance, and other factors that fall under the umbrella of data strategy. This has also been highlighted in earlier research by Mikalef et al. in 2018.

This study enriches the discussion by positioning big data as the core enabler for strategic decision-making, extending the theoretical framework of dynamic capabilities (Teece, 2018). It reinforces and refines the dynamic capabilities framework – sensing, seizing, and transforming capabilities (Teece, 2018) by establishing that these capabilities are not standalone but are highly dependent on the robust big data infrastructure. The sensing opportunities and threats require quality data that is timely and relevant data, as previous studies have also suggested (McAfee & Brynjolfsson, 2012; Wamba et al., 2017). Without high-quality and trustworthy data, even the most advanced analytical systems cannot effectively identify trends or anomalies (Akter et al., 2016; Wamba et al., 2017). This study builds upon this argument by demonstrating that firms integrating strong data governance and management practices are better equipped to sense emerging trends and risks.

When it comes to seizing opportunities, this study highlights how the seamless integration of big data across business units facilitates coordinated action, enabling firms to better respond to shifts and demands in dynamic market conditions (Constantiou & Kallinikos, 2015; Mikalef et al., 2020). Organizations leveraging high-quality data can enhance operational efficiency, decision-making process, and agility (Davenport, 2014; Akter et al., 2016). This study extends the prior research by empirically demonstrating how organizations with mature big data capabilities outperform in strategic responsiveness and opportunity capitalization.

This study also enriches the transformation/reconfiguration process, as it demonstrates that data-driven transformation depends on the ability to transform and reconfigure the processes continuously based on insights. Embedding big data into workflows and processes enables organizations to adapt quickly, ensure resilience, and sustain

competitive advantage in dynamic environments (Brynjolfsson & McElheran, 2016). Prior research has explored the role of dynamic capabilities in transformation (Eisenhardt & Martin, 2000; Teece et al., 1997), but this study adds to this understanding by illustrating the criticality of a reliable and efficient data foundation in driving transformation efforts.

Additionally, this study challenges the traditional perception of big data as primarily an operational or technological resource by positioning it as a strategic asset. By emphasizing big data as a strategic asset, this study broadens its theoretical relevance, emphasizing that it is the foundation for achieving organizational agility and strategic decisions, this study broadens its theoretical relevance, aligning with calls in the literature to reconceptualize data not as a supplementary tool but as an integral part of strategic management (Fosso Wamba et al., 2015). This shift aligns with the increasing recognition that data-driven firms outperform competitors across various dimensions of performance and innovation (Mikalef et al., 2020).

Another key theoretical contribution of this study lies in its ability to integrate both the technical and the strategic perspectives of big data. While the technical part focuses on the effective design of the data systems and other related components such as data governance, security, and compliance, the strategic part emphasizes outcomes like competitive advantage. This study positions these two perspectives as interconnected. The study findings suggest that organizations that bridge this gap are more successful in leveraging data-driven decision-making, a perspective also supported by Wamba et al. (2017) in their study on big data maturity.

Furthermore, this study enhances the dynamic capabilities framework, explicitly incorporating big data as the driver for its realization. While sensing opportunities/threats, seizing opportunities, and transforming processes have been studied extensively (Teece, 2007; Eisenhardt & Martin, 2000), this study demonstrates that these capabilities are not static but dynamic processes that depend on data quality,

accessibility, and governance. By integrating big data and dynamic capabilities into a combined framework, this study provides an enhanced and robust theoretical model that bridges existing research gaps in the literature and provides both academic research and practical implications for strategic decision-making in the era of data-driven organizations.

5.2 Managerial implications

The findings from this study underscore the importance and necessity of organizations to develop a coherent, organizational-wide data strategy. This strategy should prioritize advanced analytics and foundational aspects like data, such as its quality, data governance, and other data aspects that are part of the data strategy. Managers/leaders should understand that well-governed and accessible data is quintessential in driving operational efficiency, strategic agility, and the decision-making processes within the organization. This study finds that fragmented data systems, inconsistent data, and untrustworthy data can often hinder the strategic decision-making process and reinforce the importance of well-integrated, high-quality data systems for the data to be used for the organizational-wide strategic decision-making processes.

Another significant managerial takeaway is the need to foster collaboration between the technical data and the business teams. This study highlights that the lack of communication between these groups can result in misalignment of the priorities and underutilization of the capabilities of the technical resources and the data initiatives in general. In this process, managers can play a vital role in bridging the strategic vision and the business knowledge that most technical experts lack.

Managers can help bridge this gap by getting more insights from the business and relevant stakeholders and integrating the technical work with the business impact it would create. Managers and leaders should establish a regular forum for interaction, where the business leaders can articulate the strategic needs and requirements,

whereas the technical experts can align these needs with developing solutions that make broader use across the organization.

This also ensures accountability and a sense of accomplishment for the technical experts with the work they do and the impact they create in the execution of the business strategies. For instance, the practical framework developed during this study can be used during these meetings to ensure that the various parties involved provide their inputs and are aligned and working towards accomplishing the same goal.

Hence, by fostering this collaboration and clear communication, the organization can bridge the gap between technical solutions and business outcomes, ensuring that the data initiatives contribute more toward organizational agility and strategic decisions.

The findings also emphasize the importance of creating data insights accessible to non-technical users such as business users, leaders, and executives. It lies in the hands of the managers who plan to invest in user-friendly tools, such as interactive dashboarding tools, that present insights and recommendations precisely and in an actionable format. Another significant role that the managers and leaders can play is in unifying the data tools across the organization, such that there is less fragmentation regarding the tools, technologies, analytical capabilities, and prevalent data platform.

This study also emphasizes the importance and need of bringing in unified data platforms and systems that can result in a unified way of creating and maintaining reliable technical solutions for the end business users. The findings also highlighted that the unified way of doing things can help enhance the quality and accessibility of the data for the decision-making processes.

Finally, the findings highlight how big data enhances and is integral to enhancing dynamic capabilities by embedding data into organizational workflows. Big data strengthens organizational agility and adaptability to dynamic market conditions by

improving the ability to sense opportunities and threats, seize actionable insights, and transform processes. Managers can play a crucial role in ensuring that the data strategies are explicitly aligned with these capabilities, prioritizing investments in the right place, and making the right budget decisions to enhance organizational agility and strategic decision-making processes.

5.3 Limitations and suggestions for future research

This study provides valuable insights into the foundational role of big data in strategic decision-making processes and dynamic capabilities; it does not come without its limitations. First, this study uses a qualitative approach, relying primarily on interviews with a selected group of consultants, business leaders, and domain experts. While this study offers rich contextual insights, the findings may not be broadly generalizable across different industries or organizational contexts. Future research could complement these findings with quantitative studies to validate the relationship between big data foundations, strategic decision-making, and dynamic capabilities across a more diverse sample of organizations.

Another area for future research could be the longitudinal impact of big data on organizational performance concerning dynamic capabilities and strategic decision-making processes. This study offers a snapshot of how big data foundations influence strategic decision-making and dynamic capabilities, but more emphasis and study can be done to track these effects over time. Longitudinal research could provide valuable insights into how data strategies evolve and their long-term impact on organizational resilience, particularly in response to disruptions and market shifts.

Lastly, this study's emphasis on the collaboration and communication between technical and business teams highlights a critical area for future exploration. Future research can investigate the practical models for cross-functional collaboration in data-driven organizations. For example, studies could explore how leadership styles, organizational

culture, and team structures influence the success of data initiatives and their alignment with strategic objects and decision-making processes.

While this study contributes to the theoretical and practical understanding of big data's role in strategic decision-making, its scope and methodology leave room for further exploration. Future research should consider a broader, more diverse sample that looks at the long-term impact and culture of the organization. By addressing these gaps, researchers can build on the insights of this study to deepen our understanding.

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APPENDICES

Appendix 1: Interview Questions

Interviewee's Name:
Interviewee's position:
Interviewee's years of exp. in the big data field:
Date of Interview:
Time spent in Interview:

Background

- Could you please share a little bit about yourself, your role, and your organization?
- When and how did your customer organization's big data journey toward aiding strategic decision-making start?
- How mature is the organization in terms of the big data journey and its role in aiding strategic decisions, and why?
- What sort of data tools do your organization/customers use for this purpose (Internal/External data? What tools in big data, etc.)
- How does big data help strategize decisions when considering the changing market demands and competition?

Practicalities

- What roles do managers and executives play in bringing value to this process? Do they understand the value of the big data and its potential?
- Who were the people involved in big data platform development and strategizing? Which departments of the organization are involved?
- What challenges does the organization face while building and gathering insights from the big data platform?
- How can the various departments and the organization evaluate and use new information and knowledge from the big data?
- Are there any specific challenges in generating insights from the big data for the decision-making process?
- From your experience and perspective, what are the main difficulties you face in discovering the area that the big data projects will focus on?

Findings and Insights:

- Have you used big data to scrutinize the market demands/changes and gather insights into the competitive environment? How did you use it, and what were the challenges faced?
- How has the big data helped gain a lead over the competitors? Moreover, has it also helped in other areas, such as reducing costs and personnel, increasing operational performance, and developing new services/products?
- In what ways has big data helped tap into emerging opportunities? What difficulties did the team face during this?
- Could you explain if the investment in big data has helped reap its benefits on strategic decision-making? If so, how long did it take, or does it need more time?
- What are some of your positive and negative experiences on this topic?
- Is there anything else that you would like to share on this topic?