CREATING CAPABILITIES TO LEVERAGE EXTERNAL DATA TO MATCH SUPPLY AND DEMAND:
A multiple case study

By

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I hereby confirm that this thesis has been written by me and is the result of my own work, with no help of generative AI.

Abstract

Researchers and practitioners from the field are focusing more on external data and a supply and demand match. While these ideas are frequently researched separately, there is currently little research addressing the possible connection between matching supply and demand and exploiting external data. It is critical to balance supply and demand in the market to become relevant in the highly competitive present economy. In addition, an increasing number of businesses desire to access external data but lack the knowledge on how to do so. The goal of this study is thus to provide a framework for the capabilities required to use external data and to determine how using external data to match demand is related to it. Eleven firms engaged in the process of utilizing external data participated in a total of 14 semi-structured interviews with the aim of developing a framework on the link between these concepts. Employees who often work with data as well as data professionals made up the sample of interviewees. Through a comparison of existing literature with insights gleaned from the interviews, we were able to present a coherent image of the relationships between the aforementioned notions and how they may contradict or complement one another. The findings demonstrated that using external data to one's advantage can improve the match of supply and demand, and increases organizational performance. The ability to leverage external data in the context of matching supply and demand is predicted to benefit from employee skills, organizational capabilities, and data management capabilities. An assortment that effectively addresses market demand through strategic collection and analysis of external data may positively impact turnover and branded search success. This study contributes to the current literature of organizational capabilities, performance, and supply-demand alignment. It distinguishes itself by focusing on external data in particular and providing all the capabilities needed to use it. Additionally, this research provides managers and employees with practical implications regarding key resources needed for the usage of external data.

Keywords:

Data management capabilities, employee skills, external data, organizational capabilities, organizational performance, supply-demand match, qualitative research

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1. Introduction

The traditional methods of managing a firm in the twenty-first century have been significantly impacted by Big Data (Chen, Chiang, & Storey, 2012; McAfee & Brynjolfsson, 2012). Big Data (BD) is typically thought of as linkable information with a lot of data and intricate data structures (Khoury & Ioannidis, 2014). Companies are increasingly concentrating their attention on the management of internal and external data as a result of the recent growth of the BD phenomenon in an effort to take advantage of new opportunities that will allow them to maintain their competitive advantage (Shan, Luo, Zhou, & Wei, 2019). On the one hand, BD has transformed every area of consumer lives, enabling businesses to find previously unrecognized patterns regarding customers, markets, and organizations (Yang, Madnick, Wang, F., & Hongyun, 2014). On the other hand, BD gives businesses the chance to monitor consumer behavior and assess the success of competing initiatives, which necessitates considerable organizational adjustments (Clarke, 2016; Tirunillai & Tellis, 2014; Kulkarni, Kannan, & Moe, 2012).

Companies use BD as a source of information for market demand. The capacity of a company to understand market demand heavily influences the competitive position of the company in its industry in the highly competitive market climate of today (Porter, 2011; Levitt, 2008; Christensen, 2013). But, the majority of companies are product-centric, focusing their marketing and sales efforts on selling the most lucrative products instead of looking what the actual demand is (Kumar, 2013; Srivastava, Sharma, & Kaur, 2020). This can be an issue because a company's financial performance can be more significantly impacted by supply chains that are focused on meeting customer objectives rather than on lowering short-term expenses and inventory (Lapide, 2006; Saeed, Yousafzai, Paladino, & De Luca, 2015). Alternatively said, improving competitiveness and financial performance requires 'commercializing' a supply chain by directing it toward demand-side goals (Porter, 2011; Levitt, 2008; Christensen, 2013; Liu, Zheng, Wei, & Yang, 2023). Therefore, it is required for a company to manage their supply more outside-in oriented. Outside-in means that by perceiving the external environment, integrating, and exploiting external resources, a company can enhance its internal operational management (Saeed, Yousafzai, Paladino, & De Luca, 2015), ultimately positively influencing the sales performance (Liu et al., (2023).

However, being outside-in and using external data can also bring some challenges. According to Aaser and McElhaney (2021) the main challenges with leveraging external data are: acquiring an awareness of what is accessible in the market, evaluating the economic worth and

quality of the data source, effective use and operationalization of external data, and adjusting the organizations current data environment. The lack of knowledge about sourcing and managing external data appeared to be the most prominent challenge (Krasikov, Eurich, & Legner, 2022). The majority of businesses still source data on an as-needed basis and have not yet developed professional sourcing methods (Krasikov, Eurich, & Legner, 2022). This indicates that there is little known about how to utilize these external data within a company when determining a product's demand (Saberi, Hussain, Saberi, & Chang, 2017) and for better organizational performance (Shabbir & Gardezi, 2020), while it is required to source and manage external data to enhance the benefits external data has to offer (Krasikov, Eurich, & Legner, 2022). However, organizations tend to poorly manage external data (Davenport, Evgeniou, & Redman, 2021) as a result of these challenges and barriers (Barlatier, Jasserand, Hohberger, & Mention, 2022). These findings from research demonstrate that most businesses are not facing a technology barrier in gaining a return on their investment in external data, in terms of performance. The largest obstacles are organizational in nature and include leveraging external data to support an organization (Vidgen, Shaw, & Grant, 2017).

To address these critical gaps in the literature, we base our research on the concept of BD capabilities, which we describe as a company's capacity to efficiently use talent and technology to gather, store, and process data in order to provide insights (Gupta & George, 2016), applied to external data. This paper makes the case that while external data is a valuable resource, it is not a sufficient prerequisite for generating increases in performance. In order to effectively utilize external data and match supply and demand to gain competitive performance, companies must have a distinct blend of intangible, financial, human, and technological resources. Even while a number of studies have started to take a more comprehensive approach to leveraging BD (Gupta & George, 2016; Wamba, et al., 2017), little is known about the mechanisms of leveraging external data an how this might lead to performance. Understanding whether the key components relevant to leveraging external contribute to performance benefits and by what methods these effects are accomplished, is crucial to drawing any significant theoretical and practical implications and identifying key areas of future study. Consequently, these three phenomena are being studied in trying to answer the research question of this study:

"How can creating capabilities enable leveraging external data in order to match supply with demand in organizations?"

To the best of our knowledge, this study is the first that combines the upcoming phenomena of external data and the process of matching supply with demand and performance. Thus, this

research extended current knowledge into how the use of external data may impact an organization's product range selections and ought to highlight the function that capabilities play in this process. We identified three main dimensions of capabilities, extracted from the observations and interviews, that are helpful for leveraging external data and beneficial for organizational performance. This study also created a framework that will assist organizations in utilizing external data and appropriating the value generated by it. In this way, this research contributes to the current literature of organizational capabilities, assortment planning, and organizational performance. Additionally, this study provides managers and consultants with detailed advice on how to get around specific challenges when using external data, such as search engine data. Another significant practical contribution of this research is to make businesses aware of the difficulties of implementing external data and the fact that, in addition to the technical challenges of moving toward an outside-in approach, internal capabilities are at least equally important.

To address the research topic and provide a framework concerning organizational capabilities and performance in the context of exploiting external data, 14 semi-structured interviews were employed in this study. The semi-structured interviews were conducted at businesses that are currently using external data in their operations, particularly in the division that chooses what their supply will be. The interviewees are workers from various levels within these businesses. The interview preparation materials are based on information found in the literature.

Following is the format for the remaining section of the thesis. Section 2 of the document talks about the literature. The third section includes a broad description of the participating businesses and personnel as well as the research methodologies that were employed. Section 3 provides further details on the analysis of the interviews. The interview findings are reported in section 4 of the article. After discussing the results and summarizing the limitations in section 5, which concludes with a conclusion, section 5 moves on to recommend some directions for further study.

2. Theoretical background

The impact of leveraging external data on the process of matching supply to demand and the types of organizational capabilities that could help to create positive effects from external data are poorly understood. In relation to these topics, this chapter covers what is already known about BD in organizations, external data. Additionally, organizational capabilities, the process

of matching supply and demand and the effect of them on organizational performance are discussed from the literature.

2.1. Big Data

This study first explores BD's theoretical underpinnings. This approach is essential because external data, the main focus of this research, often takes the shape of BD. Knowing the theoretical foundations of BD is essential to appreciating its complexities and possibilities when working with external data, which frequently resembles BD in many ways (Phillips-Wren & Hoskisson, 2015).

2.1.1. Big Data definition

Large or complicated data sets that are difficult for an organization to store or process in order to make timely and accurate decisions are sometimes referred to as BD (Kulkarni R. , 2013). Some scholars claim that the meaning of BD is a "moving target" that varies over time and throughout sectors. (Manyika, et al., 2011). Given that the volume keeps growing, there is not an established standard for measuring what quantity and type of data qualify as BD. Indeed, there are multiple ways to quantify data, and distinct datasets may be produced based on the type of analytics used (Sheng, Amankwah-Amoah, & Wang, 2017). Although there isn't a single definition for BD, there does seem to be a growing understanding of how it differs from what we often think of when we think of massive databases. Early in the evolution of this concept, the three Vs of BD—volume, variety, and velocity—were proposed (Laney, 2001; Russom, 2011). These indicate the continual increase of data in terms of multiplicity.

High-velocity data collection, discovery, and analysis are made possible by a new generation of technologies and architectures known as BD technologies, according to Laney (2001). Their goal is to generate value from vast amounts of diverse data in an efficient manner. The overall amount of information is known as data volume. In 2014, it was indicated that the total amount of data would double in size every 2 years. It was expected to have 44 zettabytes in data in 2020 (EMC, 2014), this resulted to be even more, namely 64.2 zettabytes (Statista, 2022). According to Statista (2022), by 2025 there will be 181 zettabytes of data generated, which is almost 3 times more than in 2020.

In addition to growing in size, BD sets are significantly more complicated than small ones. A greater variety of sources, such as websites, mobile devices, and social media, are used to produce and collect information. Data is more diverse now that it is available in many formats. We now perceive semi-structured and unstructured data as carrying a plethora of pertinent

information, rather than just recognizing organized data. This speaks to the attribute "Variety" (Laney, 2001). Furthermore, enormous volumes of data arrive very instantaneously (Velocity). BD requires quick data dissemination and gathering, particularly for high-frequency streaming data used in real-time decision-making. BD also has other characteristics, including low veracity and high value (Gandomi & Haider, 2015; Katal, Wazid, & Goudar, 2013), which have enhanced our comprehension of the characteristics of BD. The 5V's definition of BD emphasizes the complexity that businesses must overcome in order to obtain meaningful value from BD.

Given the misunderstandings surrounding the concept of BD, in this research, BD is defined as an extraordinarily large volume of structured, semi-structured, or unstructured data (Khoury & Ioannidis, 2014) that is continuously generated from a variety of sources, overwhelms business operations in real time, and influences decision-making by extracting illuminating information from voluminous data. Below we describe first how BD is currently used within organizations and what current research directions are of BD.

2.1.2. Big Data in practice

Nowadays, practically all businesses have access to cutting-edge technology, yet they lack the abilities to make the most of it (Dubey, et al., 2019). Despite the fact that BD analytics continues to draw considerable investments from international businesses (Sun, Strang, & Firmin, 2017), not all enterprises benefit significantly from it (Ghasemaghaei, Hassanein, & Turel, 2017; Zhang, Wang, & Pauleen, 2017). A recent study found that 91% of organizations haven't reached the transformative level of maturity in BD analytics, indicating a significant portion of businesses are unable to leverage BD investments effectively (Davis, 2018). Converting BD into actionable knowledge is essential for gaining sustained competitive advantages in operational management (Alavi & Leidner, 2001; Labrinidis & Jagadish, 2012).

While business increasingly rely on BD for decision-making (Fosso Wamba, Akter, Eddwards, Chopin, & Gnanzou, 2015; Shukla & Tirwari, 2017), small and medium-sized enterprises struggle to use data analysis to improve decision-making. Large businesses, on the contrary, routinely collect BD and use analytics in their decision-making processes as standard procedure (Davenport & Dyché, 2013; Kulkarni R. , 2013). Along with a data-driven decision-making approach, managerial views and practices are evolving within organizations, which affect organizational culture, leadership, human resources, and other management practices (Davenport T. H., 2014). This BD transformation is expected to become widespread across economies and industries (McAfee & Brynjolfsson, 2012), offering more accurate predictions

and reducing reliance on intuition (McAfee & Brynjolfsson, 2012). Additionally, BD has major effects on enhancing customer interactions, reducing management risk, and increasing operation efficiency, all of which result in more successful marketing strategies and operation management to acquire a competitive edge (Kiron & Bean, 2013).

2.1.3. External data as a source of big data

There are two types of BD sources, namely internal and external ones (Bekker, 2017). The idea of data originating from outside an organization is a typical approach to characterize "external data" (Davenport & Harris, 2007; Strand & Syberfeldt, 2020), and can include market research, consumer behavior, feedback, government rules, and economic trends (Schatsky, Murashkin, & Camhi, 2019). Machine data, such as search engine data, is a significant source of external BD (Sharma, 2021). Google and other search engines have grown significantly because of increased internet usage, the growing popularity of mobile devices, and easily available high-speed internet. The rise in online shopping usage, where consumers exchange browsing and purchase-related comments in addition to transactional data, is indicative of this boom (Archer-Brown, Piercy, & Joinson, 2012). This results in a lot of concealed data, for example, the search engine Google is receiving more than 5 billion search queries every day (Mohsin, 2022). This significant quantity of search record data representing users' actual behavioral intents might indicate the evolution of users' interests (Jun, Park, & Yeom, 2014). Yet not many companies are fully exploiting the possibilities external data, like search data, has to offer. Only a small percentage of businesses have so far fully tapped into the advantages of combining internal data with that from suppliers, third parties, or the public domain (Krasikov, Eurich, & Legner, 2022). 92% of data analytics experts responding to a 2019 Deloitte survey indicated their firms needed to use external data sources, more frequently (Schatsky, Murashkin, & Camhi, 2019).

According to Schatsky et al. (2019), more and more businesses are using third-party data collection and analysis to gain deeper insights. Most businesses use external data to obtain fresh perspectives that might boost productivity and income. With inputs confined to data collected from internal operations, customers, and first-tier suppliers, companies might have overlooked opportunities and hazards that can be anticipated and prepared for by gathering and analyzing external data (Löfgren, Gravem, & Haraldsen, 2011). Organizations are functioning more and more as a component of networks made up of suppliers, regulators, channel partners, resellers, and other stakeholders because of globalization. Gathering and evaluating external data helps businesses understand how their operations may be impacted by events in the external environment (Krasikov, Eurich, & Legner, 2022). Organizations are gaining new

income streams through the introduction of new products and services, improving human capital choices, personalizing marketing offerings, improving risk visibility and mitigation, and better anticipating changes in demand for their goods and services thanks to external data sources (Krasikov, Eurich, & Legner, 2022; Strand & Syberfeldt, 2020). However, to obtain insightful knowledge and use external data as a basis for choices, this data must be properly utilized with the support of the appropriate capabilities (Wamba, et al., 2017).

2.2. Organizational capabilities

There is a vast body of literature specifically focused on organizational capabilities. For example, Amit and Schoemaker (1993), Helfat and Peteraf (2009), and Nelson et al. (2000), give in-depth explanations of the idea of an organizational capability. Although authors tend to use the word "capability" in a similar way, exact definitions vary. This may be unavoidable for a topic as complicated as capabilities. For the sake of this debate, it is clear that we take the claim that an organization has a certain "capability" to mean that the organization has the ability to carry out a certain activity in a trustworthy and at the very least minimum adequate manner (Helfat, et al., 2007).

There are a few characteristics that are noteworthy concerning capabilities. First, a capability serves a deliberate, defined goal (Amit & Schoemaker, 1993; Helfat, et al., 2007). For instance, the capacity "to manufacture a cabinet" has the explicit and intended goal of producing a usable cabinet. Second, by performance of an activity, we mean "to do" or "to carry out" the task (Amit & Schoemaker, 1993). Third, unlike ad hoc conduct that does not represent experienced or structured behavior, a capability facilitates repeated and dependable performance of an activity (Winter, 2003). A capability must have the ability to perform consistently and repeatedly; otherwise, a company cannot be regarded to have the "capability" to accomplish anything. We interpret a minimally satisfactory performance to mean that an activity's output is recognizably that of that activity and at least minimally performs as planned (Helfat, et al., 2007).

There are two main kinds of organizational capabilities defined in the current literature: operational (or ordinary) capabilities and dynamic capabilities (Helfat, et al., 2007; Winter, 2003). On the one hand, we define operational capabilities as those that allow a business to survive in the here and now (Winter, 2003). In order to support current products and services for the same client demographic, a corporation must have the operational capability to do an activity continuously using largely the same procedures on the same scale. In the sense of upholding the status quo, such a capacity is common (Collis, 1994; Winter, 2003). A dynamic capability, on the other hand, can be defined as those that function to increase, change, or

produce operational capabilities (Winter, 2003). They permit a company to change the way it now earns a livelihood. Teece, Pisano, and Shuen (1997) established the phrase in this sense, and it is still widely used in this manner today (Helfat & Peteraf, 2009; Helfat, et al., 2007; Winter, 2003). Just like any kind or organizational capability, the idea that a company has a dynamic capability suggests consistent, predictable activity (Helfat, et al., 2007; Winter, 2003). Examples of dynamic capabilities are those for conducting partnerships, new product development, and acquisitions, which change how businesses make money (Dosi, Nelson, & Winter, 2000; Helfat, et al., 2007). The goals and expected results of dynamic and operational capabilities are different. However, a clear distinction between the two categories of competences is not always attainable. This is because change is constant, at least to some extent, and because some capabilities may be applied to both static and dynamic situations (Helfat & Winter, 2011). Therefore, in this research, the focus will be on the organizational capabilities in general.

2.3. Matching supply to market demand

Organizations must decide how many distinct product categories to sell (the width), how many different product lines to carry in each category (the breadth), and how many different variations to carry in each product line (the depth). This process is known as assortment planning (Saberi, Hussain, Saberi, & Chang, 2017). 'Width' encompasses various product categories such as entertainment, personal care, or food. Within these categories, 'breadth' denotes the numerous product lines, like DVDs, sports, and games in entertainment. Additionally, 'depth' signifies the multiple product variations within a line, like soccer balls, shorts, and accessories in sports. Balancing the number of categories, product lines, and variations is crucial for successful assortment planning (Mantrala, et al., 2009). Additionally, the provision of goods so that customers may locate and purchase what they want is the goal objective of successful assortment planning (Mantrala, et al., 2009).

The difficulty of assortment planning is matching supply towards demand (Singh, Kumar, Panchal, & Tiwari, 2020). It is a highly difficult process since they must consider the changing client tastes, space and financial restrictions, supplier uncertainties, assortment shortages, and competitive pressure (Hart & Rafic, 2006; Saberi, Hussain, Saberi, & Chang, 2017). All industries have demand uncertainty, and no one forecasting methodology can accommodate all sectors (Fildes, Ma, & Kolassa, 2019). The most companies are directing towards internal data which is not always representing the actual demand in the market (Blum, 2021). Therefore, to get acquainted with the customer's preferences, market research is required (Hofmann &

Rutschmann, 2018). Market research plays a critical role in generating the needed external data from the market (Javalgi, Martin, & Young, 2006).

2.4. Organizational performance

An overall evaluation of a company's accomplishments in terms of its efficacy and efficiency of its business processes is referred to as organizational performance (Janssen, Van Der Voort, & Wahyudi, 2017; Wu, Straub, & Liang, 2015). It is defined as the capacity of an organization to utilize its resources effectively and to provide outputs that are pertinent to its users and consistent with its goals (Rai, Patnayakuni, & Seth, 2006).

The literature that is currently available primarily takes case studies into account to support the link between BD usage and company performance (Agarwal & Dhar, 2015). There is paucity of actual data showing how using BD improves performance (Wamba, et al., 2017). More studies, according to Chen et al. (2012), are required to examine how developing new technologies and BD affect business results. More empirical research is needed to determine if and how the use of BD improves corporate performance, according to McAfee and Brynjolfsson (2012). Additionally, it is asserted that there are few empirical studies that look at the commercial benefit of using BD (Wamba, Akter, Edwards, Chopin, & Gnanzou, 2015). They created an interpretative framework with the goal of better comprehending how BD contributes to capturing commercial value. According to Chen et al. (2015), companies that employ BD are more likely to be able to transform data into information and insights, increase efficiency, and expand their businesses. It is argued that BD analytics capability is one of the key corporate strengths that might boost performance (Wamba, et al., 2017).

In the era of BD, increasing operational performance is a key objective since it gives businesses a competitive edge (Martin, Borah, & Palmatier, 2017). BD analysis reveals trends that help businesses create better goods and services, provide better internal and external customer care, and operate more efficiently when compared to similar rival businesses (Wu, Straub, & Liang, 2015). For instance, credit card businesses employ sizable data repositories to comprehend customer preferences, swiftly create customized offers, and forecast future actions (Davenport, Barth, & Bean, 2012). In order to address business challenges and enhance decision-making, organizations strive to acquire and analyze data with huge diversity, volume, and velocity. According to prior research, operational success enhances other crucial organizational performance factors including revenue growth and customer connections (Rai, Patnayakuni, & Seth, 2006), which eventually aid businesses in gaining competitive edge. Additionally, it has been suggested that a firm's capabilities, like the use of BD, the analytical capability of its

employees, and the sophistication of its toolkits, could promote the improvement of operational efficiency inside organizations (Liberatore, Pollack-Johnson, & Clain, 2017). Therefore, in this study, to investigate the role of BD on organizational performance, we draw on the capabilities view.

2.5. Capabilities to match supply with demand in relation to performance.

In the process of matching supply with market demand, demand forecasting is a key factor to eventually create organizational performance (Bahng, Kincade, & Rogers, 2018). Search engine data can enhance the process of demand forecasting because it is representing users' actual behavior intents (Tang, et al., 2022). The use of external data in an organization could go two ways. Either there is as much data as possible being shared, this data will be analyzed and turned into useful insights and decisions. If done this in the right matter it could enhance the match between supply and demand and enhance the organizations' performance. The other way is that the data will not be analyzed and used correctly and will have a negative effect on the supply chain and therefore a negative effect on the organizations' performance. Furthermore, if the right amount of external data is abundant, the lack of information could be so great that it makes decisions based on the wrong data and potentially harm the company.

As indicated by prior research, the use of technology by itself will not change anything until it is accompanied by the appropriate capabilities to turn BD from a resource into an asset (Akter, Wamba, Gunasekaran, Dubey, & Childe, 2016; Gupta & George, 2016; Hitt, Bierman, Shimizu, & Kochhar, 2001; Wamba, et al., 2017). By integrating fresh procedures into the system and fostering a knowledge-based culture inside the company, these skills may also be changed into dynamic ones. The performance of the entire organization needs to be dynamic, and that means that individuals who can use that technology must also be continuously upgraded. This takes us to the significance of the human component, which not only contributes to the development of technology but also is essential to realizing its full potential. At a certain point, it even outperforms as a competitive advantage for the company (Gupta, Drave, Dwivedi, Baabdullah, & Ismagilova, 2020). However, the absence of competitive human factors (technical and managerial skills) can negatively affect the organization. Companies frequently make the error of investing heavily in data acquisition before investing in technology and without hiring and keeping the necessary human resources (Gupta & George, 2016). Dubey et al. (2019) pointed out a number of ineffective practices that pose obstacles to sustainable growth. Organizations frequently place too little emphasis on human interpretive abilities and depend heavily on mechanical output. This sticks out as one of the key reasons why BD implementations fail.

Looking at the research of Dremel (2017), there are several factors, next to the human skills, that influence the adoption of BD which potentially enables performance. One of those factors which influence the adoption of BD is the development of BD analytics competence. By allowing high velocity acquisition, discovery, and/or analysis, BD analytics is a new generation of tools and architectures created to cheaply extract value from very large volumes of a wide range of data (Mikalef, Pappas, Korgstie, & Giannakos, 2018). The organizational resources needed to make use of such technology and data and eventually achieve competitive performance advantages are not included in this definition. BD analytics competence is built up a critical number of resources that comprises the trinity of tangible, human skills, and intangible resources (Grant, 1991). The capacity of businesses to obtain, analyze, and monetize BD is a prerequisite for this transformation from resource to assets (Xie, Wu, Xiao, & Hu, 2016).

External data is challenging to develop into a capability, since it needs specific capabilities to enhance it. According to Teece et al. (1997), businesses must develop it rather than just purchase it. It is the process of transforming basic resources into advanced capabilities (Sirmon, Hitt, Ireland, & Gilbert, 2011). Like stated before, the term "capabilities" refers to a group of powerful, repeatable skills that are partly present in tacit knowledge (Winter, 2003). Capabilities are therefore crucial aspects in the process of matching supply and demand as well as organizational performance. There is still some uncertainty surrounding this link because there is not a complete and well-defined framework for how these ideas could be connected yet.

One may argue that having intangible resources are mostly beneficial for leveraging external data and matching supply and demand when examining the resources needed to leverage external data (Grant, 1991). There may be certain resources and capabilities that help the use of external data but may not necessarily support organizational performance. Additionally, there may be a conflict between using search engine data and matching supply to market demand. We decided to employ a qualitative research approach since there is still a great deal of potential for investigation into this subject (Edmonson & McManus, 2007). By employing this technique, we may observe what transpires as a result of leveraging search engine data and attempt to create a framework. Additionally, to research the link between the concepts and performance, the qualitative research will be backed up with quantitative data, this makes this research deploying mixed-method research.

3. Methods

3.1. Research design

External data in combination with the process of matching supply to demand and organizational performance are relatively recent topics in the academic literature, therefor a qualitative study would be appropriate given how little research there is on the link between these areas (Edmonson & McManus, 2007). According to Gioia et al. (2013) qualitative research is renowned for its depth and potential for discovery. This allows us to get a greater understanding of the connections between numerous previously examined topics. Additionally, qualitative research gives the option of describing phenomena from the perspective of the participants (Orb, Eisenhauer, & Wynaden, 2001). Interviews were conducted with a number of managers and staff members from companies that are actively attempting to use external data as well as management and staff members from organizations that have been using external data for a considerable amount of time. Because the research issue involves several novel ideas that have not before been explored in connection to one another, we decided to utilize an inductive methodology for this study.

To analyze the performance of the participating companies, two performance indicators were used. As an indicator of how well a company's goods or services are received in the marketplace, brand popularity may be an effective indicator of its overall performance (Bhattacharya, Morgan, & Rego, 2021). Brand popularity has been defined as the extent to which a brand is widely sought after and purchased by the general population (Chung Koo & Young, 1997). According to Binet and Field (2009), this is an indicator for market shares. Therefore, this research employs data of the company Trendata[1] which analyzes all online searches on google, which can show the brand popularity. The second performance indicator will be turnover figures. These data was gathered from the general database of the chamber of commerce. This makes this study mixed-method research because this research incorporates aspects of both quantitative and qualitative research. Because you back-up your qualitative results with quantitative data, mixed techniques can provide you a more comprehensive picture than either one alone (Shorten & Smith, 2017).

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[1] Trendata is an AI market intelligence platform which offers data from market analysis.

3.2. Research instruments

3.2.1. Qualitative part

Semi-structured interviews with open-ended questions were chosen as the method of choice due to its ability to provide comprehensive perspective of the situation and allow for reflection on what transpires during the process. Additionally, they can demonstrate how companies currently are working with external data, the effect of it on business processes, and the advantages and disadvantages it can give. Furthermore, the challenges, and limitations of using external data. In semi-structured interviews, the interviewer has the chance to pose questions as they arise, which allows them to get fresh perspective on the study issue (Miles & Huberman, 1994). The interview guide that has been used can be found in Appendix A.

To develop the interview scheme, previous studies about leveraging BD and organizational capabilities have been of great help. Several capabilities, processes, activities, and challenges were taken into account. For example, the study of Mikalef et al. (2021), which gave several capabilities of BD analytics. Others presented useful information related to just capabilities or BD utilization (Comuzzi & Patel, 2016). These sources were used in order to get the best and most comprehensive interview scheme for looking at the influence of external data on an organization that will participate in this research. Next to this, several conversations with external data consultants were held. These conversations helped to notice already certain issues and enablers that organizations are facing during the process of leveraging external data. These helped, next to the literature review, with building questions, as well as asking questions during the interviews. This contributes to the development of an even more complete understanding of the interconnected nature of the notions of utilizing external data, aligning supply with market demand, and organizational capabilities.

3.2.2. Trendata and Chamber of commerce

Besides the interviews, the data of the company Trendata was used to assess the performance based on their brand popularity, because this is an indicator for transactions which result in market share (Binet & Field, 2009). The company aims to help businesses make educated decisions regarding customer value, product innovation, brand engagement, and future-proof business strategies. Therefore, Trendata is a real-time market and consumer insights firm (Trendata, n.d.). In other words, its search insights provide companies the chance to create strategies that are driven by customer demand. The working process of Trendata involves searching, capturing, categorizing, analyzing, and visualizing data of search engines. This methodological approach aids in ensuring that the data is obtained and analyzed in accordance

with consistency and reproducibility. This implies that identical outcomes should be obtained if the data are gathered again using the same techniques in the future. This is significant because it enables companies to monitor changes in customer behavior over time, monitor their brand, and make wise choices regarding their next marketing initiatives. To analyze data provided by this company, a specific tool from Trendata was used which gives the brand popularity in volumes and percentage change.

Next to the tool of Trendata, this research will employ turnover figures from the chamber of commerce. This is an organization which, when having an account, provides you with balance sheets, turnover figures, and other financial information. This organizations checks whether a filed annual account has been correctly established, making it a reliable source (KVK, 2023).

3.3. Data collection

This study was performed using the network of a Dutch consultancy firm. Table 1 below provides an overview of the participating organizations and the roles of the interviewees. The organizations that were targeted are headquarters in a variety of sectors and were either retailers or manufacturers. To provide a complete picture of the effects of external data on the performance of an organization, we chose such a diverse range of firms. Finding possible variances when leveraging external data across various businesses is also beneficial.

Several factors were taken into considerations when the organization were chosen. First, the organizations are either retailers or manufacturers and therefore need to decide on their product range and respond to customer demand. The organization's departments must use external data and should be open to use it. The usage of data across the different departments, especially the supply chain and marketing department is a need, because it indicates that data is being used and a that almost the whole organization is working with this specific kind of data. The fourth requirement is that the firms must have already leveraged external data like search engine data or be in the process of doing so. The usage of the data should at least be descriptive and predictive, but it should also be possible to utilize it in a prescriptive manner (Berndtsson, Forsberg, Stein, & Svahn, 2018). Prescriptive implies that judgements are (semi-)automatically made using the data.

Table 1 Participants with their name and role within their organizations

Company	Industry	Function of Respondent	Gender
Organization **A**: ± 7000 employees ± 725 million (Turnover)	Retail	P1 – Head of Strategy and Data	Male
Organization **B**: ± 35 employees ± 5 million (Turnover)	Fashion	P2 – Lead Digital marketing and Data	Female
Organization **C**: ± 35 employees ± 5 million (Turnover)	Furniture	P3 – CEO and Responsible for data and marketing	Male
Organization **D**: ± 138 employees ± 50 million (Turnover)	Electronics	P4 – CRM marketing manager	Male
		P5 – Senior Product Marketing Manager	Female
Organization **E**: ± 500 employees ± 540 million (Turnover)	Installation	P6 – Marketing Manager	Male
Organization **F**: ± 17.000 employees ± 1,12 billion (Turnover)	Retail	P7 – Consumer researcher	Female
		P8 – Market & Trends researcher	Female
Organization **G**: ± 120 employees ± 20 million (Turnover)	Furniture	P9 – Head of Marketing & Category management	Male
Organization **H**: ± 1.100 employees ± 303 million (Turnover)	Fashion	P10 – Head of Wholesale NL	Male
Organization **I**: ± 20 employees ± 5 million (Turnover)	Fashion	P11 – Commercial Manager / Head of Sales	Male
Organization **J**: ± 120 employees ± 15 million (Turnover)	Furniture	P12 – Product Manager	Female
Organization **K**: ± 25 employees ± 6 million (Turnover)	Fashion	P13 – E-commerce Manager	Male
Organization **L**: ± 20 employees ± n/a (Turnover)	Data Consultancy	P14 – Data specialist	Male

For this research, 14 semi-structured interviews were conducted at 11 different companies. These interviews consisted of interviews with managers, leaders, or employees from different disciplines and were held online, were audio-recorded, and transcribed with the consent of all the participants to avoid misunderstandings and to ensure that assertions could be verified. The interviews lasted between 30 and 60 minutes and were held in Dutch or English, depending on the preference of the interviewee. Two interviews were conducted at two companies (D and F), this has to do with the size of the company and the functions of the respondents. Company L is a company that helps other businesses with exploiting data. This interview has been used for in depth information about leveraging external data and what is needed within a company for that. This company will not be part of the case analysis. Open access data was used to learn more about the company and the interviewee to be well-prepared before conducting the

interviews. The interview questions covered a variety of topics that were crucial to this investigation. The key subjects covered were product range selection, external data, and barriers and enablers related to leveraging external data.

3.4. Data analysis

3.4.1. Coding

We are attempting to create a framework around the above-described research issue using an inductive method (Ketokivi & Choi, 2014). Although there is already a sizable body of literature on the issues specified in the research question, no framework has yet been established.

We started with transcribing the interviews before the data could be analyzed. Thematic analysis (Braun & Clarke, 2006) was used to do so. The Gioia-method has been applied to organize the data (Gioia, Corley, & Hamilton, 2013). Transcribing the data, reading it aloud, and then reading it again while jotting down initial codes constitutes the first stage of the theme analysis performed by Braun et al. (2006). Phase 2 involved creating first codes by methodically emphasizing important data (Braun & Clarke, 2006). This is consistent with the Gioia-method's so-called 'first-order' notions (Gioia, Corley, & Hamilton, 2013). By performing initial data coding, we produced '1st-order' ideas in accordance with the Gioia-method. This method of open coding involved writing down every possibly pertinent statement for each interview. The third stage of theme analysis was carried out following the creation of the first codes: looking for possible themes (Braun & Clarke, 2006). This is comparable to the "2nd-order" Goia-Method themes. Multiple quotes that support each of these second-order topics should make up the themes. Creating aggregate dimensions based on the second order themes is the final stage. Third-order themes are the name given to these dimensions (Gioia, Corley, & Hamilton, 2013). Reviewing themes was the fourth phase in the thematic analysis process. This phase entails checking that the themes relate to the coded extracts (level 1) and the entire dataset (level 2) and creating a thematic 'map' of the analysis (Braun & Clarke, 2006). After creating a good thematic map of the data, the fifth stage begins (Braun & Clarke, 2006). The 'essence' of each developed subject is sought after in this stage, and the themes are defined. Building a data structure through additional data analysis, example search, and research question resolution is the last phase in theme analysis.

3.4.2. Case analysis

Next to the coding, this study grouped the participating organizations together into specific cases. Every case that is observed with respect to its use of external data is given a detailed

case narrative by the within-case method (Ridder, 2017). The cases are also contrasted with one another in the cross-case analysis in order to produce a useful analysis of the major tendencies that were seen (Ridder, 2017). This to provide a useful study on the recognized phases and the major trends that were seen. The answer to the research question have risen in validity using this within-case and cross-case analytic technique, since significant trends that occur in several individual instances are detected (Ridder, 2017).

These cases were categorized based on businesses' assortment decision-making processes and their utilization of external data. This classification aimed to establish connections between the framework's capabilities, strategic decisions in assortment planning, and performance outcomes. Combining the capabilities framework with assortment decision-making processes allows for a deeper understanding of complexities and enables a more thorough examination of how firms use external data. Table 2 outlines the companies grouped into cases, differentiated by the extent of their reliance on external data sources during assortment decisions. The first cases are grouped together because they are the companies which inform their decisions of the product range the most with external data sources. Case 2 is grouped together based on the usage of both external and internal sources within assortment decisions. Case 3 is a combination of the participating companies which are focusing the least on leveraging external data within their assortment planning. In appendix B, the sources used by the participants in their assortment planning together with the goals of using them is displayed in the table. Company L is a consultancy company which offers advice about integration and leveraging data. Therefore, this company will not be placed within a case. The interview with this company is used to gather extra relevant information about capabilities regarding implementation of data.

Table 2 Cases

Cases	Companies				Reason for grouping together
Case 1	A	C	D	F	Basing their assortment mostly on external data sources
Case 2	B	G		I	Basing their assortment on both external and internal sources.
Case 3	E	H	J	K	Basing their assortment, the most on internal sources compared to the other companies.

These cases will be analyzed based on two performance indicators. The first is turnover. The turnover figures are gathered via open verified database of the KVK, from the participants themselves, or based on their increase in balance sheet between two years. The change in turnover from 2022 is compared to the turnover from 2021. Secondly, their branded search is

analyzed based on the tool from the company Trendata. This provides a dashboard in which is displays the percentage change in search volume of brands between 2021 and 2022.

4. Results

The qualitative data analysis of the semi-structured interviews revealed first- and second-order themes, which were analyzed and presented as organized through the 3rd-order aggregate dimensions in this part. The themes discovered are summarized in Table 3, 4, and 5.

First, the reasons for leveraging external data and the external data sources used are displayed to have a comprehensive picture of the external data sources being utilized and the rationale behind them (See table 3 and 4). Subsequently, the findings of this study are presented with a particular attention to the capabilities needed to leverage these external data. 33 capabilities (represented by the first-order codes, see Table 5) were mentioned necessary or convenient when leveraging external data, which were grouped into three main categories, namely employee skills, organizational capabilities, and data management capabilities. Next to this, the several cases will be analyzed based on their assortment decisions, leveraging external data and performance. The emphasis will be on how businesses determine the scope of their product range and its foundation, and the capabilities needed for leveraging external data. There were several parallels and divergences in the companies' use of external data. First, the individual cases are discussed. After that, there is a cross-case comparison, where the key trends and identified stages will be observed, accompanied by data structures as a visualization.

Table 3 Table structure 1

First order Codes	**Second order themes**	**Aggregate dimension**
To back up your operational decisions	Decision Support	Reasons to leverage external data
Making it leading in a discussion to end it		
Use it as a fundament for forecasts of turnover		
Justify strategic decisions		
Getting feedback towards your business		
Monitoring your competitors	Environmental monitoring	
To benchmark your company with external environment		
Monitor developments in the market		

4.1. Reasons for leveraging external data

First, we have asked the participants the reasons behind leveraging external data. They use third-party data for a variety of purposes. The two main areas are: decision support and environmental monitoring, as can be seen in table 3. First, important insights from external data are used to assist both **operational** and **strategic decisions**. By considering external variables that affect demand, it helps predict and empowers merchants to make well-informed decisions. *"We do base our strategic decisions on market data so that you may more accurately predict future events. Will the market decline, will you hire more people, and will you put more of an emphasis on sustainability? All these kind of things (P8-G)"*. It was also mentioned that it is beneficial to use external data to **back up your decisions** with proof from the external market. *"... and that's why I initiated this research, because I knew I'm right, but I needed to back up my ideas with proof from external data (P5-D)"* and *"In general, people are very happy that there is data and that there are insights, because people are simply looking for, substantiation for certain choices (P7-F)"*. When it comes to examining competitors, comparing performance, and keeping up with industry innovations, external data serves as a company's eyes and ears. **Monitoring competitors** entails keeping track on their actions, shifts in market share, and new developments in their business practices. *"Keeping eye on competitors is something we do with external data (P1-A)"*. Next to this, it strengthens the **benchmarking** process. *"We use it to measure ourselves with the market (P8-G)"*. It gives companies the ability to assess their performance in relation to industry standards and pinpoint areas in need of development. Furthermore, **keeping an eye on market developments** is like having a pulse on the industry's heartbeat. The discovery of disruptive technology, emerging trends, and changes in consumer behavior is made easier by the use of external data. *"So, to see if we miss important things, important trends, important developments (P8-G)"*, *"To see important movements in the market (P2-B)"* and *"... everything about market movements (P3-C)"*. Lastly, External data serves as a rich source of **feedback** for organizations. *"You can also occasionally compare the external data with someone who criticizes your business operations, because that data can sometimes simply show that things are not going well or that you can do something differently, better. (P2-B)"*. This indicates that external provides companies with a big amount of relevant information.

Table 4 Table structure 2

First order Codes	Second order themes	Aggregate dimension
Google searches	External data sources	Assortment decisions
Trade magazines		
Conferences		
Designers		
Social media		
Trade fairs		
Ahrefs		
Developments in other branches		
Market research – survey		
Feedback from customers		
Competitor analysis		
External transaction data		
Price analysis		
Sales figures / performance of products	Internal data sources	
Feeling / own creativity		
Experience		
Own website search behavior		

4.2. External data sources

After that, we asked the participants what kind of data sources they are using within assortment decisions. It is revealed that assortment decisions are based on two factors, namely, **external** and **internal sources**. In table 4, the sources in assortment decisions mentioned by the companies are displayed.

Among all these valuable resources, one particularly important one is **external transaction data**, which offers insights into real sales data of retailers. This enables companies to closely watch their rivals and base choices on actual transaction data. Additionally, the most popular source among the participants is social media. The most used internal source for all cases is data from **sales performance**. Products that have proven to be successful in the market are given priority when decisions are made based on sales performance, and this is done using both historical and current data. *"I think the most important thing is turnover. So which products are going the fastest and making the most sales? So that's just looking at volume, how much they are bought, but also yes, at what price of course. And if there are certain products that simply*

perform under budget (P7-F)". However, this has some risks. *"You are always very safe when it comes to what did you sell best. But can you rely on that and whether it is going to be the same next year around this time. So that's a quite important thing. (P10-H)"*. Therefore, to make sure that their assortments align with consumer tastes, retailers need to be aware of the state of the market, this is done with the help of external data sources. Market driven assortment choices entail seeing and seizing the characteristics, designs, or goods that satisfy customer needs at that moment. *"It's like, first of all, your understanding in general, like what's happening in the market. What are the fashion trends and global trends. (P5-D)"* and *"What trends, what are the upcoming brands, which could be something, which brands are hip and which are less hip. (P8-G)"*. Nonetheless, this comes with some **challenges**. Precise forecasting of market demand is essential in a supply demand match. However, because of things like shifting market dynamics, forecasting may be a difficult undertaking mentioned by all the cases. This is also mentioned as the reason why to look at leveraging external data. *"Because whenever your decisions are only based on your own experience and data, you would rather sort of build your own four walls and are not looking out of those four walls. And then it becomes quite dangerous because you don't know if you miss something which is happening around those four walls (P10-H)"*. Nevertheless, to retrieve relevant insights from these external data, capabilities are needed. Hence, we asked participants about the capabilities needed. Below a capabilities framework is developed.

4.3. Capabilities to leverage external data

4.3.1. Employee skills

The interviews demonstrated how crucial employee skills are to a company's ability to use external data efficiently. Data can be utilized, but ultimately, the people must evaluate it and make sense of it. They require specific abilities in order to do it.

4.3.1.1. Data analysis skills

The first capability that each participant highlighted was 1. data analysis capabilities. The capacity to convert raw data into meaningful insights makes data analysis competence an essential human skill for using the potential of external data. To analyze the data, several skills are needed. The first that is mentioned the most is **1a. analytical skills**. *"If you want to analyze data from the start, you need to have some analytical skills. (P1-A)"*. Analytical skills are necessary to extract pertinent information from various external data sources. Furthermore, as one respondent said, they are challenging to teach, highlighting their significance as a useful talent. *"So, it is difficult to demonstrate a system as Trendata and says, 'here guys from the*

church, let's work with it and find what we can best sell'. That's not going to work. You need sort of analytical skills. (P3-C)". Furthermore, **1b. critical thinking** makes sure that the conclusions drawn from outside data are valid. It protects against potential biases and questions presumptions. This helps to create a more robust and trustworthy analytical process. *"Have critical thinking skills, because there is a lot of nonsense written, so if people cannot do that, you are lost, and you will not use the right data (P1-A)"*. When it comes to using external data, **1c. creativity** enables people to think of new uses and viewpoints. It promotes thinking beyond conventional analytical techniques, which opens doors to the discovery of special insights and opportunities that might not be obvious at first. *"Next to the analytical and critical thinking skills, you also need to be creative. Sometimes you get very big unstructured data sets then you need to creative to find data you could potentially use. (P12-J)"*.

Another important factor is people's **1d. flexibility** with their way of working, which is particularly important given the need to modify analytical methods in response to the ever-changing environment and dynamic nature of external data sources. *"What I often see is that a person who must use external data, must change his way of working but also his way of thinking sometimes. Some employees are not so flexible in adjusting it and then it becomes also more difficult to get them to work with new data like external data. (P14-L)"*. The fifth data analysis skill that was mentioned by the participants is **1e. keeping the overview** when analyzing big external data sets. It was mentioned by several participants who highlight how crucial it is to keep up a thorough awareness of the bigger picture. *"We dive into the data and think: 'yes, but this is also interesting, that is also interesting'. Then you can easily drown yourself in data, because there is just too much. (P6–E)"*. Individuals with the ability to keep the overview are able to know what data is needed and ensure that insights derived from external data are integrated into a coherent understanding.

In summary, the ability to examine data is ensured by analytical capabilities. Critical thinking ensures that the irrelevant information is removed from the data. Creativity is the source of creative solutions. Adapting your working style ensures that you can work with external data and maintain the overview that's required to handle the copious amounts of external data.

Table 5 Table structure 3

First-order codes	Second-order themes	Aggregate dimensions
1a. Thinking analytical to be able to retrieve useful insights from external data	1. Data analysis capability	Employee skills
1b. Filter out nonsense by thinking critically about the data		
1c. Being creative to find creative solutions regarding external data		
1d. Being able to adjust your way of working by being flexible		
1e. Being able to keep the overview when analyzing		
2a. Be able to translate external data into useful insights	2. Data communication skills	
2b. Visualize the insights retrieved from external data for better understanding		
2c. Explanation everything regarding external data		
3a. Having affinity with data	3. Cognitive readiness	
3b. Having internal willingness to work with external data		
3c. Having a positive mind set towards leveraging external data		
4a. Management advocacy	4. Managerial skills	
4b. Leading your employees towards the use of external data		
4c. Patience with employees who learn to use external data		
5a. Having the right human capital	5. Basic resources capabilities	Organizational capabilities
5b. Providing trainings and workshops for employees		
5c. Time is needed to transform your business and starting to analyze external data		
5d. The need for financial resources to invest in external data		
6a. Being flexible to transform internal processes and handle feedback as an organization	6. Organizational culture	
6b. The emergence of an open culture towards external data		
6c. Having the strategic focus and a long-term vision about external data usage		
6d. Supportive senior management		
6e. Internal organizational structure		
7a. The ability to source external data	7. Data acquisition skills	Data management capabilities
7b. Being able to ensure high quality of data		
8a. Provide the organization with the right technical set up to leverage external data	8. Data infrastructure and integration capabilities	
8b. Be able to integrate external data with internal data		
8c. Facilitate a place where it is supported to easily share external data insights		
8d. Having a structured framework about which function has access to which data		
9a. Being consistent in your data policy for less chaos in adopting external data	9. Data governance capabilities	
9b. Importance of managing data to provide all the employees with uniform data		
9c. Involve employees in the process of transforming towards an external data driven organization		
9d. The need for the right data security policies		

4.3.1.2. Data communication skills

2. Data communication capabilities as a skill is also important for the efficient integration of external data, mentioned by the participants. What is revealed is that after you analyzed the data, the insights retrieved, should be communicated towards the colleagues. So, effective communication goes beyond data analysis to guarantee that the conclusions drawn are understandable and applicable to a variety of organizational roles, rather than being limited to the domain of experts. This crucial human skill includes several important aspects. First, **2a. data translation skills**. It is essential to have the ability to convert difficult analytical results into information that is clear and intelligible. This component makes sure that the depth of information obtained from outside sources is condensed into a manner that appeals to people in different positions and at different organizational levels. *"So, I think that no matter how good you are with data, if you are not able to create a little bit of that, then you have not gotten anywhere. I think that it is very important that you can actually attach bite-sized actions to it, and that people can do something with. (P2–B)"*. Second, data communication gains a visual and comprehensible layer with the help of **2b. data visualization skills**. When data is visualized well, it transforms it into visually appealing representations that make complex patterns and trends easier to comprehend. *"I'm convinced that you have to make it visual to make it understandable (P11–I)"*. When it comes to telling the narrative contained in external data, graphs, charts, and dashboards are effective tools, not just long lists with data. *"... ensuring that it's provided in an understandable and practical manner. For instance, one of my first responsibilities when I arrived was to simplify the market share reporting. That was, nevertheless, required since the work that was done in Excel, was just unsightly and did not look nice. I was not thrilled with that since it is not intuitive and requires a lot of work to comprehend what I'm actually looking at. (P8–F)"*. So, data-driven storytelling became more approachable and practical when people with strong data visualization abilities communicate their findings in a more engaging and powerful way. Lastly, **3c. data explanation skills**. It is essential to be able to explain the relevance of discoveries and put the implications of external data into context because not everyone immediately understands the data. *"Explanation of what is data, where does it come from, what are we going to use it for, what benefits does it have for your position and how can we make the process easier ... So everyone needs to see exactly what they get out of it and what the benefits of the work are after the explanation (P3-C)"*. Strong data explanation abilities make sure that the actionable insights are accepted and understood by different organizational roles. This component promotes a culture of data-driven

decision-making by facilitating a common awareness of the strategic implications of external data.

These aspects of data communication abilities operate together in a smooth flow. Data translation skills transform analytical findings into a language that resonates with a broader audience. Data visualization skills then enhance this communication by providing a visually engaging representation of insights. Finally, data explanation skills tie everything together by articulating the strategic and operational implications of external data, making it relevant and applicable across the organization.

4.3.1.3. Cognitive readiness

3. Cognitive readiness reflects the preparedness and mental disposition individuals have towards leveraging external data. The first factor that has a positive influence on the adoption of external data is **3a. data affinity**. *"It remains a human job and some people like it more and have more affinity with it than others, it helps. (P8 – F)"*. It represents people's innate comfort and fascination with data. It displays the genuine interest with external data. Another factor is **3b. internal willingness**. *"I'm convinced that if you are open to it, everyone will succeed, I think, if my grandmother says, 'I would like to learn it', then they will be able to get my grandmother to work with data within two days. If you limit yourself by not wanting to learn, then it really depends on you and not your skills. (P3–C)"*. So, an environment where people actively look for ways to use external data and acknowledge its potential influence on decision-making processes is fostered by internal willingness. This brings us to the third skill, having a **3c. positive mindset** towards the use of external data. This affects how people view the potential and challenges of using external data. *"Look, if you have someone who has a negative mind set, then it becomes very difficult. So, it is very important that there are young, motivated people with the right mind set within a company. (P14–L)"*. Individuals with this mindset approach external data with optimism, recognizing its potential to enhance decision-making, foster innovation, and contribute to the organization's strategic objectives.

To summarize, data affinity forms the basis of a genuine and curious engagement with external data, internal willingness ensures an openness to change and a will to work with external data, and a positive mindset transforms challenges into steppingstones for progress regarding leveraging external data.

4.3.1.4. Managerial skills

The participants also mentioned that implementing and using external data must be managed. Therefore, the key to effectively utilizing external data is having right 4. management skills, which act as a link between the technical requirements of data analysis and the broader strategic objectives of a business. One of the fundamental components is **4a. management advocacy**. It highlights the need for leadership endorsement and support for external data usage. *"We have to inspire people, we as managers have to motivate them so they are more open to look at it. (P3–C)"*. Advocates of external data integration by managers send a clear statement about the strategic value of data-driven decision-making. *"Some people are harder to convince that external data can be a useful asset, so you have to do extra work to get them to want to use it, show them the benefits, the value, how it benefits them but also the organization (L14-L)"*. The second managerial skill is **4b. leading capabilities**. This represents the proactive guidance required to navigate the complexities of external data utilization. *"So, one team is a bit more data driven because it depends on people in the team. Who is the manager, what is his knowledge, what does he support, who decides what to do and what are they used to do? Every manager is different, every manager leads the adoption of data different, so every team will adopt it differently. (P8–F)"*. To ensure that the company progresses cohesively toward achieving the full potential of external data, several participants mentioned that leaders who support external data projects must offer the appropriate guidance. *"… and that they actually receive help. When you don't understand something or don't want to comprehend it, it's simple to get defensive. Therefor, it is advantageous to assist them, provide them with a starting point, and mentor them, essentially leading the staff. (P3–C)"*. Next to the being able to lead, motivate and support employees, managers also need to have **4c. patience**. Because in contrast to instantaneous outcomes, it frequently takes time for trial, improvement, and adaptation to realize the full value of external data. *"It takes time to learn with data and the result of working with data is not always immediately visible, so I think that from a management perspective there must also be some kind of patience. (P2 – B)"*. Essentially, managing the process is only one aspect of the management job in external data usage; another is offering the vision, direction, and tenacity required to turn data into a strategic asset.

4.3.2. Organizational capabilities

When a business wants to successfully use external data, organizational competencies become crucial. These dimensions consist of the general capabilities an organization needs to leverage data apart from the data management capabilities. This incorporates not just human skills but

also the organization's whole collective potential. Organizational culture and fundamental resource capabilities are two important aspects of this field that came forward in this research and have a significant impact on how a company integrates external data.

4.3.2.1. Organizational basic resources

The importance of having basic resources capabilities was mentioned by the participants when an organization endeavors to leverage external data effectively. One of the main components of basic resource capabilities is **5a. human capital**, or in other words; skilled employees. *"I think that you really need someone internally who can work with external data (P2–B)"*. It is crucial to have a workforce with the technical know-how mentioned above to handle the complexities of external data, from comprehending various data formats to deriving valuable insights. However, it is challenging to find the appropriate employees with the right skill set. "*Employees who understand the internal process, who understand the company, who understand data and who can divide it into pieces and insights, are not easy to find (P3–C)"*. Therefore, the need to provide **5b. training and workshops** is the second organizational capability. *"Giving workshop also helps with letting it live in your organization and try to make it work so hopefully more people understand how to use data. (P8–F)"*. By offering continuing education, employers may make sure that staff members are knowledgeable on the most recent developments in data analytics, upcoming technologies, and external data handling best practices. "*Every two weeks we meet with a specialist and that is where we get most of our knowledge from, learn skills and see which direction we want to go (P13–K)"*. However, as mentioned by some participants, you must invest in these trainings and workshops. First, you have to invest **5c. time**. "*It takes a lot of time, and we are still only a bit involved in some small mini tests. (P6–E)"*. Time is a factor that is frequently disregarded yet is essential for developing and honing the skills required to use external data. It also encourages innovation and ongoing development. *"You see that due to more time pressure and the increasing workload, people often find it more difficult to learn to work with external data (P1–A)"*. Secondly, you need **5d. financial resources** to invest in the usage of external data. *"You need people who understand data, you need developers to be able to set things up, that costs money and you have to invest in that (P9–G)"*. So, it was mentioned by the participants that you should invest in human capital and make sure you maintain their knowledge. But the organization's ability to keep up with technological innovations is also facilitated by its financial resources, which also allow the infrastructure to adapt to the increasing needs of external data integration. *"The disadvantage of external data is that I only know afterwards what the added value is,*

while you receive the big invoice in advance. That increases the risk span. For example, the technical system that comes with some sources, that is a risk because you don't know if it will work and will be used by everyone. (P1–A)".

In a seamless flow, these capabilities work together to enable the company to efficiently use external data. Skilled employees make up the human capital. Financial resources are used to fund the technology infrastructure as well as the workshops and trainings, and time ensures that they have the opportunity to start using it.

4.3.2.2. Organizational culture

It was mentioned by the participants that an organization's ability to use external data is greatly influenced by its organizational culture. Including common values, attitudes, and actions that shape how members of the company approach and incorporate external information into their decision-making. First of all, flexibility. A **6a. flexible organization** is essential for successfully navigating the dynamic landscape of external data. *"Data can immediately show that your current way of working or that current strategy is not good. So, I think openness and flexibility are very important as an organization. (P8-F)".* A flexible organization encourages allows the company to react quickly to shifting data landscapes, adjust to new trends, and manage external feedback well. *"I think that, as a company, you need to think flexibly because you need to be able to change your operations when external shows suddenly some new opportunities. (P2–B)".* Next to the flexibility, establishing an **6b. open culture** towards external data is mentioned as a fundamental aspect. This entails developing an attitude that views data as an important resource that supports decision-making at all levels. *"We have quite an internal open culture, so that means that once someone sees an interesting newspaper article or something else interesting from outside, he or she shares it immediately. Nobody says: 'I'm busy with my own work', they say: 'oh, interesting'. This of course increases the chance that you will share it again and start leveraging it more and more. (P1–A)".* This indicates that an open culture promotes an atmosphere of ongoing usage of external data.

Making sure that external data projects are in line with the organization's broader goals is indicated by **6c. a strategic focus** and **long-term vision**. *"But we have a long-term vision of where we want to go and with that feeling we build that support organization-wide. We understand what we want to do. Everybody has to realize 'What is my role and how can I contribute to the greater goal?'. (P9–G)".* This is in line with the following capability that influences the usage of external data, namely, a **6d. supportive senior management**. *"I do think that the attitude of a number of people in senior management is that they like to look*

outside, so it helps for the total adoption of external data when they are supporting it. (P1–A)" and *"Using external data is also something that is driven by the top management. (P4–D)".* Their assistance reinforces the value of utilizing external data throughout the whole business by providing the required resources, motivation, and strategic direction.

The last organizational capability is having a clear **6e. organizational structure**. Effective cooperation and communication in the context of using external data require a well-defined organizational structure. *"The teams have to be in order before you can move on to something new (P6–E)".* People are able to comprehend how their contributions fit into the larger framework of data use when roles and responsibilities are clearly defined. *"It is important that you have a clear structure in your organization. The functions should be clear, defined, the roles, the managers. This will help with the adoption of external data because everybody knowns who to rely on and what their tasks are. It will also help with preventing chaos. (P14-L)".*

All these organizational cultural factors work together to enhance an organization's ability to use outside data. A long-term vision and strategic focus guides employees, supportive senior management reinforces commitment, flexibility permits adaptation, a clear organizational structure supports effective cooperation, and an external data-driven culture encourages proactive data use.

4.3.3. Data management capabilities

Next to the human skills and the general organizational capabilities, participants mentioned that the management of external data is also a really important factor.

4.3.3.1. Data acquisition skills

In the field of data management, data acquisition skills are essential. The first mentioned skill associated with data acquisition is **7a. data sourcing**. Finding, locating, and gaining access to pertinent data from a variety of external sources is one aspect of data sourcing. *"It is sometimes hard to find the right data. All the sources are doing something with what you disagree or you would do differently, and there are just a lot. (P6–E)".* Because there are several external parties involved with external data sources it is important to be able to handle these third-party stakeholders in addition to finding accurate and valuable data. *"Look what you just notice is that external data often makes you dependent on a third party, that is one of the difficulties in external data. (P7–F)".* Effective data sourcing, results in reaching the right data and being able to manage this data. Participants noted next to this that ensuring the data is of the highest

7b. quality is just as crucial as collecting it. *"Data quality is important (P6–E)","The bias of certain companies is sometimes too great and must be taken into account. (P1–A)", and "We have to make sure that the data we acquire is correct and representative for the market. (P8–F)".* Having high-quality data is crucial to establishing credibility for information obtained from external sources. In the end, it improves the integrity and dependability of organizational insights by reducing the chance of making decisions based on inaccurate or misleading data. *"It is important to know the reliability of the insights gathered from external data before you change your operations on something that is not good. (P7–F)".* These capabilities work together to show how important data acquisition skills are to data management in a smooth flow. Effective data sourcing expands the organization's data horizons by providing access to a variety of external sources, and an emphasis on maintaining good data quality protects the accuracy of the information obtained.

4.3.3.2. Data infrastructure and integration capabilities

Furthermore, fundamental components of efficient data management include data integration and a data infrastructure. These aspects entail building a strong technology base and streamlined integration procedures to guarantee that the sourced external data is integrated into the organization's total data environment. First, the **8a. technical setup** dimension, the technological infrastructure required to effectively handle external data must be created and optimized. *"The technical set up, such as the technical landscape, which systems have we integrated and how do those systems work together is important but at the same time is it challenging for us (P4–D)".* It was mentioned that an organization's ability to gather, store, and handle external data is contingent upon a technical configuration, which provides a solid basis for leveraging it. *"So, I think a tool like Power Bi will help make it visually more transparent for people. So, the right tooling or the right system that helps you explain data. (P7–F)".* Next to the technical system, another important aspect was **8b. data integration**, i.e., the smooth merging of external and internal data sources. *"I want to be able to integrate external data with our data, so I do not benefit from another login, from another dashboard, because that is not going to work. What will help is if we can integrate additional data with existing datasets and enrich them. (P8–F)".* This guarantees that the information may be used to compare or explain existing internal information, as well as to create new insights. Another essential component of data infrastructure is **8c. data sharing capability**, which highlights the seamless exchange of information throughout the company. *"We are quite a lean organization with short lines of communication, It is quite easy to properly distribute data or insights. (P1–*

A)". Good data sharing makes sure that insights from external sources are shared with the right people. *"After all, my team spends most of its time working with data and we are also more responsible for supplying the data to other departments that need to do something with it. This ensures that there is not so much chaos, and everybody can use the right data. (P2–B)"*.

When you have the technological system in place to manage and integrate external data, the next step should be to concentrate on creating a **8d. structured accessibility framework** that makes sure that the data employed is also accessible to the right employees. *"It's not just collecting data, it's making it accessible so people can use it. (P8–F)"*. To guarantee that the data is available to certain functions in accordance with their needs, it entails creating access rights, protocols, and rules. *"So, what we are actually saying is: you have a department, a position with associated seniority and responsibilities, and that combination actually determines access to which systems. (P3–C)"*.

4.3.3.3. Data governance capabilities

Effective data management requires strong data governance. The first is having a **9a. consistent data policy**. Creating and implementing uniform guidelines and practices for the governance of both internal and external data constitutes consistent data policy. *"You must ensure that it is clear what everyone's job is related to data, that it is clear how data is handled and that everyone knows what is expected of them. It does not help when you constantly change this. (P14–L)"*. This promotes clarity and makes it easier to integrate external data into the larger organization. *"One important thing is consistency in policy. If you choose a different policy every year, people will drop out, because it takes time to adjust. (P9–G)"*. Other components of data governance include **9b. data management** and ensuring **data uniformity**, which are supported by a consistent data policy. It entails making certain that data is entered into the system consistently by all members of the company and making sure that it stays uniform over time. *"Look, if our sales employee doesn't believe in data and does not fill in the data he gathered, then he ruins the entire data flow. Hence the essence is that it can really be framed per function which data has to be filled in. (P3–C)"*. Additionally, you will receive the same responses each time you ask the same question if the data is uniform. This guarantees its reliability as well. *"… and we also are busy to standardize those data lists so that each and every question that are asked by different colleagues, get to the same answer in the end. (P10–H)"*. Additionally, data governance includes active **9c. employee involvement**. This dimension focuses on creating an environment where people in the organization recognize the value of external data. *"Take the employees with you in the process improves their commitment towards*

external data (P7–F)". When employees are involved, data quality becomes a shared responsibility which fosters teamwork and creates an atmosphere where insights from external data are used jointly to make well-informed decisions. In addition, it provides and environment in which becomes more alive in the organization because everyone may think along. *"... and those people become enthusiastic, they start thinking along, they can provide their input, then they feel valuable and happy. (P3–C)"*. Lastly, one of the most important aspects of data governance is protecting the confidentiality and integrity of data, especially when working with external data. Strong **9d. data security** policies entail putting safeguards in place to prevent abuse, breaches, and unauthorized access to data. "*It is important to have your security in order. You have to keep people's data anonymous, and many other rules that you must comply with. (P4-D)"*. Setting data security as a top priority ensures the ethical and secure use of information while reducing possible dangers related to utilizing external data. *"Looking at our data system, before it was approved, it took a long time before we had the security of the data on point. (P3-C)"*.

4.4. Case descriptions

Below, the three different cases are discussed. Although the codes included are based on common illustrative lines from each interview, it should be noted that not all codes were equally appropriate for each one of the three cases. Whichever first-order themes apply more to cases 1, 2, or 3 will depend on which interviews – those of the case 1, 2, or 3 – clearly highlighted more quotes that complemented the first-order theme. It was not possible to separate all first-order themes based on how significant they were to a certain kind of business. It is important to mention that on the one hand, there is a lot of overlap between the cases regarding the usage of external data, assortment decisions, capabilities needed and challenges that come with it. On the other hand, it also displays differences as illustrated in Table 6, 7, and 9 and appendix B, C, and D. A cell in table 9 may be annotated with a ++, +, or left empty. A cell that carries the symbol ++ indicates that the interviewer placed a lot of attention on this topic. Though not as much as in other situations, there was some focus on this topic in the case of +. A blank cell indicates that the interviewee did not place any focus on the subject. This makes it evident which issues were discussed by the various firms more often or less frequently, and which ones should be taken into account in the research's subsequent analysis.

Table 6 Comparison of the cases regarding the reasons for leveraging external data

Reasons for leveraging		Case	1	2	3
Based on		1st order themes			
Reasons for using external data	Decision support	Back up decisions made	X	X	
		Leading in discussion	X		
		Forecast turnover			X
		Get feedback	X	X	X
	Environmental monitoring	Monitor competitors	X	X	X
		Benchmark	X	X	
		Monitor developments in the market	X	X	X

Table 7 Comparison of the cases regarding the external data sources used within assortment decisions

Assortment decisions		Case	1	2	3
Based on	Goal	Sources			
External sources	Finding trends	Google searches	X	X	
		Desk research	X		
		Trade magazines	X	X	X
		Trade Conferences	X	X	
		Designers		X	X
		Social media	X	X	X
		Trade fairs		X	X
		Estimated online search		X	
		Other branches	X	X	
	Getting feedback	Market research - survey	X		X
		Feedback from customers	X		X
	Keeping an eye on competitors	Competitor analysis	X		
		External transaction data	X	X	X
		Price analysis	X		
Internal sources	Profitable products	Sales figures / performance of products	X	X	X
	Opinion	Feeling / own creativity		X	X
		Experience	X		
		Own website search behavior		X	X

4.4.1. Case 1

Case 1 consists of the companies, A, C, D, and F. When analyzing case 1, there were still differences between the companies. First, the majority of Company D's assortment is based on outside data. They do not, however, address a lot of the required skills. The two participants from D made several important points; however, they did not provide the essential in-depth information about the capabilities. Next to this, Organization F was an anomaly based on

company size. However, it is an anomaly to a lesser extent because we only interviewed head office employees. Regarding the use of external data and their assortment decisions, there were no notable distinctions between company F and the other included firms.

One notable aspect of Case 1 is its increased dependence on outside data to match supply and demand in the market. Case 1's characteristics include their primary use of external data for market monitoring. *"First of all, your understanding in general, like what's happening in the market. What are the fashion trends and global trends. (P5-D)"*. In addition, they keep an eye on rivals, get feedback, and support decisions taken (table 7). This specific case also recognizes the importance of **search engine searches** as a direct expression of customer interest and intent, and hence lays a major focus on search engine data. *"We capture the market demand with Trendata (search engine data) dashboards (P3-C)"*. Next to this source, a common source used is feedback from customers and gathering information from competitors. *"We have every half year, some general standard feedback sessions with customers (P5-D)"* and *"In my opinion, a lot of attention is paid to competitors. (P7-F)"*.

Company C and F were based on the emphasized capabilities, the most mature in leveraging external data. It could be possible to conclude that they have considered a lot of requirements for utilizing external data and have faced and overcome any problems related to it based on their responses during the interviews and the range of capabilities they highlighted. As can be seen in Appendix B, where the companies and the emphasized capabilities are displayed. The capability that both businesses mentioned as important was **data accessibility capability**. *"It's not just collecting data, it's making it accessible so people can use it. (P8–F)"*. and *" We had not thought about a role and rules at all. Suddenly we noticed that a seller was adjusting product titles in Google search. That went completely wrong. So, we really have very targeted systems per department and data access. (P3–C)"*. They both placed a great deal of emphasis on this skill. In general, the most common capabilities within this case are in the data management capabilities, especially the **'data infrastructure and integration'** capability. Where they have next to the data accessibility capability, also the data system that is important just as, data sharing capability and integration of the data. A closer look reveals that Company C and F are also seeing the largest increases in branded search in 2022 compared to 2021, as seen in table 8 below. In addition, they saw a rise in turnover in that particular year. There is one outlier, company D, but this case can be corrected because they determine their assortment mainly on external data, just like the rest in case 1. The fact that D does not score so well with branded search may be due to the fact that they are less good at leveraging it, this is reflected

in the mentioned capabilities. Therefore, concluded is that your turnover could benefit from basing your product range on external data and benefit your branded search when having the right capabilities to leverage it.

Table 8 Performance figures of case 1

Case	Company	Turnover change	Branded search change (2022 compared to 2021)	Branded search volume (in 2022)
1	A	0,9%	12,4%	982,340
	C	300%	53,4%	17,380
	D	11%	-3,9%	12,163,440
	F	5%	3,9%	57,804,330

Table 9 Capabilities mentioned by the three cases and the emphasis they placed on it

Capabilities		Cases	1	2	3
Employee Skills	1. Data analysis capability	1a. Analytical skills	++		++
		1b. Critical thinking skills	+	+	
		1c. Creativity			+
		1d. Flexibility	+		+
		1e. Keeping the overview	+	++	+
	2. Data communication skills	2a. Data translation skills	+	++	+
		2b. Data visualization skills	++	+	+
		2c. Data explanation skills	++	+	
	3. Cognitive readiness	3a. Data affinity	++		
		3b. Internal willingness	+	+	+
		3c. Positive mindset	+		+
	4. Managerial skills	4a. Management advocacy	++	+	+
		4b. Leadership	++		
		4c. Patience		+	
Organizational Capabilities	5. Basic resources capabilities	5a. Human resources	+	+	+
		5b. Trainings and workshops	++		+
		5c. Time	+	++	+
		5d. Financial resources	+	+	
	6. Organizational culture	6a. Organizational flexibility	+	++	
		6b. Open culture	+		
		6c. Strategic focus and long-term vision		+	+
		6d. Supportive senior management	+		
		6e. Strong organizational structure			+
Data Management Capabilities	7. Data acquisition skills	7a. Data sourcing capability	+		+
		7b. Data quality capability	++	+	+
	8. Data infrastructure and integration capabilities	8a. Technical system	+	+	+
		8b. Data integration capability	+	+	
		8c. Data sharing capability	++	+	
		8d. Data accessibility capability	++	+	+
	9. Data governance capabilities	9a. Consistent data policy	+	+	+
		9b. Data management and uniformity	+	+	++
		9c. Employee involvement	++		
		9d. Data security	+		+

4.4.2. Case 2

Case 2 has a moderate maturity regarding the implementation of external data in their assortment decisions. It consists of the companies B, G, and I. Examining the firms in this case in more detail reveals that company B is well developed in terms of using external data and has considered several necessary skills. It is placed in case 2 because it uses relatively the same quantity of external data for assortment judgments as the other two companies. The primary functions of Case 2's use of external data include monitoring market developments and supporting previously made judgments. They mostly employ outside resources, such as social media, information from different branches, and well-known designers. In addition, as shown in appendix C, they mostly rely on their own inventiveness and internal sales data when making judgments about their selection in addition to these sources.

Regarding the three categories of capabilities, case 2 places more focus on the **organizational capabilities**, such as financial resources and organizational flexibility, and the skills that employees must possess. So is **keeping the overview** mentioned by two of the participants, *"I think that as a specialist, we should also be able to maintain a helicopter view. (P2–B)"* and *"You don't just have to be able to interpret the numbers, you actually have to know and see the whole picture in the end (P11-I)"*. **Visualization skills** is another important skill *"I'm convinced that you have to make it visual to make it understandable. (P11–I)"*.

Upon closer examination of the situations, it is noteworthy that company B (just as company C and F from case 1), who is actively utilizing search engine data from google, displayed an increase in both branded search and turnover (see table 9). The company that is leveraging search engine data but not based on google, company G, is experiencing a decrease in turnover and branded search. This pattern could demonstrate the revolutionary potential of search engine data in influencing consumer exposure and fostering financial success.

Table 10 Performance figures of case 2

Case	Company	Turnover change	Branded search change (2022 compared to 2021)	Branded search volume (in 2022)
2	B	Increased	39,6%	5,298,270
	G	-20%	-20,9%	167,840
	I	30%	17,9%	397,630

4.4.3. Case 3

The third case consists of company E, H, J, and K. Compared to the organizations in the other cases, these businesses are distinguished by the fact that they rely on external data the least when making assortment judgments. For the most part, they are using internal data that they

base on sentiment and experience. This does not imply, however, that they do not make use of it.

Case 3 plays a great emphasis on the **analytical skills** a human should possess. *"You have to be analytic, that's where it starts (P6-E)"* and *"Taking the data out the system and analyzing it, that's one thing (P13-K)"*. In this instance, the value of creativity is also demonstrated. "*Next to the analytical part, you also need to be creative. Sometimes you get very big unstructured data sets then you need to be creative to find data you could potentially use, because you must find ways how to structure it and present it. (P12-J)"*. It is also mentioned that the data should be of high **quality** and the **uniformity** should be maintained. *"... and we are busy to standardize those data lists so that each and every question, that are asked by different colleagues that they get to the same answer in the end. (P10–H)"*.

Another noteworthy discovery is that, in Case 3, their branded search has only slightly grown or dropped. In other words, you become less relevant to your customers the less external data you utilize to match supply and demand. It appears, nevertheless, that this had less of an impact on their turnover than in the other situations, see table 10 below. This discrepancy may be since their respective industries, three of them are in the fashion industry, are less impacted by outside information such as internet searches. This would imply that the use of external data has less of an influence on those areas. In summary, Case 3 has not yet fully acquired the requisite capabilities to effectively utilize the external data and is utilizing it to the least extent.

Table 11 Performance figures of case 3

Case	Company	Turnover change	Branded search change (2022 compared to 2021)	Branded search volume (in 2022)
3	E	12%	1%	377,190
	H	0,9%	-14,2%	466,010
	J	33%	2,7%	9,140
	K	Stable	-6,6%	610,530

4.5. Cross-Case analysis

The major patterns from each individual topic are depicted in the cross-case below.

4.5.1. Capabilities to leverage external data

When analyzing the capabilities necessary for a business to use external data efficiently, the differences and overlap become clear by contrasting the three cases as can be seen in Figure 1 below. A wide range of skills became apparent in Case 1, which demonstrates a deliberate and purposeful approach to integrating external data into the organization's activities. This is a solid

base that includes powerful analytics, safe storage, quality control, data integration, and a clear governance structure. But when we get to Case 2, there is a slight change in the range of capabilities. Although they still have a significant skill set and a couple capabilities the same as case 1, there is a noticeable decline in several areas. This calls for a review and possible improvement of some skills. Interestingly, the discrepancies increase even more when we look at Case 3. The collection of skills required to use external data seems more simplified, indicating that Case 3 has not faced and overcome several challenges and has not yet improved its method regarding leveraging external data. Indicated by figure 1 below, important capabilities mentioned by all the cases were, among others, **employee skills**. Having an internal willingness to work with external data, be able to retrieve useful insights and communicate external data insights with the rest of company are capabilities needed when leveraging external data. Another interesting fact is that Case 1 and 3 both placing emphasis on analytical skills on contrary with case 2, which places more emphasis towards the critical thinking skill. Further, **basic resources** like financial resources and human capital were also mentioned as very important capabilities in external data leveraging. Next to these, the most mentioned capability is the ability to govern data. For example, a **data infrastructure**, is pointed out as an important factor. This all indicates that from every category, certain capabilities are connected with each other. For example, if you have the right system to process the data, but you do not have the right staff to work with it, it is of no use to you. The same applies if you have the right data specialists within your organization, but you do not have the right financial resources to source external data or no management that encourages the use of external data, the specialized employees are of no use to you.

Another remarkable result was that the data consultant specialist from Company L (which was not grouped into a case) mentioned some of the same capabilities necessary or convenient as case 3, like being creative and having a strategic focus and long-term vision. This was not mentioned within case 1 (See appendix D). Additionally, Case 1 and 2 mentioned that having the right accessibility framework based on function, and having a consistent policy is more important. This was also mentioned by the participants from Case 3. Supportive senior management and managers which have the ability for external data advocacy and leadership were indicated as very important in case 1.
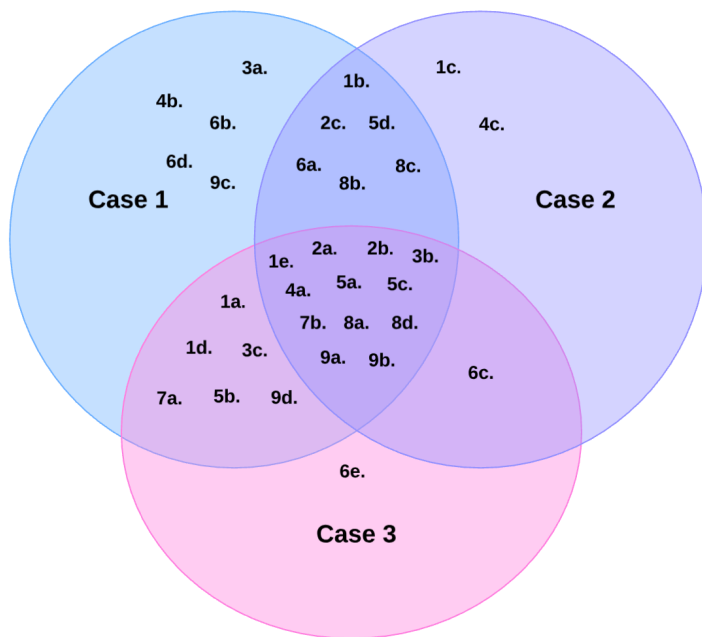
Figure 1 Diagram of capabilities mentioned by each case and the overlap between the cases

4.5.2. Performance because of supply and demand match.

By studying the performance of three different cases in the business environment, we find some interesting connections between branded search, using external data, and overall company results, see table 12. Among the cases, Case 1 stands out due to its increase of 2,6% total change in branded search. This does not seem much, but when looking at the change of volume, this is a big increase. The company's strategy approach of integrating a significant quantity of external data into their assortment selections is credited with this achievement. This emphasizes how important it is to use external data to become relevant in the marketplace. Conversely, Cases 2 and 3 tell a different story. Case 3 has a more serious problem with a -5.8% fall in branded search, whereas Case 2 has a slight decline of -1.2%. These are also small percentages, but based on their volume they say a lot. It is significant that the higher the level of maturity is within a case, the better the branded search. This points to the importance of the organizational capacity to use external data as well as the extent to which it is leveraged.

Analyzing the cases, it is important to note that Case 1 is characterized by a rise in turnover, underscoring the importance of these results. In Case 2, not all businesses had an increase in turnover, while in Case 3, all businesses reported a small rise or stayed overall stable as the year before. This association may imply a close relationship between advances of the strategic use of external data. What is remarkable is that in every case, when the branded search has increased, the turnover also increased. When the branded search did decrease, the turnover did either increase by only a small amount or decrease. In summary, organizations' branded search

is increasing in direct proportion to the degree of external data maturity, and vice versa. Furthermore, turnover has grown in direct proportion to the degree of external data leveraging.

Table 12 Cases regarding branded search and turnover change

Case	Overall changed branded search	Company	Turnover change	Branded search change (2022 compared to 2021)	Branded search volume (in 2022)
1	+ 2,6% 1,766,310	A	0,9%	12,4%	982,340
		C	300%	53,4%	17,380
		D	11%	-3,9%	12,163,440
		F	5%	3,9%	57,804,330
2	-1,2% -65,680	B	Increased	39,6%	5,298,270
		G	-20%	-20,9%	167,840
		I	30%	22,3%	469,500
3	-5,8% -89,450	E	12%	1%	377,190
		H	0,9%	-14,2%	466,010
		J	33%	2,7%	9,140
		K	Stable	-6,6%	610,530

5. Discussion and Conclusion

The purpose of this study was to respond to the following question. ***"How can creating capabilities enable leveraging external data in order to match supply with demand in organizations?".*** We discovered that there is, in all cases, a great emphasis on leveraging external data to monitor their external environment, and to inform decisions within their organization, especially when assortment decisions are made. It is also clear that there is a great variety of sources used within the assortment decision process, both internal and external. However, utilizing external data is a highly difficult task that calls for a variety of capabilities. Including employee skills, organizational capabilities, and data governance capabilities. It should be noted that when external data is implemented considering the capabilities necessary, ensuring that the data can be analyzed and translated into useful insights, it can lead to increased performance based on turnover and brand search. Moreover, each situation necessitates a distinct strategy when leveraging external data and contributing to supply demand match. More specifically: case 1, which informs their assortment decisions the most with external data sources, plays a great importance on the leveraging of external data. Companies need to have a wide range of skillset to be fully able to leverage the external data sources. Like search engine data to improve the process of finding trends. Within Case 2 it is also relevant for exemplifying the role of leveraging external data, but to a lesser extent. The organizations within case 2 mentioned fewer capabilities necessary, but they still leverage it for the same variety of purposes as case 1. Case 3 characterized by playing the least importance towards integrating external data. They play more emphasis on internal data, and only a bit on external data as well

within their assortment decisions. However, even though the branded search of case 3 decreased, it did not affect their turnover as much as within the other cases. We describe in the next section how these findings add to the current theory of organizational capabilities, leveraging external data, supply-demand match, and its influence on performance.
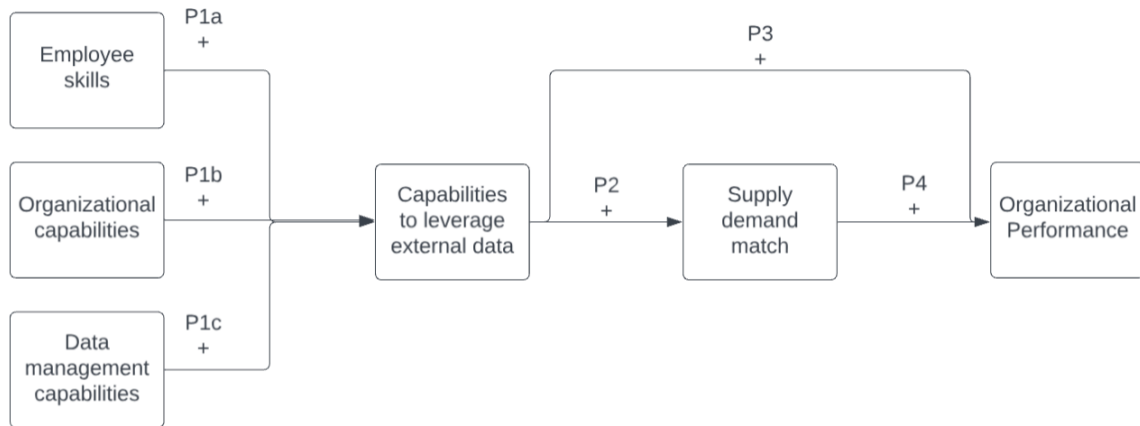

Figure 2 Conceptual model of leveraging external data to match supply and demand.

5.1. Theoretical implications

5.1.1. How capabilities enable leveraging external data

This study showed that there are multiple factors able to explain how companies should leverage external data. Figure 2 presents a framework that depicts which capabilities are prominent when leveraging external data while also thrive for a supply and demand match. Additionally, it shows the factors that are likely to result in organizational performance.

First, to the best of our knowledge this study has been the first attempt to examine the effect of leveraging external data on the supply-demand match and how they affect performance with the help of organizational capabilities. The concepts put forward in this study serve as illustrations of the effects that might be anticipated when using external data and how they could help with the supply-demand match. However, this research elaborates and partially overlaps with the already existing body of work in the capability's literature for BD analytics but now applied in assortment decisions and only focused on external data. This resulted in different capabilities needed for the usage and integration of external data. So is the difference with Wamba et al. (2017) that it is mainly focused on the analytical part of analyzing BD and not on managing it like the data management capabilities in this research. While Mikalef et al. (2020) focuses primarily on managing BD, it does not cover all the needs for utilizing external data, such as sourcing it, requiring security, or providing an infrastructure for data integration.

More specifically, in the current literature, several capabilities are mentioned necessary for leveraging BD, like data-driven culture, technical skills, organizational learning (Mikalef, Krogstie, Pappas, & Pavlou, 2020; Wamba, et al., 2017), most of them using the framework of tangible, intangible, and human skills as their foundation (Grant, 1991). They show the importance of both technical- and managerial-oriented skills as required to derive value from BD investments (Pappas, Mikalef, Giannakos, Krogstie, & Lekakos, 2018; Wamba, et al., 2017). According to this research, managerial skills play indeed an important role by leveraging external data because the process of integrating the data has to be managed and the people should be encouraged by their managers. However, this research has identified more capabilities necessary for leveraging external data. Next to the managerial skills, an employee should also have the right analytical skills to be able to analyze the data, and it should be able to communicate its findings. These make sure that the employees are not only capable of extracting relevant information but are also able to explain and communicate it towards her/his coworkers. Next to that, a certain level of cognitive readiness towards external data is beneficial. They should be motivated and have a positive attitude towards external data otherwise they are less likely to integrate external data in their daily tasks. So, this thesis supports the importance of managerial and technical skills, however, it extents the current literature with a more detailed set of skills necessary. According to Gupta and George (2016), fostering human skills is exactly what is needed to reach the full potential of BD. This brings us to the first proposition.

P1a: *Employee capabilities such as data analysis skills, communication skills, cognitive readiness, and managerial skills benefit the process of leveraging external data within the company*.

In addition to the individual employee skills required to extract valuable insights from external data, there are general organizational capabilities. The current BD analytics definitions do highlight the importance of organizational capabilities when analyzing BD (Mikalef, Pappas, Korgstie, & Giannakos, 2018). However, this research elaborates the importance of organizational capabilities when wanting to analyze specifically external data. After an in-depth look, the two main pillars of these capabilities are organizational data-driven cultural competencies and basic resources like financial resources and human capital. organizational data-driven cultural capabilities serve as the guiding principles that shape an organization's approach towards external data. The essential building elements that allow an organization to interact with external data in an efficient manner are included in the basic resources. This is in

line with recent research that highlights the importance of organizational competencies in the BD age. Companies must establish the fundamental tools as well as a mindset to support data-driven decision-making. While Dubey et al. (2019) emphasizes the necessity of a supportive corporate culture in obtaining value from external data, Tabesh et al. (2019) stress the need of a unified vision for effective implementation. This brings us to the next proposition:

P1b: *The presence of strong organizational capabilities such as basic resources and an organizational data driven culture positively influences an organization's ability to leverage external data.*

This study's conclusions also highlight the crucial role of data management capabilities that consist of three interconnected dimensions, namely data collecting skills, data infrastructure and integration capabilities, and general data governance capabilities. This third dimension is consistent with the core governance and control capabilities found by the study of Merkus et al. (2021) when leveraging BD. However, this research adds in the process of leveraging external data, data collecting abilities. Second, there is a requirement for a technical system, which offers the deployment of external and internal data sources. Third, the other skills that are helpful for utilizing data are establishing data consistency and having data security in check.

This research distinguishes between the organizational capabilities and data governance capabilities when leveraging external data, which sets it also apart from outcomes seen in earlier studies (Merkus, Helms, & Kusters, 2021). These two were kept apart in this study since the participants made a big difference between general organizational capabilities, and capabilities that are directly related towards managing the external data. Organizational capabilities in this research encompass the fundamental resources, such as financial capital and human capital, and offer a conducive atmosphere for utilizing external data. The ability to manage data pertains only to data management. As indicated by Xie et al. (2016), businesses need to be able to not only analyze BD, but also obtain, leverage, and monetize it to gain value from it. This research elaborates this and therefore the next proposition is:

P1c: *Effective data governance capabilities within an organization positively contribute to the successful acquisition, integration, and management of external data, enhancing the overall quality and reliability of the data.*

5.1.2. How using external data improves the fit between supply and demand and has a favorable impact on organizational performance.

Conceptually, this research sets external data capabilities apart from BD capabilities by emphasizing that the value is mostly found in obtaining fresh perspectives and producing information and proof to assist operational changes or adaptations inside the company. Our findings support our conceptualization, since they show that external data significantly and favorably affects a firm's assortment decisions and performance.

According to Hofmann and Rutschmann (2018), a shortage of information or expertise about market demand is the primary cause of assortment planning difficulties. However, there is an enormous amount of relevant data available in the external environment. In order to buy the correct items in the right amounts and deliver merchandise to the right locations and channels at the right time, industry operators must have a thorough awareness of consumer preferences and demand factors (Blum, 2021). This thesis finds that gathering and evaluating external data helps companies understand how their business may be impacted by variables like competitor actions, changing market trends and behaviors, or geopolitical events. This knowledge produced by analyzing external data sources serves as a decision-making anchor in addition to assisting in the detection of market demand. The qualitative research of Janssen et al. (2017) contend that the maturity of the firm's overall BD analytics has a major role in determining the caliber of choices made by senior managers and the degree to which they rely on insight created by BD within their operations. Additionally, the information gained from external data sources makes sure that companies stay relevant and have their assortment better matched with the demand in the market (Saberi, Hussain, Saberi, & Chang, 2017). Thus, to match your supply to demand, it is crucial to resolve the discrepancy between internal and external data (Hofmann & Rutschmann, 2018; Saberi, Hussain, Saberi, & Chang, 2017). This leads to the next proposition:

P2: Leveraging external data effectively improves the supply and demand match of a company and increases the relevance to consumer demand.

This study emphasizes the benefits of utilizing external data efficiently and making the appropriate judgments based on this relevant source of information can increase turnover and branded search. The empirical evidence included in this thesis supports the claims stated by academics such as Wamba et al. (2017) and Mikalef et al. (2020), who highlighted the positive effect of leveraging BD on competitive and firm performance. Hence, our findings contribute

to this discourse by illustrating the effect of specifically the combination of leveraging external data and the supply-demand match on performance.

Effectively, the shift toward a digital business strategy mentioned in the Bharadwaj et al. (2013) may be linked to the importance of capabilities to leverage external data. Businesses that support leveraging external data use it to guide strategy and provide guidance to senior executives when making choices. Organizations may find trends and variables that contribute to employee turnover by utilizing data-driven insights. This information enables proactive actions. Stated differently, leveraging external data contributes to the development of strategies that integrate technology and business. Liberatore et al (2017) explained that operations are more successful when better informed decisions are made, and better strategies are refined. The increased performance of operations could result in better performance and customer connections (Rai, Patnayakuni, & Seth, 2006). This brings us to the next proposition:

P3: The positive effect of leveraging external data effectively translates into enhanced organizational performance across various dimensions, including turnover and customer relevancy.

This study makes an important contribution to the external data literature by presenting how external data capabilities strengthen the supply-demand match, what in turn increases competitive performance. The evidence given here supports the ideas of operational effectiveness and strategic alignment by demonstrating that a supply and demand that are in balance has a favorable impact on organizational performance. Liberatore et al. (2017) mentioned that leveraging BD with the right capabilities, could promote the operation efficiencies (like a supply-demand match) of a company. Successful assortment planning avoids losses in existing or future sales by offering the appropriate items at the right price and time to the right consumers (Arbuthnot, 1997). When an organization has a clear understanding of its operational needs, it can wisely distribute resources, making sure they go where they are most needed. This strategic resource allocation improves an organization's capacity to overcome obstacles and seize opportunities since it is informed by a sophisticated understanding of demand patterns (Liberatore, Pollack-Johnson, & Clain, 2017). Case 1 in this study, was highlighted as being the most advanced in leveraging external data with capabilities within their organization. This resulted in scoring the highest on the performance indicators. Additionally, Rai et al (2006) mentioned that operational success creates revenue growth and increased customer connections. This brings us to the next proposition:

P4: a well-matched supply and demand has a positive influence on organizational performance.

In summary, this study adds to the body of knowledge about organizational performance, supply-demand alignment, and capabilities. It sets itself apart by emphasizing external data specifically and offering complete assistance for utilizing it. By focusing on more general personnel competencies like data communication and motivation levels, it broadens the scope of recent research. So this research is extending the current literature by adding a broader range of capabilities necessary to retrieve value from external data. Moreover, it emphasizes how organizational and data management capacities differ, especially when it comes to external data governance. It also emphasizes how supply-demand congruence and organizational performance, more especially, branded search and turnover, are positively correlated.

5.2. Practical implications

The study's findings also have several practical implications. First off, this study demonstrates that external data capabilities encompass much more than merely making large-scale technological expenditures, gathering enormous volumes of data, and letting the data department play about with analytics. Recruiting employees with strong technical and management knowledge of BD, cultivating an organizational learning culture, and integrating data-driven, mostly external data, decision-making, into the organization's operations are critical components of producing performance out of external data investments. Naturally, this calls for several procedures to be implemented, which needs the support of upper management and a well-defined strategy for the adoption of external data throughout the company. A few studies have already started to highlight the significance of each of the elements and have given managers instructions on leveraging BD. These instructions can also be used when leveraging external data (Vidgen, Shaw, & Grant, 2017).

This research can assist managers in creating an evaluation tool that highlights the key resources required to leverage external data and evaluates the strengths and weaknesses of their companies. The primary pillars have the potential to reveal neglected or underfunded regions. Resources from the organizational capabilities, such as an open culture and the level of strategic focus and long-term vision, may help managers recognize the value of these elements and develop plans to reinforce them throughout the whole company. Many firms are still in the early stages of their external data projects, so it's critical to assess predicted expenses and profits and have a clear understanding of all the areas in which value should be spent. Furthermore, many resources like, technological infrastructure, data shareability, and even

employee skills require preparation and a well-established procedure to establish. Whereas other resources could easily be obtained, like a supportive management, time and flexibility.

Moreover, you create a sense of urgency about the use of external data by incorporating external data practices into the organization's core operations through initiatives like holding workshops, promoting involvement, sharing information about data sources, and maintaining a strong policy. This strategy creates a climate in which staff members actively embrace and regularly emphasize the value of utilizing external data, which in turn motivates them to commit to its efficient use. Allowing it to flourish within the company demonstrates also how important and high on the organization's strategic agenda the shift to a more external data-driven culture is. A greater feeling of urgency encourages quicker acceptance and execution.

Ultimately, the study's findings demonstrate that business value cannot be immediately attained even in the presence of external data capabilities. Put it in another way, even while businesses may be generating valuable data-driven information as a consequence of leveraging external data, action is still needed to fully utilize it. The capacity of a company to perceive, seize, and reconfigure is not just dependent on data-driven insights. In order to accomplish this effectively, the organization must be built to be able to react to changes that insights signal. This calls for adaptability in business practices, quick redeployment of organizational resources, and the dismantling of any kind of inertia that can hinder the conversion of knowledge into action. In short, managers must understand that responsiveness is a more important factor in deriving value from external data investments than the information offered by external data alone.

5.3. Limitations and Future research

This research has limitations, just like any other, but that only means there are more options for further research. The first limitation is that all the participating companies were in a different stage in the degree to which they leverage external data. This is a limitation because it could restrict the generalizability of findings and complicate comparisons. Yet, this may also help highlight how different stages of the shift to leveraging external data differ and complement one another. While some businesses have been fostering external data for years, others are just getting started. Utilizing external data is a process that requires time and effort, as each responder joined the business at a distinct point in time. Before the choice to use external data was made, some of the responders were already employed by the company. This offers the chance to depict a great, wide image on the one hand, but it also means that various

tasks match different stages of the process. By asking individuals who are farther along in the process of using external data to look back and those who are comparatively at the beginning of the transformation to look ahead, we have attempted to get around this constraint. Although this was helpful, it did make generalization more challenging.

The second limitation is that all participating companies were not from the same industry. Whilst this fact can increase the variety and diversity of the results, it can also lead to some difficulties to generalize these results without making a difference per industry. Further research might go deeply into the variations between industries and see which ones gain more and which ones less from external data. Third, the companies were all a different size. There is typically a correlation between different structural, cultural, and resource-related factors and organizational size (Nason, McKelvie, & Lumpkin, 2015). While smaller businesses may be more agile, flexible, and have a more intimate work atmosphere, larger corporations may have more extensive financial resources, hierarchical layers, and a variety of functional groups. Further research should be conducted into how the effect of these innate variations have the potential to greatly affect how external data consumption is thought out, carried out, and how performance is affected as a result.

This brings us to the fourth limitation. The participants' varied origins, occupations, education, and administrative responsibilities represent another noteworthy constraint. The diversity of the participant pool results in differences in their viewpoints, backgrounds, and methods of reaching decisions. Although this diversity adds value to the data collection, it also makes generalization difficult. To effectively capture the subtleties across various organizational positions, future study might benefit from additional factors or more focused participant selection. The gender diversity within the participant pool is the subject of the fifth constraint. The majority of those participated were men. If there are any differences between males and females when it comes to leveraging external, it may be fascinating to observe them.

Sixth, it is critical to understand that organizational performance is a complex concept impacted by a wide range of variables. While the influence of using external data was the main emphasis of this study, it is important to recognize that there are a variety of externalities that affect performance results. Turnover rates, for example, changes in the economy, current trends, and even external variables like the weather may have a big impact on how well an organization performs. These unrelated factors offer a possible source of confounding effects that this study could not fully control for. To get a more thorough comprehension of the complex interactions between the use of external data and organizational performance, future studies ought to aim

to include a wider range of contextual factors. This would need a more in-depth examination that takes into consideration the dynamic character of organizational contexts and considers shifting trends, the state of the economy, and other outside variables. Additionally, even though our study provided insightful information about the relationship between higher branded search and turnover, one important drawback is the limited sample size that was used. This limitation highlights the need for care when extrapolating our results to larger settings. Future studies must employ a bigger sample size in order to improve statistical robustness and more thoroughly capture the subtleties of this connection.

Lastly, longitudinal research may offer important insights into the durability and long-term impacts of using external data, clarifying its significance in the context of organizational factors that are always shifting. Further research on the utilization of external data and its impact on organizations would be highly advantageous for academic literature as well as business practitioners.

6. Conclusion

The purpose of this study was to create a framework on leveraging external data influences the supply and demand match and what the role of capabilities are in this matter. There was no real framework yet regarding how these concepts could be related. That is why we chose a qualitative study with semi-structured interviews. We expected from several capabilities that are known for their potential to leverage BD to also be beneficial for the leveraging of external data. However, this existing body of research was not comprehensive enough to generalize it over external data. Several capabilities, especially the data management capabilities like sourcing capability and data quality become important in the context of external data. Also, the employee skills have broadened up compared to the general BD analytical skills. The results of this study showed that, employee skills, organizational capabilities, and data management capabilities came forward in this research as being able to benefit the process of leveraging external data. It became clear that leveraging external data, especially in the assortment planning decisions, contribute to a supply-demand match, which in turn could contribute to better performance. However, it is crucial to consider the opportunities and difficulties associated with accessing and managing external data.

Furthermore, this research adds to the literature with propositions about which capabilities enhance the usage of external data and their effect on performance, when matching supply towards market demand, based on the conducted interviews. Additionally, this study provides a well-reasoned overview about the challenges and reasons behind the need for leveraging external data.

References

Aaser, M., & McElhaney, D. (2021, February 3). *Harnessing the power of external data.* Retrieved from McKinsey & Company: https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/harnessing%20the%20power%20of%20external%20data/harnessing-the-power-of-external-data.pdf

Agarwal, R., & Dhar, V. (2015). Big data, data science, and analytics: the opportunity and challenge for IS research. *Information system research*, 443-448.

Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2016). How to improve firm performance using big data analytics capability and business strategy alignment? *International Journal of Production Economics*, 113-131.

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations of research issues. *MIS Quarterly*, 107.

Amit, R., & Schoemaker, P. J. (1993). Strategic assets adn organizational rent. *Strategic Management Journal*, 33-46.

Arbuthnot, J. J. (1997). Identifying ethical problems confronting small retail bueyrs during the merchandise buying process. *Journal of Business Ethics*, 745-755.

Archer-Brown, C., Piercy, N., & Joinson, A. (2012). Examining the information value of virtual communities: factual versus opinion-based message content. *Journal of Marketing Management*, 421-438.

Bahng, Y., Kincade, D. H., & Rogers, F. T. (2018). Assortment planning for retail buying, retail store operations. *Journal of Distribution Science*, 15-27.

Barlatier, P., Jasserand, E., Hohberger, J., & Mention, A. (2022). Configurations of social media-enabled strategies for open innovation, firm performance, and their barriers to adoption. *Journal of Product Innovation Management*, 30-57.

Bekker, A. (2017, November 3). *Big Data: Examples, Sources and Technologies*. Retrieved from ScienceSoft: https://www.scnsoft.com/blog/what-is-big-data#:~:text=There%20are%20two%20types%20of,neither%20owns%20nor%20controls%20it.

Berndtsson, M., Forsberg, D., Stein, D., & Svahn, T. (2018). Becoming a data-driven organisation. . *26th European Conference on Information Systems (ECIS2018)*, (pp. 368-398). Portsmouth, United Kingdom.

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). Digital business strategy: toward a next generation of insights. *MIS quaterly: digital business strategy*, 471-482.

Bhattacharya, A., Morgan, N. A., & Rego, L. L. (2021). Examining why and when market share drives profit. *Journal of Marketing*.

Binet, L., & Field, P. (2009). Empirical Generalizations about advertising campaign success. *Journal of Advertising research*, 130-133.

Blum, R. (2021, June 19). *Matching Supply with Demand in Retail operations*. Retrieved from Medium: https://robblum.medium.com/matching-supply-with-demand-in-retail-operations-b57b950ed17b

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 77-101.

Chen, D. Q., Preston, D., & Swink, M. (2015). How the use of big data analytics affects value creation in supply chain mangement. *Journal of Management Information Systems*, 4-39.

Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: from big data to big impact. *MIS Quarterly*, 1165-1188.

Christensen, C. (2013). *The innovator's Dilemma: When new technologies cause great firms to fail.* Harvard Business Review Press.

Chung Koo, K., & Young, C. J. (1997). Brand popularity, country image and market share: An empirical study. *Journal of international business studies*, 361-386.

Clarke, R. (2016). Big data, big risks. *Information Systems Journal*, 77-90.

Collis, D. J. (1994). How valuable are organizational capabilities? *Strategic Management Journal*, 143-152.

Comuzzi, M., & Patel, A. (2016). How Organisations Leverage Big Data: A Maturity Model. *Industrial Management & Data Systems*, 1468-1492.

Davenport, T. H. (2014). *Big Data at Work: Dispelling the Myths, Uncovering the Opportunities.* Boston: Harvard Business Review Press.

Davenport, T. H., & Harris, J. G. (2007). *Competing on analytics: The new science of winning.* Harvard Business School Press.

Davenport, T. H., Barth, P., & Bean, R. (2012). How big data is different. *MIT Sloan Mangement Review*.

Davenport, T., & Dyché, J. (2013). Big data in big companies. *International Institute in Analytics.* SAS Inc.

Davenport, T., Evgeniou, T., & Redman, T. C. (2021, June 24). *Your data supply chains are probably a mess. Here's how to fix them.* Retrieved from Harvard Business Review: https://hbr.org/2021/06/data-management-is-a-supply-chain-problem

Davis, J. (2018, April 2). *Big Data Maturity: You're not as mature as you think.* Retrieved from InformationWeek: https://www.informationweek.com/big-data-analytics/big-data-maturity-you-re-not-as-mature-as-you-think

Dosi, G., Nelson, R. R., & Winter, S. G. (2000). *The nature and dynamics of Organizational capabilities.* Oxford, UK: Oxford University Press.

Dremel, C. (2017). Barriers to the adoption of Big Data Analytics in the automotive sector. *Twenty-third Americas Conference on Information Systems.* Boston.

Dubey, R., Gunasekaran, A., Childe, S. J., Blome, C., & Papadopoulos, T. (2019). Big Data and Predictive Analytics and Manufacturing Performance: Integrating Institutional Theory, Resource-Based View and Big Data Culture. *Britisch journal of Management*, 341-361.

Dubey, R., Gunasekaran, A., Childe, S. J., Papadopoulos, T., Luo, Z., Wamba, S. F., & Roubaud, D. (2019). Can big data and predictive analytics improve social and environmental sustainability? *Technological Forecasting and Social Change*, 534-545.

Dubey, R., Gunasekaran, A., Childe, S. J., Roubaud, D., Fosso Wamba, S., Giannakis, M., & Foropon, C. (2019). Big data anlytics and organizational culture as complements to swift trust and collaborative performance in the humanitarian supply chain. *International journal of production economics*, 120-136.

Edmonson, A. C., & McManus, S. E. (2007). Methodological fit in management field research. *Academy of Management Review*, 1246-1264.

EMC. (2014, October 5). *The digital Universe of opportunities: Rich data and the increasing value fo inter of things.* Retrieved from https://www.emc.com/leadership/digital-universe/2014iview/executive-summary.htm.

Fildes, R., Ma, S., & Kolassa, S. (2019). Retail forecasting: Research and practice. *International journal of forecasting*.

Fosso Wamba, S., Akter, S., Eddwards, A., Chopin, G., & Gnanzou, D. (2015). How 'big data' can make big impact: findings from a systematic review and a longitudinal case study. *International journal of Production Economics*, 234-246.

Gandomi, A., & Haider, M. (2015). Beyond the hype: big data concepts, methods, and analytics. *International Journal of Information Management*, 137-144.

Ghasemaghaei, M., Hassanein, K., & Turel, O. (2017). Increasing firm agility through the use of data analytics: The role of fit. *Decision Support Systems*, 95-105.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: notes on the Gioia methodology. *Organizational Research Methods*, 15-31.

Grant, R. M. (1991). The resource-based theory of competitive advantage: implications for strategy formulation. *California Management Review*.

Gupta, M., & George, J. F. (2016). Toward the development of a big data analytics capability. *Information & Management*, 1049-1064.

Gupta, S., Drave, V. A., Dwivedi, Y. K., Baabdullah, A. M., & Ismagilova, E. (2020). Achieving superior organizational performance via big data predictive analytics: A dynamic capability view. *Indsutrial Marketing Management*, 581-592.

Hart, C., & Rafic, M. (2006). The dimensions of assortment: A proposed hierarchy of assortment decision making. . *International Review of Retail, Distribution and Consumer Research*, 333-351.

Helfat, C. E., & Peteraf, M. A. (2009). Understanding dynamic capabilities: progress along a developmental path. *Stratgic Organization*, 91-102.

Helfat, C. E., & Winter, S. G. (2011). Untangling dynamic and operational capabilities: Strategy for the (N) ever-changing world. *Strategic Management Journal*, 1243-1250.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J., & Winter, S. G. (2007). *Dynamic capabilities: Understanding Strategic Change in Organizations.* Malden, MA: Blackwell Publishing.

Hitt, M. A., Bierman, L., Shimizu, K., & Kochhar, R. (2001). Direct and moderating effects of human capital on strategy and performance in professional service firms: a resource-based perspective. *Academy of Management Journal*, 13-28.

Hofmann, E., & Rutschmann, E. (2018). Big data analytics and demand forecasting in supply chains: a conceptual analysis. *The International Journal of Logistics Management*, 739-766.

Janssen, M., Van Der Voort, H., & Wahyudi, A. (2017). Factors influencing big data decision-making quality. *Journal of Business Research*, 338-345.

Javalgi, R. G., Martin, C. L., & Young, R. B. (2006). Marketing research, market orientation and customer relationship management: A framework and implications for service providers. *Journal of Services Marketing*, 12-23.

Jun, S., Park, D., & Yeom, J. (2014). The possibility of using search traffic information to explore consumer product attitudes and forecast consumer preference. *Technological forecasting & social change*, 237-253.

Katal, A., Wazid, M., & Goudar, R. H. (2013). Big data: issues, challenges, tools and good practices. *Contempory Computing (IC3) Sixth International Conference* (pp. 404-409). IEEE.

Ketokivi, M., & Choi, T. (2014). Renaissance of case research as a scientific method. ,. *Journal of Operations Management*, 232-240.

Khoury, M. J., & Ioannidis, J. P. (2014). Big data meets public health. *Science 346*, 1054-1055.

Kiron, D., & Bean, R. (2013). Organizational alignment is key to big data success. *MIT Sloan Management Review*, 1-6.

Krasikov, P., Eurich, M., & Legner, C. (2022). Unleashing the potential of external data: a dsr-based approach to data sourcing. *Thirtieth European Conference on Information systems 2022.* Timisoara, Romania: ECIS 2022 Research Papers.

Kulkarni, G., Kannan, P., & Moe, W. (2012). Using online search data to forecast new product sales. *Decision support systems*, 604-611.

Kulkarni, R. (2013). Transforming the Data Deluge into Data-Driven Insights: Analytics that Drive Business. *Keynote Speech presented at the 44th Annual Decision Sciences Institute Meeting.* Baltimore: SAS Institute Inc.

Kumar, V. (2013). *Profitable Customer Engagement: Concept, Metrics and Strategies.* SAGE Publications Ltd.

KVK. (2023, 12 7). *Check financiële positie zakenrelatie via jaarrekening.* Retrieved from KVK: https://www.kvk.nl/veilig-zakendoen/check-financiele-positie-zakenrelatie-via-jaarrekening/

Labrinidis, A., & Jagadish, H. V. (2012). Challenges and opportunities with big data. *Proceedings of the VLDB Endowment*, 2032-2033.

Laney, D. (2001). *3-D Data Management: Controlling Data Volume, Velocity and Variety, META Group Research Note.* Retrieved from META Group Research Note: http://blogs.gartner.com/doug-laney/files/2012/01/ad949-3D-Data-Management-Controlling-Data-Volume-Velocity-and-Variety.pdf

Lapide, L. (2006). *Demand management: Matching supply and demand over time.* MIT's Center for Transportation & Logistics.

Levitt, T. (2008). *Marketing Myopia.* Harverd Business Review Press.

Liberatore, M. J., Pollack-Johnson, B., & Clain, S. H. (2017). Analytics capabilities and the decision to invest in analytics. *Journal of Computer information systems*, 364-373.

Liu, Y., Zheng, Y., Wei, J., & Yang, Y. (2023). The use of inside-out and outside-in big data anlytics on e-platforms: Performance impacts and heterogeneity analysis. *International Journal of Electronic Commerce*, 36-65.

Löfgren, T., Gravem, D., & Haraldsen, G. (2011). A glimpse into the businesses' use of internal and external data sources in decision-making processes. *BLUE-ETS conference on burden and motivation in Official Business Surveys* (pp. 53-68). Heerlen: Statistics Netherlands.

Mantrala, M. K., Levy, M., Kahn, B. E., Fox, E. J., Gaidarev, P., Dankworth, B., & Shah, D. (2009). Why is assortment planning so difficult for retailers? A framework and research agenda. *Journal of Retailing*, 71-83.

Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Byers, A. H. (2011). *Big Data: The next frontier for innovation, competition, and productivity.* McKinsey Global Institute.

Martin, K. D., Borah, A., & Palmatier, R. W. (2017). Data privacy: effects on customer and firm performance. *Journal of marketing*, 36-58.

McAfee, A., & Brynjolfsson, E. (2012). Big data: the management revolution. *Harvard Business Review*, 60-68.

Merkus, J., Helms, R., & Kusters, R. (2021). Data governance capabilities: Maturity model design with generic capabilities reference model. *The 13th International Joint Conference on Knowledge Discovery* (pp. 102-109). SCITEPRESS - Science and Technology Publications.

Mikalef, P., Krogstie, J., Pappas, I. O., & Pavlou, P. (2020). Exploring the relationship between big data analytics capability and competitive performance: The mediating roles of dynamic and operational capabilities. *Information & Management*, 103169.

Mikalef, P., Pappas, I. O., Korgstie, J., & Giannakos, M. (2018). Big data analytics capabilities: a systematic literature review and research agenda. *Information Systems*, 1-32.

Mikalef, P., van de Wetering, R., & Krogstie, J. (2021). Building dynamic capabilities by leveraging big data analytics: The role of organizational inertia. *Information & Management*.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: an expanded sourcebook*. (2nd ed.). Thousand Oaks, CA.: Sage.

Mohsin, M. (2022, Jan 13). *10 GOOGLE SEARCH STATISTICS YOU NEED TO KNOW IN 2023*. Retrieved from Oberlo: https://www.oberlo.com/blog/google-search-statistics#:~:text=Google%20has%2091.9%20percent%20of,traffic%20originates%20from%20mobile%20devices.

Nason, R. S., McKelvie, A., & Lumpkin, G. T. (2015). The role of organizational size in the heterogeneous nature of corporate entrepreneurship. *Small Business Economics*, 279-304.

Orb, A., Eisenhauer, L., & Wynaden, D. (2001). Ethics in qualitative research. *Journal of Nursing Scholarship*, 93-96.

Pappas, I. O., Mikalef, P., Giannakos, M. N., Krogstie, J., & Lekakos, G. (2018). Big data and business analytics ecosystems: Paving the way towards digital transformation and sustainable societies. *Information Systems and e-business management*.

Phillips-Wren, G., & Hoskisson, A. (2015). An anlaytical journey towards big data. *Journal of Decision Systems*, 87-102.

Porter, M. E. (2011). *Competitive advantage of nations: Creating and Sustaining superior performance.* Simon and Schuster.

Rai, A., Patnayakuni, R., & Seth, N. (2006). Firm performance impacts digitally enabled supply chain integration capabilities. *MIS Quarterly*, 225-246.

Ridder, H. G. (2017). The theory contribution of case study research designs. *Business research*, 4-12.

Russom, P. (2011). *Big Data Analytics.* TDWI Best Practices Rerport, Fourth Quarter.

Saberi, Z., Hussain, O. K., Saberi, M., & Chang, E. (2017). Online Retailer Assortment Planning and Managing under Customer and Supplier Uncertainty Effects using Internal and External data. *The 14th IEEE International Conference on e-Business Engineering*, 7-14.

Saeed, S., Yousafzai, S., Paladino, A., & De Luca, L. M. (2015). Inside-out and outside-in orientations: A meta-analysis of orientation's effects on innovation and firm performance. *Industrial Marketing Management*, 121-133.

Schatsky, D., Murashkin, C., & Camhi, J. (2019, February 28). *Data ecosystems*. Retrieved from Deloitte Insights: https://www2.deloitte.com/us/en/insights/focus/signals-for-strategists/smart-analytics-with-external-data.html

Shabbir, M. Q., & Gardezi, S. B. (2020). Application of big data analytics and organizational performance: the mediating role of knowledge management practices. *Journal of Big Data*, 2-17.

Shan, S., Luo, Y., Zhou, Y., & Wei, Y. (2019). Big data analysis adaptation and enterprises' competitive advantages: the perspective of dynamic capability and resource-based theories. *Strategic Analysis & Strategic Management*, 406-420.

Sharma, R. (2021, September 27). *Sources of Big Data: Where does it come from?* Retrieved from upGrad: https://www.upgrad.com/blog/sources-of-big-data/

Sheng, J., Amankwah-Amoah, J., & Wang, X. (2017). A multidisciplinary perspective of big data in management research. *International Journal of Production Economics*, 97-112.

Shorten, A., & Smith, J. (2017). Mixed methods ressearch: expanding the evidence base. *Evidence based Nursing*.

Shukla, M., & Tirwari, M. K. (2017). Big-data analytics framework for incorporating smallholders in sustainable palm oil production. *Production planning control*, 1365-1377.

Singh, S., Kumar, R., Panchal, R., & Tiwari, M. K. (2020). Impact of COVID-19 on logistics systems and disruptions in food supply chain. *International Journal of Production Research*, 1-16.

Sirmon, D. G., Hitt, M. A., Ireland, R. D., & Gilbert, B. A. (2011). Resource orchestration ot create competitive advantage: Breadth, depth, and life cycle effects. *Journal of Management*, 1390-1412.

Srivastava, P., Sharma, S., & Kaur, S. (2020). Data mining-based algorithm for assortment planning. *Journal of Management Analytics*, 1-15.

Statista. (2022, September 8). *Volume of data/information created, captured, copied, and consumed worldwide from 2010 to 2020, with forecasts from 2021 to 2025*. Retrieved from Statista: https://www.statista.com/statistics/871513/worldwide-data-created/

Strand, M., & Syberfeldt, A. (2020). Using external data in a BI solution to optimise waste management. *Journal fo Decision Systems*, 53-68.

Sun, Z., Strang, K., & Firmin, S. (2017). Business analytics-based enterprise information systems. *Journal of Computer Information Systems*, 169-178.

Tabesh, P., Mousavidin, E., & Hasani, S. (2019). Implementing big data strategies: A managerial perspective. *Business Horizons*, 347-358.

Tang, L., Li, J., Du, H., Li, L., Wu, J., & Wang, S. (2022). Big Data in Forecasting Research: A literature review. *Big Data Research*, 1-30.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 509-533.

Tirunillai, S., & Tellis, G. J. (2014). Mining marketing meaning from online chatter: strategic brand analysis of big data using latent Dirichlet allocation. *Journal of Marketing Research*, 463-479.

Trendata. (n.d.). *Ai Driven Marketing Intelligence Platform*. Retrieved from Trendata: https://trendata.io/product/

Vidgen, R., Shaw, S., & Grant, D. B. (2017). Management challenges in creating value from business analytics. *European journal of operations research*, 626-639.

Wamba, S. F., Akter, S., Edwards, A., Chopin, G., & Gnanzou, D. (2015). How 'big data' can make big impact: findings from a systematic review and a longitudinal case study. *Journal of Business Research*, 234-246.

Wamba, S. F., Gunasekaran, A., Akter, S., Ren, S. J., Dubey, R., & Childe, S. J. (2017). Big data analytics and firm performance: Effects of dynamic capabilities. *Journal of Business Research*, 356-365.

Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal*, 991-995.

Wu, S. P.-J., Straub, D. W., & Liang, T.-P. (2015). How Information Technology Governance Mechanisms and Strategic Alignment Influence Organizational Performance: Insights from a Matched Survey of Business and IT Managers. *MIS Quarterly*, 497-518.

Xie, K., Wu, Y., Xiao, J., & Hu, Q. (2016). Value co-creation between firms and customers: The role of big data-based cooperative assets. *Information & Management*, 1034-1048.

Yang, L., Madnick, S., Wang, R., F., W., & Hongyun, Z. (2014). A cubin framework for the chief data officer: succeeding in a world of big data. *MIS Quarterly Executive*, 1-13.

Zhang, T., Wang, W. Y., & Pauleen, D. J. (2017). Big data investments in knowledge and non-knowledge intensive firms: what the market tells us. *Journal of Knowledge Management*, 623-639.

Appendix
Appendix A: Interview Guide

Match supply and demand
1. How is your company currently determining their supply?
2. What sources do you use to get the right information to inform your decision for your assortment?
3. What are current challenges related to the process of matching supply to demand?
   a. Can you describe how you manage these challenges?
   b. Did you already find some solutions to these problems, if yes, which solutions?

External data
4. Which external data sources are you using within the company?
5. What is the reason why your company started to use external data as a source?
6. What are the main insights you gather from external data sources?
7. In which way has external data contributed to new knowledge that you were previously unaware of?
8. Can you describe in which way external data benefited your company in terms of insights and opportunities?
9. What are other influences external data is having on your company?

Challenges, barriers, capabilities, enablers of external data
10. How did you manage the difficulties and challenges that come with leveraging external data?
11. Could you describe the skillset you need to leverage external data?
    a. Can you share some situations where these skills came forward?
12. Which organizational abilities does your company has which positively influences the use of external data?
13. Could you describe how the leadership is within your company regarding external data?
14. Can you describe the organizational culture and its influence on the use external data?
15. What are the main challenges you encounter when leverage external data?
    a. How did your company face these setbacks?
16. How are external data insights integrated into the business strategy and how do they contribute to the business objectives?

Closing
17. Are there other things you would like to share related to external data and matching supply to demand that we did not talk about?

Appendix B: Reasons for leveraging external data

Reasons for leveraging external data by company.*

Assortment decisions Based on		1st order themes	A	B	C	D	E	F	G	H	I	J	K
Reasons for using External data	Decision support	Back up decisions made	X	X		X		X	X				
		Leading in discussion						X					
		Forecast turnover								X			
		Get feedback		X	X	X				X		X	X
	Environmental monitoring	Monitor competitors	X			X		X	X	X			
		Benchmark	X						X				
		Monitor developments in the market	X	X	X	X	X	X	X	X	X	X	X

*Red = case 1, Green = case 2, and Blue case 3

Appendix C: External data sources

Sources used within assortment decision by company.

Assortment decisions			A	B	C	D	E	F	G	H	I	J	K
Based on	**Goal**	**Sources**											
External sources	Finding trends	Google searches	X	X	X			X					
		Desk research	X										
		Trade magazines	X					X	X			X	
		Trade Conferences	X								X		
		Designers		X							X		X
		Social media		X				X	X			X	X
		Trade fairs							X	X		X	X
		Ahrefs							X				
		Other branches				X			X		X		
	Getting feedback	Market research - survey				X	X						X
		Feedback from customers			X	X	X			X		X	
	Keeping an eye on competitors	Competitor analysis			X	X		X					
		External transaction data		X		X		X	X	X			X
		Price analysis			X			X					
Internal sources	Profitable products	Sales figures / performance of products	X	X			X	X	X	X		X	X
	Opinion	Feeling / own creativity		X					X	X	X	X	X
		Experience				X							
		Own website search behavior							X	X		X	X

*Red = case 1, Green = case 2, and Blue case 3

Appendix D: Capabilities framework for leveraging external data

Capabilities needed for leveraging external data mentioned by company. Red is case 1, Green is case 2, and blue is case 3.

Companies		Capabilities	A	B	C	D	E	F	G	H	I	J	K	L
Capabilities														
Employee Skills	Data analysis skills	Analytical skills	++		++		+	+		++			++	
		Critical thinking skills	+	+					+					+
		Creativity					+					+		+
		Flexibility				+								+
		Keeping the overview		++	+		+	+			+			
	Data communication skills	Data translation skills		++	+								+	+
		Data visualization skills		+	+			++			+			+
		Data explanation skills		+	+			++						
	Cognitive readiness	Data affinity			++			+						
		Internal willingness		+	+				+	+				
		Positive mindset			+									+
	Managerial skills	Management advocacy		+	++									+
		Leadership			+			++						
		Patience		+										
Organizational Capabilities	Basic resources capabilities	Human resources		+	+				+			+		+
		Trainings and workshops			+			++					+	+
		Time	+	++			+				+			
		Financial resources	+			+		+	+					
	Organization data driven culture	Organizational flexibility		++				+	+					
		Open culture	+		+									
		Strategic focus and long-term vision					+		+			+		+
		Supportive senior management	+			+		+						
		Strong organizational structure					+							+
Data Management Capabilities	Data acquisition skills	Data sourcing capability	+				+	+						
		Data quality capability	++				+	++			+	+		
	Data infrastructure and integration	Technical system			+	+	+	+			+	+		
		Data integration capability			+			+			+			
		Data sharing capability	+	+		+		++						

General data governance capability													
	Data accessibility capability			++		+	++	+					
	Consistent data policy	+		+				+				+	+
	Data management and uniformity			+						+	+	++		
	Employee involvement			++			+							
	Data security			+	+						+			

*Red = case 1, Green = case 2, and blue = case 3.