

What It Takes to Become a Data-Driven SME: Insights from Portugal

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Abstract

The adoption of data analytics brings vast benefits to SMEs but many face structural constraints that impede them to fully embrace data-driven decision making. This research uses interviews with business analytics managers, conducted through various forums, to capture data-driven maturity of Portuguese SMEs and the challenges faced by companies seeking to become more data and information-driven to create business value. The emerging idea is that the change requires a holistic approach that integrates cultural, strategic, and technological dimensions supported by continuous learning and external collaboration. Key changes that could accelerate transition include shift towards a data culture mindset in which data analytics supports business strategy and objectives, and investing in data literacy across organisational levels, so employees and managers understand data potential and improve data analytics skills.

Keywords: *Big data; data analytics; decision-making; digitalisation, Small and Medium-sized Enterprises (SMEs).*

1. Introduction

Micro, Small and medium-sized enterprises (SMEs) are a key driver of innovation and job creation in Europe. They account for 99% of the non-financial business sector and are responsible for two out of every three jobs in the private sector, contributing more than half of the total added value generated by businesses. Nine out of ten SMEs are micro-enterprises employing fewer than 10 people. In Portugal, SMEs also form an essential part of the business fabric, representing 99.9% of all enterprises. Portuguese SMEs contribute approximately 67.4% of total added value and account for around 76.2% of total national employment. These percentages are above the corresponding EU averages of approximately 53% and 65.2%, respectively (DGE, 2026).

The rapid diffusion of digital technologies, advanced data analytics and AI-based information and decision systems is reshaping how companies compete in both domestic and global markets.

The ability to analyze data allows companies to identify trends, optimize processes, and innovate their products and services to meet the evolving needs of their customers. Companies that prioritize data-driven decision-making and invest in analytics capabilities will therefore be better equipped to navigate the complexities of digital transformation and stay ahead of the competition. The Digital Decade policy program defines concrete objectives for 2030 regarding Digital Transformation of European Businesses (European Commission, 2023), namely: a) 75% of EU companies using Cloud, AI, or Big Data and b) more than 90% of SMEs reach at least a basic level of digital intensity. The EU average rate of basic digital intensity in SMEs is currently 73%, with Denmark and Finland being the only Member States to have already reached the EU target of 90%. A geographic divide is evident with northern and western Europe countries exhibiting higher rates of basic digital intensity than their southern and eastern counterparts (Eurofound 2025, p. 1).

Data-driven management is a key component of companies' digital transformation, yet the proportion of SMEs employing data analytics for management purposes is just 24%. Medium-sized companies are, unsurprisingly, more likely to use this method (44%) than small-sized enterprises (21%), but the contrast with large enterprises is marked: two thirds of large companies use data analytics to support decision-making (Eurofound, 2025, p. 18). Data quality, data culture and data strategy are suggested in the literature as key challenges for companies embarking in a data-driven management approach (Vidgen et al., 2017). However, SMEs have specificities likely to affect how they embrace that change. This paper investigates the challenges faced by Portuguese SMEs to become more data- and information-driven to build competitive advantage in an increasingly digital business environment.

2. Methodology

The [name of the project removed for review purposes] is a Horizon Europe project aimed at empowering higher education institutions to develop research and innovation through institution transformation and collaboration between higher education institutions, SMEs and stakeholders in local ecosystems. Within the scope of this project, between June 2024 and November 2025 four discussion forums were organized to discuss with experts the challenges faced, and lessons learned from SMEs adopting data-driven solutions. The 15 invited experts – professionals and consultants with decision-making responsibilities in their organizations (managing director, general manager, CEO, financial director) – were selected to represent different sectors of economic activity (Table 1).

The forums took place at university campus, were open-to-public events, and the audience was made up of companies' representatives, researchers, faculty, and graduate students. In each forum, the discussions were guided by a facilitator having a semi-structured interview script to ensure consistent coverage of relevant topics. The discussion focused on the main challenges in

implementing data-driven management systems and the key success factors that enable their effective adoption. While sample size may be small, data collection was enlightening, giving the informants extensive management and data knowledge and their willingness to thoughtfully share their expertise.

Table 1. Summary of informants (experts)

Forum	Informant	Position	Gender	Main Activity of the Company
1	1	CEO	Male	Market Research and Analytics
1	2	CEO and Owner	Male	Consulting Green Energy
1	3	Chairman	Male	Business Incubation Center
2	4	Chairman	Female	Healthcare
2	5	Dean	Male	University (Technology)
2	6	R&D Director	Male	Software development
2	7	Consultant	Female	Auditing & Consulting
2	8	Finance Manager	Male	Business Software
3	9	Assistant Professor	Female	University (Management)
3	10	Project Innovation Manager	Female	Energy
3	11	Head of Department	Female	Business Association
4	12	Director	Male	Innovation Policy
4	13	Consultant	Female	Smart Mobility
4	14	CEO & Founder	Male	Educational Toys
4	15	CEO & Consultant	Male	Startup/Business Ecosystem

The forums were video recorded, and a qualitative thematic analysis was used to find repeated patterns of meanings in the experts' descriptions and opinions. Overall, we adopted an abductive approach (e.g., Reichert, 2010) combined with existing literature (e.g. Vidgen et al., 2017) to define the categories of analysis, i.e., starting from empirical information we seek the most plausible explanation (or classification) for it. Our analysis uncovers the experience of the experts about the adoption of data-driven decision making in Portuguese SMEs and we use their voice to illustrate the key ideas emerging from the findings.

3. Results

3.1 Challenges on the implementation of data-driven management systems

SMEs that consider adopting data-driven decision-making face multiple challenges, crossing different domains such as cultural, technological, and organizational. However, the forum discussions revealed that the major challenges are more inner company than eco-system.

The **lack of understanding of data potential** among managers is pointed at as one major obstacle to a management approach change. If managers with strategic decision responsibilities do not look at data as a valuable active capable of leading to long-term success, then the motivation to become data-driven is reduced and the change is unlikely to happen.

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This all is resumed in one single idea - data monetization. Data by itself has limited value, but it becomes monetizable when an organization extracts insights and applies them strategically to generate business value. (CEO, Market Research and Analytics)

Lack of understanding of data potential is also related to structural deficiencies of Portuguese business community, as this participant expressed:

About half of our [Portuguese companies'] directors only have a secondary education. So, it's difficult for them to really see the potential for innovation and competitiveness that a change in the way they manage their businesses could bring. (CEO, Startup/Business Ecosystem)

Leaders who fail to promote innovation and experimentation can create an environment where **resistance to change** dominates. Our experts noted that when companies prioritize maintaining the status quo versus adopting a more data-oriented approach to decision-making the transition becomes significantly harder, and gave examples: when companies believe their existing manual systems are sufficient tend to resist new approaches; companies that focus more on potential risks than on anticipated benefits show lower willingness to change; and when internal capabilities are limited, the tendency is to keep things as they are.

For four years, I was the director of a public healthcare organization. I faced a lot of resistance before we finally managed to implement dashboards for regular reporting of results. What other directors kept saying to me was, 'We've always done everything on excel spreadsheets, and it works - why change?' In the meantime, I left, and I was told that everything went back to the old ways - manual, conventional processes. Getting people out of their comfort zone is very difficult. (Chairman, Healthcare)

There's a segment of companies that remain unconvinced about the benefits of big data and analytics (...) they prefer to stick with familiar approaches and are very skeptical whether these tools truly add meaningful value. (Consultant, Auditing & Consulting)

Another challenge highlighted across the four forums was the **insufficient level of data literacy and analytical skills** among both managers and employees. Reliance on analytics and evidence-based decisions must be accompanied by the ability to read, understand, analyze, and communicate with data meaningfully. Moreover, data-driven transformation depends on combining data-science expertise with a solid understanding of business context to generate relevant insights. SMEs often struggle to acquire the necessary expertise due to scarcity of such skills in the labor market. This barrier is closely tied to their limited financial resources, which constrain their ability to attract and retain human talent in innovative and data-intensive domains.

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Small companies simply don't have enough people with the right mix of data science skills and business knowledge, which makes it really hard to adopt advanced analytics. (Consultant, Smart Mobility)

(...) data-driven transformation requires from companies a significant investment in infrastructure and a super-investment in human capital. (Assistant Professor, University (Management))

Data-driven decision-making is often associated with Big Data, yet SMEs are neither large organizations nor do they typically possess large datasets. Many **lack sufficient or usable data** to implement machine-learning models due to their small customer base, low levels of digitalization (for example, data not being captured automatically), or the absence of external benchmarks to compare their performance with peers or industry standards. Conversely, some SMEs do have substantial amounts of data (sales transactions, website/social media data) but it is often fragmented and dispersed across multiple systems. As a result, significant preliminary work is required to consolidate this information into a single, coherent data source.

People talk about data-driven management as it was a beautiful rainbow (...) but for many SMEs the real challenge isn't advanced analytics, it's to have enough meaningful data to begin with. (Finance Manager, Business Software)

Finally, but not the least important, are **financial limitations**. High costs associated with acquiring and implementing new technologies that a data-driven approach requires (e.g., cloud computing), including ongoing maintenance and continuous updates, discourage companies from making this transition.

In a recent survey, near 60% of SMEs in my region [Portugal NUTS II Centre] mention high cost of acquisition and implementation as the main barrier to become more digital. (CEO, Startup/Business Ecosystem)

3.2 Enablers for data-driven management systems adoption

For SMEs, transitioning toward data-driven decision-making is not simply a technological upgrade but a multidimensional transformation that touches culture, strategy, governance, and organizational capabilities. A key starting point emphasized by our experts is the shift toward a **data-oriented culture**. SMEs must move away from intuition-based decisions and adopt a culture where data is trusted, valued, and actively used. Without this cultural foundation, even the most sophisticated analytics tools are unlikely to generate meaningful impact.”

CEO is a common word, even micro companies have it, but we do not hear about CDO [Chief Data Officer]. I know that in small companies, with a short number of employees, it seems unrealistic to have someone responsible for the data. But if you want to succeed someone has to do it. (CEO, Market Research and Analytics)

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A strong data culture requires **strategic vision**, alignment of data initiatives with **business objectives** and **impact measurement** using global standards. Establishing clear metrics and benchmarks allows SMEs to evaluate the effectiveness of their data initiatives, demonstrate value, and guide continuous improvement. Using recognized frameworks also facilitates comparability and credibility, particularly when engaging with external stakeholders such as investors or partners.

Companies are like any consumer (...) buying a product if it returns value. For companies to buy a new management model they expect ROI to increase, so you must have metrics that tell you how much you are gaining with your data. (Head of Department, Business Association)

Our experts agree that being successfully data-driven requires **considering the level of data maturity** of each company. As SMEs develop their data capabilities, they must also ensure the use of tools appropriate to their stage. Adopting overly complex or advanced technologies too early can create unnecessary complexity and costs, and hinder adoption. Instead, companies should follow a staged approach, starting with basic analytics and gradually advancing as their skills, infrastructure, and needs evolve.

That's something I find pretty concerning about the industry right now. You go to any conference and it's all 'AI, AI, AI' everywhere, but a lot of SMEs are still just trying to get the basics right, while the market keeps pushing all this hyper, mega technology to them. (R&D Director, Software Development)

Continuous **training and capacity building** for SMEs managers and employees are crucial to overcoming the barrier of skills shortages and data (i)literacy. This includes offering training courses, workshops, and certifications in critical areas such as business analytics, data science, AI, cybersecurity, etc. To this regard, companies can establish partnerships with academia for tailored-designed programs that meet company's needs, and for the development of innovation ecosystems that are both competitive and socially impactful.

Collaboration with academic institutions provides access to technical knowledge, applied projects, young talent, infrastructure, and training (...) it's a win-win dynamic that accelerates adoption and promotes innovation in the business sector. (Chairman, Business Incubation Center)

We need to create 'Ba' spaces where knowledge is co-created and shared among academia, business, and policymakers. This concept facilitates the transformation of tacit knowledge into explicit knowledge, driving innovation and problem-solving. (Assistant Professor, University (Management))

Table 2 resumes the main key findings.

Table 2. Challenges and factors to success in becoming data driven.

Challenges	Factors to success
Lack of understanding of data potential	Data culture orientation
Resistance to change	Strategic vision
Data analytics skills shortage	Matching level of data maturity
Lack of (usable) data	Training and capacity building
Financial limitations	Academia-business collaboration

4. Conclusion

What it takes to become a data-driven SME? is not merely a technological upgrade but a comprehensive and dynamic organizational transformation. The path to implementation requires the cultivation of a robust data culture, a strong alignment between data initiatives and business objectives, and the development of internal capabilities supported by tools appropriate to the organization's level of maturity.

SMEs develop dynamic capabilities through learning processes and deliberate management actions that enable them to understand, capitalize on and respond to changes in their environment. They build these capabilities by learning through practice and experience, investing in skills, technologies and organizational processes, and embedding effective patterns of action into routines that support innovation and responsiveness to the market. Collaboration with academia and knowledge sharing reinforce integration across the entire organization, whilst entrepreneurial leadership guides strategic investments and fosters a culture of continuous learning and adaptation to the environment (Eisenhardt & Martin, 2000). SMEs can utilize their unique experiences and resource configurations, complemented by external partnerships and knowledge acquisition, to strengthen their ability to reconfigure management models and increase competitiveness (Tece, 2007).

Despite the benefits data-driven decision making can grant to competitiveness and long-term sustainability, many SMEs remain hesitant to adopt these practices due to lack of strategic vision, resistance to change, shortages of skilled professionals and perceived high upfront costs. Furthermore, this study underscores the critical role of partnerships with academic institutions as these collaborations provide SMEs with access to cutting-edge knowledge, technical expertise, emerging talent, and essential infrastructure, while fostering innovation and reducing implementation costs.

In summary, for SMEs to successfully transition into data-driven management, they must adopt a holistic dynamic capabilities approach that integrates cultural, strategic, and technological dimensions supported by continuous learning and external collaboration.

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