DataBench

Evidence-Based Big Data Benchmarking to Improve Business Performance

D2.4 Benchmarks of European and Industrial Significance

Abstract

One of the DataBench project's central goals is to design, develop, and validate via industrial case studies a benchmarking process based on highly relevant business metrics to help European organizations evaluate their use of Big Data and analytics (BDA) as they seek to improve business performance. This report achieves this goal by presenting the finalization of the relevant business metrics of European and industrial relevance developed over the last 2 years during this project. This report is the last and most relevant output of the WP2 research. It provides the business metrics needed for the benchmarking tool and understanding of industrial users' needs, which will be used to design a Benchmarking Handbook in the last year of the project.

This report builds on the results of the economic and market analysis presented in the D.2.2 deliverable (*Preliminary Benchmarks of European and Industrial Significance*) and on the deeper analysis of Big Data technology (BDT) business KPIs by industry presented in D.2.3 (*Analysis of Actual and Emerging Industrial Needs*). It demonstrates that the 7 business KPIs selected in the project are valid metrics and can be used as benchmarks for comparative purposes by researchers and business users across Europe and for each of the industry and company-size segment measured. The report provides the value of these benchmarks by industry, company-size segment, and use case and shows how the case studies carried out in WP4 were used to validate the industrial benchmarks. We have also calculated the value of benchmarks for the "star performers" – that is, business users of BDTs that achieved the highest level of benefits by focusing on key success factors – and have compared them with the average sample values. Finally, the report presents the results of the 2nd wave of the DataBench survey, carried out with the industrial partners of the H2020 ICT projects (pilots and business trials of Big Data), and outlines the results of the self-assessment tool, developed during the 2nd wave of the survey. This self-assessment tool is being considered for inclusion in the Benchmarking Toolbox to improve the exploitation of the DataBench results.

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Keywords

Benchmarking, key performance indicators (KPIs), Big Data and analytics (BDA), Big Data technologies (BDTs), business performance, business report, economic impact, economic indicator, industrial relevance, performance metrics, self-assessment tool, technical performance tool, use cases

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Executive Summary

Main Objectives and Achievements

One of the DataBench project's central goals is to design a benchmarking process based on highly relevant business metrics to help European organisations evaluate their use of Big Data technologies (BDTs) as they seek to improve their business performances. This report achieves this goal by presenting the finalization of the relevant business metrics of European and industrial relevance developed over the last 2 years during the project. This report is the last and most relevant output of the WP2 research. It provides the business metrics needed for the benchmarking tool and the understanding of industrial users' needs, which will be used to design a Benchmarking Handbook in the last year of the project.

We have demonstrated that the 7 business KPIs selected in this project are valid metrics and can be used as benchmarks for comparative purposes by researchers and business users across Europe, in each of the industry sectors and company size segments measured. They are valid because they align with the most relevant metrics used in business practice, such as revenue and profit increases; because they are collected from real business users on the basis of clear and well-understood definitions; ; and because they respond to business users' relevant needs, as shown by the DataBench survey, with its sample of 700 EU-industry-representative companies. Further understanding of users needs' was brought by 30 additional interviews implemented in the 2nd wave survey and by the 18 case studies conducted during the course of this project. The selection criteria for these indicators and their definitions are explained in the Methodology chapter (par. 2.2) and descend from the conceptual framework of the project defined in WP1, D.1.1 *Industry Requirements with Benchmark Metrics and KPIs.*

The real challenge was to calculate the actual value of these benchmarks. Quantitative estimates of the business impacts of BDT are not easy to find, because they are too difficult to calculate or kept confidential. More often, pilots of innovative technologies such as BDT analyse impacts based on specific ad-hoc business metrics, which are not easily scalable, or technical and operational metrics.

Nevertheless, in this report, we present measurements of our KPI benchmarks, by industry and company size, which we believe are reasonably sound and reliable. To do so, we leveraged the data collected in the DataBench survey, using only the answers from respondents using or piloting BDT (a total of 466); we carried out quality control, checking the coherence of each benchmark value with mainstream business metrics in each industry and company size segment, based on IDC research, standard desk research, and cross checks with case studies; we removed outlier results by using median values for benchmarks.

Benchmarks by Industry

The value of the quantitative KPI benchmarks calculated in this report for the overall sample are the same as the preliminary benchmarks (D.1.2) in the case of profit increase and cost reduction (5% profit increase and 3% cost reduction), but higher for revenues increase (from 4% median increase to 5%, Figure 22). The variations by industry are more relevant, but they confirm that finance, business/IT services, and telecom/media are the leaders in terms of benefit level. Manufacturing is aligned with the overall sample benchmarks but has better results for cost reduction. Compared to other industries, Agriculture and Healthcare benchmarks are lower but still valuable. Both these industries have great potential benefits from BDT but organizations reaping the full benefits are rare.

Qualitative KPIs (time efficiency, product/service quality, customer satisfaction, number of new products/services launched, and business model innovation) are measured on a rating scale of 1–5, corresponding to a range of improvements (from less than 5% to 50% or more). We used the average rating as the benchmark for each of these KPIs. This is not a perfect indicator, but it provides a good proxy for the level and size of improvements achieved by business users. It is remarkable that the most frequent score is 3, corresponding to a range of 10 to 24% improvement, which is a positive and realistic impact. There are interesting variations of the qualitative KPIs benchmarks by industry and use case which reflect well the way different industries exploit BDT to strengthen their competitiveness and respond to their users' wishes. There are several cases of qualitative KPIs scoring 4 (improvements over 25% to 50%), especially for customer satisfaction and quality of product or service.

Benchmarks by Company size

The report presents benchmarks for 4 company size classes (SMEs with 50 to 249 employees, Medium-Large enterprises with 250-499 employees, Large enterprises with 500-999 employees and Very Large enterprises with more than 1000 employees). The sample of enterprises under 50 employees was too small to allow for the calculation of benchmarks. There is a clear and striking progression in the value of benchmarks from SMEs up to Very Large enterprises who show the highest impacts, thanks to their economies of scale and ability to leverage large datasets. The combination of leading industries in BDT uptake and large company size is confirmed as the main explanatory factor for high KPI benchmark values.

Star performers

The star performers are 36 enterprises that are BDT users and have achieved high benefit levels. This is reflected in their quantitative KPI benchmarks values, higher than the average sample. Star performers achieve median 8% profit increase and 8% revenue increase thanks to BDT, compared with the 5–6% median benchmark values for the total sample for these indicators (Figure 9). Concerning cost reduction, star performers achieve only slightly better KPIs than the overall sample. However, this is not their priority, since they are more focused on innovation and growth, in which they perform better than any industry or company size segment, confirming they are true leaders. Star performers tend to be large or very large companies and come from multiple industries, but many belong to the retail & wholesale and business/IT services sectors, in which data-driven innovation is now essential for success.

Next Steps

The KPIs calculated in this deliverable, as well as the understanding of users' needs and demand dynamics, will be used to help shape the DataBench Toolbox and the Benchmarking Handbook, particularly concerning user interfaces and ways to interact with the tool. In addition we plan to improve and finalize the self-assessment tool, the interactive web-based tool implemented as an add-on to the DataBench survey, which can be used to guide potential users to compare their performance to the benchmarks and/or identify targets for their BDT investments.

1 Introduction

1.1 Objectives

One of the DataBench project's central goals is to design a benchmarking process based on highly relevant business metrics to help European organisations evaluate their use of Big Data technologies (BDTs) as they seek to improve their business performances. This report achieves this goal by presenting the finalization of the relevant business metrics of European and industrial relevance developed over the last 2 years during the project. This report is the last and most relevant output of the WP2 research. It provides the business metrics needed for the benchmarking tool and the understanding of industrial users' needs, which will be used to design a Benchmarking Handbook in the last year of the project.

WP2's focus was on economic and market research and analysis, addressing two of the main objectives of the project:

- **Objective II:** To perform economic and market analysis to assess the "European economic significance" of benchmarking tools and performance parameters
- **Objective III**: To evaluate the business impacts of BDT performance benchmarks of industrial significance

This report builds on the results of the economic and market analysis presented in the D.2.2 deliverable (*Preliminary Benchmarks of European and Industrial Significance*) and on the deeper analysis of BDT business KPIs by industry presented in D.2.3 (*Analysis of Actual and Emerging Industrial Needs*). The main objectives are:

- To prove that the 7 business KPIs selected in the project are valid metrics and can be used as benchmarks for comparative purposes by researchers and business users across Europe and for each of the industry and company-size segment measured
- To provide relevant metrics of business performance improvements achieved by European industries thanks to the use of BDTs based on the 7 business KPIs selected, differentiated by industry and company-size segment
- To highlight the characteristics of so-called “star performers” – that is, business users of BDTs that achieved the highest level of benefits by focusing on key success factors
- To document how the results of the 2nd wave of the DataBench survey carried out among the industrial partners of the H2020 ICT 14 and H2020 ICT 15 projects and the results of the case studies have been used to validate the finalization of the industrial benchmarks
- To report on the development and implementation of the self-assessment tool, developed during the 2nd wave of the survey to enable real-time comparison between survey respondents' KPIs and those of their peers (other survey respondents from the same industry)

  This tool is being considered for inclusion in the DataBench Toolbox to improve the exploitation of the DataBench results.

1.2 Structure of the Report

The report is structured as follows:

- **Chapter 1** outlines the objectives of the report and its main contents, as well as the interdependencies with other WPs.
- **Chapter 2** describes the methodology approach and the processes used to define the KPIs used to measure the industrial benchmarks.
- **Chapter 3** describes the results of the research carried out in the last period of the project, after the main survey had been conducted, including the 2nd wave of the survey and the relevant results of the WP4 case studies.
- **Chapter 4** presents the value of the finalized benchmarks by industry.
- **Chapter 5** presents the value of the finalized benchmarks by company size.
- **Chapter 6** presents the value of the benchmarks for the best performers in the sample and compares their KPIs with those of the overall sample.
- **Chapter 7** draws our main conclusions.
- The **Annex** presents the references and the use cases survey data (in tables), from which the finalized benchmarks were calculated.

1.3 WP Interdependencies

The DataBench workflow is designed to enable close collaboration between partners and to allow the research results to flow from one work package to another and be exploited efficiently. To build the bridge between business and the technical benchmarking of Big Data, we have designed two parallel but closely connected research tracks, focusing respectively on Business Benchmarks (WP2 and WP4) and Technical Benchmarks (WP1 and WP3). WP1 in particular developed the conceptual framework of the project and the definition of the main indicators, while WP2 developed the economic and market analysis methodology and implemented the field research among business users. The results of the indicators developed in these work packages are used to develop the DataBench Toolbox (WP3), while WP6 supports the activities of consensus building, dissemination, and exploitation of the results. The DataBench ecosystem of indicators is the first result of the project research and is a collaborative endeavour, as shown below (Figure 1):

- WP1 developed the overall indicators framework for the project, leveraging Big Data Value Association (BDVA) joint analysis.
- WP2 developed the business indicators and benchmarks (presented in this report), drawing on European industry requirements.
- WP3 extracted and implemented the technical benchmarking indicators in the development of the DataBench Toolbox.
- WP4 focused on business evaluation indicators based on case study interviews and desk research.
- WP5 developed the ontology and knowledge graph to be used in the DataBench Toolbox for validation and updating.

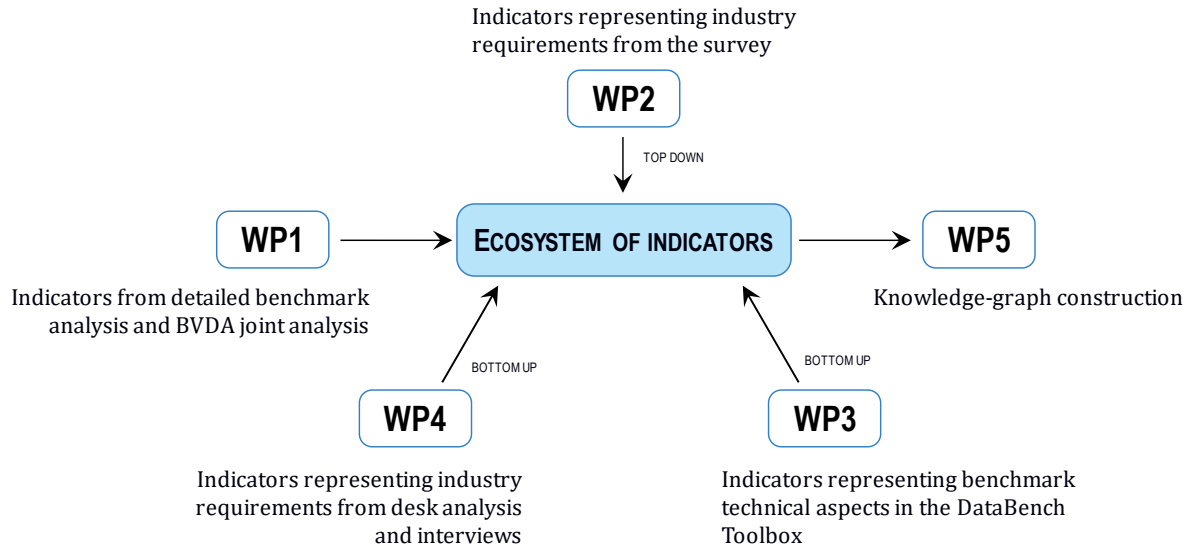

Figure 1 – DataBench Ecosystem of Indicators

Source: DataBench, 2019

It is important to note that the economic and market analysis of WP2 takes a top-down approach, leveraging economic and statistical data that represents the overall European industry and economy, in order to identify business metrics of European value. Conversely, WP4 evaluates business impacts, with a focus on individual enterprise use cases and experience. The bottom-up analysis of the interaction between technology and business includes an in-depth examination of investments in Big Data technologies. The case studies of WP4 are meant to validate and enhance the results of the industrial analysis of WP2.

2 Methodology

2.1 Methodology Approach

This paragraph outlines briefly the methodological approach used to develop and finalise the industrial benchmarks included in this report. More details can be found in D.2.1, *Economic and Market Analysis Methodology*, published in April 2018. The methodology was structured in the following two main phases:

2.1.1 Phase 1 (January–December 2018)

a) Desk research of the main public sources (mainly, Eurostat and OECD) to select the most relevant economic indicators

b) The extraction of relevant data from IDC databases and ongoing research on BDTs and the European data market

c) The elaboration of data to identify the most economically significant industries and those with the highest Big Data impact potential

d) The preliminary classification of the main use cases by industry and business process and the main KPIs based on desk research from public and IDC sources

e) Primary data collection through a survey of 700 European BDT business users

f) The elaboration of the survey results on KPIs, BDTs used, and use cases by industry, company size, and country

g) The calculation of preliminary benchmarks of economic and industrial significance

h) The production of deliverable D.2.2, presenting the main results of the survey and the preliminary benchmarks

2.1.2 Phase 2 (January–December 2019)

a) In-depth analysis of industrial users' needs and of the correlation between business impacts and technical choices (presented in D.2.3, in June 2019)

b) The Phase 2 survey among H2020 ICT project (BDT pilots and trials) participants, using the same survey as in Phase 1, to investigate business KPIs and to test the preliminary benchmarks (The June–November 2019 results are presented in this report.)

c) The designing and testing of a self-assessment tool, associated with the questionnaire survey of H2020 ICT projects (This was not originally planned and was added to test how to make the benchmark results easier to use.)

d) The collection and assessment of results from the case studies conducted during WP4, with a view to validating the preliminary benchmarks (presented in this report)

e) The final validation of the metrics for business performance improvements achieved using BDT, and the presentation of the final benchmarks of economic and industrial significance (presented in this report)

2.2 Definition of Business KPIs

As explained above, the DataBench team developed an ecosystem of indicators (described in detail in D.1.1, *Industry Requirements with Benchmark Metrics and KPIs*), as shown in Figure 2 , below, with business feature indicators being a relevant group.

The business feature indicators can be divided into the following main subgroups:

1. The classification of business users (industry and company size)
2. The type of BDA implementation (application area, level of business process integration, level of BDA solutions maturity, company approach to data management, and main business goals)
3. The type of use case (cross-industry and industry-specific)
4. **Business impact KPIs, which correspond to industrial benchmarks**

Groups 1, 2, and 3 are semantic indicators measured through simple nominal questions in the survey (business users select the category in which they belong) to classify users. The survey results are measured as frequencies of respondents by category. Descriptive parameters can be used to measure the correlation between the type of user and the type of application and, in turn, the type of business impact. They will be used in the benchmarking tool as a user interface to guide users to identify themselves and their type of BDA application and, in turn, to look for the type of technical benchmark most relevant for them.

The business KPIs (group 4) are different from the others because they are impact indicators. They represent 7 categories of business factor, selected on the basis of business literature and IDC research of technology vendors and users as the most relevant for measuring the impacts of innovative technology investments on business performance. For example, these factors are most often used to evaluate the results of pilots of new technology investments.

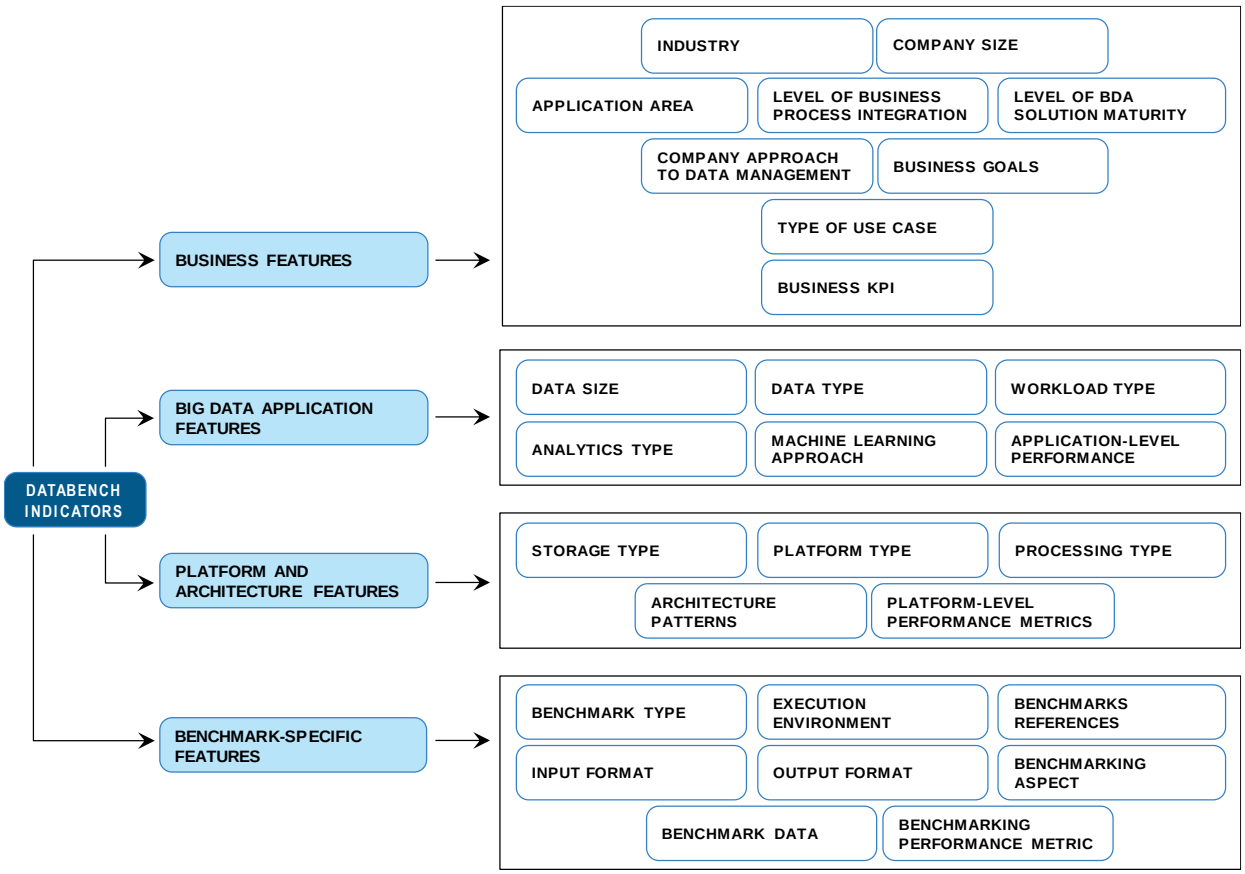

Figure 2 – DataBench Business Indicators

Source: DataBench D.1.1

The business KPI definitions are based on business and marketing literature, but these definitions have been simplified and operationalized to allow measurement through business surveys. This approach is one of several options for the measurement of technology business impacts, an approach chosen for its applicability to an objective of the project – namely, the need to estimate business-impact-related industrial benchmarks that are valid for European industry and differentiated by sector and company size.

Since IDC focuses on emerging technologies and market forecasting, we have developed a methodology based on business surveys that enables us to collect data about the overall average impacts of technology investments based on companies' own evaluations. Since companies do not carry out investments without an economic or business rationale, this data has a sound basis, even though it is technically a result of the opinions of respondents. To make sure these opinions are valuable, and fact based, we have employed several methods, including:

- The careful selection of the role and responsibility of the survey respondent (who must have the relevant knowledge)
- The careful quality control of survey data, discarding incoherent and unbelievable answers, as well as the careful management of the survey itself (for example, rotating answer options so that no ranking bias exists)
- Statistical elaboration techniques, discarding outliers and extreme values, by checking the maximum and minimum data points
- Long experience in survey management and a reliance on experienced and well-known interviewers
- Comparative analysis of the resulting data with literature and other sources about the business impacts of technology innovation

All these methods have been employed in this project to define and collect data about the business impacts of BDA and to calculate industrial benchmarks. Table 1 and Table 2, below, provide details of each KPI, its metrics, and the measurement results.

KPI	Definition	Data Source	Survey Question	Metrics
Revenues increase	Increase in company revenues thanks to the adoption of BDA	DataBench business survey	**Q6a**. In percentage terms, what is the actual benefit realised (alt: what benefit do you expect to realise) from the use of Big Data and analytics for the following business KPIs? ANSWER = absolute number	Absolute value: % increase calculated as: • Mean • Median • Minimum • Maximum **Benchmark**: The median value was selected as most representative.
Profit increase	Increase in company profit thanks to the adoption of BDA			
Cost reduction	Reduction in process costs thanks to the introduction of BDA			

Table 1 – Definition and Metrics of Business KPIs, I.

Source: DataBench, 2019

KPI Improvement of:	Definition	Data Source	Survey Questions	Metrics
Time efficiency	Efficient use of time in business processes: This is often used as a simple proxy for productivity improvements in IDC surveys	DataBench business survey	**Q7**. To what extent has your organization's deployment of Big Data and analytics impacted [IF QS6 = 3 display: will your organization's deployment of Big Data and analytics be impacted by] your ability to attain the following business KPIs? *ANSWERS: decrease, no change, slight increase, moderate increase, high increase* Q8. For the following business KPIs, please estimate what percentage of expected improvement will be linked to the adoption of Big Data and analytics by 2020? *ANSWERS: none (0%), less than 5%, 5–9%, 10–24%, 25–49%, 50% or more, don't know*	**Q7** = share of respondents by answer; **Benchmark:** share of respondents with moderate or high increase (D.2.4) Q8 = share of respondents by answer; **Benchmark:** average rating on a scale of 1–5 based on the following ratings: • Less than 5% = 1 • 5–9% = 2 • 10–24% = 3 • 25–49% = 4 • 50% or more = 5
Product/Service quality	Product/Service features corresponding to users' implied or stated needs and impacting their satisfaction			
Customer satisfaction	A measure of customers' positive or negative feeling about a product or service compared with their expectations (Philip Kotler)			
Business model innovation	Novel ways of mediating between companies' product and economic value creation; In IDC surveys, most often used as a transformation of the revenue sources of a new product/service (for example, moving from traditional sales to subscription models)			

Table 2 – Definition and Metrics of Business KPIs, II.

Source: DataBench, 2019

2.3 From Business KPIs to Benchmarks

Thanks to our methodological approach, the 7 business KPIs selected by the project are valid metrics and can be used as benchmarks for comparative purposes by researchers or business users across Europe and for each of the industry and company-size segments measured. These indicators are:

- **Benchmarks**, because they represent the average improvement achieved by a representative sample of business users and can be used for comparative purposes, as a target or as a best performance metric;

  Compared with our first calculation of preliminary benchmarks, we have now recalculated all KPIs based on the actual user sample, excluding the survey respondents only planning to use BDT in the future. In addition, we have used the median value instead of the average value (mean) for each industry and company-size segment to reduce the relevance of outlier answers.

- Of **industrial significance**, because they apply to the actual and emerging needs of specific industries and specific company-size segments, as demonstrated in the previous deliverables.

- Of **European economic significance**, because the benchmarks are measured for all the relevant European industries and company-size segments in which Big Data can have the highest impacts, as demonstrated in the previous deliverables.

- **Useful for linking technical and business benchmarking**, because they are also measured for the main **use cases**, consisting of the application of Big Data technology to particular business processes and/or application domains, thus enabling the user to match the expected business improvements with the type of technology performance needed to achieve the business goal.

2.4 DataBench Survey Methodology

This section summarises the DataBench survey methodology and approach. The survey was carried out in September–October 2018 among European business organisations in 11 member states, resulting in 700 valid interviews, segmented as follows:

- 11 member states: France, Germany, the Netherlands, the U.K., Denmark, Sweden, Italy, Spain, the Czech Republic, Poland, and Romania.
- 16 industry sectors and 7 company size segments by number of employees.

The survey excluded micro-enterprises with fewer than 10 employees (unlikely to be advanced adopters of BDT). The survey was conducted in the local language by experienced interviewers, targeted senior decision makers and influencers for BDTs, and screened respondents on the basis of their actual and planned use of BDA. Business organisations not using and not interested in using BDTs were excluded.

The industry classification is based on Eurostat's NACE REV. 2 code to be able to use statistical data with value-added parameters and others, as well as with IDC's vertical market databases. The following industries were excluded for the following reasons:

- Government: DataBench focuses on the private sector; government does not use the same business KPIs as the private sector, and the number of government agencies

varies substantially from country to country. Eurostat does not provide comparable statistics by number of entities.

- Education: This is a mostly public and no profit sector, very different from private industry, with vastly different dynamics in terms of technology adoption by segment (primary school versus research and university, for example). Investigating it would have required a different type of survey and questionnaire.
- To achieve a reasonable sample size by industry, we had to eliminate another industry. We chose construction, which, according to EDM monitoring tool statistics, is a low user of BDTs, is highly fragmented, and would have required greater screening efforts to identify data-user companies.

The survey aimed to collect quantitative evidence on BDT use cases prioritised in each industry, actual and planned; the KPIs used and why they are used; the potential impacts on business processes; and their relevance for business strategies and objectives. The Annex includes the references and and the use cases survey data (in tables), from which the finalized benchmarks were calculated.

3 Results of 2nd Phase Research

This chapter documents the results of additional research carried out in 2019 and how those results were used to validate and finalise the business KPIs. It includes the 2nd wave of the survey of H2020 projects and a summary of the relevant results from the WP4 case studies.

3.1 Survey Wave 2

DataBench conducted a 2nd wave of the survey in June–October 2019 aimed at H2020 projects engaged in Big Data trials and pilots under the BDVA umbrella, giving the priority to projects answering ICT 14 and ICT 15 challenges, particularly large-scale pilots such as Boost 4.0 and DataBio. The survey targeted 45 projects (Table 3) and surveyed 21 new respondents from 9 projects. In addition, 3 respondents from the case studies of WP4 answered the survey, and 3 organizations completed the survey from the DataBench website, so the size of the final sample is now 730.

The majority of the new respondents come from the manufacturing industry (13 answers), and 11 of them are from the BOOST 4.0 project. This is because BOOST has a strong focus on measuring the business impacts of Big Data in manufacturing, and the consortium includes a DataBench partner, which helped to push the survey to the consortium. This has also influenced the split by company size, skewing the set of new answers towards larger companies (13 new answers). Analysing the country of origin, more than 40% of the answers come from two strongly industrialized countries, Italy and Germany (Figure 3 and Figure 4).

PROJECT TITLE AND TYPE	Work Programme Challenge	Survey Answers	PROJECT TITLE AND TYPE	Work Programme Challenge	Survey Answers
CloudButton	ICT-12		MUSKETEER	ICT-13	
euBusinessGraph	ICT-14a		Safe-DEED	ICT-13	
QROWD	ICT-14a		BigDataOcean	ICT-14a	
EW-Shopp	ICT-14a	1	SLIPO	ICT-14a	1
BodyPass	ICT-14	1	AEGIS	ICT-14a	
TheyBuyForYou	ICT-14		FashionBrain	ICT-14a	
DataBio	ICT-15		Data Pitch	ICT-14b	
TT: Transforming Transport	ICT-15		EDI: European Data Incubator	ICT-14	
BigMedilytics	ICT-15	1	Track and Know	ICT-16	
BOOST4.0	ICT-15	11	Lynx	ICT-14	
BigDataStack	ICT-16	1	FANDANGO	ICT-14	
CLASS	ICT-16		Icarus	ICT-14	
I-BiDaaS	ICT-16	1	E2DATA	ICT-16	
Cross-CPP	ICT-14		BigDataGrapes	ICT-16	
ELASTIC	ICT-12		Typhon	ICT-16	
EXA MODE	ICT-12	1	SODA	ICT-18a	
ExtremeEarth	ICT-12		MH-MD (My Health-My Data)	ICT-18a	
INFORE	ICT-12		SPECIAL	ICT-18a	
SmartDataLake	ICT-12		Infinitech	ICT-11	1

Table 3 – List of H2020 Projects Targeted/Surveyed

Source: DataBench, October 2019

The objective to reach primarily ICT 14 and 15 projects – as the ones directly focused on the impacts of Big Data – has been accomplished, with 17 new responses coming from these projects (3 from ICT 14 projects and 14 from ICT 15 projects), as shown in Table 4, below.

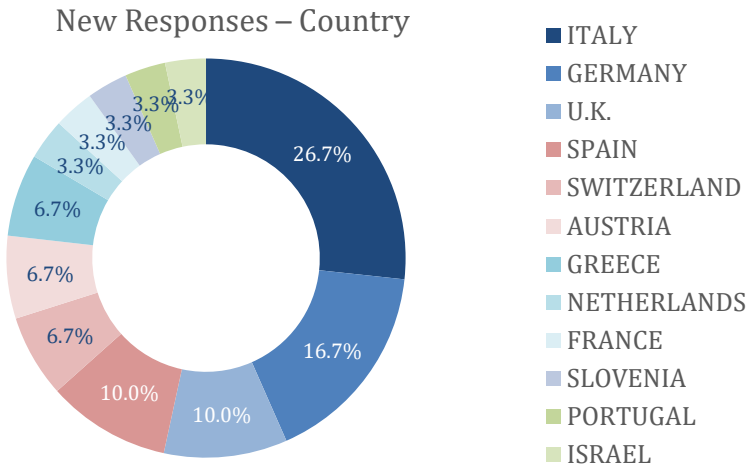

Figure 3 – Survey Wave 2: Respondents by Country

Source: DataBench, October 2019 (27 interviews)

Project Title	ICT Topic	Industry	Company size	Country
BodyPass	14	Healthcare	1,000–2,499	Italy
EW-Shopp	14	Retail	50–249	Slovenia
SLIPO	14	IT services	250–499	Greece
BigMedilytics	15	Healthcare	10–49	Germany
BigMedilytics	15	IT services	500–999	Germany
BOOST4.0	15	Manufacturing – process	> 5,000	Portugal
BOOST4.0	15	Manufacturing – process	500–999	Austria
BOOST4.0	15	Manufacturing – discrete	500–999	Austria
BOOST4.0	15	IT services	500–999	Israel
BOOST4.0	15	Manufacturing – discrete	> 5,000	Netherlands
BOOST4.0	15	Manufacturing – discrete	50–249	Germany
BOOST4.0	15	Manufacturing – discrete	500–999	Austria
BOOST4.0	15	IT services	500–999	Israel
BOOST4.0	15	Manufacturing – discrete	> 5,000	Netherlands
BOOST4.0	15	Manufacturing – discrete	50–249	Germany
BOOST4.0	15	Manufacturing – process	2,500–4,999	Switzerland
BOOST4.0	15	Manufacturing – process	250–499	France

Project Title	ICT Topic	Industry	Company size	Country
Infinitech	11	Business/Professional services	< 10	U.K.
EXA MODE	12	Healthcare	1,000–2,499	Switzerland
BigDataStack	16	Retail	1,000–2,499	U.K.
I-BiDaaS	16	Banking	> 5,000	Spain

Table 4 – Survey Wave 2: List of Respondents by ICT Topic

Source: DataBench, October 2019

3.1.1 Profile of the ICT Projects respondents

Focusing only on the 21 respondents from ICT projects (Figure 5), the majority belong to the manufacturing industry (52%), 3 are in healthcare (14%), and the others are from a plurality of industries. From a company-size perspective, 68% of the 21 respondents are from large companies (38% with 1,000+ employees and 28% with 500–999 employees), since large companies are more likely to engage in business trials in H2020 projects (Figure 6).

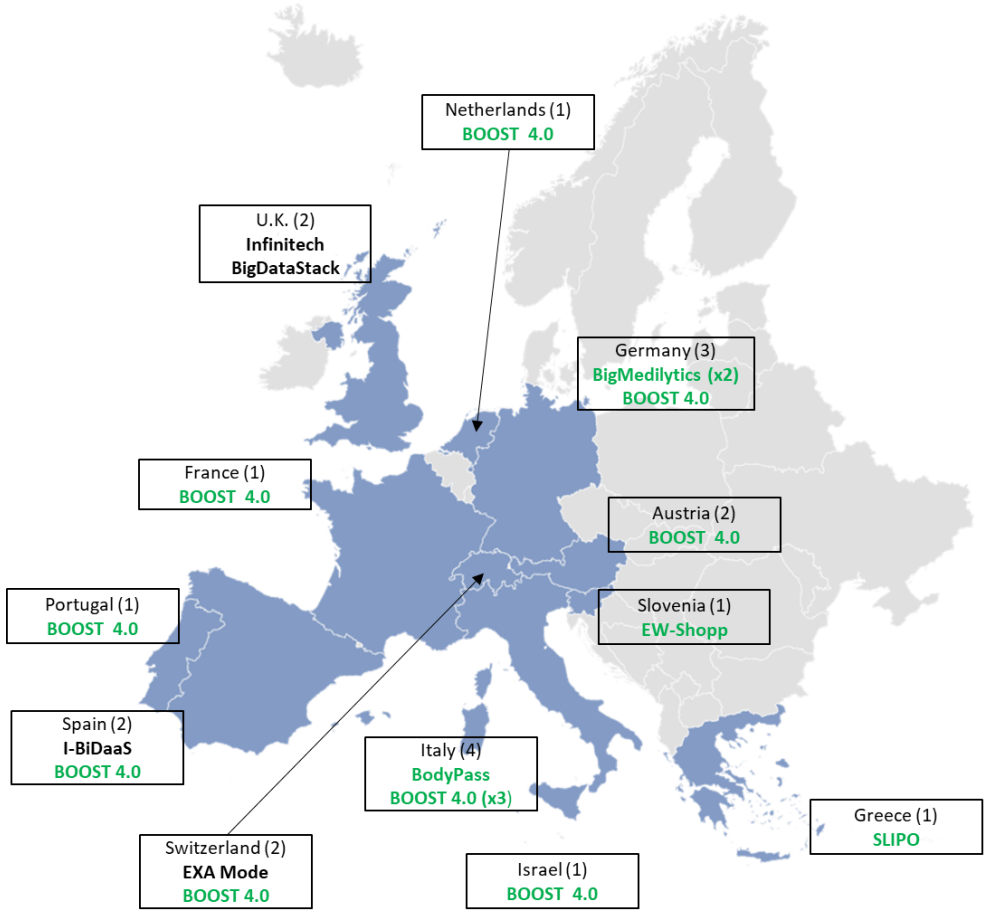

Figure 4 – Survey Wave 2: ICT Project Respondents by Sector

Source: DataBench, October 2019 (21 interviews)

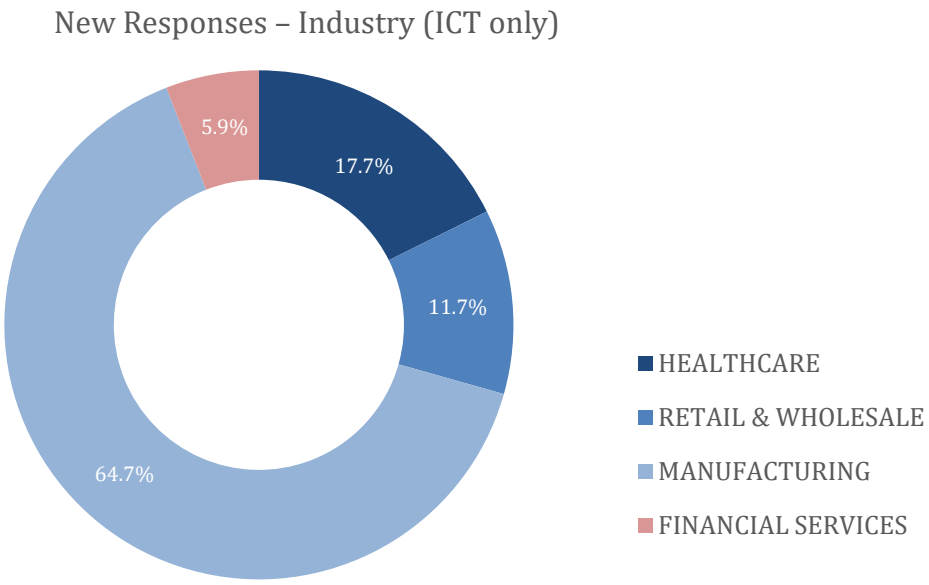

Figure 5 – Survey Wave 2: ICT Project Respondents by Geography

Source: DataBench, October 2019 (21 interviews)

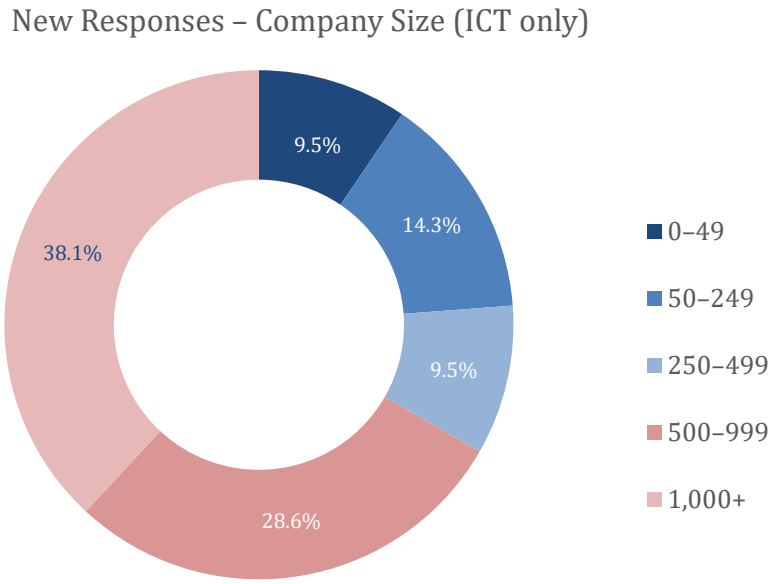

Figure 6 – Survey Wave 2: ICT Project Respondents by Company Size Segment

Source: DataBench, October 2019 (21 interviews)

3.1.2 Business KPIs Values from the ICT Projects Sample

The 21 respondents from ICT projects are from different industries and countries, but they all run pilot trials of BDT: We can look at them as a group to assess whether they are aligned or not with the main sample of business users in terms of their business impacts.

Unfortunately, since the pilots focus on measuring the performance of innovative technologies, they are not yet at the stage at which their impacts on revenues, profits, and cost reductions at scale can be measured. Project respondents measure business process indicators that are very specific to the pilots and trials they are running; they differ from the top-level indicators we selected. The 2nd wave of the survey thus did not provide much in terms of the validation of the quantitative KPIs. But the respondents did answer the question on the range of improvements for business KPIs, which are presented in chapters 4 and 5 as ratings. The main results are strongly aligned with the benchmarks presented in the following chapters, as shown in the Table 5.

The exceptions are the KPIs for new products and services launched and for business-model innovation, which are rated as 2 – lower than most business users – because the ICT projects do not focus on the immediate launch of new products/services or on innovating revenue sources.

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Cost Reduction	3	2.88	17	10–24%
Time efficiency	3	3.13	16	10–24%
Product/service quality	3	2.88	17	10–24%
Revenue Growth	2.5	2.56	16	10–24%
Customer satisfaction	3	2.71	17	10–24%
Number of new products/services launched	2	2.33	15	5–9%
Business model innovation	2	2.13	15	5–9%

Table 5 – Benchmark Values for Qualitative KPIs, Survey Wave 2: ICT Projects

Source: DataBench, October 2019 (21 interviews)

The DataBench survey remains open, and we collected 2 more answers in November 2019 from partners of the I-BiDaaS project, one from the telecommunications sector and one from transport and logistics. Since the calculations for this deliverable were already closed, we were unable to add them to the sample. From preliminary analysis, the two new survey responses are in the same ballpark as the KPIs presented in the report. However, in due time, these responses will be added to the original dataset, which will be one of the data sources for the Toolbox.

3.2 Self-Assessment Tool

The self-assessment tool is an interactive web-based tool implemented as an add-on to the DataBench survey and sent to respondents in report format (PDF file). The respondents' answers are compared with the current data set (a detailed description is presented in D.2.3, paragraph 4.2). The tool is a simple visualisation solution to benchmark seven questions from the DataBench survey. ICT projects, those taking part in the WP4 interviews, and the general public will benefit from the final report, as it shows their BDA and BDT

positions against their European peers. In the customised report, "personal" responses to the Big Data survey are compared with responses from peers in the same respondents' industries and company-size segments to help validate or reframe each BDT project's needs. The report includes charts and written analytical feedback on current BDTs.

The self-assessment tool was distributed with the survey and received by all respondents. The objectives were to test a user-friendly way of exploiting the value of the benchmarks in real time and to provide a value-added service to incentivize the respondents to complete the survey.

Based on some reactions collected from the respondents, the self-assessment tool was appreciated but was not really effective as an incentive for survey respondents; perhaps it was insufficiently visible even though it was publicized on the DataBench survey page and on the first page of the survey itself, as well as in our letter of invitation. Some respondents instead felt that their specific situations and activities with Big Data were not reflected well in the questionnaire.

The next step for the last year of the project will be to analyse more systematically user satisfaction with the self-assessment tool, to understand its strong and weak points, and to work within WP4 to improve its design and usability as a potential component of the Benchmarking tool set of services.

3.3 Relevant Results from Case Studies

Case study analysis is an important goal of WP4. Deliverable D4.2 provides a detailed description of the methodology that has been used in case study analysis and of the status of research in WP4, drawing preliminary conclusions, while the final research results will be presented in D4.3. Figure 7 shows the case studies that have been analysed. A total of 18 case studies have been collected so far across 7 industries: agriculture, business/IT services, financial services, healthcare, manufacturing, retail & wholesale, and transport & logistics. As thoroughly discussed in D4.1 and D4.2, case study analysis is aimed at an in-depth understanding of companies and their processes, using multiple and complementary approaches to gathering information, including interviews (possibly in multiple rounds), sharing material, and, ultimately, collaborating on a pilot. As a consequence, the effort that is required to analyse a case study is significant for both parties (the researcher and the company). This effort clearly limits the number of participating companies; on the other hand, it adds to the value of the insights.

DataBench touches on several sensitive issues – first and foremost, the measurement of the business benefits of BDA projects. Business KPIs are considered confidential information. As such, it is more easily revealed in the context of a large-scale survey whereby anonymity is guaranteed, with results typically being a set of statistics across a sample of respondents. Companies involved in case studies are instead providing information that has value as a stand-alone example of a general phenomenon. BDA implementation priorities, technical decisions, and their impacts on business benefits can also be considered strategic and thus confidential. As discussed in D4.1, we have made an effort to provide value to the companies participating in the study, ensuring they are compensated for the information they have given by furnishing them with knowledge about issues, common decisions and results, and different approaches taken by other companies to the opportunities that BDTs offer.

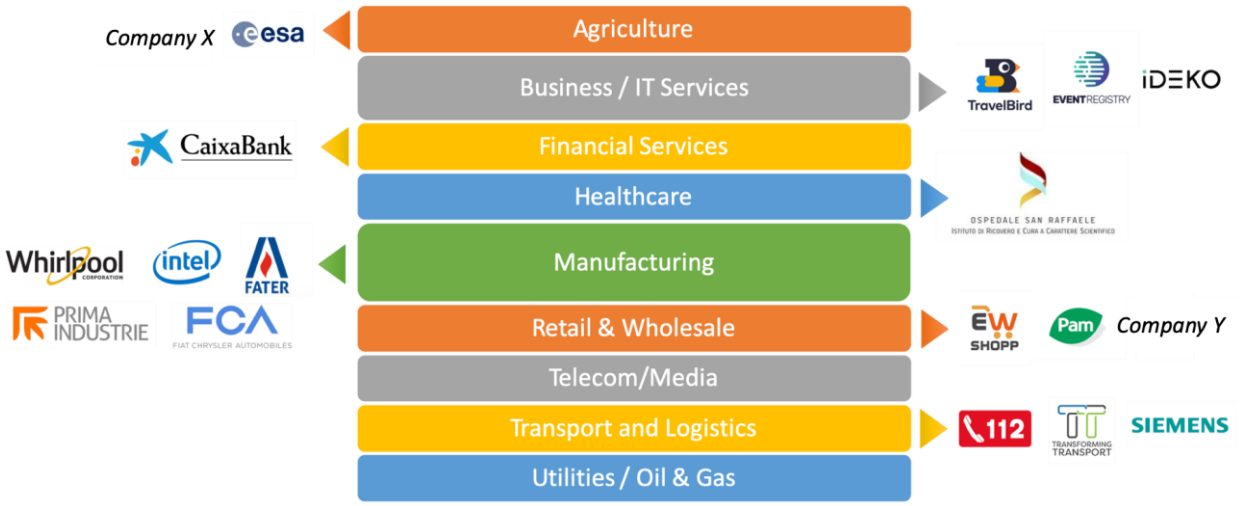

Figure 7 – Summary of Case Studies

Source: DataBench, 2019

Some characteristics are common to all the companies that have been interviewed. Firstly, they have all piloted at least one BDT project. Secondly, they have all analysed issues related to the large-scale deployment of their pilots and have faced BDT-related technical choices. Thirdly, they all know what type of business benefits to expect from BDTs and which business KPIs should be measured, although not all of them have measured the actual benefits.

3.3.1 Approach to the Case Studies

From the preliminary results of WP4, we can draw insights relevant to the definition of benchmarks of European and industrial significance. A first insight from case studies is that European companies are at the beginning of a substantial wave of change caused by BDTs and their applications. This wave of change is generally considered very promising from a business perspective. In principle, BDT use cases are always associated with corresponding business benefits that are most often measurable in economic terms (such as greater revenues or margins). Evidence from the case studies suggests that the relationship is tight between BDT projects and overall financial business benefits. This relationship is considered a consequence of the goals of BDT projects, which are typically targeted at improving decision making.

However, as noted before, only a few companies have actually measured business benefits. This is partly related to the early stage of development of the majority of case studies; as noted before, most companies have piloted and are considering large-scale development. It is also due to a recognized lack of commitment towards the evaluation of decision-making activities, which can be seen as a threat to experimentation and innovation. Understandably, experimentation tends to be accompanied by the idea that trial and error should be allowed to support learning and to enable the comparison of alternative approaches, including their advantages and disadvantages. Some of the interviewees noted that piloting emerging technologies is inherently risky and that measuring benefits can be detrimental to the commitment of people to innovation.

Another common approach is the adoption of BDTs that do not necessarily represent a final choice. A typical goal of pilot projects is to experiment with new technologies, and the initial

choices are made based on the options available on the market at an early stage. As BDTs develop and solutions become more mature, companies are most often willing to change their initial technical choices. In particular, we have found that internal technology standards represent a guideline but have rarely been found to prevent experimentation with other emerging solutions.

3.3.2 Main Results

As noted previously, business KPIs have been measured for a cross-industry subset of case studies. There is substantial agreement between the benchmarks from the WP2 survey and the measures of business benefits from the WP4 case studies. For example, a 5% increase in margins has been measured in a case study from the retail industry for the intelligent fulfilment use case. This percentage is equal to the median value of the industry benchmark from the survey (see chapters 4 and 5) but is slightly lower than the mean value (7%). This discrepancy can be explained by considering that the benefits measured in the intelligent fulfilment use case represent a baseline and could grow as existing initiatives are fine tuned. Furthermore, the benefits measured in the case study are associated with one use case and could grow as more initiatives (use cases) are launched.

From the survey and desk analysis, companies have just started with BDT implementations and have plans to extend their BDT projects in the future (see D2.3 and D4.2). For example, tables and structured data seem to play a prominent role, and descriptive and diagnostic analytics are still the most popular types of analytics among European companies. The batch processing approach is most common, and only 16% of companies are pioneering the management and exploitation of real-time data (see D2.3 and D4.2). Companies are planning to move to prescriptive and predictive analytics in the future. The most widely adopted technical performance metric is data quality. This indicates that companies are still concerned with ensuring that their data is suitable for BDT use cases, which clearly represents a first step.

The change involved in BDT application is not limited to technology infrastructure; it also affects organizational aspects, including innovation processes and related skills. The time horizon for this type of change is most likely long term. It is important to make technical choices that can support long-term change in order to enable greater business benefits. From the evidence that has been collected so far from case studies, an important lesson learnt is that most companies believe that technical benchmarking requires highly specialized skills – skills that are not currently present in the company – and considerable investment. In fact, we have found that very few companies have performed an accurate and extensive benchmarking initiative. There is general agreement on the fact that BDTs are diverse and complex and that technical choices are not simple and are potentially impactful. Even if companies do not perform benchmarking themselves, they have been found to rely on trusted external entities to compare technologies, such as IT consultants and systems integrators. According to our interviewees, the technical assessments available from these third parties should include IT benchmarks, especially in the coming years, when technical KPIs such as latency and throughput will become more important (see D4.2). Currently, comparisons for non-functional characteristics tend not to be systematic, and there is a lack of integrated results. As discussed in D4.2, the DataBench Toolbox addresses these needs by providing a platform to both facilitate benchmarking and share the results of benchmarking efforts across companies. In all our case studies, we have verified strong

interest in the Toolbox as a way to help build a common body of knowledge on the non-functional characteristics of BDTs.

Companies also envision the following risks associated with uninformed technical choices:

- Realizing the technology choice proving non-scalable over time, either technically or economically
- Relying on cloud technologies that might result in lock-in and require a considerable redesign of software to be migrated to other cloud technologies
- Discovering that cloud services simplify technical choices but are expensive, especially as a consequence of scalability, and that technology costs are higher than the business benefits

Figure 9 shows at a glance one of the use cases that we have analysed, the intelligent fulfilment use case. The figure reports the business KPIs (5% margin increase) that we have previously discussed, as well as the technical choices made by the retail company. It is worth noting how the operating costs of the intelligent fulfilment software in cloud are very high. This indicates that cloud platforms make BDTs very accessible, as pilot costs are low (around €100 in this case study, in AWS cloud). However, they add up as system rollout unfolds, and estimates of total operating costs can be very high. In our retail case study, cost estimates have led the company to put the project on hold.

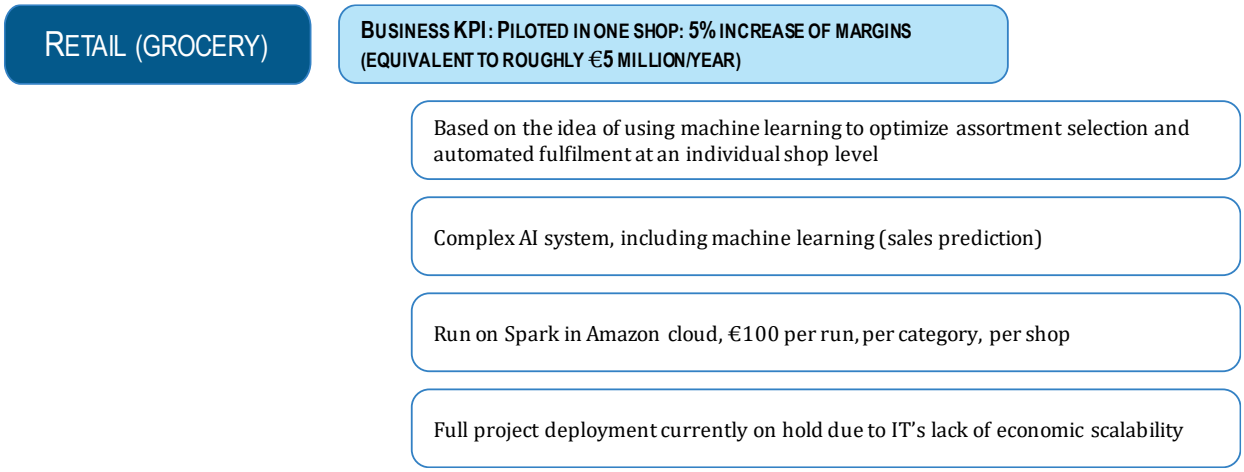

Figure 8 – Intelligent Fulfilment Use Case: Retail

Source: DataBench, 2019

3.3.3 Concluding Remarks

Preliminary conclusions from our case study analysis suggest that:

1. It is crucial for companies to maximize business benefits and, therefore, to design their BDT solutions to maximize business KPIs.
2. The cost variable is critical, as it can affect feasibility and thus innovation. In this respect, costs seem to be an important variable output of technical benchmarking initiatives. Although most benchmarks do not estimate costs directly, they provide ways to estimate the processing requirements of alternative technologies and

perform correct hardware sizing. These estimates can be easily translated into costs. Ongoing work in WP4 concerns the studying of the relationship between technical benchmarking and costs.

To conclude, it must be noted that technical solutions can differ from each other regarding a variety of characteristics. For example, functional completeness can be very different across machine-learning suites and can affect the feasibility of a BDT project and the business benefits that can be obtained. For example, an ML library may have an algorithm that can make more accurate predictions, which clearly result in greater business benefits in a number of use cases. An ability to make informed technical choices is critical and can help companies avoid lock-in, which could prevent the future adoption of more mature BDT solutions that emerge in the coming years.

4 Final KPI Benchmarks by Sector

This chapter presents the business KPIs selected as benchmarks in a standard template for each of the 9 industries analysed in the survey. The metrics selected as benchmarks in each template are illustrated below (the definitions of the KPIs are in par. 2.2). The previous deliverables have analysed in depth the variations of KPIs of each industry and company-size segment. Here, we focus on the finalization of the metrics of each KPI without repeating the previous considerations.

Quantitative KPIs: Revenue Increase, Profit Increase, Cost Reduction (Question 6)

- For these KPIs, the benchmark selected is the median value of an increase achieved (percentage) from an investment in BDT. For example, the respondents from the agriculture industry achieved a median profit increase of 5% from its BDT investment (Table 6). The median is more balanced as a benchmark than the mean because it excludes extreme (potential outlier) values.
- We have also calculated the average value (mean) as an additional data point.
- This calculation includes only respondents actually using or piloting/implementing BDT (a total of 466), excluding the respondents only evaluating BDT, who do not have any practical experience of the technology.
- For each benchmark value, we also present the number of valid answers (cases). IDC considers 30 valid answers to be the minimum threshold to accept for an indicator. Because of the breakdown of the sample in 9 industries, in some industries and some KPIs, the number of valid answers is even lower than 30. These indicators are marked in red and should be only considered as indicative.
- All the benchmarks presented are consistent with mainstream business metrics in each industry or company-size segment. Outlier and clearly unbelievable results have been eliminated.
- Use cases: The mean KPIs values have been calculated by industry and by use case. Unfortunately, the number of valid answers is too low for them to be considered benchmarks; they are only indicative values.

Qualitative KPIs: time efficiency, product/service quality, customer satisfaction, number of new products/services launched, and business model innovation

- These KPIs are measured through a rating scale of 1–5 corresponding to a range of improvements (from less than 5% to more than 50%). The scale is a qualitative measurement, since we have no way of knowing the actual level of specific improvement of each respondent.
- For these KPIs, the benchmark selected is the average rating, since there is no problem with outlier values distorting the average. We still provide the mean rating as an additional data point.
- This calculation includes only respondents actually using or piloting/implementing BDT (a total of 466), excluding the respondents only evaluating BDT that do not have any practical experience with the technology.
- For each benchmark rating, we also present the number of valid answers (cases). IDC considers 30 valid answers to be the minimum threshold to accept for an indicator. Because of the breakdown of the sample in 9 industries, in some industries and some KPIs, the number of valid answers is even lower than 30. These indicators are marked in red and should be only considered as indicative.
- Use cases: The average rating values have also been calculated for these KPIs by industry and by use case. Unfortunately, the number of valid answers is too low for them to be considered benchmarks; they are only indicative values.

Improvement Range (%)	Rating
Less than 5%	1
5–9%	2
10–24%	3
25–49%	4
50% or more	5

Table 6 – Qualitative KPI Ratings and Corresponding Improvement Ranges

Source: DataBench, 2019

4.1 Agriculture

4.1.1 Quantitative KPIs

The survey results indicate that business KPI improvements in the sector are more modest than in other sectors. Agriculture is the industry with the lowest benchmarks in terms of profit, revenues, and cost reductions (compared with the other 8 industries; see par. 4.3 in D.2.2). Unfortunately, the number of cases is limited; we had difficulty finding agricultural enterprises engaged in BDT, even though there are many of them engaged in research pilots and trials (for example with lighthouse projects such as DataBio and IoF).

The potential impact of BDA in the agricultural sector is impeded to some extent by the inevitable inflexibility of core production processes and the historical trend of slow investment in information technology. Nevertheless, the benchmark values are promising, particularly in the case of profitability improvements in some use cases (Table 8). A key

opportunity is precision agriculture, which involves collecting and analysing data about production down to potentially the individual plant level to increase productivity and ensure that best-practice policies are adhered to. Key technologies include those used for remote sensing via satellite and drone observation, as well as on-the-spot IoT sensors. In each case, analytics are key to the interpretation of observations and recommendations for appropriate action.

Agriculture KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	5.2%	26
Revenues increase	4.0%	3.8%	16
Cost reduction	3.0%	3.4%	25

Table 7 – Quantitative KPI Benchmark Values: Agriculture

(Values in red = fewer than 30 cases, indicative) Source: DataBench, 2019

Agriculture Use Cases	Median % Profit Increase	Median % Revenues Increase	Median % Cost Reduction	Number of Cases
Predictive maintenance	5.0%	4.0%	3.0%	19
Inventory and service parts optimization	4.0%	3.0%	3.0%	19
Price optimization	5.0%	3.5%	3.0%	16
Field mapping & crop scouting	5.0%	4.0%	3.0%	16
Supply chain optimization	5.0%	3.0%	3.0%	15
New product development	5.0%	3.0%	3.0%	13
Precision agriculture	6.0%	5.0%	3.0%	13
Yield monitoring and prediction	5.0%	2.0%	3.0%	13
Risk exposure	5.0%	3.5%	3.0%	9
Heavy equipment utilization	3.0%	3.0%	3.0%	9

Table 8 – Quantitative KPI Mean Values: Agriculture by Use Case

(Values in red = fewer than 30 cases, indicative) - Source: DataBench, 2019

4.1.2 Qualitative KPIs

BDT users in agriculture seem more optimistic about the impacts achieved (in terms of more qualitative KPIs) than about revenues and profits, with a median rating of 4 for time efficiency improvements (linked to productivity, which is expected to be strongly impacted by the use of Big Data) and product/service quality improvements. The other benchmarks are still positive, but at lower values (3 rating) with average improvements of 10–24%. The cross-elaboration of KPIs by use case confirms this view, even though the number of cases is small, meaning the values can be considered only as indicative (Table 51 in the Annex).

Two main considerations emerge. Firstly, the main benefits consist of efficiency and productivity improvements rather than disruptive innovation, at least in our sample: Farmers are not so much finding new sources of revenue or inventing completely new services; they are extracting value from data and changing traditional business processes. Secondly, qualitative KPIs benchmarks calculated only for actual users are higher than those calculated including potential users, meaning that actual impacts are better than the expected impacts. But this may hint at a hidden resistance to technical innovation in the sector: Sometimes, low expectations by potential users may become a convenient excuse to postpone innovation investments.

Agriculture KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Time efficiency	4.00	3.48	29	25–49%
Product/service quality	4.00	3.48	29	25–49%
Customer satisfaction	3.00	3.23	30	10–24%
Number of new products/services launched	3.00	3.23	30	10–24%
Business model innovation	3.00	3.07	30	10–24%

Table 9 – Qualitative KPI Benchmark Values: Agriculture

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

4.2 Financial Services

4.2.1 Quantitative KPIs

Finance and retail show the joint second highest level of business KPIs after business/IT services. The difference between the median and the mean shows the existence of a few cases of very high profits and revenue impacts (over 10%). This is not entirely surprising, as the financial services industry has always been a leader in technical innovation, and customer satisfaction is a competitive differentiator between service providers, be they high street banks, insurance companies, or investment management providers. Quantitative KPIs by use case (of indicative value because of the small number of cases) nevertheless confirm this picture.

Finance KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	6.0%	7.6%	39
Revenues increase	5.0%	8.0%	29
Cost reduction	3.5 %	5.0%	36

Table 10 – Quantitative KPI Benchmark Values: Financial Services

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

Finance KPI by Use Cases	Median % Profit Increase	Median % Revenues Increase	Median % Cost Reduction	Number of Cases
Fraud prevention and detection	5.0%	4.5%	4.0%	28
Customer profiling, targeting, optimization of offers	6.0%	5.5%	4.0%	27
Customer scoring and/or churn mitigation	6.0%	4.0%	3.5%	26
New product development	6.0%	4.5%	4.0%	24
Regulatory intelligence	4.0%	5.0%	4.0%	24
Risk exposure	6.0%	5.0%	4.0%	23
Cyberthreat & detection	5.0%	4.5%	4.0%	18
Product & service recommendation systems	7.0%	5.0%	3.0%	17
Price optimization	7.0%	5.0%	4.0%	15
Automated customer service	6.5%	5.0%	4.0%	11
Usage-based insurance	6.5%	4.0%	5.0%	6

Table 11 – Quantitative KPI Mean Values: Financial Services by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

4.2.2 Qualitative KPIs

Qualitative KPI benchmarks confirm the high level of benefits achieved in the finance industry and the focus on customer innovation.

The history of applying statistical and machine learning techniques to predicting market and individual asset values is long. But, with the increasing availability of data sources on customers and potential customer behaviour, combined with the increasing maturity and usability of BDA tools, deploying new techniques to personalise services for customers has become increasingly possible. An important application is in the effective cross-selling and up-selling of services that accurately match customer needs (Table 52 in the Annex).

Finance KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	3.00	3.35	46	10–24%
Customer satisfaction	4.00	3.31	45	25–49%
Number of new products/services launched	3.00	3.05	43	10–24%
Time efficiency	3.00	3.02	46	10–24%
Business model innovation	3.00	2.93	46	10–24%

Table 12 – Qualitative KPI Benchmark Values: Financial Services

Source: DataBench, 2019

4.3 Business/IT Services

4.3.1 Quantitative KPIs

This industry has the highest business impact of the 9 industries measured, particularly concerning profit increase, and the number of cases is quite high, confirming their validity and credibility. This is coherent with IDC research, which sees this industry as a leader in Big Data adoption and exploitation. As can be seen from the difference between the mean and median benchmarks, there are cases of enterprises achieving improvements of over 10%. The IT services industry in particular has been a pioneer in the strategic use of data thanks to its completely digital processes. The level of impact is also high in the breakdown by use case, with a lower number of respondents but close to the relevance threshold.

Business/ IT services KPIs	Benchmark (Median)	Mean	Number of cases
Profit increase	6.0%	9.9%	49
Revenues increase	5.0%	9.1%	44
Cost reduction	4.0%	9.1%	45

Table 13 – Quantitative KPI Benchmark Values: Business/IT Services

Source: DataBench, 2019

Business/ IT services KPIs by Use cases	Median % Profit increase	Median % Revenues increase	Median % Cost reduction	Number of cases
Customer profiling, targeting, and optimization of offers	6.0%	5.0%	3.0%	29
Risk exposure	7.0%	6.0%	4.0%	27
New product development	5.0%	4.5%	4.0%	25
Fraud prevention and detection	6.5%	5.5%	4.0%	25
Product & service recommendation systems	6.0%	6.0%	4.0%	23
Automated customer service	6.0%	6.0%	4.0%	20
Regulatory intelligence	6.0%	5.5%	5.0%	18
Price optimization	7.0%	5.0%	4.5%	16
Social media analytics	15.0%	5.0%	3.0%	5

Table 14 – Quantitative KPI Mean Values: Business/IT Services by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

4.3.2 Qualitative KPIs

The qualitative KPI benchmarks are good, but closer to the average of the other industries than the quantitative KPIs. In our analysis of KPI relevance (D.2.3, par. 2.2.3), we found this industry regards product/service quality as a more important goal for BDT deployment than customer satisfaction, the priority of the financial services sector (even though customers remain a strategic priority for data-driven innovation). The business and IT services sector concentrates on the quality of its offering, with the expectation that improvements here will directly lead to increases in market share and/or customer satisfaction. This is reflected in qualitative KPIs by use case, shown below. While only a few respondents picked social media as a BDT use case, it is interesting to note that they gave it a very high rating in terms of the improvement of the KPIs (Table 53 in the Annex).

The scope for BDT to support the introduction of new types of product and service is based on the role of data for:

- Better analysis of client requirements and buying patterns: This parallels BDA use cases in most other sectors.
- New products and services based on BDT capabilities developed by the service provider and offered to clients: These are potentially more numerous and diverse than in any other sector due to service providers' flexibility when it comes to introducing new offerings.

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	4.00	3.54	57	25–49%
Customer satisfaction	4.00	3.46	57	25–49%
Time efficiency	3.00	3.18	57	10–24%
Number of new products/services launched	3.00	3.07	56	10–24%
Business model innovation	3.00	2.96	57	10–24%

Table 15 – Qualitative KPI Benchmark Values: Business/IT Services

Source: DataBench, 2019

4.4 Healthcare

4.4.1 Quantitative KPIs

The healthcare industry has the same level of quantitative KPIs as agriculture and is one of the laggard industries in BDT uptake, even though the potential for benefits is very high. The variety of use cases showing high KPIs is a demonstration of this potential (Table 17).

A growing number of European healthcare systems are embarking on long-term reforms to improve outcomes and foster innovation with the ultimate goal of benefiting patients while also ensuring long-term sustainability of healthcare services provision. As the ability to use, share, and manage data becomes a critical enabler of digital transformation, the need to define an appropriate framework to safely manage data as a key asset becomes an imperative. The high sensitivity of patients' data is both an opportunity and a challenge. The ultimate goal is to create secure, standardized, interoperable, and accessible pools of data that can be used to enhance decisions and automate processes to improve care quality, patient experience, organizational efficiency, and innovation.

KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	5.0%	40
Revenues increase	4.0%	4.8%	29
Cost reduction	3.0%	4.2%	44

Table 16 – Quantitative KPI Benchmark Values: Healthcare

Source: DataBench, 2019

Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Fraud prevention and detection	5.0%	5.0%	4.0%	29
Quality of care optimization	5.0%	4.5%	3.5%	24
Regulatory intelligence	4.0%	4.0%	4.0%	23
Risk exposure	5.0%	4.0%	3.5%	22
Personalized treatment via comprehensive evaluation of health records	5.0%	4.0%	3.0%	22
Automated customer service	5.0%	4.0%	4.0%	20
Illness/disease diagnosis and progression	5.0%	4.0%	3.0%	19
Patient admission and readmission predictions	5.0%	5.0%	4.0%	17
Price optimization	3.0%	4.0%	4.0%	16
New product development	5.5%	5.0%	3.5%	16

Table 17 – Quantitative KPI Mean Values: Healthcare by Use Case

Source: DataBench, 2019

4.4.2 Qualitative KPIs

Healthcare benchmarks for qualitative KPIs are firmly in the midrange, with little difference between the KPIs. This reflects a scenario in which data-driven innovation affects all aspects of healthcare processes driven by pervasive digital transformation. This is confirmed by the elaboration of KPIs by use case (Table 54 in the Annex), since use cases are numerous and without peaks for any specific KPIs.

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Customer satisfaction	3.00	3.35	49	10–24%
Product/Service quality	3.00	3.02	49	10–24%
Time efficiency	3.00	2.92	48	10–24%
Business model innovation	3.00	2.71	48	10–24%
Number of new products/services launched	3.00	2.71	48	10–24%

Table 18 – Qualitative KPI Benchmark Values: Healthcare

Source: DataBench, 2019

4.5 Manufacturing

4.5.1 Quantitative KPIs

Manufacturing median benchmarks for profit increases are close to the overall sample values, while those for revenues and, especially, for cost reductions are higher. The high mean values result from a few outliers with much higher impacts and benefits. Manufacturing is a very large and diverse sector, and the KPIs for the use cases are equally positive, with the best benchmarks for use cases such as new product development and supply chain optimization. Much of the investment within the manufacturing sector in BDTs has, until recently, been by the larger industry-leading manufacturers, but the benefits are rapidly becoming more accessible to mid-tier or smaller manufacturers.

KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	7.5%	56
Revenues increase	5.0%	6.4%	50
Cost reduction	4.0%	6.9%	49

Table 19 – Quantitative KPI Benchmark Values: Manufacturing

Source: DataBench, 2019

Manufacturing KPIs by Use Case	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
New product development	5.0%	4.5%	3.0%	31
Predictive maintenance	4.0%	4.5%	4.0%	31
Supply chain optimization	5.0%	4.5%	3.5%	28
Quality management investigation	5.0%	4.5%	4.0%	27
Price optimization	4.0%	4.0%	4.0%	26
Regulatory intelligence	4.0%	5.0%	4.0%	19
Smart warehousing	4.5%	5.0%	4.5%	18
Risk exposure	5.0%	4.0%	3.0%	17
Asset management	5.0%	4.0%	4.0%	17
Inventory and service parts optimization	4.0%	5.0%	4.0%	14
Connected vehicles optimization	5.5%	5.0%	3.5%	6

Table 20 – Quantitative KPI Mean Values: Manufacturing by Use Case

Source: DataBench, 2019

4.5.2 Qualitative KPIs

Qualitative KPIs benchmarks in manufacturing have a median rating of 3 for all KPIs save for business model innovation, which is lower. Product/Service quality is the best-rated improvement. The range of use cases is quite wide, with some variation of ratings, with best performance achieved through the new product development, predictive maintenance, and supply chain optimization use cases (Table 55 in the Annex).

The opportunities to benefit from BDT in the sector have been boosted by:

- An ability to effectively integrate and analyse the significant amounts of data already available from existing sources, such as manufacturing system monitoring data and information from traditional IT systems, such as inventory, production, sales and support
- The increasing availability of new data: The most-often-cited example of new data availability is from industrial IoT, whether from the manufacturing process or from the use of the resultant products. In B2C contexts, potential also exists to automatically collect and analyse consumer feedback.

Not only is this new (or newly accessible) data now available for analysis, but it is increasingly feasible to apply advanced analytical techniques to this data in a cost-effective way to target use cases that will deliver against the sector's KPIs.

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	3.00	3.26	65	10–24%
Time efficiency	3.00	2.92	66	10–24%
Customer satisfaction	3.00	2.84	64	10–24%
Number of new products/services launched	3.00	2.64	61	10–24%
Business model innovation	2.00	2.57	63	5–9%

Table 21 – Qualitative KPI Benchmark Values: Manufacturing

Source: DataBench, 2019

4.6 Retail & Wholesale

4.6.1 Quantitative KPIs

Quantitative KPI benchmarks in retail are the same as in manufacturing and align with the overall industry values for profit and revenue increases, but they are higher for cost reductions. The sample has some best performers – companies that achieved much better profit and revenue increases than the median for the industry. Among the use cases, intelligent fulfilment and customer profiling show higher benchmarks than the industry medians for profit and revenue increases, which corresponds with literature.

Retail KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	7.6%	49
Revenues increase	5.0%	7.0%	39
Cost reduction	4.0%	4.6%	44

Table 22 – Quantitative KPI Benchmark Values: Retail & Wholesale

Source: DataBench, 2019

Retail KPIs by use case	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Price optimization	5.5%	4.5%	4.0%	27
New product development	5.0%	5.0%	4.0%	24
Supply chain optimization	5.0%	5.0%	3.5%	24
Intelligent fulfilment	6.0%	5.0%	4.0%	24
Risk exposure	4.5%	4.0%	3.0%	19
Regulatory intelligence	5.0%	5.0%	4.0%	19
Customer profiling, targeting and optimization of offers	6.0%	5.5%	3.0%	14
Product & service recommendation systems	5.0%	5.0%	4.0%	14
Automated customer service	5.0%	4.0%	4.0%	8
Increase productivity and efficiency of DCs/warehouses	5.0%	6.0%	5.0%	7
Inventory and service parts optimization	6.0%	4.0%	4.0%	6
Predictive maintenance	5.0%	8.0%	4.5%	5

Table 23 – Quantitative KPI Mean Values: Retail & Wholesale by Use Case

Source: DataBench, 2019

4.6.2 Qualitative KPIs

Product/Service quality improvement is the highest-rated benchmark for retail, while the others align with a medium level of improvement (rating 3). For decades, the retail sector has intensively used analytics in applications such as supply chain management, inventory control, and stocking/pricing by analysing consumer behaviour via touch points, including discount offers and loyalty programmes. But BDT is now offering new opportunities, and the competition between traditional and e-commerce retailing is extremely high.

In fact, respondents rated business model innovation as the most important KPI (see D.2.3, par. 2.6). Nevertheless, the actual impacts of business model innovation are not as satisfactory – at least, considering the average rating achieved (Table 24). Price optimization and customer profiling are the use cases with the best KPI impacts (Table 56 in the Annex).

Retail KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	4.00	3.44	59	25–49%
Customer satisfaction	3.00	3.34	59	10–24%
Number of new products/services launched	3.00	3.30	53	10–24%
Time efficiency	3.00	2.83	58	10–24%
Business model innovation	3.00	2.81	58	10–24%

Table 24 – Qualitative KPI Benchmark Values: Retail & Wholesale

Source: DataBench, 2019

4.7 Telecom & Media

4.7.1 Quantitative KPIs

Telecom & media is a small sector but, like finance, it is particularly well suited to the use of BDT and has already reaped a high level of benefits, as shown by Table 25, particularly in terms of profit increases. The wide uptake of BDT in this sector is reflected in the variety of use cases, the benchmarks of which align with the overall industry ratings, with a satisfactory level of impact (Table 26).

KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	6.0%	6.2%	58
Revenues increase	5.0%	5.7%	51
Cost reduction	4.0%	4.8%	49

Table 25 – Quantitative KPI Benchmark Values: Telecom & Media

Source: DataBench, 2019

Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Customer profiling, targeting, and optimization of offers	6.0%	5.0%	4.0%	39
Automated customer service	6.0%	5.0%	4.0%	28
Product & service recommendation systems	5.5%	4.0%	3.0%	23
New product development	5.0%	5.0%	4.0%	21
Customer scoring and/or churn mitigation	5.0%	5.0%	4.0%	19
Price optimization	5.5%	6.0%	4.0%	18
Regulatory intelligence	5.0%	5.0%	4.0%	17
Network analytics and optimization	5.0%	4.0%	4.0%	17
Risk exposure	6.0%	5.0%	4.5%	16
Fraud prevention and detection	5.5%	4.5%	5.0%	16
Ad targeting	6.0%	4.0%	4.0%	5
Scheduling optimization	4.5%	4.0%	6.0%	5

Table 26 – Quantitative KPI Mean Values: Telecom & Media by Use Case

Source: DataBench, 2019

4.7.2 Qualitative KPIs

Product/Service quality and customer satisfaction show high median ratings, with improvements over 25% in this industry. Only business model innovation (apparently, a tough target for all industries) shows low improvements, under 10%.

The telecom sector faces an unprecedented challenge in consumer choice, as it is now easier than ever before for consumers to switch provider. Customer satisfaction is a critical factor in customer loyalty, especially when it comes to signal strength and the availability of mobile devices.

Advanced analytics, especially in real time, can greatly increase the ability to respond more quickly, both to address technical service issues with the operator that may affect customer satisfaction and to rapidly and proactively interact with customers who have experienced issues that may affect their satisfaction.

A similar need to profile customers and fight competition is prevalent in the media industry (just think of the battle of video-streaming services dominated by Netflix, which is now fighting with newcomers such as Disney). This fierce competition explains why product/service quality and customer satisfaction are the most important use cases (Table 57 in the Annex).

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	4.00	3.70	69	25–49%
Customer satisfaction	4.00	3.47	68	25–49%
Number of new products/services launched	3.00	3.35	66	10–24%
Time efficiency	3.00	3.06	68	10–24%
Business model innovation	2.00	2.51	69	5–9%

Table 27 – Qualitative KPI Benchmark Values: Telecom & Media

Source: DataBench, 2019

4.8 Transport & Logistics

4.8.1 Quantitative KPIs

Quantitative KPIs in this industry are about average, but benefits achieved from cost reductions are lower than for other industries, such as manufacturing. This is surprising, since cost reduction is considered extremely relevant and a higher priority than is the case in other industries (D.2.3, par. 2.28). Unfortunately, valid answers by use case are relatively few, but they show higher benchmarks achieved for price optimization and new product development. Cost reduction benchmarks are higher for predictive management, risk exposure, and supply chain management.

KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	5.5%	40
Revenues increase	5.0%	4.6%	31
Cost reduction	3.0%	4.3%	35

Table 28 – Quantitative KPI Benchmark Values: Transport & Logistics

Source: DataBench, 2019

Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Inventory and service parts optimization	5.0%	5.0%	3.0%	21
Price optimization	6.0%	5.0%	3.0%	19
Logistics and package delivery management	5.0%	4.5%	3.0%	18
Predictive maintenance	4.0%	5.0%	4.0%	17
Risk exposure	5.0%	4.5%	4.0%	15
New product development	6.0%	4.0%	3.0%	13
Connected vehicles optimization	5.0%	5.0%	3.0%	13
Regulatory intelligence	6.0%	5.0%	3.0%	12
Supply chain optimization	6.0%	5.0%	4.0%	12

Table 29 – Quantitative KPI Mean Values: Transport & Logistics by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

4.8.2 Qualitative KPIs

Qualitative KPIs for the transport & logistics industry are around the mid-level 3 rating, with the exception of product/service quality, which has a median rating of 3.5, pointing to higher impacts achieved.

This is an industry with highly sophisticated use of ICT. For many years, companies in the sector have relied on software to ensure quality of service. The use of BDA to provide added value is now seen as a significant additional option. Cost reduction is a core selling point in the sector, with timeliness and reliability regarded as givens. In this industry, business model innovation and cost reduction are regarded as "extremely important" or "very important" significantly more so than in other sectors. This is an unusual combination, but it reflects the drivers to maintain an innovative competitive edge while still keeping basic costs as low as possible. However, as we see from Table 35, above, effectively achieving cost reductions is not so easy.

Real-time tracking of deliveries from the supplier to the client (at least for the final delivery stage) has been both an operational management resource and a customer benefit for some time. BDT enables this information to be analysed much more effectively for delivery optimisation, combined with basic data about the frequency and value of deliveries to regions and destinations. The use cases show a variety of KPI ratings (Table 57 in the Annex) with peaks of higher improvements for logistics and package delivery management, regulatory intelligence, and supply chain optimization.

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	3.50	3.36	44	10–24%
Customer satisfaction	3.00	3.04	45	10–24%
Number of new products/services launched	3.00	3.02	42	10–24%
Time efficiency	3.00	2.73	45	10–24%
Business model innovation	3.00	2.68	44	10–24%

Table 30 – Qualitative KPI Benchmark Values: Transport & Logistics

Source: DataBench, 2019

4.9 Utilities and Oil & Gas

4.9.1 Quantitative KPIs

This is a small industry (particularly utilities) of high strategic relevance for the EU economy – one undergoing a profound transformation process involving both digital technologies and core technologies (e.g. the introduction of renewable energy sources). Quantitative benchmarks are aligned with the best performers in the case of profit increase, revenue increase (but the number of valid answers is low), and, on average, cost reduction. KPIs by use case, however, show some higher impacts for regulatory intelligence, new product development, customer scoring, inventory, and service parts optimization (Table 32).

KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	6.0%	5.9%	38
Revenues increase	5.0%	4.4%	21
Cost reduction	3.0%	4.3%	36

Table 31 – Quantitative KPI Benchmark Values: Utilities and Oil & Gas

Source: DataBench, 2019

Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Regulatory intelligence	5.0%	5.0%	4.0%	21
Predictive maintenance	5.0%	3.5%	3.0%	20
Risk exposure	5.0%	4.0%	3.5%	19
Field service optimization	5.0%	4.0%	3.0%	19
Supply chain optimization	3.0%	3.0%	3.5%	17
Price optimization	5.5%	3.0%	4.0%	14
New product development	6.0%	5.0%	4.0%	14
Energy consumption analysis and prediction	4.5%	3.0%	3.0%	14
Customer scoring and/or churn mitigation	5.0%	4.5%	3.0%	12
Customer profiling, targeting, and optimization of offers	3.5%	3.0%	4.0%	10
Inventory and service parts optimization	7.0%	10.0%	4.0%	5

Table 32 – Quantitative KPI Mean Values: Utilities and Oil & Gas by Use Case

Source: DataBench, 2019

4.9.2 Qualitative KPIs

The industry shows high improvement ratings (rating 4) for customer satisfaction, new products and services, and product/service quality. This reflects the ongoing innovation process of the industry.

The context is different for oil & gas (a pioneer of advanced analytics, but a mainly resource-focused industry) and utilities (more focused on distribution issues and final customers, dealing with the introduction of smart grids). The use of BDT to manage customer relationships is a priority for utilities. The diffusion of smart meters generating vast datasets on users' behaviour is enabling better demand prediction and interest in AI, particularly through the introduction of machine learning technologies. There is a plurality of use cases, and most of them show high improvements in customer satisfaction and product/service quality. Regulatory intelligence (a critical BDT use case in such a highly regulated industry) shows high benchmarks for business model innovation and the number of new products and services launched. (Table 59 in the Annex).

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Customer satisfaction	4.00	3.67	39	25–49%
Number of new products/services launched	4.00	3.53	38	25–49%
Product/Service quality	4.00	3.51	39	25–49%
Time efficiency	3.00	3.15	40	10–24%
Business model innovation	3.00	2.73	40	10–24%

Table 33 – Qualitative KPI Benchmark Values: Utilities and Oil & Gas

Source: DataBench, 2019

5 Final KPIs Benchmarks by Company Size Segment

The following paragraphs present the KPI benchmarks by company-size segment, with the same methodology and sample described in chapter 4 for the segmentation by industry. The respondents' sample is the same, that is end-users of BDT, but broken down by size rather than industry.

5.1 Small and Medium-Sized Enterprises

5.1.1 Quantitative KPIs

The quantitative KPI benchmarks for SMEs (50–249 employees) show the highest impacts for profit increase, followed by revenue increase, and cost reduction. The benchmark values are close to the overall sample results, but not as high as in the case of the best performing industries. On the other hand, SMEs prioritize cost reduction versus innovation, according to the statistical analysis of their priorities in terms of KPI relevance (D.2.3 par. 3.1). There seems to be some discordance between their business goals and their achievements with BDT.

However, the size segmentation groups together companies from different industries, and it is difficult to know whether performance results are shaped more by the industry context or by the size segment. Looking more closely at use cases (Table 35), we can see a wide range of impacts – probably influenced by the industry, as well (remember that use cases were preselected by industry in the questionnaire).

The top use case of price optimization shows a 4% cost reduction and revenue increase, while the profit increase is lower. Customer profiling and customer scoring use cases (which were asked only within certain industries) show high benchmarks for profitability and revenue. Overall, the combination of industry and size explains much of the level and types of impact achieved. This means that SMEs adopting the right use case can perform as well as large enterprises.

Small and Medium-Sized Enterprise KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	5.6%	43
Revenues increase	4.0%	5.9%	38
Cost reduction	3.5%	6.3%	42

Table 34 – Quantitative KPI Benchmark Values: SMEs (50–249 Employees)

Source: DataBench, 2019

SMEs KPIs by Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Price optimization	3.5%	4.0%	4.0%	31
Risk exposure	3.0%	4.0%	4.0%	28
Regulatory intelligence	3.0%	4.0%	3.0%	24
Predictive maintenance	3.0%	4.0%	4.0%	20
Supply chain optimization	4.0%	5.0%	3.5%	17
New product development	3.5%	4.0%	3.0%	16
Inventory and service parts optimization	3.0%	4.0%	3.0%	14
Fraud prevention and detection	5.0%	4.5%	4.0%	12
Customer profiling, targeting, optimization of offers	5.0%	5.0%	3.0%	10
Product & Service recommendation systems	5.0%	5.0%	3.0%	10
Automated customer service	5.0%	4.5%	3.0%	8
Customer scoring and/or churn mitigation	7.0%	5.0%	3.0%	6
Illness/disease diagnosis and progression	5.0%	4.0%	3.0%	6
Precision agriculture	5.0%	5.0%	3.0%	5
Personalized treatment via comprehensive evaluation of health records	5.0%	3.0%	4.0%	5
Quality of care optimization	5.5%	4.5%	4.0%	5
Quality management investigation	4.0%	2.0%	2.0%	5

Table 35 – Quantitative KPI Benchmark Values: SMEs (50–249 Employees) by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

5.1.2 Qualitative KPIs

SMEs show mid-level impacts for qualitative KPIs concerning product/service quality, customer satisfaction, and time efficiency, while the KPIs more closely concerned with innovation (new products/services and business model innovation) show marginal benefits, with a 2 rating (5–9% improvement). The use cases are many, but only one has a valid number of answers, price optimization, the KPIs for which have a rating slightly above 2, corresponding to low impacts. Some use cases show higher impacts for the product/service quality and customer satisfaction KPIs (Table 60 in the Annex).

Small and Medium-Sized Enterprise KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/service quality	3.00	2.96	53	10–24%
Customer satisfaction	3.00	2.81	53	10–24%
Time efficiency	3.00	2.78	50	10–24%
Number of new products/services launched	2.00	2.71	49	5–9%
Business model innovation	2.00	2.33	51	5–9%

Table 36 – Qualitative KPI Benchmark Values: SMEs (50–249 Employees)

Source: DataBench, 2019

5.2 Medium-Large Enterprises

5.2.1 Quantitative KPIs

Medium-large enterprises (250–499 employees) have the exact same benchmark level as SMEs (Table 51). The most frequent use cases (new product development, risk exposure, and price optimization) show the exact same benchmark values, while regulatory intelligence shows higher impacts in revenue increase and cost reduction.

Medium-Sized Enterprise KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	5.2%	91
Revenues increase	4.0%	4.7%	64
Cost reduction	3.0%	3.7%	92

Table 37 – Quantitative KPI Benchmark Values: Medium Enterprises (250–499 Employees)

Source: DataBench, 2019

Medium Enterprise KPIs by Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
New product development	5.0%	4.0%	3.0%	36
Risk exposure	5.0%	4.0%	3.0%	36
Regulatory intelligence	4.0%	5.0%	4.0%	36
Price optimization	5.0%	4.0%	3.0%	35
Customer profiling, targeting, optimization of offers	6.0%	4.0%	4.0%	24
Predictive maintenance	4.5%	4.0%	3.0%	24
Fraud prevention and detection	5.0%	4.0%	4.0%	23
Supply chain optimization	4.0%	4.0%	3.5%	22
Automated customer service	5.0%	4.0%	4.0%	19
Customer scoring and/or churn mitigation	4.0%	4.0%	4.0%	15
Product & service recommendation systems	4.5%	5.0%	3.0%	15
Inventory and service parts optimization	5.0%	2.0%	3.0%	11
Personalized treatment via comprehensive evaluation of health records	4.0%	4.0%	3.0%	9
Field service optimization	5.0%	3.0%	3.0%	8
Quality of care optimization	3.0%	4.0%	4.0%	7
Intelligent fulfilment	4.0%	5.0%	4.0%	7
Patient admission and re-admission predictions	3.0%	4.0%	4.0%	6
Logistics and package delivery management	5.0%	4.0%	3.0%	6
Illness/Disease diagnosis and progression	3.5%	3.0%	5.0%	5
Asset management	5.0%	4.0%	3.0%	5
Connected vehicles optimization	7.0%	5.0%	3.0%	5

Table 38 – Quantitative KPI Benchmark Values: Medium Enterprises (250–499 Employees) by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

5.2.2 Qualitative KPIs

All qualitative KPIs are positioned in the moderate impacts range, with a 3-rating corresponding to improvements of 10–24%. The average rating for customer satisfaction is slightly higher but still below 4.

The list of use cases is very long, as these enterprises also operate in different industries. Ratings by use case are indicative (a low number of valid answers for each use case), and it

is difficult to identify prevalent trends or a rationale behind the KPI variations. However, no KPIs show improvements above the 10–24% range, and quite a few score in the 5–10% improvement range, so there seem to be no star performers in this group (Table 61 in the Annex).

Medium Enterprise KPIs by Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
New product development	5.0%	4.0%	3.0%	36
Risk exposure	5.0%	4.0%	3.0%	36
Regulatory intelligence	4.0%	5.0%	4.0%	36
Price optimization	5.0%	4.0%	3.0%	35
Customer profiling, targeting, optimization of offers	6.0%	4.0%	4.0%	24
Predictive maintenance	4.5%	4.0%	3.0%	24
Fraud prevention and detection	5.0%	4.0%	4.0%	23
Supply chain optimization	4.0%	4.0%	3.5%	22
Automated customer service	5.0%	4.0%	4.0%	19
Customer scoring and/or churn mitigation	4.0%	4.0%	4.0%	15
Product & service recommendation systems	4.5%	5.0%	3.0%	15
Inventory and service parts optimization	5.0%	2.0%	3.0%	11
Personalized treatment via comprehensive evaluation of health records	4.0%	4.0%	3.0%	9
Field service optimization	5.0%	3.0%	3.0%	8
Quality of care optimization	3.0%	4.0%	4.0%	7
Intelligent fulfilment	4.0%	5.0%	4.0%	7
Patient admission and re-admission predictions	3.0%	4.0%	4.0%	6
Logistics and package delivery management	5.0%	4.0%	3.0%	6
Illness/Disease diagnosis and progression	3.5%	3.0%	5.0%	5
Asset management	5.0%	4.0%	3.0%	5
Connected vehicles optimization	7.0%	5.0%	3.0%	5

Table 39 – Qualitative KPI Benchmark Values: Large Enterprises (250–499 Employees)

Source: DataBench, 2019

5.3 Large Enterprises

5.3.1 Quantitative KPIs

Large enterprises (500–999 employees) are strong adopters of BDT and represent a large share of the survey respondents. Their KPI benchmarks, however, are not very different from the previous 2 size segments, but with slightly better revenue increase impacts. Several use cases show KPI values above the group average (the opposite of the previous groups). Amongst the most frequent use cases, customer profiling shows a high profit increase. The quality management investigation use case was specific to manufacturing, and the KPIs on cost reduction appear as outliers.

Large-Enterprises KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	5.0%	7.4%	112
Revenues increase	5.0%	7.3%	86
Cost reduction	3.0%	5.0%	102

Table 40 – Quantitative KPI Benchmark Values: Large Enterprises (500–999 Employees)

Source: DataBench, 2019

Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
New product development	5.0%	5.0%	3.0%	53
Price optimization	5.0%	5.0%	3.0%	52
Risk exposure	5.0%	5.0%	3.0%	48
Regulatory intelligence	5.0%	5.0%	4.0%	36
Customer profiling, targeting, optimization of offers	6.0%	4.5%	3.0%	33
Fraud prevention and detection	6.0%	5.0%	4.0%	27
Supply chain optimization	6.0%	5.0%	3.0%	26
Automated customer service	5.0%	5.0%	4.0%	24
Predictive maintenance	5.0%	4.5%	3.0%	23
Product & service recommendation systems	6.0%	4.0%	3.0%	20
Inventory and service parts optimization	5.0%	5.0%	3.0%	16
Customer scoring and/or churn mitigation	5.5%	5.0%	3.5%	14
Smart warehousing	4.5%	5.0%	4.0%	8
Quality management investigation	5.0%	6.0%	13.0%	8

Use Cases	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Personalized treatment via comprehensive evaluation of health records	5.0%	4.5%	3.0%	7
Quality of care optimization	5.0%	5.0%	3.5%	7
Asset management	4.0%	3.5%	5.5%	7
Connected vehicles optimization	4.0%	4.0%	3.0%	7
Intelligent fulfilment	5.0%	4.5%	3.0%	6
Field mapping & crop scouting	5.0%	3.0%	3.0%	5

Table 41 – Quantitative KPI Benchmark Values: Large Enterprises (500–999 Employees) by Use Case

Source: DataBench, 2019

5.3.2 Qualitative KPIs

Qualitative KPIs for large enterprises show a high rating for product/service quality (4, corresponding to more than a 25% improvement), closely followed by customer satisfaction and new products/services, even though these two falls in the improvement range of 10–24%. Among the most frequent use cases, customer profiling shows particularly high impacts for time efficiency (a proxy for productivity impacts), product/service quality, and customer satisfaction (Table 62 in the Annex).

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	4.00	3.45	132	25–49%
Customer satisfaction	3.00	3.36	130	10–24%
Number of new products/services launched	3.00	3.27	128	10–24%
Time efficiency	3.00	3.09	132	10–24%
Business model innovation	3.00	2.73	131	10–24%

Table 42 – Qualitative KPI Benchmark Values: Large Enterprises (500–999 Employees)

Source: DataBench, 2019

5.4 Very Large Enterprises

5.4.1 Quantitative KPIs

Very large enterprises (1,000+ employees) claim the highest KPI benchmarks, particularly in the case of profit increase (+6%). These enterprises were among the first to adopt BDT and have been able to reap the main benefits – partly thanks to the availability of large datasets in house. The number of cases is sufficiently high to make these KPIs particularly reliable. KPIs by use case mostly align with the top-level results, and they are a varied bunch; it is to be noted that this is the only enterprise segment in which automated customer service is included as a frequent use case with high KPIs (Table 44).

Very Large Enterprises KPIs	Benchmark (Median)	Mean	Number of Cases
Profit increase	6.0%	7.1%	149
Revenues increase	5.0%	6.3%	121
Cost reduction	4.0%	5.6%	129

Table 43 – Quantitative KPI Benchmark Values: Very Large Enterprises (1,000+ Employees)

Source: DataBench, 2019

Very Large Enterprises KPIs by Use Case	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
New product development	5.0%	5.0%	4.0%	67
Regulatory intelligence	6.0%	5.0%	4.0%	51
Risk exposure	6.0%	6.0%	4.0%	47
Customer profiling, targeting, optimization of offers	6.0%	5.0%	4.0%	47
Price optimization	6.0%	5.0%	4.0%	41
Fraud prevention and detection	6.0%	6.0%	4.0%	35
Automated customer service	6.0%	5.5%	4.0%	33
Product & service recommendation systems	6.0%	5.0%	4.0%	29
Supply chain optimization	6.0%	5.0%	4.0%	25
Customer scoring and/or churn mitigation	6.0%	5.0%	4.0%	20
Predictive maintenance	6.0%	5.0%	4.0%	18
Inventory and service parts optimization	5.0%	5.5%	4.0%	17
Quality management investigation	5.0%	5.0%	4.0%	15
Intelligent fulfilment	6.0%	4.0%	4.0%	10

Very Large Enterprises KPIs by Use Case	% Profit Increase	% Revenues Increase	% Cost Reduction	Number of Cases
Cyberthreat & detection	6.0%	6.5%	4.0%	9
Network analytics and optimization	5.0%	5.0%	4.0%	8
Smart warehousing	5.5%	10.0%	8.0%	7
Logistics and package delivery management	5.0%	5.5%	4.0%	6
Patient admission and re-admission predictions	5.0%	5.0%	3.5%	5
Connected vehicles optimization	6.0%	5.5%	6.5%	5

Table 44 – Quantitative KPI Benchmark Values: Very Large Enterprises (1,000+ Employees) by Use Case

Source: DataBench, 2019

5.4.2 Qualitative KPIs

The ranking of qualitative KPIs for very large companies shows high ratings for product/service quality improvements and customer satisfaction. The other KPIs score around 3, with improvements in the 10–24% range, which is the most common, as we have seen in this report. The high number of respondents in this size segment is reflected by the very high number of use cases (Table 63 in the Annex), of which 7 use cases have more than 30 valid answers (the threshold we have selected for validation). Among them, customer profiling and price optimization show the highest benchmark values. These are use cases common in finance, retail, telecom, and utilities – all industries showing a high level of BDT business impacts. The combination of leading industries in BDT uptake and large company size is the main reason for the high KPI benchmark values.

KPIs	Median Rating	Average Rating	Number of Cases	Improvement Range (%)
Product/Service quality	4.00	3.61	170	25–49%
Customer satisfaction	4.00	3.46	171	25–49%
Time efficiency	3.00	3.10	174	10–24%
Number of new products/services launched	3.00	3.05	159	10–24%
Business model innovation	3.00	2.84	170	10–24%

Table 45 – Qualitative KPI Benchmark Values: Very Large Enterprises (1,000+ Employees)

Source: DataBench, 2019

6 Star Performers

By design, the survey covered a wide range of European companies at various stages of their adoption of BDA technology to give insight into their attitudes and approaches.

However, it has been observed for many decades that specifically analysing the behaviour of the early adopters of new or fast-evolving technologies is extremely valuable to:

- Service and technology vendors in the given technology space, to understand how to evolve the technology to best address the needs of later adopters
- Later adopters, to learn from the successes and problems experienced by early adopters and to understand how to plan and benchmark the results of their own adoption
- Policy makers – especially those who design investment programs that support research and innovation in the given technology space

An indicative early work specifically addressing innovative software technologies in this context is the influential Crossing the Chasm, by Geoffrey Moore, first published in 1991 (Ref 5).

The work identifies a number of distinct cohorts in terms of the decisions, processes, and success criteria (i.e. benchmarks) involved in technology adoption, including: “innovators”, who are prepared to accept a high level of risk by adopting a technology that is new or rapidly evolving in return for a high perceived competitive advantage; “early adopters” (other texts use the term “visionaries”), who are slightly more cautious but still prepared to trade perceived high business benefits against adoption risk; and "later adopters".

Accordingly, in this chapter, we analyse the survey responses of innovators and early adopters of BDA. We specifically analyse those that regard their adoption as very successful to identify best practices and to further validate the benchmarking guidelines outlined in the earlier chapters. We term these respondents as “star performers”, as they have already adopted BDA and perceive its adoption to have been very successful.

Later adopters, such as those who responded “piloting or implementing” in the survey, should be guided by the benchmarks in previous chapters. However, the benefits achieved by the star performers, as described in this chapter, may be considered aspirational goals that carry an acceptable level of technology risk, a level typically taken on by early adopters. The technology adoption practices of star performers can be seen as best practices in this case, although caveats are presented in the respective parts of this chapter.

We have identified successful adopters of BDA (i.e. innovators and early adopters) by combining the results of two questions from the survey:

- Screening question 6 in the survey asked respondents to identify their stage of BDA adoption, whether “currently using”, “piloting or implementing", or "considering or evaluating for future use”. Of the 700 respondents, 228 responded with “currently using”.
- Question 5 asked for a general level of self-assessment of the benefits of BDA adoption, with response options starting at “a high level of benefit” and running through more moderate levels of perceived benefit. Of the 695 respondents, 70 companies responded with “a high level of benefit”.

We identify the star performers as the 36 companies that responded to both questions in this way. This group represents 5% of the surveyed companies, which is consistent with the 15% of Moore's technology adoption curve for innovators and early adopters, in combination with the observation of various industry experts that over 50% of BDA projects fail.

This chapter highlights areas in which the responses of the star performers differ significantly from those that either have not implemented BDA in practice or do not perceive such a high level of benefit. These are qualitative observations but are illustrative of the current state of best practices.

The BDA market is in a state of rapid change. The star performers we analyse in this chapter are those that have adopted early and that believe they have done so successfully.

6.1 Star Performer KPIs and Business Goals

Star performers report significantly higher benefits in the key profit increase and revenues increase KPIs. Cost reduction is considered the least significant KPI among all survey respondents, with only 25% considering it very important or extremely important. It is thus unsurprising that the additional benefit experienced by the star performers is lower, as they are strongly driven by business goals and so will not have targeted their BDA investments towards achieving this KPI.

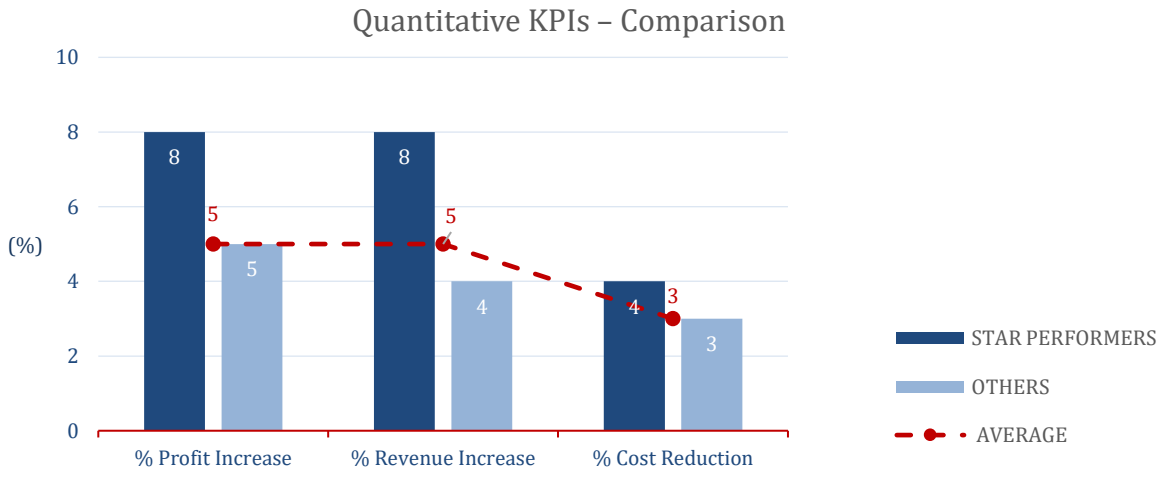

Figure 9 – Quantitative KPIs: Star Performers Versus Others

Source: DataBench, October 2019

Early adopters are more likely to have more ambitious business goals than the more conservative late adopters; early adopters are accepting of the additional risks of taking on emerging technologies at the earlier stages of their development.

Today, many such goals would be categorized as digital transformation.

Figure 10 shows a comparison between the stated business goals of the star performers and those of the remainder of the surveyed companies.

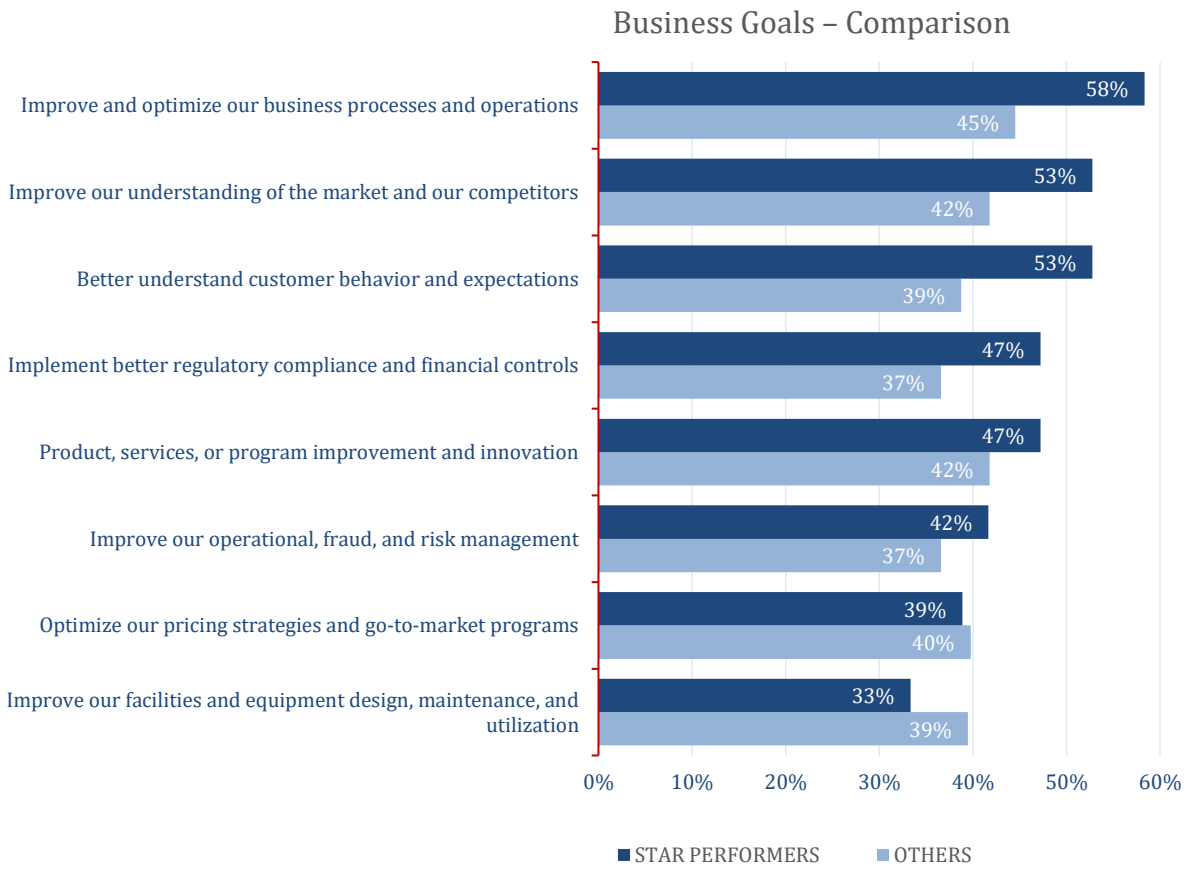

Figure 10 – Business Goal Rankings: Star Performers Versus Others

Source: DataBench, 2019

Star performers are simply clearer and more ambitious about what their business goals are for BDA adoption, which is entirely consistent with the characterization of early adopters. No individual business goals stand out when compared. Unsurprisingly, however, the very conservative – though clearly worthwhile – goal of improving facilities and equipment design, maintenance, and utilization has a relatively low level of perceived importance among star performers.

6.2 Star Performer Detailed KPI Comparison

As observed above, the benefits are significantly greater for star performers in two of the three core KPIs. Figure 11–Figure 14 present comparisons of star performers versus others in terms of the range of KPI benefits achieved.

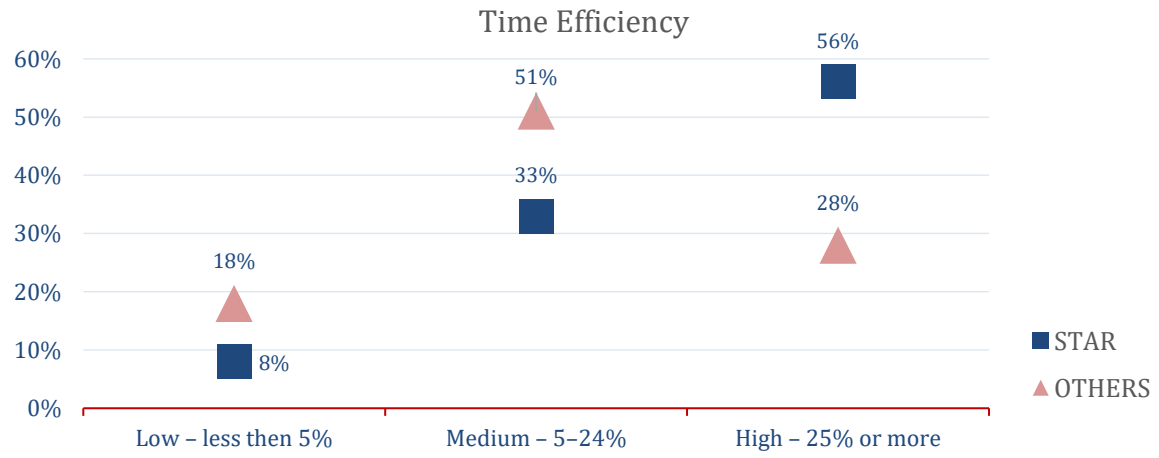

Figure 11 – Time Efficiency KPI: Star Performers Versus Others

Source: DataBench, 2019

The chart shows that star performers report a higher level of benefit improvement than has been experienced or is expected by others: 56% versus 28% (Figure 11).

Table 46 shows a more detailed analysis. For the time efficiency KPI, the majority of star performers report improvements higher than 50% (rating 5), as compared with 10–24% (rating 3) for others.

Time Efficiency			
	Rating	**Star Performers**	**Others**
None (0%)		2.78%	3.03%
Less than 5%	1	5.56%	15.13%
5–9%	2	11.11%	24.21%
10–24%	3	22.22%	27.09%
25–49%	4	25.00%	20.61%
50% or higher	5	30.56%	7.49%

Table 46 – Time Efficiency KPI: Star Performers Versus Others

Source: DataBench, 2019

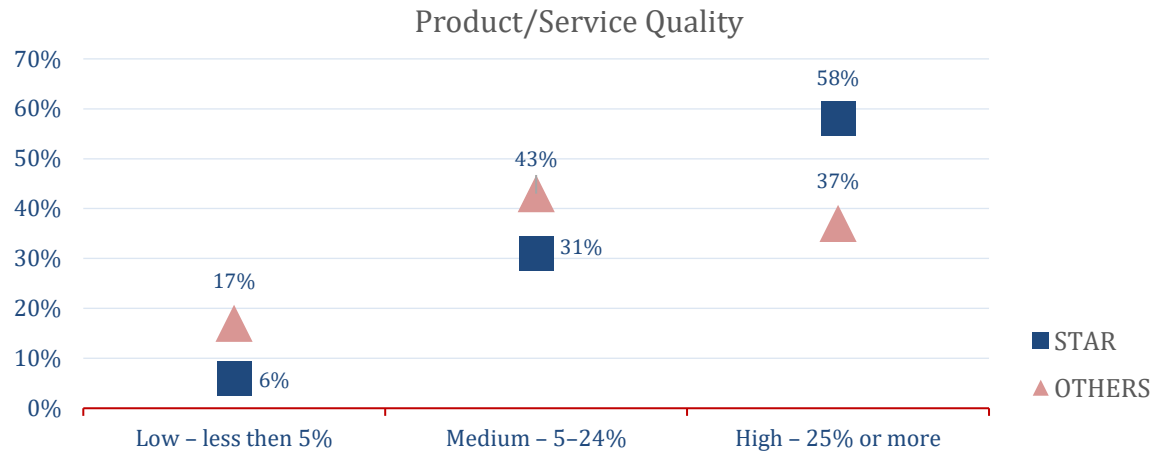

Figure 12 – Product/Service Quality KPI: Star Performers Versus Others

Source: DataBench, 2019

The chart shows that star performers report a higher level of benefit improvement than has been experienced or is expected by others: 58% versus 37%.

The Table 47 shows a more detailed analysis. For the product/service quality KPI, the majority of star performers report improvements in the 25–49% range (rating 4), as compared with 10–24% (rating 3) for others.

Product/Service Quality			
	Rating	**Star Performers**	**Others**
None (0%)		0.00%	3.03%
Less than 5%	1	5.56%	14.12%
5–9%	2	13.89%	17.15%
10–24%	3	16.67%	25.94%
25–49%	4	47.22%	21.18%
50% or higher	5	11.11%	16.28%

Table 47 – Product/Service Quality KPI: Star Performers Versus Others

Source: DataBench, 2019

Figure 13 – Customer Satisfaction KPI: Star Performers Versus Others

Source: DataBench, 2019

The Table 48 shows that star performers report a higher level of benefit improvement than has been experienced or is expected by others: 61% versus 37%.

The below table shows a more detailed analysis. For the customer satisfaction KPI, the majority of star performers report improvements in the 25–49% range (rating 4), as compared with 10–24% (rating 3) for others.

Customer Satisfaction			
	Rating	**Star Performers**	**Others**
None (0%)		0.00%	2.59%
Less than 5%	1	11.11%	16.43%
5–9%	2	8.33%	17.00%
10–24%	3	13.89%	24.21%
25–49%	4	41.67%	19.74%
50% or higher	5	19.44%	17.72%

Table 48 – Customer Satisfaction KPI: Star Performers Versus Others

Source: DataBench, 2019

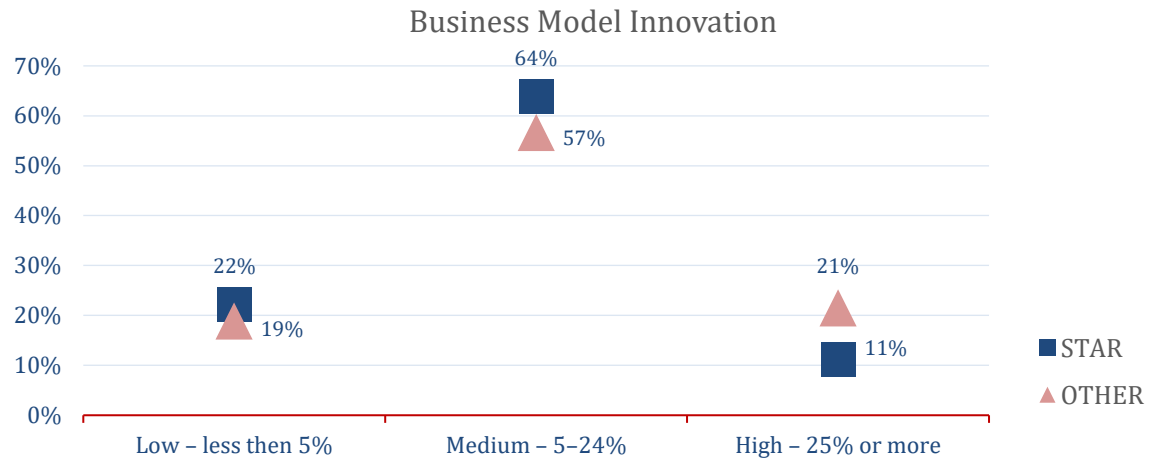

Figure 14 – Business Model Innovation KPI: Star Performers Versus Others

Source: DataBench, 2019

The chart shows that star performers report a lower level of benefit improvement than has been experienced or is expected by others: 11% versus 21%.

The below table shows a more detailed analysis. For the business model innovation KPI, the majority of star performers only report improvements in the 5–9% range (rating 2), as compared with 10–24% (rating 3) for others.

Business Model Innovation			
	Rating	**Star Performers**	**Others**
None (0%)		2.78%	3.46%
Less than 5%	1	19.44%	15.42%
5–9%	2	33.33%	27.81%
10–24%	3	30.56%	28.82%
25–49%	4	2.78%	17.00%
50% or higher	5	8.33%	4.47%

Table 49 – Business Model Innovation KPI: Star Performers Versus Others

Source: DataBench, 2019

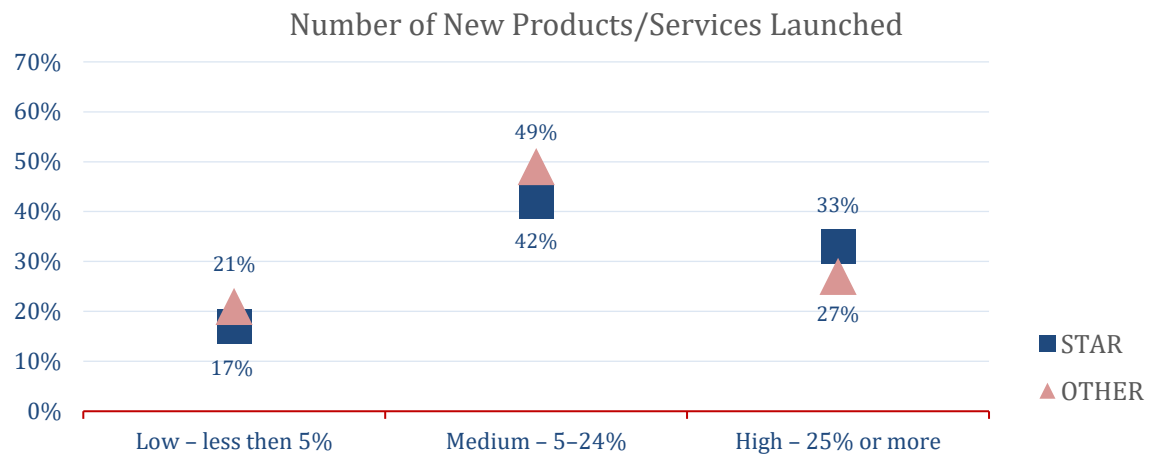

Figure 15 – New Products/Services Launched KPI: Star Performers Versus Others

Source: DataBench, 2019

The chart shows that star performers report an approximately equal level of benefit improvement to that experienced or expected by others: 27% versus 33%.

Table 50 shows a more detailed analysis. For the KPI for the number of new products/services launched, the majority of star performers and others report improvements in the 10–24% range (rating 3).

Number of New Products/Services Launched			
	Rating	**Star Performers**	**Others**
None (0%)		5.56%	5.48%
Less than 5%	1	11.11%	15.56%
5–9%	2	13.89%	19.60%
10–24%	3	27.78%	29.25%
25–49%	4	25.00%	17.72%
50% or higher	5	8.33%	8.93%

Table 50 – Number of New Products/Services Launched: Star Performers Versus Others

Source: DataBench, 2019

In general, the results for the individual KPIs are significantly better for star performers, as might be expected. However, the difference is significantly greater for the more tactical KPIs (time efficiency, product/service quality, and customer satisfaction) than for the more strategic KPIs (addressing business models and product innovation). This is entirely consistent with star performers' focus on tactical business goals.

Later adopters may wish to take a more strategic approach to BDA adoption and plan initially to address these longer-term objectives, but these figures represent the results that can be achieved through the successful early and focused adoption of BDA.

Guidelines such as The Data Warehouse Institutes' Advanced Analytics Maturity Model Guide (Ref 6) provide advice on how companies can best trade off the early adopter benefits, which are the primary focus of this chapter, against longer-term strategic goals.

6.3 Star Performers by Company Size Segment and Industry Sector

As noted in previous analyses from this project and elsewhere, large companies are more likely to have the resources to fund successful BDA adoption and may also have the senior management drive and experience to maximize its success as a part of digital transformation initiatives. However, cultural inertia is a factor, too, and one that may also challenge BDA adoption in large companies.

Although large companies have the benefit of potential access to a larger volume of internally collected data for analysis – data that can provide business value – there is a corresponding complexity of integration needed, both technical and organizational, to tap this potential value.

Factors based on company size therefore appear to be opposing, factors that may affect adoption success. Figure 17 illustrates the actual breakdown from the survey.

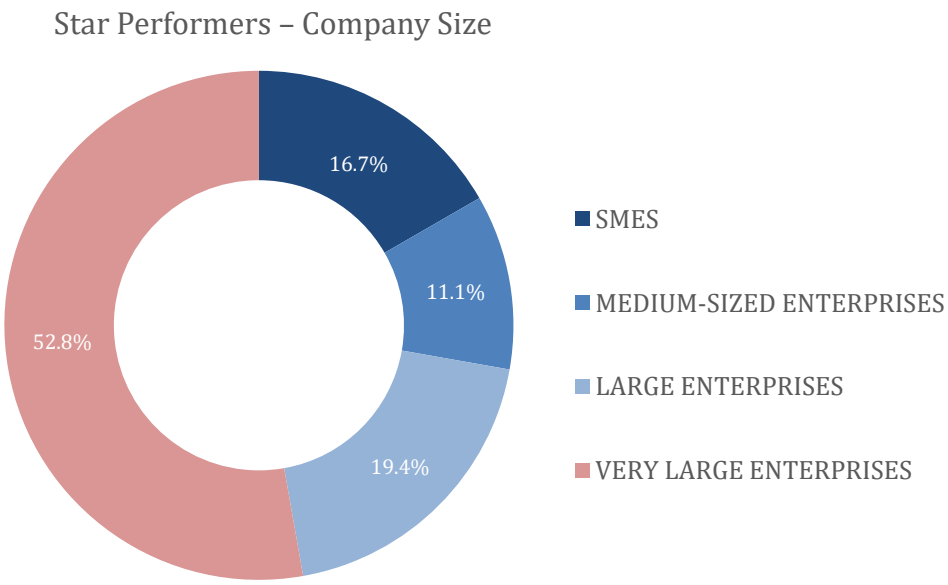

Figure 16 – Star Performers Broken Down by Company Size Segment

Source: DataBench, 2019

Very large enterprises (N = 19 for star performers; N = 207 overall) form the majority of the star performers, with the other company sizes being approximately evenly distributed.

This appears to confirm the analysis above – conflicting influences regarding company size and benefits. Overall, however, companies that have the resources to drive BDA adoption are more likely to perceive a high level of success.

This contrasts to some extent with a contemporary McKinsey survey and report on digital transformation (*Unlocking Success in Digital Transformations*, October 2018-Ref 7), which states that "At organizations with fewer than 100 employees, respondents are 2.7 times more likely to report a successful digital transformation than are those from organizations with more than 50,000 employees."

Nevertheless, although BDA is a vital component of digital transformation, one of the key DataBench findings is that it is also possible to deploy BDT tactically to achieve business value based on traditional KPI benchmarking, without digital transformation being a necessary goal. This is consistent with the conflict between cultural inertia and technical capability between SMEs and larger companies.

As noted in previous DataBench deliverables, the differences are significant between industry sectors in terms of the following:

- The level of current BDA adoption
- The level of expected or perceived benefits from BDA adoption
- The KPIs expected to benefit from BDA adoption
- The BDA use cases expected to deliver these benefits

See the high-level summary presented in Deliverable 2.3, *Analysis of Actual and Emerging Industrial Needs*, Figure 15, "Categorization of Distinctive KPI Priorities by Sector".

Several factors underly this overall trend, including:

- The technical capability for adoption may already exist. For example, technology-heavy sectors such as telecom & media and business/IT services are more likely to have existing in-house technical expertise and an ability to add to this as required.
- Sectors such as retail & wholesale are likely to have large volumes of valuable data for analysis.
- Sectors such as finance have well-established and internally credible use cases to which modern BDT can add additional value.
- Sectors such as healthcare may have complex data privacy issues that may impede adoption.
- Sectors such as agriculture have a larger proportion of SMEs, which are not traditionally leading-edge IT adopters.

The star performer segment of the survey consists of successful early adopters that are likely to have the ambition and confidence to embark on BDA adoption despite potential obstacles. The results are presented in Figure 18, which compares the proportion of companies planning or evaluating BDA adoption with star performers.

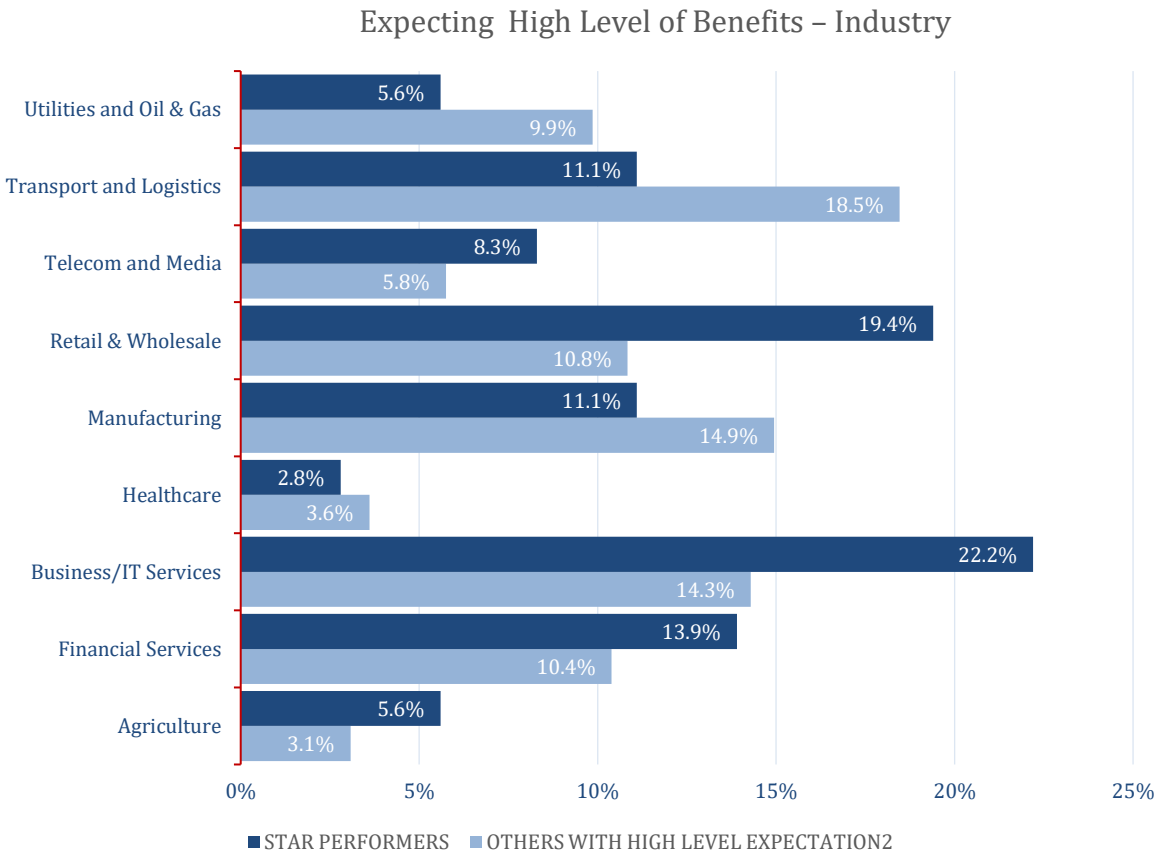

Figure 17 – Expecting High Level of Benefit Broken Down by Industry Sector

Source: DataBench, 2019

The difference is notable between the distribution of those expecting a high level of benefit (N = 695) and the distribution of the star performers that perceive a high level of benefit has already been achieved (N = 36).

Retail & wholesale and business/IT services have larger proportions of star performers than the overall survey sample, indicating a high level of optimism among early adopters in these sectors that early BDA adoption would deliver significant business value. This is consistent with the hypothesis that these sectors have very successful early adopters that have made early creative use of BDA.

Transport & logistics, however, has a much smaller proportion of star performers that expect to achieve a high level of benefit than is the case for the total survey sample. This is likely because of an expectation in this sector that the ever-increasing ability to gather and effectively analyse IoT data to optimize operations and manage supply chains will yield benefits that current early adopters have yet to see. Hence late, or prospective, adopters are more optimistic than early adopters.

A central goal of DataBench is to establish the importance of the benchmarking of BDA adoption.

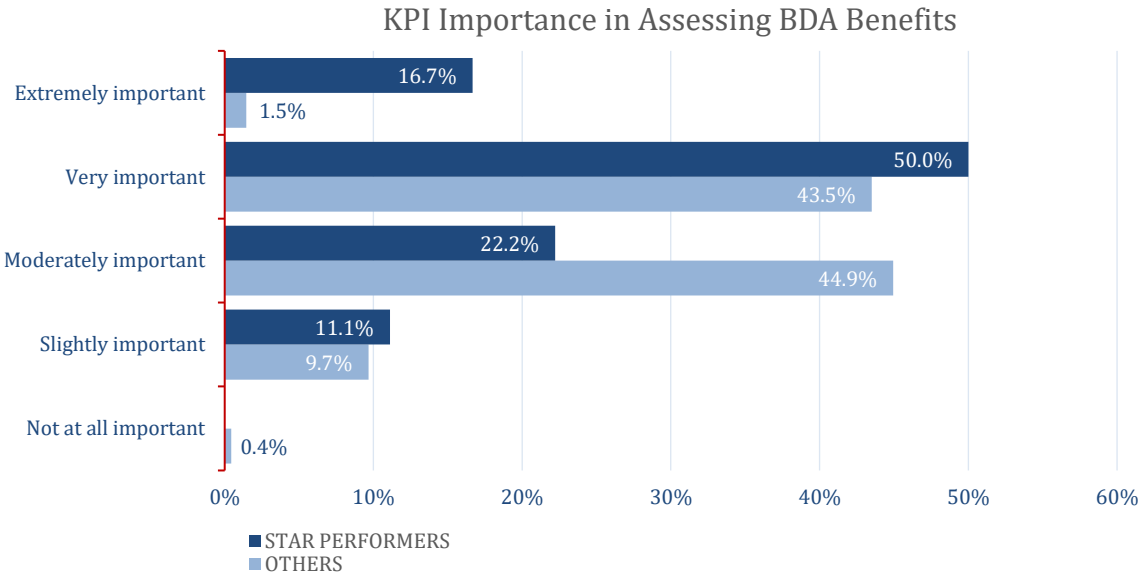

Figure 18 – KPI Importance in Assessing BDA Benefits: Star Performers Versus Others

Source: DataBench, 2019

Figure 19 shows that star performers are overwhelmingly more likely to consider KPIs as extremely important in assessing the benefits of their BDA adoption, which is consistent with the findings and recommendations of DataBench.

6.4 Star Performers by Technical Approach

As BDA technology matures and competitive pressures grow, it is widely acknowledged that companies will increasingly use advanced analytics techniques that were not previously economically viable. The reasons for this include:

- Immature supporting technology
- Lack of affordable scalable processing power
- Lack of accessible and integrated data to support more advanced techniques

Early adopters such as star performers might be expected to be ahead of their peers in using such techniques. However, as mentioned above, their business goals are extremely focused.

Prescriptive analytics will become increasingly important, but many recent BDA technology advances (e.g. deployment in public cloud, self-service analytics, semi-automated data discovery, and data integration) are equally valuable in improving the effectiveness of more traditional analytical approaches. For an ambitious BDA-user company, this is a worthy goal in itself and is business rather than technology driven.

A comparison of star performer respondents with other respondents is shown in Figure 20.

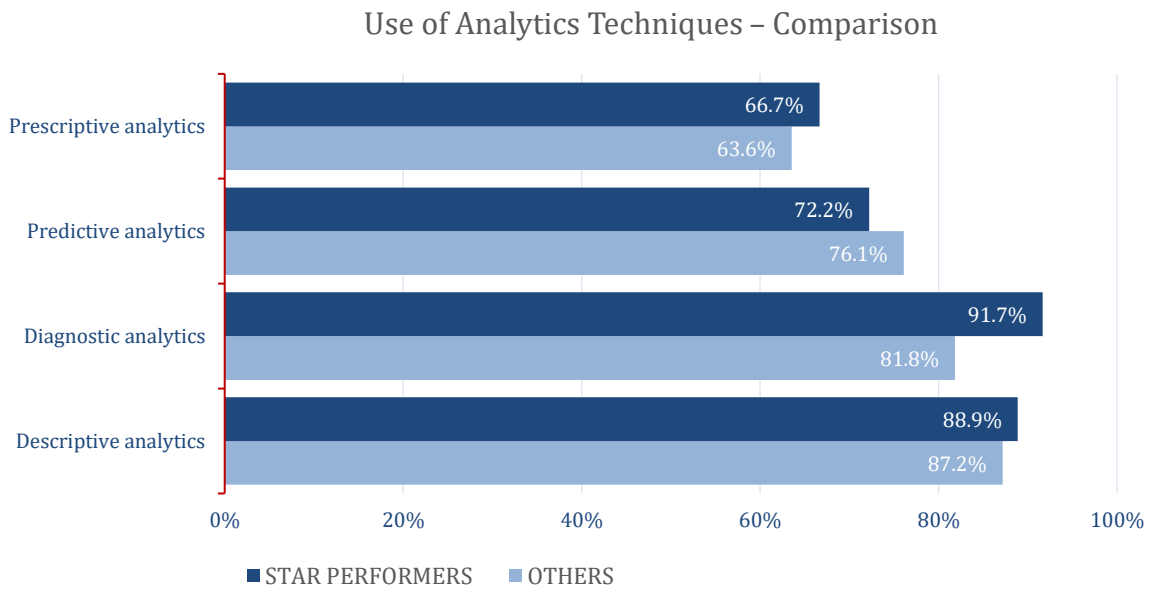

Figure 19 – Analytics Approach: Star Performers Versus Others

Source: DataBench, 2019

The adoption of more advanced analytics among star performers differs little from that of other respondents, although star performers are slightly more likely to use diagnostic analytics. As noted earlier, star performers are strongly driven by business goals, and these may be enabled by faster and better execution of traditional prescriptive analytics, as well as by more advanced techniques. Conversely, early adopters may adopt very focused technological approaches to achieve their ambitious business objectives.

Analysts such as Moore have observed that early adoption may cause problems later, when technologies mature, with the tools and architectures chosen to achieve early benefits becoming legacy applications that need broadening, adapting, or even completely replacing.

Figure 21 presents a comparison of the data management approaches taken by star performers with those taken by the other respondents.

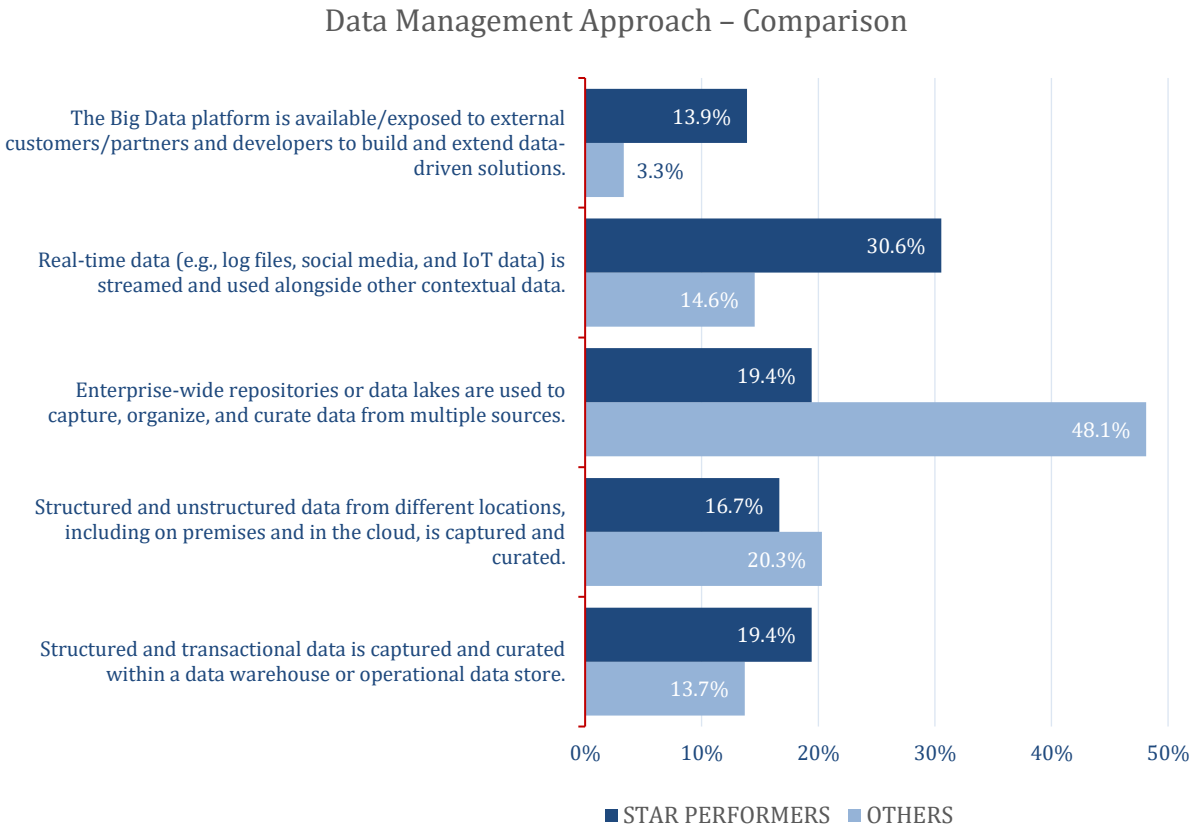

Figure 20 – Data Management Approach: Star Performers Versus Others

Source: DataBench, 2019

There are some striking differences between star performers and other respondents. Star performers have ambitious business goals and a higher risk tolerance to achieve those goals. It is thus unsurprising that technically demanding goals, such as exposing a data platform to share information with external companies and making real time data available for analysis, are far more common among star performers.

More surprising is data lakes being far less common among star performers. This is likely because such repositories are intended to support a variety of current and future BDA requirements, yet early adopters tend to focus on fast and effective returns on their BDA investments and are more likely to choose specific tailored technology to achieve this.

As noted, this may prove to be an expensive decision in the longer term, when reengineering may be necessary, but these companies have bought into the concept of business agility being a vital characteristic in today's business climate.

Real-time analytics integration is still a challenging task, but one that can yield significant business value in many sectors and use cases. Figure 22 shows that star performers have almost all invested in the technical effort to achieve this goal, which is not the case for other respondents.

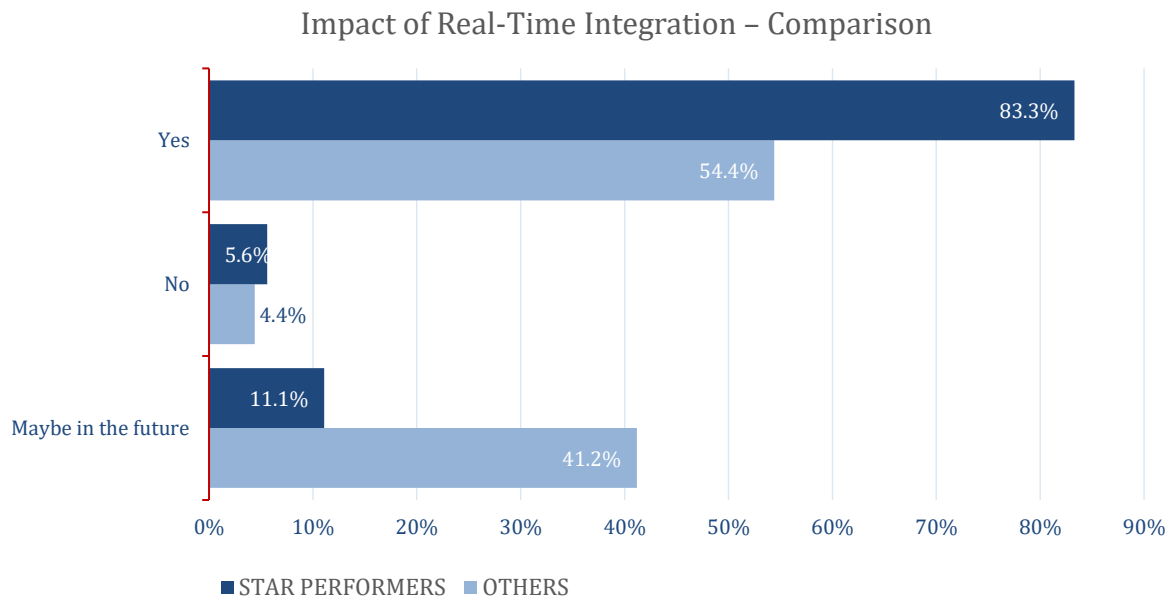

Figure 21 – Real-Time Integration: Star Performers Versus Others

Source: DataBench, 2019

6.5 Concluding Remarks

Star performers are companies that have already adopted BDA and are hence early adopters, as opposed to those that are piloting or implementing or which are considering or evaluating for future use. They also report a high level of benefit.

Star performers are distinguishable from other companies in several ways, as summarized in Figure 17. Key features include the following:

- Star performers have higher quantitative KPIs benchmarks than the average sample, with approximately 8% profit increase and 8% revenue increase resulting from BDT, as compared with the 5–6% median benchmark value for the total sample for these indicators (Figure 10).
- Concerning cost reduction, star performers perform only slightly better than the overall sample, but this is not their priority, since they are more focused on innovation and growth.
- Star performers' KPI benchmarks are better than those of any industry or company size segment (as shown in chapters 4 and 5), confirming they are the true leaders.
- More than 50% are very large companies: This segment is more likely to have the management sponsorship and resources to make early adoption of BDA a viable and successful business option.
- The industry sector split is similar to the survey as a whole, although retail & wholesale and business/IT services make up larger proportions. IT innovators in these sectors have been successful with even earlier adoption of BDA, and their competitors have followed suit.

- Star performers place more emphasis on achieving a wide range of business goals from BDA adoption.
- Star performers are more prepared to implement technically complex architectures for data sharing outside of the company, especially real-time analytics.
- Star performers are significantly less likely to invest in generic platform technologies, such as data warehouses and data lakes, preferring to focus on specific business-value-led use cases.

These considerations delineate clearly the profile of the most successful BDT users.

7 Conclusions

The main goal of this report was to provide relevant metrics for the business performance improvements achieved by European industries resulting from the use of BDT, and we believe we have achieved that.

Firstly, we have demonstrated that the 7 business KPIs selected in the project are valid metrics and can be used as benchmarks for comparative purposes by researchers and business users across Europe in each of the industry sectors and company size segments measured. They are valid because they align with the most relevant metrics used in business practice, such as revenue and profit improvements, because their definitions are clear and understood by the respondents and because they respond to business users' relevant needs, as determined in the DataBench survey, with its sample of 700 EU-industry-representative companies, and in the 18 case studies conducted during the course of this project.

The selection criteria for these indicators and their definitions are explained in the Methodology chapter (par. 2.2). We have analysed business users' needs and their business goals when investing in BDT (D.2.3 *Analysis of Actual and Emerging Industrial Needs*) and demonstrated that our KPIs respond to users' priorities and choices.

The real challenge was to calculate the actual value of these benchmarks. Quantitative estimates of the business impacts of BDT are not easy to find, for multiple reasons. First of all, economic impacts result from multiple factors, of which technology investment (whatever the type of innovation) is only one, so estimates are complex and difficult. Second, when companies calculate business impacts, they tend to keep values confidential and do not easily share them with interviewers. More often, pilots of innovative investments focus on either specific ad-hoc business metrics, which are not easily scalable, or technical and operational metrics. Even the 18 case studies of BDT impacts conducted within this project provided useful and interesting qualitative evidence of the correlation between business choices and technology choices, but they did not provide quantitative evidence of profit or revenue increases.

Nevertheless, in this report, we present measurements of our KPI benchmarks, which we believe are reasonably sound and reliable. They are based on estimates from the DataBench survey respondents in 2018, validated through additional research and analysis in the 2nd phase of the project.

We differentiated the calculation method by KPI type:

- For the 3 quantitative KPIs (revenue increase, profit increase, and cost reduction), we provide absolute values of % increase/reduction, calculating the mean and

median values for each industry and company size segment, as well as for each use case. We selected the median as the benchmark because it is less influenced by outlier values.

- For the 5 qualitative KPIs (time efficiency, product/service quality, customer satisfaction, number of new products/services launched, and business model innovation), we used a rating scale of 1–5, corresponding to a range of improvements (from less than 5% to 50% or more). The scale represents a qualitative measurement (since we have no way of knowing the actual level of the specific improvement of each respondent). We used the average rating as the benchmark for each of these KPIs. This is not a perfect indicator, but it provides a good proxy for the level and size of improvements achieved by business users.

The quality control and validation of the final benchmarks have been done as follows:

- We have added 30 new interviews conducted with ICT project partners carrying out BDT pilots and trials, as well as a few interviews with other organizations, thus bringing the total survey sample to 730.
- We have recalculated benchmarks from the survey results, selecting only respondents actually using or piloting/implementing BDT (a total of 466) and excluding the respondents only evaluating BDT, who do not have any practical experience with the technology. This is the main reasons the values in this report are different from those presented in D.2.2, *Preliminary Benchmarks*.
- We have checked that all the benchmarks presented are consistent with mainstream business metrics in each industry and company size segment, based on IDC research, standard desk research, and cross checks with case studies. Outlier and unbelievable results have been removed.
- We also present the number of valid answers (cases) for each benchmark value. IDC considers 30 valid answers to be the minimum threshold for the validity of an indicator (the more answers, the better of course). In this report, we have used red font for the values that are derived from fewer than 30 cases. This is mostly the case for the breakdown of benchmarks by industry and use case and by company size segment and use case.

7.1 Conclusions by Industry

The quantitative KPI benchmarks calculated only for actual users of BDT for the overall sample are the same as the preliminary benchmarks value in the case of profit increase and cost reduction, but higher for revenues increase (from 4% median increase to 5%, Figure 22). The variations by industry are more relevant, but they confirm that finance, business/IT services, and telecom/media are the leaders in terms of benefit level. Manufacturing is aligned with the overall sample benchmarks but has better results for cost reduction.

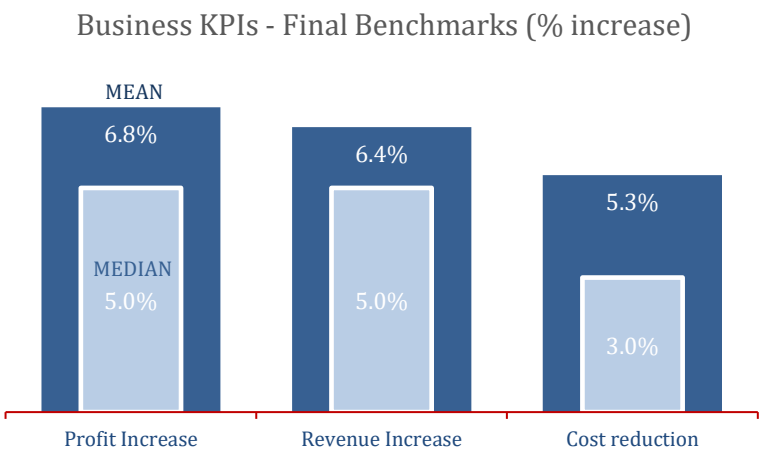

Figure 22 – Business KPIs – Final Benchmarks

Considerations by industry are as follows.

7.1.1 Agriculture

Agriculture is the industry with the lowest benchmarks in terms of profit increase, revenue increase, and cost reduction (compared with the other 8 industries – see D.2.2, par. 4.3). The potential impact of BDT in the agricultural sector is impeded to some extent by the inevitable inflexibility of core production processes and the historical trend of slow investment in information technology.

BDT users in agriculture feel more optimistic about the impacts achieved in terms of more qualitative KPIs than about revenues and profits, with a median rating of 4 for time efficiency improvements (linked to productivity, which is expected to be heavily impacted by the use of Big Data) and product/service quality improvements. The other benchmarks are still positive, but each has a lower value (a rating of 3), falling in the improvement range of 10–24%. The cross-elaboration of KPIs by use case confirms this view, even though the numbers of cases are small, meaning the values are only indicative.

7.1.2 Financial Services

Finance and retail show the joint second highest level of business KPIs after business/IT services. The difference between the median and the mean shows the existence of a few cases of very high profit or revenue impact (over 10%). This is not entirely surprising, as the financial services industry has always been a leader in technical innovation, and customer satisfaction is the competitive differentiator between service providers, be they high street banks, insurance companies, or investment management providers.

Qualitative KPI benchmarks confirm the high level of benefits achieved in the finance industry and a focus on customer innovation. An important application is in the effective cross-selling and up-selling of services that accurately match customer needs.

7.1.3 Business/IT Services

This industry has the highest business impacts of the 9 industries measured, particularly concerning profit increase, and the number of cases is quite high, confirming their validity and credibility. This is consistent with IDC research, which sees this industry as a leader in

Big Data adoption and exploitation. As can be seen from the difference between the mean and the median benchmarks, enterprises have achieved improvements of over 10% in some cases.

The qualitative KPI benchmarks are good but closer to the averages of the other industries than the quantitative KPI benchmarks. In our analysis of KPI relevance (D.2.3, par. 2.2.3), we found that this industry regards product/service quality as a more important goal for BDT deployment than customer satisfaction.

7.1.4 Healthcare

The healthcare industry has the same level of quantitative KPIs as agriculture and is one of the laggard industries in BDT uptake, even though the benefit potential is very high in this sector. The variety of use cases with high KPIs is a demonstration of this potential (Table 20).

Healthcare benchmarks for qualitative KPIs are firmly in the midrange, with little difference between the KPIs. This reflects a scenario in which data-driven innovation affects all aspects of healthcare processes driven by pervasive digital transformation. This is confirmed by the elaboration of KPIs by use case (Table 22), which are numerous and without peaks for any specific KPI.

7.1.5 Manufacturing

Manufacturing median benchmarks for profit increase are close to the overall sample values, while those for revenue increase and, in particular, cost reduction is higher. The high mean values reflect a few outliers with much higher impacts and benefits. Manufacturing is a very large and diversified sector. A number of use cases show benchmarks higher than the industry average, for example new product development and supply chain optimization.

Qualitative KPI benchmarks in manufacturing have a median rating of 3 for all KPIs, save for business model innovation, which is lower. Product/Service quality is the best-rated improvement. The range of use cases is quite wide, with some variation in ratings, with the best performance achieved through the new product development, predictive maintenance, and supply chain optimization use cases (Table 55 in the Annex).

7.1.6 Retail & Wholesale

Quantitative KPI benchmarks in retail are the same as those for manufacturing and align with the overall industry values for profit increase and revenue increase but are higher for cost reduction. The sample has some best performers, which have achieved much better profit increases and revenue increases than the medians for the industry. Among use cases, intelligent fulfilment and customer profiling show higher benchmarks than the industry medians for profit increase and revenue increase, which corresponds with literature on the value of BDT for improving retail margins.

Concerning qualitative KPIs, product/service quality improvements represent the highest-rated benchmark for retail, while the others align with a mid-level of improvement (a rating of 3). Price optimization and customer profiling are the use cases with the best KPI impacts (Table 30).

7.1.7 Telecom & Media

The telecom & media sector is small but, like finance, is particularly well suited to the use of BDT, having already reaped a high level of benefit, as shown in Table 31, particularly in terms of profit increase. The broad uptake of BDT is reflected in the variety of use cases, the benchmarks for which align with the overall industry rating, showing a satisfactory level of impact (Table 32).

For qualitative KPIs in this industry, product/service quality and customer satisfaction show high median ratings, with improvements of over 25%. Only business model innovation (apparently, a tough target for all industries) shows a low level of improvement – under 10%.

7.1.8 Transport & Logistics

Quantitative KPIs in this industry are about average, but benefits achieved from cost reduction are lower than for other industries, such as manufacturing. This is surprising, since cost reduction is considered extremely relevant and a higher priority than is the case in other industries (D.2.3, par. 2.28). Unfortunately, valid answers by use case are relatively few, but they show higher benchmarks achieved for price optimization and new product development. Cost reduction benchmarks are higher for predictive management, risk exposure, and supply chain management.

Qualitative KPIs for the transport & logistic industry are around the mid-level 3 rating, with the exception of product/service quality, which has a median of 3.5, indicating higher impacts achieved.

7.1.9 Utilities and Oil & Gas

This is a small industry (particularly utilities) of high strategic relevance for the EU economy – one undergoing a profound transformation process involving both digital technologies and core technologies (the introduction of renewable energy sources). Quantitative benchmarks align with the best performers for profit increase, are good for revenue increase (but with a low number of valid answers) and are average for cost reduction. KPIs by use case, however, show some higher impacts for regulatory intelligence, new product development, customer scoring, inventory control, and service parts optimization.

For qualitative KPIs, the industry shows high improvement ratings (4 rating) for customer satisfaction, new products/services, and product/service quality. This reflects the ongoing innovation process in the industry.

7.2 Conclusions by Company Size

The analysis by company size shows a clear increase in KPI benchmark values from small companies up to very large companies, which reap the highest benefits. The combination of leading industries in BDT uptake and large company size is confirmed as the main explanatory factor for high KPI benchmark values.

7.2.1 Small & Medium-Sized Enterprises

The quantitative KPI benchmarks for SMEs (50–249 employees) are high in the case of profit increase, less so for revenues increase and cost reduction. The benchmark values are close to the overall sample results, but they are not as high as those in the best performing industries. On the other hand, SMEs prioritize cost reduction over innovation, according to

statistical analysis of their priorities in terms of KPI relevance (D.2.3, par. 3.1). Some discordance is evident between their business goals and their achievements with BDT.

SMEs show mid-level impacts for qualitative KPIs concerning product/service quality, customer satisfaction, and time efficiency, while the KPIs more closely concerned with innovation (new products/services and business model innovation) show marginal benefits, with a rating of 2 (5–9% improvement).

7.2.2 Medium-Large Enterprises

Medium-large enterprises (250–499 employees) have exactly the same benchmark levels as SMEs (Table 37). The most frequent use cases (new product development, risk exposure, and price optimization) show the exact same benchmark values, while regulatory intelligence shows higher impacts for revenue increase and cost reduction.

All qualitative KPIs are positioned in the moderate-impacts range, with a rating of 3, corresponding to improvements of 10–24%. The average customer satisfaction rating is slightly higher but is under 4.

7.2.3 Large Enterprises

Large enterprises (500–999 employees) are strong adopters of BDT and represent a large share of the survey respondents. Their KPI benchmarks, however, are not very different from the previous 2 size segments, with slightly better revenue increase impacts. Several use cases show KPI values higher than the group average (the opposite of the previous groups). Among the most frequent use cases, customer profiling shows a high profit increase.

Qualitative KPIs for large enterprises show a high rating for product/service quality (4, corresponding to a 25% or higher improvement), closely followed by customer satisfaction and new products/services, with ratings in the 10–24% improvement range. Among the most frequent use cases, customer profiling shows particularly high impacts for time efficiency (a proxy for productivity), product/service quality, and customer satisfaction.

7.2.4 Very Large Enterprises

Very large enterprises (with 1,000+ employees) claim the highest KPI benchmarks, particularly in the case of profit increase (+6%). These enterprises were among the first to adopt BDT and have been able to reap the main benefits — partly thanks to the availability of large datasets in house. The number of cases is sufficiently high to make these KPIs particularly reliable. KPIs by use case mostly align with the top-level results, and they are a varied bunch. It is worth noting that this is the only enterprise segment in which automated customer service is included as a frequent use case with high KPIs.

The ranking of qualitative KPIs for very large companies shows high ratings for product/service quality improvement and customer satisfaction. The other KPIs score around 3, indicating improvements in the 10–24% range, which is the most common. The high number of respondents in this size segment is evident in the very high number of use cases. Among them, customer profiling and price optimization show the highest benchmark values.

7.3 Star Performers

The star performers are 36 enterprises that are BDT users and have achieved high benefit levels. This is reflected in their quantitative KPI benchmarks values, higher than the average sample. Star performers achieve median 8% profit increase and 8% revenue increase thanks to BDT, compared with the 5–6% median benchmark values for the total sample for these indicators (Figure 9).

Concerning cost reduction, star performers achieve only slightly better KPIs than the overall sample. However, this is not their priority, since they are more focused on innovation and growth, in which they perform better than any industry or company size segment, confirming they are true leaders. Star performers tend to be large or very large companies and come from multiple industries, but many belong to the retail & wholesale and business/IT services sectors, in which data-driven innovation is now essential for success.

In terms of technology choices, remarkably, star performers are more prepared to implement technically complex architectures for data sharing outside the company – especially real-time analytics – but prefer to focus on specific business-value-led use cases. They are also significantly less likely to invest in generic platform technologies such as data warehouses and data lakes.

7.4 Next Steps

The results of this deliverable, especially the benchmarks, will be used to feed into the DataBench Toolbox – in particular, to provide input into the user-friendly interface and to enrich the Toolbox potential users' profiles. To do so we will work together with WP3 to organize the material, make it indexed and searchable from the Toolbox. We also want to include in the Toolbox some of the technical indicators results presented in D.1.2. The concept of use cases is still not part of the Toolbox but there is a need for further discussion between the partners to decide how best to implement it there. This work will also be extremely useful to prepare the Benchmarking Handbook, which will be the final output of this project.

A specific activity will concern the self-assessment tool, the interactive web-based tool implemented as an add-on to the DataBench survey and sent to respondents in report format (PDF file), comparing respondents' answers with the current dataset (see D.2.3, par. 4.2). The tool is a simple visualisation solution to benchmark seven questions from the DataBench survey. The next steps for the last year of the project will be to analyse more systematically user satisfaction with the self-assessment tool and understand its strong and weak points, and to work within WP4 to improve its design and usability as a potential component of the DataBench Toolbox.

8 Annex

8.1 References

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8.2 Qualitative KPIs by Industry and Use Case

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Predictive maintenance	**19**	3.12	10–24%	2.58	10–24%	2.95	10–24%	2.61	10–24%	2.71	10–24%
Inventory and service parts optimization	**19**	2.73	10–24%	2.78	10–24%	2.68	10–24%	3.11	10–24%	2.50	10–24%
Price optimization	**16**	3.31	10–24%	3.00	10–24%	3.25	10–24%	2.63	10–24%	3.07	10–24%
Field mapping & crop scouting	**16**	2.79	10–24%	3.07	10–24%	3.29	10–24%	2.38	5–9%	2.53	10–24%
Supply chain optimization	**15**	2.93	10–24%	2.92	10–24%	2.27	5–9%	2.87	10–24%	2.86	10–24%
New product development	**13**	3.00	10–24%	2.92	10–24%	2.67	10–24%	2.54	10–24%	2.75	10–24%
Precision agriculture	**13**	3.17	10–24%	2.77	10–24%	2.77	10–24%	2.69	10–24%	2.92	10–24%
Yield monitoring and prediction	**13**	2.85	10–24%	2.46	5–9%	3.15	10–24%	3.15	10–24%	3.15	10–24%
Risk exposure	**9**	3.00	10–24%	3.00	10–24%	3.11	10–24%	3.33	10–24%	3.56	25–49%
Heavy equipment utilization	**9**	3.00	10–24%	1.88	5–9%	2.67	10–24%	2.56	10–24%	2.11	5–9%

Table 51 – Qualitative KPI Mean Values: Agriculture by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Fraud prevention and detection	**28**	3.22	10–24%	3.37	10–24%	3.37	10–24%	2.89	10–24%	2.73	10–24%
Customer profiling, targeting, optimization of offers	**27**	3.37	10–24%	3.11	10–24%	3.41	10–24%	3.00	10–24%	3.21	10–24%
Customer scoring and/or churn mitigation	**26**	3.08	10–24%	3.40	10–24%	3.24	10–24%	2.80	10–24%	3.08	10–24%
New product development	**24**	2.57	10–24%	3.39	10–24%	3.08	10–24%	3.00	10–24%	2.96	10–24%
Regulatory intelligence	**24**	2.67	10–24%	2.79	10–24%	2.63	10–24%	2.54	10–24%	2.32	5–9%
Risk exposure	**23**	2.77	10–24%	2.91	10–24%	3.00	10–24%	2.86	10–24%	2.65	10–24%
Cyberthreat & detection	**18**	3.35	10–24%	3.35	10–24%	3.50	25–49%	2.83	10–24%	2.78	10–24%
Product & Service recommendation systems	**17**	2.82	10–24%	2.94	10–24%	3.29	10–24%	3.12	10–24%	2.94	10–24%
Price optimization	**15**	2.79	10–24%	2.93	10–24%	3.13	10–24%	2.60	10–24%	2.86	10–24%
Automated customer service	**11**	2.36	5–9%	3.09	10–24%	3.09	10–24%	3.18	10–24%	3.09	10–24%
Usage based insurance	**6**	3.50	25–49%	3.50	25–49%	3.40	10–24%	2.67	10–24%	2.83	10–24%

Table 52 – Qualitative KPI Mean Values: Financial Services by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Customer profiling, targeting, and optimization of offers	**29**	3.03	10–24%	3.45	10–24%	3.55	25–49%	2.69	10–24%	3.24	10–24%
Risk exposure	**27**	3.15	10–24%	3.37	10–24%	3.30	10–24%	3.04	10–24%	2.85	10–24%
New product development	**25**	3.45	10–24%	3.23	10–24%	3.68	25–49%	3.18	10–24%	2.77	10–24%
Fraud prevention and detection	**25**	3.13	10–24%	3.54	25–49%	3.71	25–49%	2.70	10–24%	2.88	10–24%
Product & service recommendation systems	**23**	2.76	10–24%	3.57	25–49%	2.85	10–24%	2.90	10–24%	2.95	10–24%
Automated customer service	**20**	3.16	10–24%	3.63	25–49%	3.11	10–24%	3.21	10–24%	3.00	10–24%
Regulatory intelligence	**18**	2.44	5–9%	3.19	10–24%	2.93	10–24%	2.88	10–24%	2.73	10–24%
Price optimization	**16**	3.56	25–49%	3.19	10–24%	3.69	25–49%	2.88	10–24%	3.07	10–24%
Social media analytics	**5**	3.60	25–49%	4.40	25–49%	4.80	> 50%	2.80	10–24%	4.20	25–49%

Table 53 – Qualitative KPI Mean Values: Business/IT Services by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Fraud prevention and detection	**29**	2.93	10–24%	2.71	10–24%	3.04	10–24%	2.82	10–24%	2.39	5–9%
Quality of care optimization	**24**	2.63	10–24%	2.71	10–24%	2.92	10–24%	2.52	10–24%	2.70	10–24%
Regulatory intelligence	**23**	2.36	5–9%	2.83	10–24%	2.74	10–24%	2.52	10–24%	2.36	5–9%
Risk exposure	**22**	2.64	10–24%	3.05	10–24%	2.81	10–24%	2.68	10–24%	2.45	5–9%
Personalized treatment via comprehensive evaluation of health records	**22**	3.10	10–24%	2.48	5–9%	2.91	10–24%	2.55	10–24%	2.27	5–9%
Automated customer service	**20**	2.60	10–24%	2.50	10–24%	2.55	10–24%	2.40	5–9%	2.40	5–9%
Illness/disease diagnosis and progression	**19**	2.84	10–24%	2.33	5–9%	2.84	10–24%	2.38	5–9%	2.71	10–24%
Patient admission and re-admission predictions	**17**	2.53	10–24%	2.71	10–24%	2.71	10–24%	2.38	5–9%	2.80	10–24%
Price optimization	**16**	2.86	10–24%	3.00	10–24%	2.69	10–24%	2.73	10–24%	1.88	5–9%
New product development	**16**	2.69	10–24%	2.69	10–24%	2.88	10–24%	2.81	10–24%	2.25	5–9%

Table 54 – Qualitative KPI Mean Values: Healthcare by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
New product development	**31**	2.83	10–24%	3.63	25–49%	3.07	10–24%	3.00	10–24%	2.82	10–24%
Predictive maintenance	**31**	2.83	10–24%	3.11	10–24%	2.69	10–24%	2.48	5–9%	2.43	5–9%
Supply chain optimization	**28**	2.89	10–24%	3.15	10–24%	2.89	10–24%	2.46	5–9%	2.59	10–24%
Quality management investigation	**27**	2.68	10–24%	3.08	10–24%	2.39	5–9%	2.67	10–24%	2.00	5–9%
Price optimization	**26**	2.48	5–9%	3.13	10–24%	2.55	10–24%	2.65	10–24%	2.61	10–24%
Regulatory intelligence	**19**	2.79	10–24%	3.42	10–24%	2.89	10–24%	2.84	10–24%	3.00	10–24%
Smart warehousing	**18**	2.61	10–24%	3.25	10–24%	2.94	10–24%	2.75	10–24%	2.76	10–24%
Risk exposure	**17**	2.76	10–24%	3.38	10–24%	2.75	10–24%	2.94	10–24%	2.81	10–24%
Asset management	**17**	2.53	10–24%	3.40	10–24%	3.07	10–24%	2.75	10–24%	2.60	10–24%
Inventory and service parts optimization	**14**	2.46	5–9%	2.82	10–24%	2.85	10–24%	2.70	10–24%	3.09	10–24%
Connected vehicles optimization	**6**	2.17	5–9%	2.80	10–24%	2.60	10–24%	2.83	10–24%	2.40	5–9%

Table 55 – Qualitative KPI Mean Values: Manufacturing by Use Case

Source: DataBench, 2019

Retail Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Price optimization	**27**	2.96	10–24%	2.93	10–24%	3.19	10–24%	2.92	10–24%	3.13	10–24%
New product development	**24**	2.52	10–24%	3.48	10–24%	3.21	10–24%	2.74	10–24%	2.81	10–24%
Supply chain optimization	**24**	2.77	10–24%	3.14	10–24%	3.04	10–24%	2.45	5–9%	2.81	10–24%
Intelligent fulfilment	**24**	2.38	5–9%	3.26	10–24%	3.04	10–24%	2.61	10–24%	2.45	5–9%
Risk exposure	**19**	2.06	5–9%	3.18	10–24%	3.06	10–24%	2.71	10–24%	2.53	10–24%
Regulatory intelligence	**19**	2.47	5–9%	3.42	10–24%	2.89	10–24%	2.74	10–24%	2.88	10–24%
Customer profiling, targeting and optimization of offers	**14**	3.00	10–24%	3.92	25–49%	3.14	10–24%	2.92	10–24%	3.42	10–24%
Product & service recommendation systems	**14**	2.00	5–9%	3.14	10–24%	2.71	10–24%	2.15	5–9%	3.38	10–24%
Automated customer service	**8**	2.43	5–9%	2.43	5–9%	3.14	10–24%	2.25	5–9%	4.00	25–49%
Increase productivity and efficiency of DCs/warehouses	**7**	3.17	10–24%	3.29	10–24%	2.86	10–24%	3.00	10–24%	3.00	10–24%
Inventory and service parts optimization	**6**	3.80	25–49%	2.50	10–24%	3.67	25–49%	3.60	25–49%	3.50	25–49%
Predictive maintenance	**5**	2.75	10–24%	3.40	10–24%	2.60	10–24%	2.25	5–9%	2.75	10–24%

Table 56 – Qualitative KPI Mean Values: Retail & Wholesale by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Customer profiling, targeting, and optimization of offers	**39**	3.35	10–24%	3.68	25–49%	3.73	25–49%	2.34	5–9%	3.61	25–49%
Automated customer service	**28**	3.30	10–24%	3.50	25–49%	3.61	25–49%	2.50	10–24%	3.46	10–24%
Product & service recommendation systems	**23**	2.87	10–24%	3.65	25–49%	3.61	25–49%	2.78	10–24%	3.35	10–24%
New product development	**21**	2.67	10–24%	3.05	10–24%	2.95	10–24%	2.62	10–24%	2.78	10–24%
Customer scoring and/or churn mitigation	**19**	2.79	10–24%	3.79	25–49%	3.11	10–24%	2.58	10–24%	3.32	10–24%
Price optimization	**18**	2.94	10–24%	3.76	25–49%	3.59	25–49%	2.59	10–24%	3.43	10–24%
Regulatory intelligence	**17**	2.69	10–24%	3.44	10–24%	2.80	10–24%	2.81	10–24%	2.93	10–24%
Network analytics and optimization	**17**	2.76	10–24%	3.18	10–24%	3.06	10–24%	2.35	5–9%	2.56	10–24%
Risk exposure	**16**	3.13	10–24%	3.31	10–24%	3.25	10–24%	2.25	5–9%	3.33	10–24%
Fraud prevention and detection	**16**	2.94	10–24%	3.56	25–49%	3.44	10–24%	3.00	10–24%	3.38	10–24%
Ad targeting	**5**	3.25	10–24%	3.25	10–24%	3.75	25–49%	2.00	5–9%	4.33	25–49%
Scheduling optimization	**5**	3.50	25–49%	3.50	25–49%	2.75	10–24%	2.25	5–9%	2.25	5–9%

Table 57 – Qualitative KPI Mean Values: Telecom & Media by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Inventory and service parts optimization	**21**	2.63	10–24%	3.22	10–24%	2.95	10–24%	2.50	10–24%	2.71	10–24%
Price optimization	**19**	2.53	10–24%	2.94	10–24%	2.84	10–24%	2.67	10–24%	2.60	10–24%
Logistics and package delivery management	**18**	2.67	10–24%	3.65	25–49%	3.00	10–24%	2.61	10–24%	2.82	10–24%
Predictive maintenance	**17**	2.69	10–24%	2.88	10–24%	2.88	10–24%	2.35	5–9%	2.60	10–24%
Risk exposure	**15**	2.79	10–24%	2.92	10–24%	2.93	10–24%	2.29	5–9%	2.36	5–9%
New product development	**13**	2.92	10–24%	3.31	10–24%	3.15	10–24%	2.69	10–24%	2.42	5–9%
Connected vehicles optimization	**13**	2.85	10–24%	3.17	10–24%	2.92	10–24%	2.38	5–9%	2.62	10–24%
Regulatory intelligence	**12**	3.09	10–24%	3.82	25–49%	3.67	25–49%	2.70	10–24%	2.83	10–24%
Supply chain optimization	**12**	3.27	10–24%	3.55	25–49%	3.50	25–49%	3.27	10–24%	3.10	10–24%

Table 58 – Qualitative KPI Mean Values: Transport & Logistics by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Regulatory intelligence	**21**	2.90	10–24%	3.43	10–24%	3.45	10–24%	3.05	10–24%	3.00	10–24%
Predictive maintenance	**20**	3.11	10–24%	3.06	10–24%	3.68	25–49%	2.18	5–9%	3.28	10–24%
Risk exposure	**19**	2.95	10–24%	3.05	10–24%	3.24	10–24%	2.53	10–24%	3.06	10–24%
Field service optimization	**19**	2.82	10–24%	3.18	10–24%	3.81	25–49%	2.27	5–9%	2.83	10–24%
Supply chain optimization	**17**	2.75	10–24%	3.35	10–24%	3.00	10–24%	2.47	5–9%	2.93	10–24%
Price optimization	**14**	2.45	5–9%	2.92	10–24%	2.91	10–24%	2.20	5–9%	2.27	5–9%
New product development	**14**	2.85	10–24%	2.54	10–24%	3.00	10–24%	2.75	10–24%	2.43	5–9%
Energy consumption analysis and prediction	**14**	2.83	10–24%	2.08	5–9%	3.09	10–24%	2.64	10–24%	2.46	5–9%
Customer scoring and/or churn mitigation	**12**	3.10	10–24%	3.09	10–24%	3.27	10–24%	2.64	10–24%	3.18	10–24%
Customer profiling, targeting, and optimization of offers	**10**	2.78	10–24%	3.63	25–49%	3.88	25–49%	2.33	5–9%	2.38	5–9%
Inventory and service parts optimization	**5**	3.40	10–24%	4.00	25–49%	3.80	25–49%	3.20	10–24%	3.20	10–24%

Table 59 – Qualitative KPI Mean Values: Utilities and Oil & Gas by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

8.3 Qualitative KPIs by Company Size and Use Case

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Price optimization	31	2.52	10–24%	2.41	5–9%	2.41	5–9%	2.43	5–9%	2.26	5–9%
Risk exposure	28	2.26	5–9%	2.81	10–24%	2.74	10–24%	2.61	10–24%	2.35	5–9%
Regulatory intelligence	24	2.41	5–9%	2.57	10–24%	2.77	10–24%	2.05	5–9%	2.24	5–9%
Predictive maintenance	20	2.58	10–24%	2.33	5–9%	2.17	5–9%	2.35	5–9%	2.59	10–24%
Supply chain optimization	17	2.82	10–24%	2.82	10–24%	2.38	5–9%	2.69	10–24%	2.19	5–9%
New product development	16	2.87	10–24%	3.00	10–24%	2.60	10–24%	2.50	10–24%	2.33	5–9%
Inventory and service parts optimization	14	2.77	10–24%	2.46	5–9%	2.36	5–9%	3.00	10–24%	2.58	10–24%
Fraud prevention and detection	12	2.82	10–24%	2.73	10–24%	2.45	5–9%	2.27	5–9%	2.44	5–9%
Customer profiling, targeting, optimization of offers	10	2.67	10–24%	3.20	10–24%	3.22	10–24%	2.90	10–24%	3.50	25–49%
Product & Service recommendation systems	10	2.00	5–9%	2.78	10–24%	2.56	10–24%	3.00	10–24%	3.29	10–24%
Automated customer service	8	1.88	5–9%	2.50	10–24%	2.75	10–24%	2.00	5–9%	2.50	10–24%
Customer scoring and/or churn mitigation	6	3.17	10–24%	3.33	10–24%	3.17	10–24%	2.50	10–24%	3.00	10–24%
Illness/disease diagnosis and progression	6	2.33	5–9%	2.50	10–24%	2.67	10–24%	1.60	5–9%	2.80	10–24%

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Precision agriculture	5	3.25	10–24%	2.20	5–9%	2.40	5–9%	2.60	10–24%	2.80	10–24%
Personalized treatment via comprehensive evaluation of health records	5	2.50	10–24%	2.20	5–9%	2.40	5–9%	1.75	5–9%	2.20	5–9%
Quality of care optimization	5	2.00	5–9%	2.60	10–24%	2.40	5–9%	2.20	5–9%	3.25	10–24%
Quality management investigation	5	2.80	10–24%	2.80	10–24%	2.60	10–24%	2.00	5–9%	1.60	5–9%

Table 60 – Qualitative KPI Benchmark Values: SMEs (50–249 Employees) by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
New product development	36	2.44	5–9%	2.85	10–24%	2.82	10–24%	2.68	10–24%	2.42	5–9%
Risk exposure	36	2.55	10–24%	3.03	10–24%	3.18	10–24%	3.03	10–24%	2.85	10–24%
Regulatory intelligence	36	2.35	5–9%	3.24	10–24%	2.68	10–24%	3.00	10–24%	2.60	10–24%
Price optimization	35	2.52	10–24%	3.06	10–24%	3.00	10–24%	2.66	10–24%	2.57	10–24%
Customer profiling, targeting, optimization of offers	24	2.91	10–24%	3.29	10–24%	3.14	10–24%	2.38	5–9%	2.77	10–24%
Predictive maintenance	24	2.71	10–24%	3.04	10–24%	2.88	10–24%	2.41	5–9%	2.65	10–24%
Fraud prevention and detection	23	2.61	10–24%	2.95	10–24%	3.14	10–24%	2.78	10–24%	2.70	10–24%
Supply chain optimization	22	2.89	10–24%	3.16	10–24%	2.77	10–24%	2.67	10–24%	2.67	10–24%
Automated customer service	19	2.76	10–24%	2.89	10–24%	3.05	10–24%	2.53	10–24%	3.11	10–24%
Customer scoring and/or churn mitigation	15	2.57	10–24%	3.57	25–49%	2.79	10–24%	2.57	10–24%	3.27	10–24%
Product & Service recommendation systems	15	2.27	5–9%	2.87	10–24%	2.79	10–24%	2.53	10–24%	2.40	5–9%
Inventory and service parts optimization	11	3.00	10–24%	3.33	10–24%	3.18	10–24%	3.22	10–24%	2.67	10–24%
Personalized treatment via comprehensive evaluation of health records	9	2.89	10–24%	2.63	10–24%	3.22	10–24%	2.67	10–24%	2.22	5–9%

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Field service optimization	8	2.71	10–24%	3.57	25–49%	4.43	25–49%	2.29	5–9%	3.00	10–24%
Quality of care optimization	7	3.14	10–24%	3.00	10–24%	2.86	10–24%	2.43	5–9%	2.43	5–9%
Intelligent fulfilment	7	1.71	5–9%	2.83	10–24%	3.00	10–24%	2.17	5–9%	2.33	5–9%
Patient admission and re-admission predictions	6	2.00	5–9%	2.67	10–24%	2.33	5–9%	2.33	5–9%	3.17	10–24%
Logistics and package delivery management	6	2.33	5–9%	3.40	10–24%	2.50	10–24%	2.67	10–24%	3.50	25–49%
Illness/disease diagnosis and progression	5	3.20	10–24%	2.25	5–9%	2.20	5–9%	2.40	5–9%	2.80	10–24%
Asset management	5	2.40	5–9%	3.00	10–24%	2.75	10–24%	2.20	5–9%	2.00	5–9%
Connected vehicles optimization	5	2.20	5–9%	2.40	5–9%	2.60	10–24%	2.60	10–24%	2.60	10–24%

Table 61 – Qualitative KPI Benchmark Values: Medium-Sized Enterprises (250–499 Employees) by Use Case

(Values in red = fewer than 30 cases, indicative)
Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
New product development	53	3.00	10–24%	3.33	10–24%	3.28	10–24%	3.06	10–24%	3.00	10–24%
Price optimization	52	2.82	10–24%	3.29	10–24%	3.17	10–24%	2.76	10–24%	2.94	10–24%
Risk exposure	48	3.06	10–24%	3.15	10–24%	2.73	10–24%	2.62	10–24%	2.76	10–24%
Regulatory intelligence	36	3.00	10–24%	3.20	10–24%	2.88	10–24%	2.68	10–24%	3.06	10–24%
Customer profiling, targeting, optimization of offers	33	3.21	10–24%	3.58	25–49%	3.76	25–49%	2.48	5–9%	3.48	10–24%
Fraud prevention and detection	27	3.27	10–24%	3.15	10–24%	3.46	10–24%	3.07	10–24%	2.88	10–24%
Supply chain optimization	26	2.72	10–24%	3.46	10–24%	3.15	10–24%	2.28	5–9%	2.88	10–24%
Automated customer service	24	3.17	10–24%	3.35	10–24%	2.96	10–24%	3.13	10–24%	3.23	10–24%
Predictive maintenance	23	3.19	10–24%	3.05	10–24%	3.68	25–49%	2.23	5–9%	2.90	10–24%
Product & Service recommendation systems	20	2.84	10–24%	3.79	25–49%	3.37	10–24%	2.84	10–24%	3.63	25–49%
Inventory and service parts optimization	16	2.80	10–24%	3.07	10–24%	3.31	10–24%	2.64	10–24%	2.80	10–24%
Customer scoring and/or churn mitigation	14	2.85	10–24%	3.62	25–49%	2.85	10–24%	2.86	10–24%	3.29	10–24%
Smart warehousing	8	2.13	5–9%	3.14	10–24%	2.57	10–24%	2.50	10–24%	2.75	10–24%
Quality management investigation	8	2.86	10–24%	3.14	10–24%	3.00	10–24%	2.50	10–24%	1.67	5–9%
Personalized treatment via comprehensive evaluation of health records	7	3.86	25–49%	2.71	10–24%	2.86	10–24%	2.86	10–24%	2.57	10–24%

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Quality of care optimization	7	2.57	10–24%	2.57	10–24%	3.00	10–24%	2.86	10–24%	2.71	10–24%
Asset management	7	2.57	10–24%	3.33	10–24%	3.60	25–49%	2.67	10–24%	2.33	5–9%
Connected vehicles optimization	7	2.57	10–24%	3.60	25–49%	3.00	10–24%	2.14	5–9%	2.14	5–9%
Intelligent fulfilment	6	2.83	10–24%	3.50	25–49%	3.00	10–24%	2.00	5–9%	2.50	10–24%
Field mapping & crop scouting	5	3.20	10–24%	4.00	25–49%	4.25	25–49%	2.80	10–24%	3.20	10–24%

Table 62 – Qualitative KPI Benchmark Values: Large Enterprises (500–999 Employees) by Use Case

Source: DataBench, 2019

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
New product development	67	2.83	10–24%	3.45	10–24%	3.26	10–24%	2.89	10–24%	2.65	10–24%
Regulatory intelligence	51	2.69	10–24%	3.51	25–49%	3.22	10–24%	2.98	10–24%	2.76	10–24%
Risk exposure	47	3.04	10–24%	3.48	10–24%	3.52	25–49%	2.71	10–24%	2.98	10–24%
Customer profiling, targeting, optimization of offers	47	3.49	10–24%	3.69	25–49%	3.62	25–49%	2.83	10–24%	3.43	10–24%
Price optimization	41	3.29	10–24%	3.58	25–49%	3.68	25–49%	2.95	10–24%	3.11	10–24%
Fraud prevention and detection	35	3.29	10–24%	3.66	25–49%	3.71	25–49%	2.88	10–24%	2.75	10–24%
Automated customer service	33	2.97	10–24%	3.28	10–24%	3.31	10–24%	2.67	10–24%	3.11	10–24%
Product & Service recommendation systems	29	2.96	10–24%	3.59	25–49%	3.34	10–24%	2.81	10–24%	3.12	10–24%
Supply chain optimization	25	3.20	10–24%	3.52	25–49%	3.50	25–49%	3.04	10–24%	3.35	10–24%
Customer scoring and/or churn mitigation	20	3.30	10–24%	3.55	25–49%	3.80	25–49%	2.79	10–24%	3.21	10–24%
Predictive maintenance	18	3.24	10–24%	3.82	25–49%	3.47	10–24%	2.88	10–24%	2.71	10–24%
Inventory and service parts optimization	17	3.00	10–24%	3.67	25–49%	3.38	10–24%	2.87	10–24%	3.31	10–24%
Quality management investigation	15	2.50	10–24%	3.29	10–24%	2.43	5–9%	2.86	10–24%	2.31	5–9%
Intelligent fulfilment	10	2.70	10–24%	3.40	10–24%	3.11	10–24%	3.30	10–24%	2.71	10–24%
Cyberthreat & detection	9	3.44	10–24%	3.67	25–49%	3.78	25–49%	2.78	10–24%	2.78	10–24%

Use Cases	# of Cases	Time Efficiency		Product/Service Quality		Customer Satisfaction		Business Model Innovation		Number of New Products/Services Launched	
		Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)	Mean Rating	Imp. Range (%)
Network analytics and optimization	8	2.88	10–24%	3.88	25–49%	3.75	25–49%	2.75	10–24%	3.00	10–24%
Smart warehousing	7	2.71	10–24%	3.29	10–24%	3.14	10–24%	2.71	10–24%	2.50	10–24%
Logistics and package delivery management	6	2.67	10–24%	4.00	25–49%	3.67	25–49%	2.50	10–24%	2.67	10–24%
Patient admission and re-admission predictions	5	2.20	5–9%	2.20	5–9%	2.80	10–24%	2.50	10–24%	2.75	10–24%
Connected vehicles optimization	5	3.00	10–24%	3.80	25–49%	3.40	10–24%	3.00	10–24%	3.25	10–24%

Table 63 – Qualitative KPI Benchmark Values: Very Large Enterprises (1,000+ Employees) by Use Case

Source: DataBench, 2019