Developing Business Managers' Skills for Data-Driven Decision-Making

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Abstract: The ongoing digitalisation of business operations continues to increase the amount of data available for organisations. As a result of this transformation, organisations are investing in business analytics tools and technologies to facilitate the use of this data in their decision-making. The existing business analytics literature suggests that the tools and technologies alone do not guarantee success in such endeavours, as organisations also need to have other types of resources, such as human skills and data-driven organisational culture, to form coherent set of business analytics resources that enable them to leverage data and business analytics technologies in their decision-making. While previous studies have recognized the importance of business analytics skills as the enablers of data-driven decision-making in organisations, they have focused mainly on the skills of analytics professionals who manage and run business analytics related operations, rather than the skills of business managers who use business analytics and its output to support their decision-making. Based on empirical data collected through 36 semi-structured interviews, the objective of this study is to identify the skills business managers need for using business analytics in their decision-making. Additionally, the study identifies several practices applied by organisations to help their business managers develop such skills. Contributing to the extant business analytics literature, this study highlights the importance of business managers' skills in making data-driven decisions by applying analytics-based output to support their decision-making and thereby offers new insights for both scholars and organisations concerning the prerequisites for using business analytics in managerial decision-making. Besides bringing concrete and practical ideas for organisations to develop the skills of their business managers and to seize the value from their business analytics investments, our findings also help the educational professionals to design programs for the future business managers in universities and other educational institutions by increasing their understanding on the skillset required from their students.

Keywords: Business analytics, Business managers, Skills development, Data-driven culture

1. Introduction

As a result of digital transformation, organisations have increasing amounts of data at their disposal. Business analytics (BA) consists of methods, tools and technologies organisations can use to analyse and interpret this data and to use it for making data-driven decisions (Davenport & Harris, 2007). Using BA helps organisations to leverage their data assets to better understand their operations, to identify new business opportunities, and to improve their performance (Oesterreich et al, 2022).

Extant research has established that BA-related resources such as data and technology, human skills, and specific cultural traits are integral for successful BA value creation. While data, technology, and basic resources form the backbone of BA, analytics professionals' (APs) skills are required to leverage those resources to produce analytics output, and data-driven culture ensures that this output acts as a basis for organisational decision-making (Gupta & George, 2016). However, much less attention has been given to the BA skills of business managers (BMs), who should make data-driven decisions based on analytics output (Schmidt et al, 2023).

This study contributes to the existing corpus of BA literature by identifying the skills BMs need for making data-driven decisions, and the practices organisations apply to develop such skills. We use a thematic analysis of empirical data collected from 36 interviewees in large companies to respond to two questions: 1) What kind of skills BMs need to make data-driven decisions? and 2) What kind of practices organisations apply to support the development of such skills? We start by summarising the extant literature and introducing our research methods. After that, we present our findings concerning the skills and the development practices. Finally, we discuss our findings in the light of existing BA literature and the implications they provide to scholars, organisations and educational practitioners interested in developing BMs' data-driven decision-making (DDDM) skills.

2. Theoretical Background

2.1 Resource-Based View of Business Analytics

The resource-based view of the firm (RBV) suggests that organisations should apply their resources in innovative combinations rather than in isolation to generate business value (Penrose, 1959; Barney 1991). Research has also shown that an investment into BA assumes investing into a combination of tangible resources, such as data assets, tools and technologies, and intangible resources, such as human skills and data-driven culture (Gupta & George, 2016; Mikalef et al, 2020). While financial BA investments in organisations often focus on acquiring tangible resources, the intangible resources are also crucial, as they are needed to leverage the other resources (Gupta & George, 2016).

DDDM means that data is proactively utilized to support decision-making (Davenport & Harris, 2007). In an organisation that is considered to have a data-driven culture, analytics-based insight is actively used for decision-making on different levels of the organisation (Medeiros & Maçada, 2022). Building a data-driven culture requires a collaborative approach that nourishes interaction between analytics and business (Öhman et al, 2021) but also adequate skills that enable creating and using BA output for decision-making purposes (Lamest & Brady, 2019). Organisations that invest into BA should understand its potential and applicability (Srivastava & Dixit, 2025) and plan their analytics-related activities accordingly (Narwane et al, 2021).

The skills of APs have been considered an essential enabler for DDDM (Gupta & George, 2016; Srivastava & Dixit, 2025). Besides technical skills needed to run BA and to produce analytics output, APs should possess managerial skills that enable them to manage analytics teams' work (Srivastava & Dixit, 2025). Additionally, APs should have skills that help them collaborate with their business and other stakeholders, such as communication and presentation skills (Carillo, 2017). Besides APs, also top managers have an important role in enabling BA adoption and DDDM in organisations, as they decide upon the resources dedicated to driving the related activities (Egwuonwu et al, 2024) and show commitment of using BA to support decision-making (Szukits & Móricz, 2024).

For BA adoption to be deemed successful, the organisation should use data-driven insight as a basis for organisational decision-making activities. Part of the value from BA arises from its potential to increase the share of automated decisions within organisations (Davenport & Harris, 2007), while BMs are also expected to use BA and analytics output to make data-driven decisions in those situations where automated decision-making is not a feasible opportunity (Oliveira & Handfield, 2023; Schmidt et al, 2023). Making data-driven decisions assumes BMs to possess an ability to understand analytics output and to apply it accordingly (Grandhi et al, 2021; Nasir et al, 2020). Hence, to reap the benefits of their BA investments requires organisations to equip their BMs with skills that enable them to use BA to support their decision-making activities (Lamest & Brady, 2019).

2.2 Business Nanagers' BA Skills

To make data-driven decisions, BMs should possess the ability to use BA and analytics output to support their decision-making. Whereas BA literature highlights the importance of managerial BA skills as building blocks of organisational BA capabilities (Mikalef et al, 2020), research focus has been on the organisation-level skills as well as the skills of APs and BA managers rather than BMs (Schmidt et al, 2023). What can, however, be considered as a common view within BA literature is that BMs need to 'understand analytics' and to be able to derive business impacts and plan actions based on analytics output (Lamest & Brady, 2019; Oliveira & Handfield, 2023).

Analytics understanding, referring to the ability to interpret the analytics output and use it as a basis for decision-making, is considered as a crucial skillset for BMs (Lamest & Brady, 2019). Such understanding seemingly acts as a common ground when BMs interact with APs, whereas possessing a more in-depth 'data efficacy', referring to basic skills on statistics, tools and software, technical infrastructure, experimental design as well as the development of performance indicators, would even increase their confidence on leveraging BA and collaborating with APs. Analytics understanding and data efficacy also support effective leadership in organisations. (Schmidt et al, 2023).

Some findings within the extant literature indicate that analytics understanding and data efficacy alone do not automatically lead BMs to make data-driven decisions. First, BMs should be able to balance their decision-making practices to fit the context they operate in and to explain their decision-making approach to their teams (Korherr et al, 2023). In this sense, they need to be aware of what DDDM means for the organisation but also to be able to reflect on their own behaviour concerning how they apply BA and analytics output in their decision-making, and why they do it in the way they do. Second, it seems that BMs should possess knowledge of the

latest BA tools and methods used by the organisation. BMs who aim at enhancing their DDDM skills should understand that they also need to update their skills on a continuous basis (Zaitsava et al, 2022). Hence, they need to establish an approach that enables them to do this. Third, DDDM assumes BMs to develop a positive attitude towards data and analytics, as otherwise they are not willing to apply their skills (Szukits, 2022). Besides helping them develop their skills, organisations should support them in building an attitude that encourages them to make data-driven decisions (Carillo et al, 2019).

2.3 Developing Data-Driven Decision-Making Skills of BMs

Organisations have an important role in equipping their BMs with BA skills, and they can proactively facilitate and promote using BA in decision-making (Grandhi et al, 2021). Various skills development practices, such as training programs, are important for building adequate-level skills for everyone involved with BA (Arora et al, 2022). To plan skills development for their BMs, organisations should start by identifying those factors that may prevent their BA use and thereby DDDM, such as competence gaps or information siloes (Zhan & Than, 2020).

To enable BA skills development, BMs should be supported by training activities (Merhi, 2021), but also by providing them with proper end-user assistance and making BA easily accessible (Arora et al, 2023). Knowledge sharing events about BA-related benefits can also support BA use (Economou et al, 2023). Additionally, organisations can encourage using BA and analytics output in decision-making by taking it into their strategic priorities as well as setting objectives and compensation schemes that promote such behaviour (Korherr et al, 2023).

Based on the extant literature, BMs need analytics understanding and data efficacy to use BA and organisations need to support them in developing such skills. However, previous findings indicate that a skillset enabling DDDM may also require something else. Next, we explain the methods we used for collecting and analysing data to take a closer look on what kind of skills enable BMs to make data-driven decisions and what kind of practices organisations have applied to support the development of these skills.

3. Methodology

3.1 Data Collection

The empirical data of this study was collected in the context of a two-year research project examining the development and use of BA capabilities in large companies. Qualitative inquiry (Timmermans & Tavory, 2012) was carried out through semi-structured interviews (Qu & Dumay, 2011) that were conducted between September 2022 and January 2023 for 3-5 informants selected by each of the 11 companies involved in the research project. Throughout data collection, we observed the emergence of new themes to ensure that the collected data formed a purposive sample (Constantinou et al, 2017). A third-party service provider was then used for transcribing all the 36 interviews before moving into the data analysis phase.

3.2 Data Analysis

The objective of our data analysis was to identify how the informants describe those BA skills BMs apply when making data-driven decisions, as well as how they consider their organisations to support the development of such skills. To focus on the relevant aspects within our data, we applied a thematic analysis approach that enabled inductive pattern identification and reporting for descriptive purposes (Braun & Clarke, 2006). Compared with for example content analysis, thematic analysis leans more on searching for common threads rather than specific issues and their frequency within the data, which increases the researchers' opportunities to identify patterns within the data (Vaismoradi et al, 2013).

For our analysis, we applied the six steps of the thematic analysis described by Braun & Clarke (2006, 87): 1) Familiarizing ourselves with the data; 2) Generating initial codes; 3) Searching for categories and themes; 4) Reviewing themes and creating thematic maps; 5) Defining and naming themes; and 6) Producing this research report. During the analysis, two thematic maps were created: 1) Themes concerning DDDM skills of BMs; and 2) Themes concerning the development of DDDM skills of BMs. Next, we describe our empirical findings using these thematic maps.

4. Empirical Findings

4.1 DDDM skills of BMs

Our first objective for this study was to find out what kinds of skills the BMs need to make data-driven decisions. Thematic map in Figure 1 describes the four themes and their underlying categories that, based on our data, form the DDDM skillset of a BM.

Understanding analytics value. Our analysis shows that the rationale for BMs to involve BA and analytics output in their decision-making activities in the first place is the value it can add to the decision-making process and its outcomes. Based on our data, BMs who use BA to support their decision-making consider analytics either to improve decision-making in general, or to improve their own understanding of the situation. Besides understanding the value arising from the use of BA in decision-making, also the ability to identify situations where using analytics could potentially bring additional value was considered to impact on whether it is used in decision-making situations.

Understanding and applying analytics output. Our data indicates that DDDM involves using analytics output such as reports, dashboards and analyses produced with BA tools and technologies. BMs interpret this output and apply it to their needs also without direct involvement of APs. Our observations indicate that analytics output can be used at any stage of decision-making to make it 'data-driven', whether discussing the interpretation of these reports and analyses, using this information to enrich the decision-maker's own knowledge, using the analytics output as a basis for the decisions, or leveraging it to lead people and communicate to them. Additionally, when analytics output is used for any of these decision-making related activities, the way it is applied depends entirely on the decision-maker who uses it.

Understanding analytics processes. Whereas the ability to understand and apply analytics output is where DDDM can be observed, it was also brought up by the informants of this study that BMs should understand how analytics work. Based on our data, BMs are expected to understand what kind of methods and data the analytics teams use and how, while they should also possess an understanding of which methods and data would be relevant from the viewpoint of their business. Additionally, to have a basic understanding of the time and effort required for creating different types of analytics output, they should understand how these methods and data are applied as part of the work conducted by APs.

Collaborating with analytics professionals. Although BMs were seemingly capable of utilizing analytics output without the involvement of APs, during our analysis we observed that many of the DDDM practices also involved close collaboration between these two roles. BMs have specific questions they want APs to find answers for, or they want to gain a deeper understanding of the analytics output. BMs are also seemingly proactive when collaborating with APs, expressing their needs concerning reports and analyses, participating in data and information gathering for analysis purposes, and participating in designing and validating the analysis and the output to ensure it can be used for decision-making.

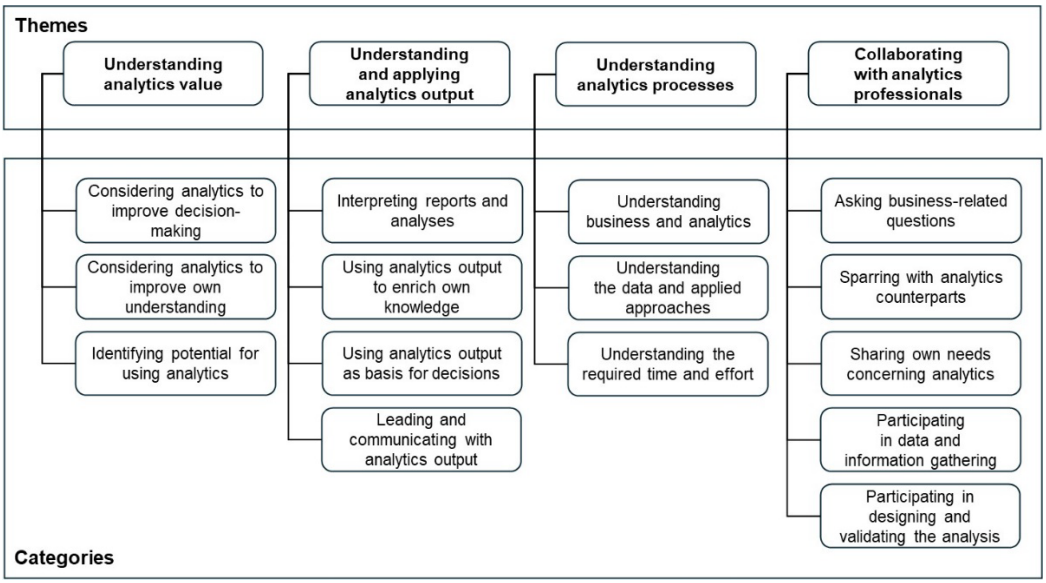

Figure 1: Themes concerning DDDM skills of BMs. Source: Authors' own work

4.2 Development of DDDM Skills of BMs

The other objective for this study was to identify practices for organisations to support their BMs to develop their DDDM skills. Thematic map in Figure 2 describes three approaches identified in our data, as well as examples of concrete practices that represent each of these approaches.

Arranging analytics training. Our data shows training-related practices form an important approach to equip BMs with skills that enable DDDM. Trainings offered by organisations vary from training programs to individual courses. While some training programs involve a curriculum or different themes and phases, other programs are tailored to serve specific needs of target group within the organisation. In some organisations, BMs can also choose from a selection of individual courses, that may either be instructed or offered as part of the organisation's self-service training offering. According to our observations training content highly depends on the organisation-specific needs identified by the APs; while some organisations emphasize the need for data utilization and data literacy, other organisations focus on teaching the use of analytics tools, reports or dashboards to their BMs. Some of the courses may also be compulsory for BMs, either due to regulatory requirements or because they are considered essential from the organisational viewpoint.

Facilitating analytics use. In addition to training their BMs, organisations also apply other practices that help develop skills for DDDM. Based on our observations, BMs get involved in DDDM as part of their daily responsibilities, and the related skills are developed through experience. Examples of this from our data include using reports and dashboards for sharing business status and learning to leverage analytics when using data as part of daily practices. Organisations facilitate the analytics use of their BMs by making the tools and reports as easy to use as possible, which may mean for example adjusting them to better fit the needs of a specific user or even letting the BMs create their own reports. BMs are also proactively supported by APs, either through dedicated support channels or simply being involved in joint activities such as projects or meetings. Some organisations also intentionally involve selected BMs into analytics use as "change agents" and use them as examples of successful analytics users as well as potential sources of peer support for other BMs who want to enhance their DDDM skills.

Sharing knowledge about analytics. Organisations apply various practices with an approach to share knowledge about analytics and how it can be used for DDDM. Whereas newsletters and information sharing events create awareness about analytics use, organisations also use them to share knowledge about analytics-related success stories and pilots that seemingly motivate BMs' DDDM. According to our data, BMs also ask APs to join in their meetings and events for knowledge sharing purposes whenever they have identified this to serve their needs. Some organisations have also established regular forums or continuous communities where BMs can get involved and hear the latest opportunities concerning analytics use and DDDM.

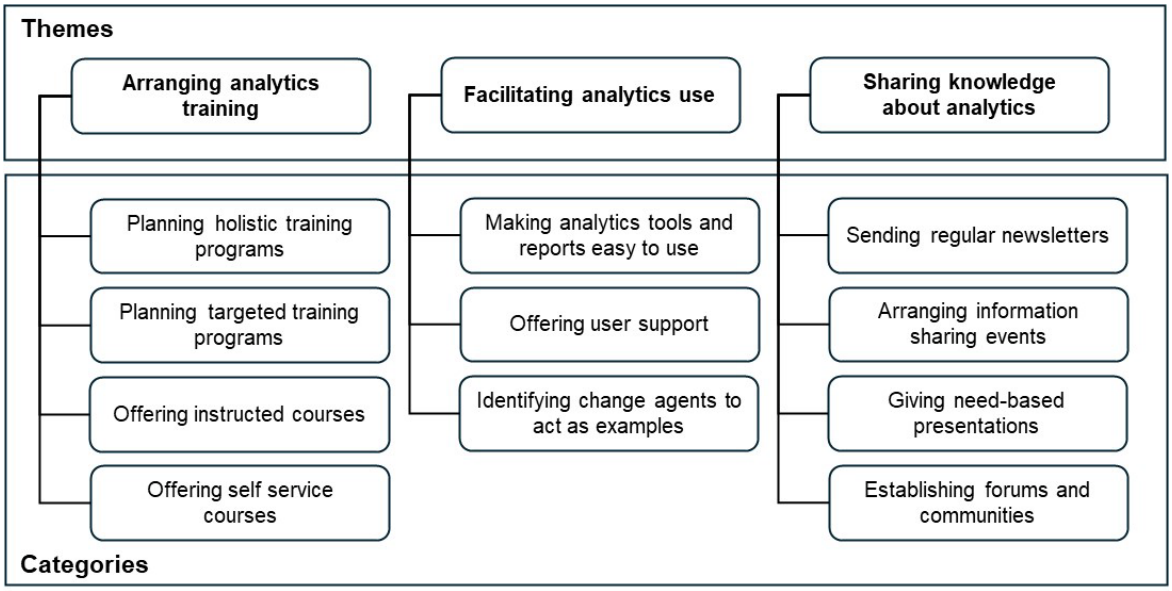

Figure 2: Themes concerning the development of DDDM skills of BMs. Source: Authors' own work

5. Discussion

To leverage the full value potential of BA, organisations should ensure that their BMs use BA and analytics output as the basis for their decision-making (Oliveira & Handfield, 2023; Schmidt et al, 2023). Our study shows that BMs need four types of skills for DDDM, and that organisations have various ways to equip their BMs with such skills.

First, to be willing to make data-driven decisions, BMs need to understand the value of analytics. Our data shows that BMs should consider BA and analytics output to improve both decision-making and their own understanding, while they also need to be able to identify where it may be used to add value. Understanding the value helps establish a positive attitude towards BA (Szukits, 2022), and organisations can support BMs in this by sharing knowledge on BA-related success stories and pilots via different channels, such as events, newsletters or communities. This is in line with previous findings stating that organisations can enhance BA use by organising events where they share knowledge about BA-related benefits (Economou et al, 2023).

Second, BMs who make data-driven decisions should be able to understand and apply analytics output. Our findings are aligned with the extant literature (Lamest & Brady, 2019; Schmidt et al, 2023), showing that this involves interpreting the output and using this to enrich BM's own knowledge and to make data-driven decisions Also in line with the extant literature (Korherr et al, 2023), BMs need these skills when leading their teams and communicating with them on the decisions they make. Whereas our data shows that skills to understand and apply analytics output are partly developed through experience, organisations also support their BMs to develop such skills through training activities. Organisations also intentionally facilitate the use of analytics output, by improving the accessibility and usability BA, as well as by tailoring its suitability for different needs BMs may have (Arora et al, 2023).

Third, understanding analytics processes, hence, how analytics work, helps BMs in DDDM. While the knowledge on analytics methods and the available data is important (Schmidt et al, 2023), also the understanding of the time and effort required for the analytics work is needed. Organisations provide various courses and training programs for their BMs to develop such skills. Whereas training for data literacy and analytics skills is considered a suitable approach, both the extant literature and our analysis show that organisations should also ensure end-user support for their BA users to enhance these skills (Arora et al, 2023). Our findings show that BMs get extensive support from APs, both as part of daily collaboration as well as through dedicated support channels.

Fourth, ability to proactively collaborate with APs is an important skill for BMs, as it helps them leverage BA and analytics output during different stages of their decision-making process. Based on the extant literature, analytics understanding and data efficacy may support such collaboration (Schmidt et al, 2023). Considering that BA methods, tools and technologies are constantly evolving, APs may also act as an important source for BMs on the new opportunities arising from this (Zaitsava et al, 2022). However, there seem to be other underlying factors that trigger BMs to reach out to APs, asking them questions, communicating their needs, and participating in data gathering and analysis design activities. Deriving from the extant research, such proactive collaboration means that both BMs and APs possess adequate skills for enabling DDDM (Lamest & Brady, 2019) and it can be considered a sign of data-driven culture as such (Öhman et al, 2021).

6. Conclusions, Implications and Limitations

According to RBV, organisations need to combine different types of resources to create value (Penrose, 1959; Barney, 1991). While BA enables organisations to create value through DDDM (Davenport & Harris, 2007), this will not take place without the DDDM skills of BMs (Lamest & Brady, 2019).

The current discourse of human BA skills emphasizes the skills of APs, paying less attention to the BMs, whose BA skills are mainly considered to consist of analytics understanding and data efficacy (Schmidt et al, 2023). This study updates this view by identifying four types of skills BMs need for DDDM: 1) Understanding analytics value, 2) Understanding and applying analytics output, 3) Understanding analytics processes, and 4) Collaborating with APs. The extant BA literature also suggests that organisations can support BA use of various end-users by, e.g., sharing BA-related knowledge through internal and interorganisational events (Economou et al, 2023) as well as providing end-users with training opportunities (Merhi, 2021) and end-user assistance (Arora et al, 2023). This study enriches these findings by offering concrete examples of those practices that organisations have applied to develop the DDDM skills of their BMs.

Extending the current view of human BA skills, this study provides scholars, organisational practitioners and educational professionals with new insight on DDDM skills and their development in organisations. Scholars can

include the findings of this study as a basis for further examination of human BA skills and the creation of DDDM culture in organisations. Whereas organisational practitioners may find it useful for evaluating the current skills of their BMs and for identifying new approaches to developing these skills, educational professionals can use our findings in curriculum planning for future BMs.

This study also involves limitations, some of which may serve as opportunities for future research. Whereas we consider our data to form a purposive sample that enables fulfilling the objectives of this study (Constantinou et al, 2017), this research still leaves plenty of room to further explore the DDDM skills and their development in other contexts and with other research methods. Our analysis also indicates that the four kinds of skills identified in this study may be interconnected, providing an opportunity for future research to evaluate these connections with other methods.

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AI declaration: No AI tools were used for developing this research paper.

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