Business analytics in managerial decision-making: top management perceptions

Johanna Orjatsalo, Henri Hussinki and Jan Stoklasa

Abstract

Purpose – *Firms seek to improve their decision-making and enable more "fact-based" decisions by using business analytics. While the benefits of using business analytics to monitor, develop and improve daily operations have been reported by many scholars, using it in more complex top management decisions has received less attention. Building on the resource-based view of the firm, this study aims to investigate top management perceptions of using business analytics for making decisions on firm resources.*

Design/methodology/approach – *This study uses semi-structured interviews to collect perceptions of 12 top managers in large firms on when and why they use business analytics in their decision-making.*

Findings – *Top managers use business analytics output as their main source of information for monitoring ongoing business performance against set targets and taking corrective actions. Concerning future-oriented planning and strategic decision-making involving more complex changes on the firms' resource base, top managers proactively complement knowledge derived via business analytics with other sources of knowledge, such as stakeholder and expert opinions. Moreover, top managers use of business analytics depends on their own expectations of its value potential and on the expectations of their organization.*

Originality/value – *This study adds to the extant literature on the business value of business analytics by outlining the purposes and reasons for top management business analytics use. By demonstrating when and why top managers apply business analytics when making decisions on the firm's current and future resource base, this study contributes to the discussion on the resource-based view and decision-making practices of the firm.*

Keywords *Strategy, Strategic management, Decision-making, Business analytics, RBV*

Paper type *Research paper*

1. Introduction

According to the resource-based view (RBV), firm competitiveness derives from its ability to acquire and allocate resources efficiently (Barney, 1991). The firm's top managers (TMs) have the main decision-making responsibility regarding firm resources (Noda and Bower, 1996). Identification, acquisition, development and use of firm resources are knowledge-based activities, thus making knowledge the core component of the resource-related decision-making of the firm (Spender, 1996).

Access to knowledge of existing resources is essential for firms when making decisions on how to allocate those resources as part of the operational decision-making of the firm (Sirmon *et al.*, 2007). Besides making decisions on the allocation of existing resources in the context of existing operations, firms also need to identify new opportunities and resources to maintain their competitiveness (March, 1991; Teece, 2007). Such decisions require knowledge that may not yet exist, like making predictions on the development of the firm's operating environment and its potential impact on resource requirements (Hutzschenreuter and Kleindienst, 2006; Luoma, 2016).

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Received 15 September 2023
Revised 14 March 2024
26 August 2024
Accepted 10 September 2024

The authors would like to thank the Finnish Work Environment Fund (Grant Number 220121) and PHP Säätiö (Grant Number 20220021) regarding research funding for the study design, data collection, data transcription, data analysis, and reporting of the findings.
The authors would also like to express their gratitude for the participants of 18th International Forum on Knowledge Asset Dynamics (IFKAD) conference held in Matera, Italy on 7-9 June 2023, the two anonymous reviewers of Measuring Business Excellence Journal, as well as Professor Aino Kianto (LUT University Business School) for their valuable comments on the earlier versions of this paper.

Firms gather data from various sources and analyse it using variety of methods and models to achieve adequate knowledge for acquiring and allocating resources (Luoma, 2016; Davenport, 2018). Digitalization and continuously developing technologies have provided firms with an array of new opportunities to capture, store, manage, and share data as well as continuously advancing business analytics (BA) tools to derive insight from this data. Firms are investing in their BA to improve their decision-making efficiency and to make more "fact-based" decisions (Davenport and Harris, 2017). By using BA, firms aim at making more intelligent decisions faster (Lepenioti *et al.*, 2020) and improving both their business process and decision-making performance (Chatterjee *et al.*, 2021).

TMs have a central role in supporting BA adoption in firms (Korherr *et al.*, 2023). Their own responsibility is to make complex strategic decisions concerning the firm's long-term resource allocation, impacting on the resource use and the related decisions on lower level of the organization (Noda and Bower, 1996). Even though BA team's ability to support managerial decision-making is crucial, those receiving the analytics output, such as the TMs, should also understand when and how to use this output as part of their decision-making (Pauleen and Wang, 2017).

BA use in organizations has been widely studied and its value potential has been demonstrated (Contreras Pinochet *et al.*, 2021). Among this evidence, BA has been identified as a tool capable of helping managers in complex tasks (Vidgen *et al.*, 2017; Lepenioti *et al.*, 2020). Strategic decision-making involves such complexity, and it impacts the firm's resource base and competitiveness in the long term (March, 1991). Understanding how TMs use BA to support such decisions would help scholars and practitioners find new ways to realize its full potential.

When and why do TMs then use BA when making decisions? In this study, we explore this through the types of decisions managers encounter when managing the resource base of the firm (Barney, 1991). We start by outlining how previous literature has addressed the role of BA in managerial decision-making. After this, we introduce the research methods and approach, present the empirical findings and conclude by reflecting on our findings within the current discourse and proposing future research opportunities.

2. Theoretical background

2.1 Managers and firm decision-making

Firm's ability to operate depends not only on the resources it has but also on how it applies those resources (Barney, 1991). As the market conditions are constantly evolving, firms also need to continuously develop and adjust their resources as part of their strategic management activities (March, 1991; O'Reilly and Tushman, 2008). Firms that succeed in managing and adapting their resources better than others are more likely to gain a competitive advantage (Barney, 1991; Teece, 2007).

Managers need to make different types of decisions concerning resources (Sirmon *et al.*, 2007). When the decision-making elements are already familiar for decision-makers in terms of the context, alternatives and impacts, the decision can be considered a routine-type decision. Such decisions, often focusing on the exploitation of the existing resources, can be considered as well-structured as they can be defined without considerable effort, which makes them easy to model or even to automate (Simon, 1960; Holsapple, 2008).

Managers also encounter decision-making situations that involve novel or unknown elements that require them to explore new knowledge to understand the potential alternatives and impacts (Simon, 1960; March and Simon, 1993). Such non-routine decisions contain such a level of complexity and uncertainty, that identifying potential alternatives and their impacts needs to be partially based on assumptions. As the

decision-making context is constantly evolving, many of these types of decisions cannot be repeated as such or even fully modelled (Simon, 1973; Luoma, 2016).

Decisions faced by managers can contain both routine and non-routine elements (March and Simon, 1993), and managers are responsible for selecting a suitable decision-making approach (Cohen *et al.*, 1972). As the amount of knowledge available for firms increases and the means to process this knowledge (e.g. BA) improve, the share of decisions that firms can handle as routine-type decisions also increases (Simon, 1960; Simon, 1973). Despite this, firms and their managers will also continue facing decision-making situations where the required knowledge is not fully available (Simon, 1973; Luoma, 2016).

Managers who make decisions that impact the resource base constellation and allocation typically operate on the group or group subsidiary management team level (Hambrick *et al.*, 2015; Wang *et al.*, 2022). These TMs participate in strategic decision-making from the viewpoint of their responsibility area (Bunderson and Sutcliffe, 2002). This includes assessing both the firm's external and internal conditions and their impact on the firm and their own responsibility areas, formulating the strategy in terms of making choices on suitable actions, and defining how they are monitored and measured (Cohen and Cyert, 1973; Randall and Dent, 2019).

While past performance and historical data form a basis for strategic decisions, especially when identifying intra-organizational opportunities, most of future-oriented, strategic decisions require firms to understand their constantly changing environmental context (Hutzschenreuter and Kleindienst, 2006). Hence, those decisions cannot be characterized as routine, as they include novel, unstructured and consequential elements that prevent decision makers from relying on their previous knowledge and decision-making experience (Simon, 1960; March and Simon, 1993). While TMs may use various tools and aids to support their knowledge gathering and decision-making (Vuorinen *et al.*, 2018), the particular interest of this study lies in the use of BA in such activities.

2.2 Purposes for using business analytics in managerial decision-making

The success of the firm's end-to-end resource management depends greatly on its managers' skills to coordinate firm resources and the related development activities in synchronicity with continuous monitoring and adapting to the changing conditions (Sirmon *et al.*, 2007). Efficient allocation of limited firm resources and acquisition of new resources require sufficient knowledge of the external environment and internal operations and capabilities. BA is a viable means to acquire such knowledge (Vidgen *et al.*, 2017; Lepenioti *et al.*, 2020). For firms, the most important reason for using BA is the data-based insight which enables them to make better decisions (Davenport and Harris, 2017).

When would managers then use BA? According to Lepenioti *et al.* (2020), potential purposes for using BA are to follow up on what happens, to understand what has happened, to predict what may happen or to identify and analyse potential actions and outcomes in case something happens. Depending on the situation when BA is used, it may help firms to improve decision-making accuracy and reduce the human role in decision-making (Kesavan and Kushwaha, 2020), improving efficiency and effectiveness, especially within routine-type decision processes (Luoma, 2016).

In addition to the high operational potential, BA also has high strategic potential (Wamba *et al.*, 2017). Digitalization has increased the amount of data and continuously developing technologies and tools can help convert data into insight for strategic decision-making (Volberda *et al.*, 2021). However, using BA to support such decisions still requires creating supplementary, synthetic data and assumption-based models (Kunc and O'Brien, 2019). Whereas analytics-based tools and models help make routine decisions faster and more accurately, more complex decisions are usually supported with tailored BA models which

aim at embedding the dynamic and contextual factors that are typical for complex and consequential decisions (Luoma, 2016).

Strategic management requires analysing the internal and external environments, formulating the strategy, defining how it is monitored, monitoring its implementation and taking corrective actions (Cohen and Cyert, 1973; Randall and Dent, 2019). To increase understanding of BA use for those purposes, we turn to TMs to identify different situations when they use BA. As decision-makers, they also decide when and why BA should be used (Pauleen and Wang, 2017).

2.3 Reasons for using business analytics in managerial decision-making

Ability to create value through BA is highly dependent on how effectively firms can use it to improve resource management (Contreras Pinochet *et al.*, 2021). TM support and commitment positively impact BA use in decision-making (Korherr *et al.*, 2023), and managers play a crucial role in enabling BA use across the organization (Carillo, 2017). However, they must also be aware and skilled in using BA for their own decisions. In large firms, TM responsibilities include making firm or business unit-level decisions as part of a management team (Hambrick and Mason, 1984), representing their function's resource needs and participating in decisions on resource allocation (Edmondson *et al.*, 2003). Using BA to support such decisions can significantly impact how the value of BA is realized.

There are multiple frameworks and models for understanding why information technology, including BA, is adopted and used (Venkatesh *et al.*, 2003). Recent studies explore why individuals, especially employees and managers, choose to use BA. For individual users, expectations on personal value from BA can drive BA adoption (Ali and Essien, 2023; Zaman *et al.*, 2021). Managers' use of BA depends on how they perceive its value compared to using their own intuition (Yu *et al.*, 2022). The higher the perceived quality of BA output, the higher the perceived business value and user satisfaction (Wamba *et al.*, 2019). Additionally, managers' decision styles and preferences influence their use of BA, particularly in strategic decision-making (see, e.g. Martinsons and Davison, 2006; Phillips-Wren *et al.*, 2019).

TMs play an important role in enhancing the analytics-driven decision-making culture through their decisions and behaviours (Korherr *et al.*, 2023), necessitating their own proficiency with BA. While individual expectations influence the use of BA, also organizational expectations, such as readiness and attitude (Min and Lea, 2021) and social norms (Zaman *et al.*, 2021), impact BA use. Additionally, BA use is impacted by contextual factors, such as the rapid development of new analytics methods and technologies (Kunc and O'Brien, 2019) and the firm's BA maturity (Chen and Nath, 2018).

The extant research recognizes that managers use BA for various reasons and purposes. To deepen this understanding and to explore BA's potential in strategic, complex decisions, this study focuses on TMs' use of BA. We address this through two key questions:

RQ1. When do TMs use BA?

RQ2. Why do TMs use BA?

To add to the extant research that broadly addresses BA use in organizations, our study seeks to allow TMs to voice their own perceptions on their BA use.

3. Methodology

3.1 Research approach

Our study uses qualitative approach, as it allows combining deductive and inductive approaches and enables making iterations throughout the research process (Timmermans and Tavory, 2012). After reviewing the existing literature on BA and TM decisions, we

formulated the research questions and chose qualitative one-on-one interviews as our main data collection method (Qu and Dumay, 2011). We contacted several large firms (annual turnover exceeding 200 MEUR) having their headquarters in Finland and secured participation from 12 TMs with strategic decision-making responsibilities as part of their managerial role, which was considered sufficient for ensuring credible and trustworthy findings (Saldana *et al.*, 2011). Full anonymity was guaranteed for all research participants.

3.2 Data collection and handling

Data was collected through individual, semi-structured interviews (Galletta, 2013), allowing thematically coordinated, flexible approach, letting "both interviewer and interviewee to participate in the interview, producing questions and answers through a discourse of complex interpersonal talk" (Qu and Dumay, 2011, p. 247). The interview guide was iteratively developed and covered four key areas:

1. the informant's role and views on decision-making;
2. the informant's views on BA's benefits in the organization;
3. the informant's experiences with BA use in strategic decision-making; and
4. the informant's personal benefits of using BA.

The interviewees were categorized into three roles: five were Heads of Business Units, four were Heads of Functions (e.g. sales and marketing), and three were Heads of Strategy (Table 1). The interviews were conducted mostly face-to-face between September 2022 and January 2023, averaged 62 min, with sessions recorded and transcribed for analysis.

3.3 Data analysis

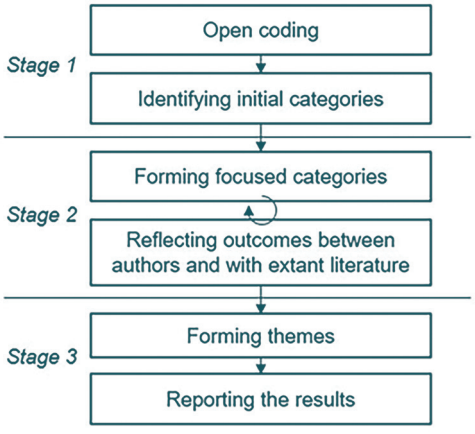
The interview transcripts were analysed using a three-stage data coding and analysis approach (Roulston, 2014). Open coding (Gioia *et al.*, 2013) was used to generate first-order categories, which were then reviewed against the original transcripts. Next, these categories were aggregated into second-order themes, refined, and reorganized to align with the research questions and existing literature (Fereday and Muir-Cochrane, 2006). Finally, the identified themes were interpreted and discussed among the authors for reporting purposes. The analysis was conducted in English, with Finnish quotes translated and participant anonymity was ensured by replacing identifiable details with more generic terms. The data analysis process is illustrated in Figure 1.

Table 1 Interview statistics

Identifier	*Type of responsibility*	*Interview type*	*Language*	*Duration (min)*
A	Head of business unit	Onsite	Finnish	57
B	Head of strategy	Onsite	Finnish	60
C	Head of strategy	Onsite	English	57
D	Head of business unit	Onsite	English	77
E	Head of business unit	Onsite	Finnish	57
F	Head of business unit	Onsite	Finnish	68
G	Head of function	Onsite	Finnish	64
H	Head of function	Online	Finnish	48
I	Head of business unit	Online	Finnish	57
J	Head of function	Onsite	Finnish	60
K	Head of function	Onsite	Finnish	56
L	Head of strategy	Online	Finnish	87

Source: Authors' own work

Figure 1 Data analysis process



Source: Authors' own work based on Roulston (2014)

3.3.1 Analysing data to identify when top managers use business analytics. To understand when TMs use BA in decision-making, the first round of coding focused on identifying the types of situations in which informants used BA, resulting in 11 first-order categories. These were then reflected to existing literature and across the interview data to identify overarching themes. During the second-order analysis, it became clear that BA was often used for monitoring business performance, and making related adjustments, making decisions on various business aspects and supporting planning activities. This led to the identification of four purposes for using BA:

1. business and operations follow-up and adjustments;
2. mid-term monitoring, planning and decision-making;
3. long-term planning and scenario analysis; and
4. strategic options evaluation and decision-making.

These purposes, together with the related situations are summarized in Table 2 and further detailed in the results section.

3.3.2 Analysing data to identify why top managers use business analytics. To uncover the reasons why TMs use BA, we first focused on uncovering such factors that had impacted the informants' choice to use BA and identified 14 first-order categories. We then grouped these categories into seven second-order themes to describe the reasons why TMs use BA, and further classified these themes with two third-order constructs based on whether they were connected to organizational or individual expectations. Three reasons were connected to organizational expectations for using BA: leveraging digital transformation, maintaining firm competitiveness and facilitating overall business management, while four other reasons were reflecting individual expectations: identifying new perspectives and insights, making decisions based on facts, justifying decisions and having a sense of making the right decision. These findings, summarized in Table 3, provide a detailed overview of the reasons and underlying factors behind TMs' use of BA.

Table 2 Purposes for using BA

First-order categories	*Second-order themes*
Monitoring and improving product- and asset-related operations Monitoring and improving sales and marketing impact Monitoring and improving customer service and management	Business and operations follow-up and decisions on improvement activities
Investment planning and timing Business planning Product planning Project planning	Mid-term monitoring, planning, and decision-making
Long-term plans Scenario simulations	Long-term planning and scenarios
Investment/divestment decisions Product portfolio decisions	Strategic options evaluation and decision-making

Source: Authors' own work

Table 3 Reasons for using BA

First-order categories	*Second-order themes*	*Third-order constructs*
Industry is digitalizing Customers are moving to digital channels	Leveraging digital transformation	Organizational expectations
Competition is already benefitting from analytics Competition can be beaten with analytics	Maintaining firm competitiveness	
Systematic view and follow-up of firm activities Better understanding of what should be done	Facilitating overall business management	
More data means more insights New viewpoints through analytics	Identifying new perspectives and insights	Individual expectations
Backing up decisions with data Justifying why something needs to be done	Justifying decisions	
Analytics enables more accurate predictions Analytics-based data enables better decisions	Making decisions based on facts	
The manager prefers to use numbers Data brings comfort and peace of mind	Having a sense of making the right decision	

Source: Authors' own work

4. Results

4.1 Top manager perceptions on when to use business analytics

4.1.1 Business and operations follow-up and adjustments. Based on our data, TMs use BA to follow up and improve the ongoing business and operations. Firstly, BA is used for monitoring business performance against set targets. Interviewee A describes the role of BA as follows:

> The understanding how our performance is formed. It would not be enough for me if someone would just say that our turnover was this, costs were this and profit was this. It is so obvious, at least for me, to have the ability to go deeper and measure both financial and operative performance indicators.

Secondly, BA helps TMs recognize those areas where performance does not meet the set targets and make quick decisions on implementing potential corrective actions. Interviewee I provides an example:

> If we think about the business and market areas, we have eight of them. On a monthly basis, we monitor how they perform in terms of order acquisition, sales, and profitability. It also helps us see where we need to support more, where we need to push them more, and so on. Where it pays off to do what, and you start to see how different products can be sold with different prices and profitability margins in different areas.

The scope of business monitoring depends on the responsibility area of each informant. While all informants use BA to monitor overall business performance, other specific monitoring areas, such as sales and marketing, customer service and management and product and asset-related operations were also highlighted. Interviewee B gives an example of supply chain analytics and planning:

> We are probably the most advanced when it comes to supply chain analytics and planning. This is probably due to it being so complicated, it requires so many experts to make a decision that understanding this with the human brain is practically impossible, we need to trust analytics to tell us what we should do.

4.1.2 Mid-term monitoring, planning and decision-making. TMs use BA for business analysis, planning and making decisions on altering and developing the current resource base. As an outcome of these decisions, TMs appear to define the business and operational targets along with the plan to achieve them within a specified timeframe. Business and operations follow-up and related decisions seem to be leveraging these mid-term plans and decisions.

The mid-term monitoring, planning and decision-making activities are often linked to a specific planning purpose, such as business planning and budgeting, project planning, product-related planning or investment planning. Such analysis and planning involve proactively integrating data and information from various sources with a primary reliance on BA output. For example, Interviewee F explains their product development planning:

> We combine our knowledge base on customer needs into customers and customer relationship. This information is our profound raw material, our own information from the customer base, product base, transactions. [. . .] We then use these to model and plan <product features>.

4.1.3 Long-term planning and scenarios. Beyond its use for mid-term planning purposes and setting targets for a certain timeframe, BA is also used to support long-term planning. It helps in developing an understanding of the current situation, serving as a starting point for longer-term strategic plans, which may then lead to evaluating alternative strategic options and making decisions. Interviewee I discusses this as they describe when they use BA:

> To define the market size and to forecast future potential. [. . .] If we know where the growth comes from and what this requires from us, we then decide in the business line [. . .] on what to do to achieve this.

The development of alternative future scenarios plays a crucial role in longer-term planning. Scenario simulation incorporates BA outputs with various types of internal and external data, such as governmental plans and trend forecasts from third parties. Scenario analysis also involves internal stakeholders for discussions and making assumptions about future developments in selected areas. Some examples of future scenarios mentioned by

informants include growth scenarios, macro-environment development scenarios and demand scenarios. Interviewee H describes scenario analysis as follows:

> We do need to understand the growth scenario we have ahead of us, on the longer term. In this case, we were talking about looking forward some 10-15 years [. . .] I immediately understood we need to make a lot of assumptions, but we must start from somewhere to understand how the world would be and what has changed [. . .] If we want to calculate profitability potential, we need to anchor items that are critical for this. [. . .] Whenever you calculate something for the future, there are politics and development of population, urbanization [. . .] Quite a lot of external and already researched development paths to accompany own data.

4.1.4 Strategic options evaluation and decision-making. While the role of BA in long-term planning and scenario development was considered essential, its role appears to shift when discussions turn to evaluating strategic options and making decisions. Based on the interviews, significant and strategically relevant decisions require extensive data and information gathering from other sources, including internal or external experts who help assess the concrete impacts of potential alternatives, for example, when discussing strategic decisions concerning business or product line investment/divestment. Interviewee I describes information gathering for product portfolio decisions:

> Product portfolio, in a sense that we know about our biggest customers and their plans. Let's say we have three optional ways to <serve them>. We take one and see whether they are going that way, and this indicates whether we should go in that direction. Then we also know the trends about how these products are used globally. Our R&D team has members who have long experience, they know how trends have developed over time. They can provide experience-based information and historical information on how technological trends have changed.

Although we have categorized the purposes for using BA into four distinct themes, it is important to recognize that these purposes are interconnected. Based on the interviews, the mid-term monitoring, planning and decision-making activities establish the targets that TMs continuously monitor as part of business and operations follow-up and adjustments. Additionally, Strategic options evaluation and decision-making provides direction for mid-term monitoring, planning, and decision-making. While some activities related to long-term planning and scenarios lead to strategic options evaluation and decision-making, this does not happen in those situations when the scenarios start to seem unlikely. Interviewee D describes this as follows:

> If we have five hypotheses and two hypotheses go wrong, then we should critically evaluate should we continue. If three of five disappears, then we should stop, because then this changed and we need a new decision, because the reality may have changed.

In our list of potential purposes for using BA, its role is central for both knowledge gathering and decision-making, particularly in Business and operations follow-up and adjustments and Mid-term monitoring, planning, and decision-making. In Long-term planning and scenarios, BA provides a platform to gather the essential data and information to understand potential future developments of those contextual elements that could impact the firm in the long run. However, as the need to make decisions to adapt to these developments arises, Strategic options evaluation and decision-making process involve significant human interaction among decision-makers and stakeholders, with BA output serving as an input in these discussions. Following this analysis, we aimed to identify the reasons why our informants use BA in various situations.

4.2 Top manager perceptions on why to use business analytics

4.2.1 Reasons linked to organizational expectations. 4.2.1.1 Leveraging digital transformation. According to the informants, rapid digitalization has increased the opportunities to use BA. In certain service-based industries where intangible assets and BA have already been at the core

of the firms' operating model, digitalization has fundamentally changed how BA is used to support business. Interviewee F provides an example of such a situation:

> Our whole operations are about data, intangible assets. Now we do not have any paper prints anymore, everything is digital, immaterial services and solutions. Of course, some of this is realized concretely in the form of service and customer care models or through our business partners.

Another factor related to digitalization arises from how it has changed customer behaviour. Our informants suggested that customer expectations toward digital services are constantly evolving. Interviewee L describes this as follows:

> Customers can contact us via phone, we have good response times and all, but people have moved more and more towards digital self-services. We are not at our strongest there and decided we cannot accept this.

4.2.1.2 Maintaining firm competitiveness. In addition to the opportunities created by digitalization, the informants explained that the competitors' BA activities also influence their own willingness to adopt BA. A competitor effectively using BA to support their business could pose a potential threat to business profitability, as described by Interviewee L when discussing why they use analytics for pricing:

> Why we need to do this is that our neighbours do this, and if they do this aggressively, we <get the worse customers> and get in trouble with our profitability.

Firms may also achieve a competitive advantage if they manage to be first in the market with BA development. While some informants emphasized that the first-mover advantage would be only temporary, BA is still considered worthwhile to be invested in, as explained by Interviewee C:

> But if we were the ones managing first or best to bridge that and to really integrate that and leverage our business analytics capabilities to the point of, to address a problem on the business side, then that could give us a competitive edge.

4.2.1.3 Facilitating overall business management. BA enables a systematic view and follow-up of firm activities, making it valuable from a business perspective. For some informants, such as Interviewee J, improving BA has facilitated business management:

> For example, product costs, we have worked a lot during my time to get better visibility on that. Earlier we got some surprises after we had already started the production process <regarding realized costs> but we have advanced this with 1-2 years, the timing when the product development project receives product cost calculations via our systems.

BA is also beneficial for TMs in recognizing when corrective actions are needed if business deviates from its planned course. Interviewee H describes this as follows:

> Because we want to understand what activities and how the activities impact <on our business> and to ensure we are on the right track, and to get a fast indication on those signals that tell us we are not on the right track, and we need to do something to fix this.

4.2.2 Reasons linked to individual expectations. 4.2.2.1 Identifying new perspectives and insights. Besides its usefulness for monitoring and managing business, BA also provides TMs with easier access to data and analytics tools, enabling them to gain more data and use it to identify new perspectives and insights. Interviewee D refers to these enablers when discussing data sharing:

> Data helps us to start at the right angle, and we don't start at the same perspective. Therefore, data needs to be very wide and very open, because this is about people's development. It's not about firm development, it's about people development. We develop, when the people develop, as a firm.

Whereas BA enables identification of new perspectives and insights throughout the firm, BA output also helps individual TMs look at things from new viewpoints when making decisions,

thereby increasing the number of alternatives to choose from. Interviewee L considers BA to provide many opportunities to gain new insight:

> I like it because it gives clear rationale, you can set the questions right for yourself on what you look for from analytics [. . .] In the end, what limits the use of analytics is the imagination, what we could investigate.

4.2.2.2 Justifying decisions. BA also supports justifying decisions by providing output that can help clarify the rationale behind them. According to Interviewee B, this may also accelerate decision making:

> It is maybe the best support for business, when one feels like this and the analytics says yes, it's confirmed and helps accelerate decision making.

BA output may also be used to justify why something needs to be done. In such a situation, BA output is used to motivate action that is required to implement decisions, as described by Interviewee I:

> It needs to be somehow justified. Not precisely but in a way that one can make the team believe in it. [. . .] Analytics helps in this and I have noticed that doing things systematically and chopping things into suitable pieces helps get the adaptation and acceptance.

4.2.2.3 Making decisions based on facts. Decisions driven by BA are often referred to as "fact-based decisions". Some informants see BA output as a tool to support or even question experience-based knowledge, while others believe it has the power to change people's beliefs or opinions. Additionally, BA is seen to provide more accurate predictions compared with relying solely on past experiences or historical data. Interviewee L states this as follows:

> If you do not have <analytics based predictions>, your business is random [. . .] your price levels are random. If your perception of <price> being right or wrong is based purely on history, and you do not analyse the future, you only guess the price with your old parameters while the world might have changed so much that these are not valid anymore.

The informants also pointed out that decisions based on BA output are better than those heavily reliant on past experiences or personal beliefs. Integrating BA output into decision-making is considered to reduce bias and enhance objectivity and factual accuracy, as described by Interviewee K:

> I do believe that data-driven firms that base their decisions on data will manage better and make higher-quality business decisions. Then these are not opinion-based or biased, or based on wrong assumptions, but we rather aim at being a neutral, fact-based firm and make decisions this way.

4.2.2.4 Having a sense of making the right decisions. Individual managers' personal preferences and feelings appear to be an important reason in their use of BA. Some informants described themselves as number-oriented or "engineers" as a factor having an impact on relying on BA output in decision-making. As Interviewee L explains this:

> First of all, I like numbers if you have not figured that out yet [. . .] Because numbers do not lie, they are nice in that sense, or they can of course lie but they are unambiguous, they are not necessarily opinions but based on analysing what happens when you take a move A and how it impacts the outcome B and what is the total cost C, and you can calculate what pays off and what not.

Some informants also mentioned how data brings them comfort and peace of mind and gives them a sense of control when running the business. Interviewee A summarizes this as follows:

> I can go home at the end of the day and be more certain of having made the right decisions.

Based on the interviews, TMs highlight several factors that influence their reasons for using BA. while they use it for different purposes depending on the decision-making situations at hand. Next, we will discuss our observations in relation to the existing literature.

5. Discussion

TM responsibilities span from strategic planning to monitoring strategic targets (Hambrick and Mason, 1984). BA has operational and strategic potential (Wamba *et al.*, 2017) and it can be used to support both routine and non-routine decisions (Luoma, 2016). Our research indicates that TMs use BA for a variety of purposes, in multiple situations. The primary use of BA is to follow-up business performance and make decisions on operational adjustments to help achieve short-term objectives. In doing so, TMs monitor the firm's progress towards its targets within the constraints of its existing resources.

Firm exploitation activities that use existing resources also leverage the existing knowledge (March, 1991). BA plays a crucial role as a central source for such knowledge, as its core functionality involves using data from various systems to review past events and predict outcomes based on, e.g. resource reallocation. This capability allows TMs to identify and analyse anomalies, and once actions are chosen to address these anomalies, BA is used to monitor the impact. BA also helps exploring potential alternatives for adjustments to better reach set targets (e.g. Lepenioti *et al.*, 2020). However, our analysis found no evidence that BA alone is used to make these decisions: TM involvement remains essential for short-term resource adjustments, such as budget reallocations and operational adjustments in production volumes (e.g. short-term reallocation of production assets between product lines) or customer service (e.g. reallocation of customer service personnel time between tasks). Despite the potential for automation in many operational decisions (Simon, 1960; Luoma, 2016), TMs' decisions are not typically automated.

TMs also involve BA as the primary source of data and knowledge when conducting mid-term business planning and budgeting, as well as for planning development projects, product development or investments, aligning these activities with the firm's strategic direction. Concerning longer-term planning, BA aids in identifying scenarios and opportunities for the firm, i.e. those activities that require exploration of new opportunities and resources (March, 1991), by integrating internal and external data for analysis purposes (e.g. Vidgen *et al.*, 2017). However, for comprehensive longer-term planning, firms also rely on other types of information sources, such as governmental plans, external reports or stakeholder insights which are used for discussing and anticipating the future direction for the firm. This approach aligns with research indicating that strategic decisions often require a tailored analysis (Luoma, 2016; Kunc and O'Brien, 2019). To identify new opportunities, firms need to acquire new knowledge (Teece, 2007), while the role of BA output is to act as a basis for assumptions made using this knowledge and to help understand the impact of uncertainty in future predictions (Kunc and O'Brien, 2019).

As discussions shift towards evaluating strategic options and making strategic decisions the role of BA diminishes. Although BA output is used for plans and scenarios, the process of making strategic decisions on suitable actions (Cohen and Cyert, 1973) is seemingly human-driven. Depending on the organization and the context, TMs often involve various stakeholders, such as board members and professionals, in these discussions, whereas BA functions as one of the strategy tools to facilitate the discussions (Vuorinen *et al.*, 2018).

TMs appear to use BA for reasons that can be linked to their individual expectations on BA (Wamba *et al.*, 2019), but also for reasons that are more clearly reflecting the organizational expectations (Zaman *et al.*, 2021). Some of these reasons are connected to contextual factors that originate from the external environment such as digitalization in general and its impact on customer behaviour, that have provided firms and their managers with new opportunities for using BA (Kunc and O'Brien, 2019). From TM perspective, BA can be considered an opportunity identified by the firm but also a potential source of new knowledge that may help the firm to compete (Teece, 2007). The maturity of the firm's internal BA capability enables the value of BA in decision-making (Chen and Nath, 2018). One of the main reasons for TMs to use BA is that it facilitates fulfilling the organizational expectations set for business monitoring and management.

From individual perspective, TMs expect BA to help them gain new insights, as it provides an easy access to data that has been gathered and compiled from different sources. TMs also consider BA to enable fact-based decisions and use BA output also as a justification for the decisions they make, which indicates their satisfaction with the quality of BA output (Wamba *et al.*, 2019). Whereas these reasons seem to span from individual expectations, they may also be connected to organizational expectations on BA enabling fact-based decision-making for the firm (Davenport and Harris, 2017) and the expected TM role as an enabler for the analytics-driven culture (Korherr *et al.*, 2023). On the other hand, due to the visible role of TMs within organizations, their satisfaction with BA may also impact on the social expectations on BA use across the firm.

6. Conclusions

This study explored TMs' views on using BA in decision-making. The results reveal that TMs see BA as crucial for business management and decision-making, particularly in monitoring, managing and adjusting ongoing operations. Regarding more strategic, future-oriented planning and decision-making, TMs recognize BA's potential but rely also on other sources of information, such as expert opinions and experience-based knowledge from different parts of the organization, to guide their planning and decisions.

6.1 Implications

This study contributes to the RBV (Barney, 1991; Sirmon *et al.*, 2007) and the emerging discussion on BA business value (Wamba *et al.*, 2017; Lepenioti *et al.*, 2020) by providing insights on when and why TMs use BA in resource-related decision-making.

For scholars, our findings add insight into the literature discussing the potential of using BA in the identification of new opportunities and resources to maintain their future competitiveness (Wamba *et al.*, 2017; Kunc and O'Brien, 2019). Our findings suggest that BA is also a valuable tool for TMs in longer-term planning and decision-making, extending beyond the efficiency improvements and fact-based decision-making (Davenport and Harris, 2017) as the main drivers of BA use in firms. The study contributes to this discussion by revealing that TMs also use BA for individual reasons, such as gaining new perspectives and ensuring they make right decisions.

For managers, this study offers practical insights into BA use. Outlining various reasons for BA use and introducing situations where BA has been applied, it can sprout new ideas for those expected to promote the use of BA within their organizations. Additionally, the study enhances understanding of how individual and organizational expectations influence TMs BA use, helping to find new approaches to support BA adoption among TMs.

For educational professionals, this study provides input for designing management education. Managers should be equipped with an understanding of the basics of BA and its strengths and weaknesses as a source of knowledge for decision-making. Furthermore, managers should be able to clearly articulate their needs concerning the support they expect from BA professionals, especially concerning strategic decision-making. Finally, managers must be prepared to handle uncertainty and understand that strategic decision-making remains a human responsibility.

6.2 Limitations and future research avenues

This study has some limitations related to its empirical context and methodology. Conducted in Finland with large, internationally operating firms, the research involved 12 committed informants. The narrow geographical scope and the nature of the participating firms should be considered by those citing our findings or planning future research in this area.

This study also offers valuable insights and ideas for future research. Firstly, focusing on the individual expectations of TMs could help develop BA into a direction that would better serve their needs. Secondly, exploring whether TMs' satisfaction with BA influences a firm's expectations on BA or even the intention to invest in BA would be an interesting research topic. Moreover, expanding the study to examine how analytics teams currently support TMs and how this support could be enhanced might provide fruitful insights for increasing BA use among TM. Also, monitoring TMs' decision-making in practice could yield highly valuable information on BA's role in these processes.

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