

# Business Analytics in the Finance Department – A Literature Review

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**Abstract.** Business analytics has become more and more relevant to practitioners and academics over the past few years. With vast amounts of data from in- and outside an organization and the availability of fast enough hardware to process it, all functions in an organization aim to benefit from analytics. We conduct a literature review looking at the finance department, i.e. financial and management accounting, and identify hotspots of current and potential future research. We summarize our findings in a framework for literature classification with the two dimensions accounting activity and rationale for business analytics. On this grid, better organization performance and better decision outcomes for most management accounting activities have been covered the most, while support of strategic and tactical goals as well as obtaining value from data should be considered more in detail by future research.

**Keywords:** Business analytics, predictive analytics, financial and management accounting, literature review.

## 1 Introduction

Business analytics is one of the main organizational levers to benefit from digitization [1]. However, the use of business analytics varies substantially among the different functions of a company. According to a 2014 study, 64% of respondents said they already use predictive analytics in marketing, with an additional 24% saying they will use it within the next three years [2]. Finance, on the other hand, was only mentioned by 39% and 26%, respectively. While this is still considerably more than, e.g., human resources (17% and 22%), it is noteworthy that the number-crunching finance department is not the first stop for advanced statistical methods. The demand, however, for business analytics adoption is clear when looking at practitioner literature. For example, in its 2017 CFO Agenda, the Hackett Group states that the finance department needs to step in and support the company strategy facing more constraints on funding and headcount and, secondly, provide the organization with more and better information [3].

The finance or accounting department has as a long tradition as a supporting function for corporate management [4]. It spans two areas: (1) *Financial accounting* addressing external stakeholders and covering bookkeeping, statutory reporting, and consolidation on the one hand [5], and (2) *management accounting* addressing internal stakeholders

and covering strategic cost management, planning and decision making, performance measurement as well as financial statement preparation [6] on the other hand. Thus, there are many opportunities to apply analytics in both financial and management accounting. Although, there is a wide range of applications for business analytics in the treasury and corporate finance function, too, the focus of this paper is on accounting.

Analytical (i.e. advanced statistical) techniques to gain insights from data are and have always been one of the main concerns in the field of statistics. Only today, the fast pace at which transactions are moving online allows for the collection of vast amounts of data [7]. Thus, analytics is becoming more relevant to practitioners (e.g., [8]) and scholars (e.g., [9]) alike. Building on the omnipresence of data arising from all kinds of sources such as enterprise systems, social networks, mobile devices, public data, and the internet-of-things, analytics goes beyond traditional business intelligence to generate better insights. Linking the data to a set of explanatory variables in order to determine causal inferences or in a predictive sense [10] enables a shift from a reactive towards a proactive, forward-looking management of the organization [11].

Although, there has been an increasing interest in the benefits of business analytics for the finance department, only certain aspects have been considered so far. Existing research mostly covers the impact of digitization on management accounting from a practitioner's perspective or the benefits of business analytics in general with no particular focus on the finance department.

Addressing the divide between potential use cases and actual application of business analytics, this paper will answer two research questions:

1. How can the application of business analytics to accounting be structured?
2. What has been the main focus of research for business analytics in accounting and where is potential for future research?

In order to answer these questions, we conducted a literature review following vom Brocke et al. [12] and propose a framework for business analytics in the finance department. After laying out our *research methodology* and giving an overview of the results in chapter 2, we will focus on the *framework for literature classification* in chapter 3 followed by an *agenda for future research* based on the identified research gaps in chapter 4 and a *conclusion* and outlook in chapter 5.

## 2 Research Methodology

Literature reviews are a widely accepted methodology not only as a first step for any research project, but also as a means to categorize existing research, present avenues for future research, and facilitate theoretical progress [12–14].

### 2.1 Search Strategy

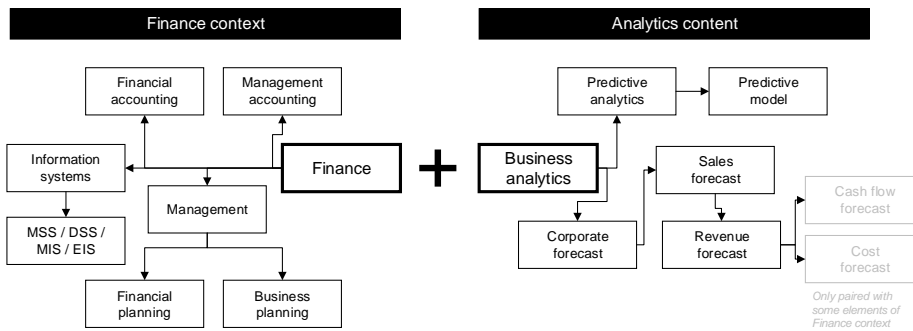
We started our literature review with a *journal search* in leading journals followed by a backward and forward search to look for articles cited in the identified papers (backward) and newer articles citing the identified papers (forward) [14]. Since the focus of

this research project is at the intersection of statistics and operations research on the one hand and accounting on the other hand, literature was searched “from both ends”.

Regarding accounting, we chose the top ten accounting journals<sup>1</sup> in line with Nitzl [15], complemented them with the top information systems (IS) journals from the Senior Scholar’s Basket of Journals<sup>2</sup> and with AIS conferences<sup>3</sup>. We then used the search terms business analytics and predictive analytics.

With respect to statistics and operations research, we chose five journals<sup>4</sup> from the list of top journals based on their scope and used the search terms management (or managerial) accounting and financial accounting.

As a second step of our literature search we broadened our scope and started a *comprehensive database search* in ScienceDirect, EBSCOhost, and Google Scholar combining different search terms according to the *citation pearl growing* approach [16]. We started with “finance” and “business analytics” and then widened our search to include different accounting, information systems, and planning terms in the finance context and predictive modeling and various forecast terms in the analytics context. For a list of search terms used in this second step, see **Figure 1**.



**Figure 1.** Citation pearl growing search terms for the database search

Due to the importance of the field to practitioners, a number of accounting organizations and consulting agencies have published surveys and point-of-view reports. In

<sup>1</sup> Journal of Accounting and Economics; Journal of Accounting Research; The Accounting Review; Management Accounting Research; Journal of Management Accounting Research; Contemporary Accounting Research; Behavioral Research in Accounting; Accounting, Auditing & Accountability Journal; Accounting and Business Research; Accounting, Organizations and Society

<sup>2</sup> European Journal of Information Systems; Information Systems Research; Information Systems Journal; Journal of the Association for Information Systems; Journal of Information Technology; Journal of Management Information Systems; Journal of Strategic Information Systems; MIS Quarterly

<sup>3</sup> Americas Conference on Information Systems; European Conference on Information Systems; International Conference on Information Systems; Pacific and Asia Conference on Information Systems

<sup>4</sup> International Journal of Forecasting; Journal of Forecasting; Operations Research; European Journal of Operational Research; International Journal of Production Economics

this work, however, the focus is on academic, peer reviewed, literature. While this may omit a number of recent developments, we consider it justified for a literature review. For an overview of practitioner statements regarding management accounting see, for example, [17].

## 2.2 Overview of Results

The journal search lead to a large number of initial hits (see **Table 1**), for which we checked title, abstract, and keywords. We ended up with an initial 22 relevant results from this first step<sup>5</sup>.

**Table 1.** Search results

<b>Journals</b>	<b>Search term</b>	<b>Total results</b>	<b>Relevant results</b>
Accounting	Predictive analytics	13	<b>1</b>
	Business analytics	33	<b>2</b>
IS	Predictive analytics	26	<b>2</b>
	Business analytics	88	<b>4</b>
IS conferences	Predictive analytics	15	<b>0</b>
	Business analytics	52	6
Stats / OR	Financial accounting	84	<b>1</b>
	Management accounting	101	<b>6</b>
Sum			<b>22</b>
Additional results from backward, forward, and database search			<b>47</b>
<b>Total number of relevant results</b>			<b>69</b>

From our consecutive backward and forward search and the broader database search, we found an additional 47 relevant results, which lead to a *total of 69 relevant results*.

Looking at the results on a timeline, different phases can be noted (**Figure 2**). (1) Owing to the roots of analytics in mathematical models that were developed already in the 1970s, e.g. the seminal work on time series analysis by Box-Jenkins [18], a small number of studies in the 1980s can be considered as relevant. They focus on the transfer of methods from operations research to management accounting [19] as well as the state of adoption of these methods [20, 21]. (2) By the end of the 1990s and early 2000s, sales forecasting was a common in practice and (fuzzy) neural networks were increasingly used [22, 23]. Additionally, there were further studies looking at the adoption of forecasting methods [24]. (3) The third phase is characterized by an increasing availability of data and a more comprehensive application of advanced statistical methods – by then called analytics. With a number of articles covering the added value of business or predictive analytics [25, 26], analytics adoption is no longer only a question of ability. It is a question of organizational transformation [10] and a new way of working with information in a digitally enabled business [27].

<sup>5</sup> Note that no sum for total results is given in **Table 1** because some results were found with both search terms. Relevant results, on the other hand, are all unique.

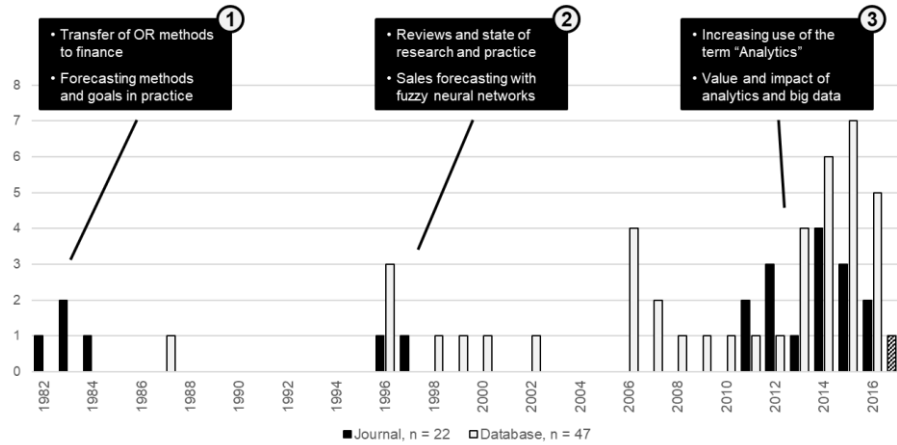


Figure 2. Search results on a timeline

### 3 Framework for Literature Classification

Based on the results of our literature search, we propose a framework to classify the existing applications of business analytics in financial and management accounting. With the help of this framework, we then identify what we call “hotspots” of current interest and potential hotspots of future interest.

#### 3.1 Dimensions

Our framework has two dimensions: first, the accounting activities and second, the rationale for using business analytics with respect to a specific accounting activity.

**Accounting Activities are the tasks that an accountant in financial or management accounting performs on a regular basis.** Although, the scope of financial accounting is not the same for all companies, there is some common denominator in companies of a certain size. We follow a list of three activities in financial accounting presented by Horngren [5]: (1) *Bookkeeping* (incl. accounts payables, receivables, and credit management), (2) *Statutory reporting*, and (3) *Consolidation*.

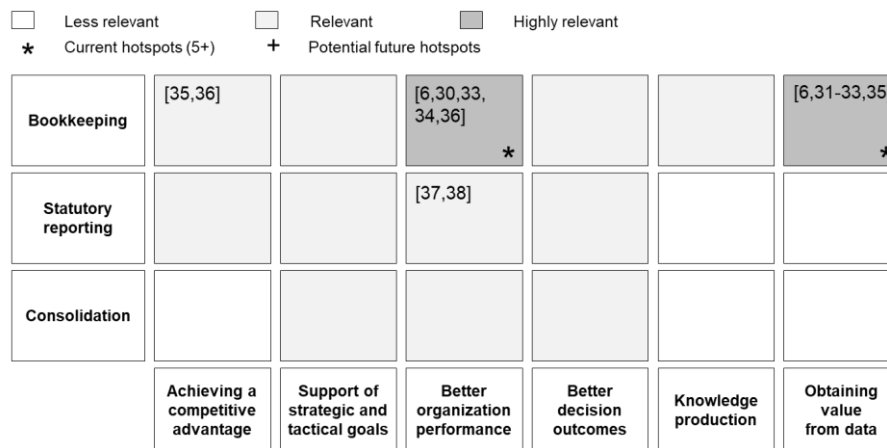
Equally, management accounting can be set up differently in an organization, but four core tasks are common as well, as described by Blocher et al. [28] and Brands and Holtzblatt [6]: (1) *Strategic (cost) management*, (2) *Performance measurement*, (3) *Planning and decision making*, and (4) *Support in financial statement preparation*.

**Rationale for Business Analytics is the reason why business analytics are applied in this specific situation.** Generally, there are numerous possible nuances, however, we follow a list of six endogenous elements summarized by Holsapple et al. [29]: (1) *Achieving a competitive advantage*, (2) *Support of strategic and tactical goals*, (3)

Better organizational performance, (4) Better decision outcomes, (5) Knowledge production, and (5) Obtaining value from data

### 3.2 Classification of the literature

Comparing the analytics coverage in financial accounting and management accounting, it is clear that the latter has attracted more attention. While this is partly due to the type of work in each of the two domains, it should not lead to an exclusion of financial accounting from consideration. In the following, we will propose three categories – less relevant (white shading), relevant (light grey shading), and highly relevant (middle grey shading) – of increasing interest and highlight some of the applications of business analytics in each of these categories. Our categorization is based on the nature of the activity and the general potential for statistical methods as well as current literature coverage. **Figure 3** shows the results for financial accounting with two highly relevant areas in bookkeeping, a couple of relevant and some less relevant areas.



**Figure 3.** Classification for financial accounting

Brands and Holtzblatt [6] address better organization performance in bookkeeping and state that accounts payable and payment monitoring can greatly benefit from an analytics integration. Analytics can also help in choosing and contacting the right customers in order to improve collections cash flows [30]. Achieving a competitive advantage and obtaining value from data are generally not directly associated with bookkeeping, but can become relevant goals when it comes to fraud detection, bankruptcy prediction, or credit default prediction [31–36]. Dybvig [37] propose an optimized income statement improving organization performance in statutory reporting by including more accurate forecasts and Schneider et al. [38] see potential for predictive analytics in an early identification of financial accounting discrepancies.

Currently, there is only one hotspot of research with the integration of external data in order to improve credit default and bankruptcy prediction (bookkeeping – obtaining value from data). We do not see a real future hotspot, but consider better organization

performance in bookkeeping very relevant. Amani and Fadlalla [39] found 11% of data mining applications in financial accounting, 25% in managerial accounting, and 64% in assurance and compliance. The papers cited for financial accounting apply neural networks or other data mining techniques to predict, e.g., quarterly cash flows, risk factors in financial statements or sentiments between different public statements. Yet, most of them take an external perspective, which is not the focus of our study.

	Less relevant	Relevant	Highly relevant			
	★ Current hotspots (5+)	+ Potential future hotspots				
<b>Strategic (cost) management</b>	[39,40] +	[27,45] +	[38,39,41,42]	[17,19,39,43-46] ★		[17,44] +
<b>Performance measurement</b>	[44]	[48]	[6,11,47,49]	[21,47,49,51]		[50]
<b>Planning and decision making</b>	[33,57]	[24,38] +	[2,34,49,52-54] ★	[10,27,55,56]	[27]	[2,27,35,48-50] ★
<b>Financial statement</b>	[27]	[24]	[37,58]	[32]		
	Achieving a competitive advantage	Support of strategic and tactical goals	Better organization performance	Better decision outcomes	Knowledge production	Obtaining value from data

**Figure 4.** Classification for management accounting

With respect to management accounting, the overall picture is different. We see a number of highly relevant and only two less relevant areas in our grid. More in detail, researchers mention almost all rationales for business analytics in connection with strategic (cost) management. Marchant [40] states that management accountants are perfectly prepared to help management find ways to use data for a competitive advantage. Bhimani and Willcocks [27] consider the impact of novel forms of information on corporate strategy and goals and even organizational structures. Better organization performance, for example through the creation and revision of business rules with the help of business analytics, is addressed by many authors [38, 39, 41, 42]. Likewise, better decision outcomes, for instance using the analytical hierarchy process for cost driver selection [43] or through a holistic view and integrated thinking [17], are covered sufficiently [19, 39, 44–46]. Looking at performance measurement, there is less literature coverage of business analytics. Schläfke et al. [47] provide a framework that consists of the four layers capture (performance drivers in inputs, processes, and outputs), couple (performance drivers), control (knowing cause-effect relationships and crucial levers), and communicate (internally and externally). Recent conference proceedings look at critical success factors for business analytics in performance management to support

strategic goals [48] or the mechanisms through which business analytics supports strategic decision making [49]. Further research emphasizes better decision outcomes or identifies ways to obtain value from data [11, 21, 50, 51].

Planning and decision making is another area of high interest. However, at the current point it is focused mainly on better organization performance [2, 34, 49, 52–54] and better decision outcomes [10, 27, 55, 56] due to more accurate and fact-based data, even for small and medium-sized companies. Business analytics is also applied to planning and decision making to achieve a competitive advantage, for instance with the help of a generalized advanced analytics competency in the finance department [33, 57], or to support strategic goals with improved forecasting [24]. Obtaining value from data [2, 27, 35, 48–50] was also covered from various angles like looking at what possible actions customers might take. Finally, financial statement preparation was covered only occasionally with articles focusing on the impact of selecting different accounting methods [32] or better organization performance in preparing the statements [37, 58].

Finally, there were a number of articles in top accounting or information systems journals, which did not address accounting-specific benefits of business analytics. Some of them highlighted a better organization performance from a general business perspective [59, 60] or obtaining value from data in the business functions [61, 62].

#### **4 Discussion and agenda for further research**

The combination of financial accounting data in the narrower sense and business analytics was mostly used from an external perspective on the company. This changes a bit when looking at credit default prediction, bankruptcy prediction or fraud detection. For example, as a predecessor of fraud detection, data quality issues and irregularities can be addressed with analytics. Consolidation is quite a complex activity; however, potential use cases for business analytics still need to be investigated. Knowledge production, on the other hand, seems less relevant in financial accounting. Bookkeeping in combination with better organization performance or obtaining value from data are currently the only two areas addressed by a number of researchers. Support of strategic and tactical goals as well as better decision outcomes come to mind as potential areas for further research.

Management accounting has clearly received more attention by researchers. Current hotspots with more than five articles are better decision outcomes in strategic (cost) management and two combinations with planning and decision making. Looking ahead, *strategic (cost) management* with business analytics to *achieve a competitive advantage, support strategic or tactical goals or to obtain value from data* should be addressed more in detail. Moreover, the use of business analytics in order to *support strategic or tactical goals in planning and decision making* should be addressed by future research. Despite these promising content areas, more research should focus on the application of *prescriptive analytics*. Currently, the focus is on descriptive and predictive analytics, as has been elaborated by [39]. Prescriptive analytics, on the other hand, goes one step further and combines analytics with intelligent automation.



## 5 Conclusion, limitations, and outlook

Motivated by the increasing interest in analytics by practitioners, we surveyed literature at the intersection of business analytics and the finance department. Looking at financial and management accounting separately we proposed a framework to get a comprehensive overview of motivations for business analytics with respect to different accounting activities. Identifying current hotspots like better decision outcomes for strategic (cost) management as well as planning and decision making, we also highlighted potential future hotspots like achieving a competitive advantage or obtaining value from data in strategic (cost) management. For research purposes, this paper contributes to a more comprehensive coverage of an emerging field of interest. For practice, it contributes to a more relevant and directed research, exploring possibilities in combining accounting activities and motivations for using business analytics. A next study should broaden the scope and include grey reports published by accounting organizations or consulting agencies. Besides, a closer look at the identified hotspots should be beneficial to researchers and practitioners alike.

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