

Data Analytics and Financial Forecasting: A Field Study from Finnish Enterprises

Timo Hyvönen, Lauri Lepistö and Sanni Mäki

Abstract

This explorative study investigates the current state and usage of recent technological advancements in financial forecasting. Data analytics has received increasing interest amongst practitioners and researchers in recent years and it has been argued that data analytics will enhance the development and evolution of budgeting processes. The empirical materials of this study come from interviews conducted in six Finnish enterprises. Results indicate that whilst practitioners consider the importance of improving forecasting processes, they have reservations regarding the potency of data analytics. Overall, our findings suggest that the shift towards the application of data analytics in financial forecasting is not yet taking place.

Keywords:

big data, data analytics, enterprise resource planning systems, financial forecasting, management accounting

Timo Hyvönen is a Professor of Accounting at Tampere University, Finland.

Lauri Lepistö is a Senior Lecturer in Accounting and Finance at the University of Turku, Finland.

Sanni Mäki is a Consultant at Deloitte Consulting, Finland.

1. Introduction

This paper focuses on micro-level business foresight, especially the possibilities offered by contemporary information technologies for executing management accounting. During recent decades, researchers and practitioners have shown interest in the development of proactive business expertise (Kaivo-oja, 2021). In line with this, enterprises of all sizes have implemented enterprise resource planning (ERP) systems to replace fragmented legacy systems, thus improving the efficiency of their organisational processes (e.g. Granlund and Malmi, 2002; Hyvönen 2003; Lepistö, 2014; Sardo & Alves, 2018; Jaatinen et al., 2021). More recently, data analytics has been at the forefront of the latest developments in management technology (Wadan and Teuteberg, 2019; Youssef & Mahama, 2021). According to McAfee and Brynjolfsson (2012), the emergence of big data analytics can be perceived as a form of management revolution due to its potential to bring radical improvements to an organisation's performance, operations and culture. Despite the indisputable fascination with data analytics in public discussions, incumbent enterprises continue to face considerable challenges in transforming the idea of data analytics into action. For such organisations, data analytics can be considered a form of potentially transformative but elusive technology (Caesarius and Hohenthal, 2018).

'Data analytics' refers to the process of 'computing to gain insights from data'; hence, the focus of data analytics is to improve decision-making rather than automatise processes (Nielsen, 2018). In this respect, data here include all kinds of data that vary in terms of volume, velocity, and variety (McAfee and Brynjolfsson, 2012). Data analytics is sometimes categorised into three dimensions. Descriptive analytics is the simplest version of data analytics, as it refers to the use of past descriptive statistics. Predictive is the next step in knowledge creation from data, as the use of predictive and probability models characterise it. Prescriptive analytics recommends solutions based on the results of descriptive and predictive analytics and has links to optimisation (Appelbaum et al., 2017; Greasky, 2019).

As data analytics is inherently future-oriented and aims to solve complex issues, its potency has been recognised in the field of budgeting and forecasting. Studies have argued that management accountants must focus on predictions and forecasts (Hyvönen et al., 2015; Nielsen, 2018; Youssef & Mahama, 2021) and that further research on the impacts of data analytics on budgeting and forecasting is needed (Rikhardsson and Yigitbasioglu, 2018; Bergmann et al., 2020). According to Warren et al. (2015), big data will enhance the development and evolution of budgeting processes, and new streams and forms of data may even advance beyond budgeting practices. These openings are worthy of consideration, as budgeting has been regarded as a primary management control mechanism amongst enterprises (Libby and Lindsey, 2010), despite the introduction of rolling budgets and beyond budgeting (Hansen, 2011). Huikka et al. (2017) investigated the initiation phase in the development projects of forecasting. They found that enterprises are not always satisfied with their ERP systems, especially with regard to sales budgeting based on sales forecasting. Thus, enterprises must decide between the integration of forecasting tools into the existing ERP system or the acquisition of a separate system for forecasting.

Earlier studies have increasingly encouraged further investigation into the use of recent technological advancements in forecasting (Nykänen et al., 2016; Rikhardsson and Yigitbasioglu, 2018; Wadan & Teuteberg, 2019). Building on this literature, the present study investigates the current state of financial forecasting in Finnish enterprises and poses the following research question: How is the emergence of data analytics affecting financial forecasting in enterprises?

2. Methodology

For the purposes of this study, we chose the qualitative research method, which is considered suitable when answering research questions starting with ‘why’ and ‘how’ (Agee, 2009). Moreover, the qualitative research approach is suitable for studying emerging phenomena that are relatively novel (Ryan et al., 2002). In addition, we used the field study method, which has been previously applied to explore new areas and provide preliminary input from which more intensive case study or survey research with greater breadth could continue (Lillis and Mundy, 2005). Thus, our study can be considered explorative.

Our field enquiry focuses on six Finnish enterprises evenly representing both business-to-consumer and business-to-business (B2B) industries. From each enterprise, we interviewed a participant who was responsible for financial forecasting processes or who had the best expertise regarding the matter. The roles and positions of the interviewees are presented in Appendix 1. Both medium and large-sized Finnish companies were selected for our study as according to our previous knowledge these kinds of enterprises have more realistic opportunities to develop sophisticated IT systems. Four of the companies are publicly listed. The method followed the format of theme interviews. Each interview lasted from 45–90 minutes and was recorded, except for one (interviewee #4). The interviews were later transcribed word-by-word, and the transcriptions were later checked by the interviewees in question. Table 1 provides information on the interviews and their companies (the interview guide is available from the authors upon request).

Table 1. Details of the interviews

	DATE	DURATION (MINS)	JOB TITLE	TURNOVER (MEUR AS OF 2020)
#1	February 2020	45	Vice President, Analytics and Customer Data	>9,000 (listed company)
#2	February 2020	45	Vice President, Group Business Control	>1,000 (listed company)
#3	March 2020	50	Senior Solution Consultant	>2,500 (listed company)
#4	March 2020	90	Chief Financial Officer	>20 (non-listed company)
#5	March 2020	50	Chief Financial Officer	>100 (non-listed company)
#6	April 2020	45	Chief Financial Officer	>200 (listed company)

Data analysis was informed by the findings of earlier research on the topic, but the process can be characterised as inductive. First, the transcribed interviews were carefully read by all the authors. Then, distinctive themes were identified from the empirical materials. As a result, the following four themes emerged: financial forecasting, the role of data in financial forecasting, the use of data analytics in financial forecasting, and data analytics and its possibilities. Next, we formed a coherent description that discusses the state of financial forecasting in six enterprises. Authentic quotes from interviews, which were translated from Finnish, were used in the next section. Some details were anonymised to protect the identities of the enterprises involved in the study.

3. Findings

At the beginning of the interviews, we observed that the forms of traditional budgeting were used in all six enterprises. Enterprises tend to rely on annual budgeting in which budgets are compiled for the next 12 months. The interviewees perceived the synchronisation of the budget period with the accounting period as practical:

We have organised forecasting so that we make an annual budget that is compiled in autumn, and the board of directors handles next year's budget in December of the current year at the latest. We make a budgeted income statement, cash budget, capital budget and sales budget for our accounting period, which consists of one calendar year. (#5)

We have not yet fully given up annual budgeting, as it provides a good platform [for financial planning] as far as our accounting period is a calendar year. (#6)

Alongside annual budgeting, most enterprises use rolling budgeting in which the budgeting period varies from the next month to the next quarter year. One interviewee commented that, until recently, rolling budgeting has made a real breakthrough in practice:

The thing that has progressed quite extensively is the rolling budgeting. We discussed this when I was in business school, so it was not a new thing. But now, firms are really applying it. Nevertheless, budgeting processes are prone to be burdensome (#3).

During the interviews, we observed that the interviewees used the terms 'budgeting' and 'forecasting' somewhat interchangeably. Unsurprisingly, all interviewees pointed out that forecasting processes should reflect the qualities of the business. Sales forecasting was especially perceived as an important—albeit challenging—task. Interviewee #2 revealed that the recent profit warnings were caused by the difficulties and weaknesses in the company's forecasting processes. Generally speaking, it can be argued that interviewees naturally see sales forecasting as an area that could benefit from data analytics:

The main challenge in forecasting is data analytics and understanding the most important issue, which is sales composition. (#6)

Interviewees reported that historical data remained the primary source for forecasts. Enterprises commonly use historical data in their forecasts by incorporating different variables into them. Enterprises that sell directly to consumers obtain their data from customer relationship management systems, including loyalty programmes, whilst enterprises that operate in B2B environments utilise data available on their ERP systems. However, many interviewees reported that their enterprises attempted to complement internal historical data by using external sources. Especially, interviewee #1 affirmed that the statistical data provided by Statistics Finland, the economic outlooks of foreign research institutes, and weather forecasts were useful sources. Moreover, enterprises are increasingly attempting to use web browsing data and censored data in forecasting.

Our interviewees also commented that their enterprises nurtured a genuine interest in data analytics. However, the variety of information systems leading to data fragmentation was considered a primary obstacle to data analytics endeavours:

One thing that hampers our financial forecasting and monitoring is that we do not have a common ERP system. We do not have integrated finance master data in the background, and our data are too scattered. We have just moved on and have begun to harmonise data. (#2)

When you collect data to utilise it, such data should be correct. Some master data exercises, like data cleansing and data quality, may occur, but if you begin talking to businesses about them, it is considered terribly boring IT stuff. (#3).

Nevertheless, the interviewees admitted that many factors affect forecasting. In addition to possible coincidence, the person in charge of forecasting or management may choose those forecasts and scenarios that are in line with their interests. Interviewee #4, in particular, mentioned that forecasting is susceptible to behaviour resembling game playing.

Management support is always important to forecasting. The quality of forecasts depends on the meticulousness of people. At the end of the day, it does not depend on the [forecasting] tool, but on the honesty and concentration of people who prepare the forecasts. (#5)

Currently, enterprises have formed in-house forecasting systems that are not linked to ERP systems. Most enterprises intend to replace extant forecasting systems with applications that enable data integration. Interviewee #5 stated that their company has made considerable investments to procure a new forecasting system that is capable of integrating data from various sources, performing simulations using many variables and segmenting both customers and markets more accurately compared to the legacy system. Some interviewees also commented that the emergence of data analytics is a critical factor that would drive forecasting projects in the future:

In the field of data analytics, we are having an ERP experiment, and the whole reporting environment is [expected to] change. We are counting quite much on the fact that we could [integrate] more data analytics into it. (#6)

Arguably, most of the enterprises in our sample had no concrete intention to harness data analytics for financial forecasting. Some interviewees commented that the characteristics of the business pose challenges to data analytics, whilst others underscored the need to first improve organisational processes and structures. Moreover, problems with existing data were also mentioned. Only one enterprise has purposefully attempted to develop data analytics in financial forecasting:

At the moment, we are, for example, trying to make with our artificial intelligence team a tool that could better deal with sales forecasts and scale them [forecasts] for different purposes. So, we are trying to prepare one forecast that would benefit as many as possible. (#1)

The interviewees also commented that the business environments of their enterprises suffer from several issues that fall beyond the reach of data analytics. Interviewee #4, for example,

pointed to the incidence of unexpected factors that affect forecasting. Contemporary markets are prone to different trends and phenomena that are impossible to forecast, such as the global pandemic that broke out in 2020. Interviewee #1 shared that, despite the fact that their company's investments in data analytics aided financial forecasting, disruptive processes taking place in the business environment and consumer behaviours pose severe challenges to forecasting (this person was also the only one, who even mentioned artificial intelligence, AI). Thus, to a certain extent, the forecasting system has to consider several factors in a changing world that may weaken the motivation to perform forecasting:

The question is, always, how do you take into account in forecasts things that take place in the environment, how do you treat them and eventually forecast them. Surprisingly, huge changes may occur in how people start behaving in different situations where no historical data are used and nothing informs you. (#1)

Overall, it can be argued that data analytics still appears as an emerging technology, and enterprises seem to have reservations towards it.

4. Discussion and conclusions

This study investigated the current state of financial forecasting in six Finnish enterprises and posed the following research question: How is the emergence of data analytics affecting financial forecasting in enterprises? The findings suggest that traditional forms of budgeting, which incorporate rolling budgeting, are still used in Finnish enterprises. In this light, traditional budgeting seems to have adapted slowly to change. Nevertheless, our interviewees indicated that extant forecasting processes have room for improvement. Forecasting systems tend to remain external to ERP systems; consequently, data remain susceptible to fragmentation. Enterprises also face difficulties in obtaining and accessing relevant, high-quality data. Due to prevailing weaknesses in extant systems, enterprises have the intention of developing their respective forecasting processes sometime in the future. The interviewees also shared that forecasting should better reflect the qualities of certain businesses and that sales forecasting is considered a primary area for improvement (cf. Wadan & Teuteberg, 2019).

Our findings suggest that enterprises have a genuine interest in data analytics, but a clear movement towards the transition is not yet taking place. Amongst all the companies, only one enterprise—operating in consumer business—is designing a financial forecasting system based on data analytics. Arguably, both technical and social factors hinder the inclination. First, the development of data analytics is considered an extensive investment, which requires improving organisational structures and processes first. Second, the interviewees believe that the models of data analytics are unable to fully capture the intricacies of business environments and that forecasting always remains susceptible to subjective understandings and interpretations. Based on such considerations, it can be argued that practitioners have a reserved and realist stance towards data analytics (cf. Granlund and Malmi, 2002; Sardo & Alves, 2018).

The findings above warrant the following conclusions. Although data analytics is considered a recent technological breakthrough, it has yet to be incorporated into financial forecasting due to the business environment and socio-technical restrictions in enterprises. Thus, the current study echoes the findings of Caesarius and Hohenthal (2018), who observed that incumbents face difficulties in materialising the potential behind data analytics in their operations. Our analysis further reveals that data access and quality concerns restrict enter-

prises from improving their financial forecasting processes (Huikku et al., 2017). Therefore, it seems that data integration remains an important issue, despite the fact that ERP systems are already established technologies in enterprises (Granlund and Malmi, 2002). Finally, our study suggests that data analytics, as a phenomenon, is easier to distinguish theoretically than empirically. On the level of empirics, it has become increasingly challenging to identify when traditional financial forecasting ends and data analytics-aided forecasting begins (Appelbaum et al., 2017; Bergmann et al., 2020; see also Lepistö, 2014). Moreover, it seems that quite many concepts, such as data analytics, predictive analytics, and business intelligence, refer to more or less similar phenomena (McAfee & Brynjolfsson, 2012).

Finally, our explorative study calls for more in-depth investigations not only on the design and implementation processes of data analytics to financial forecasting at the enterprise level but also on proactive business expertise and its development in activities at all levels of society (Kaivo-oja, 2021; Huhtasalo, 2022).

References

- Agee, J. (2009). Developing qualitative research questions: A reflective process. *International Journal of Qualitative Studies in Education* 22:4, 431–447.
- Appelbaum, D., Kogan, A., Vasarhelyi, M., & Yan, Z. (2017). Impact of business analytics and enterprise systems on managerial accounting. *International Journal of Accounting Information Systems* 25, 29–44.
- Bergmann, M., Brück, C. & Knauer, T. (2020). Digitization of the budgeting process: Determinants of the use of business analytics and its effect on satisfaction with the budgeting process. *Journal of Management Control* 31, 25–54.
- Caesarius, L. M., & Hohenthal, J. (2018). Searching for big data: How incumbents explore a possible adoption of big data technologies. *Scandinavian Journal of Management* 34:2, 129–140.
- Granlund, M., & Malmi, T. (2002). Moderate impact of ERPS on management accounting: A lag or permanent outcome? *Management Accounting Research* 13:3, 299–321.
- Greasley, A. (2019). *Simulating business processes for descriptive, predictive and perspective analytics*, Boston: Walter de Gruyter GmbH.
- Hansen, S. C. (2011). A theoretical analysis of the impact of adopting rolling budgets, activity-based budgeting and beyond budgeting. *European Accounting Review* 20:2, 289–319.
- Huhtasalo, J. (2022). *Asiantuntijuus, digitaalinen teknologia ja moniaineksiset toimijaverkostot*. Tampereen yliopiston väitöskirjat 536. Tampereen yliopisto, Yhteiskuntatieteiden tiedekunta.
- Huikku, J., Hyvönen, T., & Järvinen, J. (2017). The role of a predictive analytics project initiator in the integration of financial and operational forecasts. *Baltic Journal of Management* 12:4, 427–446.
- Hyvönen, T. (2003). Management accounting and information systems: ERP versus BoB. *European Accounting Review* 12:1, 155–173.
- Hyvönen, T., Järvinen, J., & Pellinen, J. (2015). Dynamics of creating a new role for business controllers. *Nordic Journal of Business* 64:1, 21–39.
- Jaatinen, P., Kihn, L-A, & Näsi, S. (2021). Historical development of IT-related innovations: From manual and paper bookkeeping to automated and financial accounting. *Nordic Journal of*

- Business* 70:2, 85–108.
- Kaivo-oja, J. (2021). Ennakoiva liiketoimintaosaaminen ja sen kehittäminen yhteiskunnan eri tasoissa toiminnoissa. *Futura* 40:2, 9–30.
- Lepistö, L. (2014). Label in context: On the enterprise resource planning system in a medium-sized enterprise. *The Finnish Journal of Business Economics* 63:1, 48–72.
- Libby, T., & Lindsay, R. M. (2010). Beyond budgeting or budgeting reconsidered? A survey of North-American budgeting practice. *Management Accounting Research* 21:1, 56–75.
- Lillis, A. M., & Mundy, J. (2005). Cross sectional field studies in management accounting research—closing the gaps between surveys and case studies. *Journal of Management Accounting Research* 17:1, 119–141.
- McAfee, A. & Brynjolfsson, E. (2012). Big data: The management revolution. *Harvard Business Review* 2012(October), 1–9.
- Nielsen, S. (2018). Reflections on the applicability of business analytics for management accounting –and future perspectives for the accountant. *Journal of Accounting & Organizational Change* 14:2, 167–187.
- Nykänen, E., Järvenpää, M., & Teittinen, H. (2016). Business intelligence in decision making in Finnish enterprises. *Nordic Journal of Business* 65:2, 24–44.
- Rikhardsson, P. & Yigitbasioglu, O. (2018). Business intelligence & analytics in management accounting research: Status and future focus. *International Journal of Accounting Information Systems* 29, 37–58.
- Ryan, B., Scapens, R. W., & Theobald, M. (2002). *Research Method and Methodology in Finance and Accounting*. 2nd edition. Thomson.
- Sardo, F. & Alves, M-C. (2018). ERP systems and accounting: A systematic literature review. *International Journal of Enterprise Information Systems* 14:3, 1-18.
- Wadan, R. & Teuteberg, F. (2019). Understanding requirements and benefits of the usage of predictive analytics in management accounting: Results of a qualitative research approach. *Business Information systems 2019*, Springer.
- Warren Jr, J. D., Moffitt, K. C. & Byrnes, P. (2015). How Big Data will change accounting. *Accounting Horizons*, 29:2, 397-407.
- Youssef, M.A.E-L. & Mahama, H. (2021). Does business intelligence mediate the relationship between ERP and management accounting practices? *Journal of Accounting & Organizational Change*, 17:5, 686-703.

Appendix 1.

List of interviews, their organizational status, and their role in data analytics projects

INTERVIEW #	INDUSTRY TYPE	TITLE	RESPONSIBILITIES IN ORGANIZATION	ROLE IN DATA ANALYTICS PROJECT
1	b2c	Vice President, Analytics and Customer Data	Business analytics & AI projects	Forecasting projects, demand planning
2	b2c	Vice President, Group Business Control	Business controlling, BI reporting, owner of master data	Financial forecasts, annual budgets, rolling forecasts (monthly)
3	b2b	Senior Solution Consultant	Project manager	Project manager
4	b2b	Chief Financial Officer	Group-level financial mgmt	Long-range planning
5	b2b	Chief Financial Officer	Group-level financial mgmt	Real-time reporting for mgmt. group
6	b2b	Chief Financial Officer	Group-level financial mgmt	Total responsibility of group level forecasting and development projects