

The Role of Predictive Analytics Project Initiator in Integration of Financial and Operational Forecasts

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Abstract

Purpose – This paper investigates the initiation of accounting information system projects. Specifically, it examines the role of the predictive analytics (PA) project initiator in the integration of financial and operational sales forecasts.

Design/Methodology/Approach –The study uses a field study method to address the studied phenomenon in 8 Finnish companies that have recently adopted PA systems. The data is primarily based on 19 interviews in the companies and 5 interviews with the PA consultants.

Findings - We found that initiators appear to play a major role regarding the degree of integration of financial and operational sales forecasts. The initiators from an accounting function have a tendency to pay more attention to the integration than the representatives from other functions, such as operations and sales.

Practical Implications – Our study also makes a practical contribution to companies in showing and discussing the important role of the accounting department as an initiator of a project if the target is to achieve a tight coupling of financial and operational forecast figures, i.e., “one set of numbers.”

Originality/Value – Even though companies have increasingly adopted PA systems in recent years, we still know little about how the initiation affects the design of accounting information systems overall. The central contribution of the paper, therefore, is to show that if a PA project is initiated by the accounting department, data integration becomes more likely. It contributes also to the discussion related to the appropriateness of data integration in the context of forecasting.

1. Introduction

Companies commonly implement Business Intelligence (BI) systems on top of their enterprise resource planning (ERP) systems so as to enhance the utilisation of the wealth of information stored in ERP systems. Generally, it can be argued that BI systems have emerged to solve the problem of providing flexibility of use while ensuring the integration of data. In fact, Elbashir et al. (2013) argue that BI systems only create value for business when they are integrated effectively with data warehouses of organisations. Further, they suggest that, ideally the BI system should be configured to provide analysis and reporting that can then be effectively used both in decision-making and managerial control.

One key application area within BI is predictive analytics (PA). Recently PA software solutions by vendors, such as SAS, IBM Cognos and Qlick, have gained considerable attention in organisations. PA can be considered a part of BI that focuses on future forecasting to enable better planning and decision-making, whereas the rest of BI focuses on reporting and analysing historical data. An essential area of PA-supported forecasting is related to sales forecasts. Sales forecasts can be delineated into financial sales forecasts (e.g., for annual budgeting and rolling forecasting) and operational sales forecasts (e.g., for production planning). In a turbulent business environment, accurate sales forecasts are critical for managing uncertainty by predicting what will be sold to whom and when (Hofer et al., 2015). The negative effects of unsuccessful sales forecasting have been documented widely (see e.g., Kerkkänen et al., 2009). While a number of surveys indicate that quantitative sales forecasting methods may not be preferred (Sanders and Mandrodt, 2003), there seems nonetheless to be an upward trend for using quantitative modelling (see e.g., Fotr et al., 2015), including the use of PA systems.

At a fundamental level, one key issue when implementing PA-supported sales forecasting is whether the (new) forecasting will become a separate system or whether it will lead to the integration of the company's operational and financial forecasting processes. Many accounting textbooks argue that sales budgets (financial sales forecasts) would be based on operational sales forecasts and that there is a logical link between these forecasts (see e.g., Atkinson, Banker, Kaplan and Young, 2001, p. 413). In our context, this would imply that financial and operational forecast figures should either be the same or at least include a logical link that allows the numbers to be derived one from the other. Hence, there can be a tight link between these two forecasting processes, which leads in the extreme to one set of numbers. However, it is also possible that the forecasts are not integrated (i.e., the company uses two sets of numbers) and they may or may not be compared with each other.

The proponents of greater data integration advocate economic reasons (cost efficiency) and avoiding potential discrepancy between different sets of numbers (see e.g. Goodhue et al., 1992). According to Balkan and Goul (2010), several simultaneous predictive models/modelers ("multiple sources of truth") may lead to problems of "multiple versions of truth", and as a consequence the proponents advocate a tighter coupling of databases. Nevertheless, Goodhue et al. (1992) maintain that there can be negative impacts of data integration that can result in higher costs, loss of autonomy, and a lack of flexibility. They suggest that the advantages of data integration may outweigh costs only in certain situations (when the business environment is not turbulent or uncertain), and not necessarily for all

the data that the organisation uses. The opponents of data integration also refer to inherent challenges that are related to the different purposes of different forecasts, i.e., problems related to a simultaneous use of forecasts for challenging targets (financial forecasts) and realistic estimates (operational forecasts) (see e.g., Becker, 2014; Bourmistrov and Kaarbøe, 2013; Henttu-Aho and Järvinen, 2013).

Prior studies suggest that the initiator of a project has a significant impact on its outcome (see for information system projects: Hyvönen, 2003; for accounting technology projects: Anderson, 1995, and McGowan and Klammer, 1997). Initiators can be defined as powerful groups or individuals who initially suggest and support the initiation of a new system/technology (Arnaboldi et al., 2010). Indeed, Anderson (1995) suggests that well-positioned individuals (e.g., controllers in the ABC implementation context) have the potential to embrace change due to the centrality of their proposed solution and its connection to their job, their authority and their area of responsibility. According to Greenwood and Hinings (1996), key organisational actors can greatly influence an intended change in their organisation by mobilising their skills, commitment, and leadership. Even though the role of project initiators on the outcome of the project adoption has been addressed (among other aspects) in accounting technology studies (e.g., Anderson, 1995), the research focusing on the initiator's role and specifically his/her influence on the integration of the system being adopted is still scarce. Accordingly, our knowledge about this important relationship is still in its infancy. The notable exception is Hyvönen (2003), who suggests that accounting departments have been advocating more stand-alone systems than fully integrated systems. However, in contrast to these findings, Henttu-Aho (2016) found that accountants can have a positive influence on the integration of numbers within financial forecasting.

Taken all together, companies today seem not to be totally content with the ability of their ERPs to support sales forecasting, but they acquire PA tools on top of their systems for these processes (e.g. Gatt et al., 2008; Loudhouse, 2013). Nevertheless, in this kind of situation, the integration of various forecasts does become an issue. There are contradictory views about the appropriateness of integration between such forecasts (e.g., financial and operational sales forecasts), and also about the influence of initiators on the degree of integration. According to the prior studies, the initiator can play a major role in the outcome of IT- related projects. Consequently, based on this particular setting outlined above, the purpose of this study is to shed further light on the role of the PA project initiator in the integration of financial and operational sales forecasts, a topic largely overlooked in the prior literature.

This current study is also motivated by the calls of Granlund (2011) and Elbashir et al. (2011) which urge more research on BI-related aspects. Granlund (2011, 14-15) identified in his literature review a clear gap in the BI research. In line with this view, Elbashir et al. (2011, 178) invite researchers to explore the diffusion of BI technologies and specifically to enhance our current scarce understanding about the impact of this diffusion on the roles of accountants in organisations. Taipaleenmäki and Ikäheimo (2013, 341) further suggest that it would be a great benefit to the knowledge to investigate technology-driven changes in accounting, and specifically explore crossroads and interfaces between the various functions that to a large extent are currently an unexplored No-man's land.

We approached the issue of data integration and the project initiator's role in it by interviewing accountants and other personnel involved with the initiation phase in eight companies that recently adopted PA tools for sales forecasting, and PA-consultants (a field study). We address specifically the initiation phase, starting with the original ideas and ending by finding the match between a PA solution and its application, a phase wherein the degree of integration is under consideration. In addressing this integration, we elaborate also on the potential contextual aspects that influence the integration, such as the original reasons for the introduction of the PA tool and the length of the forecasting interval, as well as the budgeting and rolling forecasting systems that are already in place.

Our paper adds to the scarce accounting literature on initiation and the integration of accounting information systems by extending the knowledge about the relationship between the initiators and the integration of financial and operational sales forecasting. We found that the initiators play a major role in this integration and that the initiators from the accounting function have a tendency to pay more attention to the integration than do representatives from the operations functions, for example. Accordingly, the central contribution of this paper is showing that if the PA project is initiated by the accounting department, data integration is more likely. We also contribute to the ongoing discussion on the appropriateness of data integration in a forecasting context. We suggest that in certain situations, a single integrated data structure may be beneficial, whereas in other situations, it is not necessarily appropriate. For example, if a company has a need for a very short forecast interval and focuses on forecasting non-monetary figures, then integration is potentially less appropriate. Our study also offers a practical contribution to companies in showing and discussing the important role of the accounting department as an initiator of a PA-supported sales forecasting project, if the aim is to achieve a tight coupling of forecast figures, i.e., only "one set of numbers."

The remainder of this paper is structured as follows. Section 2 presents the relevant prior literature for this study, and Section 3 describes the data and methodology. The empirical findings are presented in Section 4. Finally, concluding remarks are presented in Section 5.

2. Literature Review

Here we review first the definition of PA, as well as the academic and non-academic literature related to its adoption and use. Then, we discuss financial and operational sales forecasting, specifically focusing on aspects related to their integration. Finally, before summing up and synthesising the literature, we address the role of the initiator in an initiation (including design) of a new system/technology.

Predictive analytics as part of business intelligence

While a substantial amount of organisational data are normally stored in an organisation's information systems, it remains a challenge to understand and make use of that information (Elbashir et al., 2011, p. 156). BI systems strive to combine data from multiple sources so as to enable a comprehensive view of the organisation, and thus, the potential to support strategic decision-making (Halladay 2013, p. 1). For instance, Elbashir et al. (2011) studied the possibility of integrating BI with other information systems of organisations. Their results indicated that the ability to absorb new information and make use of external data become the most important factors that enable the integration and use of BI.

BI entails the application of several different analysis techniques, one of which is called predictive analytics (PA). This technique has been suggested as having the potential to improve financial planning practices significantly (Halladay, 2013, p. 1). According to Eckerson (2007), PA is an aspect of BI that focuses on the future. Thus, PA is a set of complex but potentially value adding BI tools that make use of various forecasting methods to enable better planning and decision-making.

In this study, we adopt a view from the prior literature that uses PA as one important aspect of BI systems. What differentiates PA from other BI tools is the emphasis on proactive forecasting; the rest of BI in contrast is mainly concerned with reporting and analysing historical data (Halper, 2013, p. 6). Thus, while the majority of BI techniques use deductive logic wherein a manager seeks "facts" from past events to assist in decision-making, PA utilises more inductive logic. Hence, the decision-maker seeks out information that can be developed into more general models that can clarify specific

uncertain situations (Eckerson, 2007). SAS, IBM Cognos and Qlick are common softwares used for PA purposes.

The academic literature on PA in the accounting context is almost non-existent. However, Nykänen et al. (2016) report in their survey on BI practices in Finland that 41% of the respondent companies use PA often or very often. Further, Lee et al. (2014) suggest that realising the potential of PA requires not just investing in supporting IT systems, but also making a strong commitment to new ways of managerial thinking. Additionally, there have been recent non-academic studies on both the adoption rates and the perceived benefits of PA tools (see e.g. Computer Economics Report (2011), Halladay (2013), Halper (2013), and Loudhouse (2013).

Integration of financial and operational sales forecasts

Sales forecasts can be categorised into two main groups, namely, financial sales forecasts and operational sales forecasts. The expectations for accounting function with regard to sales forecastingⁱ are primarily related to financial aspects, such as predicting the profit levels for profit centres (see e.g. Mentzer and Moon, 2005). In practice, annual budgets or rolling forecasts are commonly used for these financial sales forecasting purposes. The horizon for profit plans is typically generated for a coming one to five years. With regard to forecast intervals, the nearest periods are often shown on a monthly basis, whereas the later periods are reported on a quarterly or an annual basis. For their use as forward-looking information in accounting, these financial forecasts can be updated and consolidated for division and corporate reporting purposes, depending on company policy, every month or quarterly (a rolling forecast company), or even only annually in connection with the budgeting process (a traditional annual budgeting company) (see e.g., Horngren et al., 2015). In some instances, the distinction between an annual budget and rolling forecasts may not be obvious, as one of the sales forecasts of a company may be “frozen” and serve as the budget for the entire year (Henttu-Aho and Järvinen, 2013). Typically, the accounting function is in charge of coordinating financial forecasting, including sales forecasting.

The traditional view holds that budgeting is a comprehensive process that typically includes sales forecasting as a starting point.ⁱⁱ The budgeting process starts with a sales forecast, often the responsibility of the sales function, which is then translated into a sales budget. Then, other sub-budgets are made, with the process culminating in an enterprise-wide budget summary or master budget. Anthony and Govindarajan (2007, p. 380) provide a definition for the annual budget as one that “usually covers one year and states the revenues and expenses planned for that year.”

Nevertheless, the purpose of a budget is not only financial forecasting, but it includes also aspects such as managerial commitment to objectives, review and approval by a higher authority, the binding and restricting nature of the process, and periodic analysis of budget variances. Hereinafter in this paper, we refer only to the traditional annual budget as a “budget” and refer to other “budget variants” as rolling forecasts. Hence, in this case study rolling forecasts include the budgets that are updated during the fiscal year (i.e., rolling budgets) and also the rolling forecasts reaching over the annual budgetary period.

There are a lot of variants on how to conduct rolling forecasts, but they can be prepared for the coming 15 months and updated every third month, for example. They are also prepared in a much less detailed manner than the traditional budgets are (e.g. Anthony et al., 2014). Indeed, Sandalgaard (2012) argues that rolling forecasts are necessary, especially in uncertain and competitive business environments, however, they cannot be considered as evidence of a non-budgeting focus. Likewise, Becker et al. (2016) found that during the financial crisis companies increased planning by introducing a rolling forecasting process or by greatly increasing its frequency and detail if a forecasting process already existed. Recent studies on budgeting practice indicate an increasing reliance on other tools to replace and/or supplement the annual budgeting functions (Henttu-Aho and Järvinen, 2013).

Operational sales forecasts support operational purposes, such as production planning. Normally, operational sales forecasts may not be linked directly to budgeting, either because of their short forecast cycles or their emphasis on physical product quantities instead of sales as monetary value. The horizon can range from a month to one year, depending on, for example, the raw materials purchasing order cycle or other constraints (Wallace and Stahl, 2002). The interval for the forecast can be as short as one day, even though weekly or monthly planning intervals are more common. The frequency for updating the forecasts is related to the interval: the shorter the interval, the more often the update must take place (Smith and Mentzer, 2010). To sum up then, the primary focus of operational sales forecasts is commonly related to predicting the number of stock-keeping units (SKUs) for a very short period of time (day, week, month), whereas accounting requires sales information for longer time periods delivered in monetary form. Hence, for production and logistical planning purposes, forecasts primarily deal with SKUs, not money (Smith and Mentzer, 2010).

Data integration has been at the heart of ERP development from the start (e.g. Hyvönen, 2003; Dechow and Mouritsen, 2005;). The key indicator of the degree of integration is the similarity of numbers. In the extreme, a company may use only one set of numbers. Accordingly, in our setting,

there is a tight link between two procedures, i.e., budgeted/rolling forecasted figures are directly derived from operational forecasts. Nevertheless, it is also possible that these are not integrated (i.e., the company uses two sets of numbers) and they may or may not be compared with each other. The proponents of one set of numbers advocate for economic reasons (i.e., the cost efficiency of generating one set of numbers) and the reasons related to avoiding any potential discrepancy between various sets of numbers. Balkan and Goul (2010) suggest that several simultaneous predictive models and modelers (“multiple sources of truth”) may lead to problems with “multiple versions of truth” within operational forecasting, so accordingly, they advocate for a tighter coupling of databases. In congruence with this view Elbashir et al. (2011) maintain that only BI systems that are effectively integrated with the data warehouses of organisations can create value for the business. The opponents refer to inherent challenges related to the different purposes of different forecasts, i.e., the problems related to a simultaneous use of forecasts for challenging targets (financial forecasts) and realistic estimates (operational forecasts) (see Becker, 2014; Henttu-Aho and Järvinen, 2013). Furthermore, it has been suggested that data integration—of which accounting information is a prime example—does not automatically yield benefits (Goodhue et al., 1992)

The role of initiator in the initiation of new systems/technology

Initiation is the first stage in the IT implementation process, followed by adoption, adaptation, acceptance, routinisation and infusion (see Kwon and Zmud, 1987 and Cooper and Zmud, 1990). According to Cooper and Zmud (1990), during the initiation phase the pressure to change IT systems evolves either from organisational need (pull) or technological innovation (push). The latter need includes the introduction of new IT technologies (Krumwiede, 1998). In this phase, a match between an IT solution and its application is found. In the following adoption phase negotiations ensue to get backing for the solution, ending with the decision to invest resources for the implementation. In the adaptation phase, the IT solution is developed and installed, and organizational processes are potentially revised and developed. At the end of this phase the new system is available for use in the organization. The following phases (acceptance, routinisation and infusion) are related to the different degrees of using the new system.

Building on Cooper and Zmud’s (1990) theorisation on the stages of implementation, Anderson (1995) suggests a framework for evaluating the success of the implementation of an accounting technology (ABC). In her framework, 5 contextual factor groups (individual, organisational, technological, task characteristics and external environment) including 21 separate factors are

addressed. She elaborates on how these factors influence the successful transition from one stage to another, i.e., from initiation to adoption, for example. She identifies individual characteristics, such as role involvement, as the supporting factors for success in the initiation phase. Accordingly, she suggests that well-positioned individuals (e.g., controllers in an ABC implementation context) have the potential to embrace change due to the centrality of the proposed solution to their jobs, their authority and their area of responsibility. In a similar vein, Greenwood and Hinings (1996) maintain that actors with their skills, commitment and leadership do matter regarding the change processes in their companies, and Cobb et al. (1995) also emphasise the role of individuals as leaders in change.ⁱⁱⁱ

Further, Shields (1995), Malmi (1997) and McGowan and Klammer (1997) simultaneously address several potential success factors and suggest that individuals may play a major role in the initiation of ABC. Similarly, in the BSC context, Kasurinen (2002) shows that individuals have a great influence on the initiation phase whether a new technology is adopted or not. Henttu-Aho (2016) found in her recent case study of a multinational paper company that accountants are an important driving force for initiating and integrating new forecasting processes.

Several parties can be simultaneously involved in an initiation. Hyvönen et al. (2012) show that even though there was only one individual (CFO) originally initiating an IT supported accounting technology project (shared service centre), that individual still had to find allies within and beyond the company to support the initiation. Siverbo (2014), based on his study on introducing benchmarking systems, suggests that there can be a link between initiators' failure to interest and enroll important actor groups and later implementation problems. In line with this view, Arnaboldi et al. (2010) maintain that initiators have to guide and support the sense making of the proposed new systems (performance appraisal system) within the organization to avoid failure in their implementation. Scholars have also shown that consultants can play a major role in initiating accounting technology (e.g., Arnaboldi et al., 2010; Sharma et al., 2010). Initiators can participate in subsequent phases after initiation (e.g. Anderson, 1995), but they are not necessarily involved anymore in the later phases (e.g., Arnaboldi and Lapsley, 2004; Arnaboldi and Azzone, 2010; Hyvönen et al., 2006; Siverbo, 2014). There is also voluminous evidence that accounting staff (e.g. CFOs and controllers) have indeed initiated and driven reforms related to accounting technology (e.g. Anderson, 1995; Hyvönen, 2012; Sharma et al., 2014; Siverbo, 2014).

Hence, prior studies do suggest that the role of the project initiators on the outcome of the project implementation can be great. Nevertheless, research that has focused on the initiator's role in the

initiation of accounting information systems is still scarce. Hyvönen (2003) shows that there is a link between the accounting profession and IT system design. His results further indicate that the initiator of a new IT system has an impact on what kind of system will ultimately be implemented. It appears that accounting departments are more interested in traditional stand-alone systems (Best of Breed, BoB), while other departments concentrate on ERP solutions. For instance, in 83% of the cases in his study, the solution was BoB when the initiator was the accounting department alone. In cases where the initiator was either the accounting department along with another department or any department other than the accounting department, the solution was more often ERP (57% and 61% of those cases, respectively).^{iv} Nevertheless, in contrast to Hyvönen's (2003) results, Henttu-Aho (2016) found that, in addition to being a driving force for the initiation of a forecast project, accountants can have a positive influence on the integration of numbers within the financial forecasting. She suggests that today's accountants are increasingly getting more responsibility for producing and delivering forward-looking information than they have had before, and further, inherently forecasting related issues have become ever more important for them.

To sum up, companies appear not to be fully satisfied with the ability of their ERPs to support their sales forecasting, but they are increasingly acquiring PA tools on top of their ERP systems. When companies do initiate new future-oriented sales forecasting methods, the integration of various forecasts becomes an issue. According to the prior literature, the initiator's role can be crucial in the initiation, but that literature further suggests that there are contradictory ideas about the role of accounting for the integration of accounting information systems, for example. Hence, we lack any deeper understanding about the role of initiators in the integration of accounting data. Accordingly, in this paper "*What is the role of PA project initiator in the integration of financial and operational sales forecasts*" is the research question we specifically examine. To answer this question, we discuss the potential contextual aspects influencing integration, such as the reasons for the introduction of the PA tool and the length of the forecasting interval, as well as the budgeting and rolling forecasting systems that are already in place. When addressing these aspects, we focus on the initiation phase, starting with the initiation, and ending up by finding the effective match between a PA solution and its application.

3. Data and Methodology

Considering that the objective of this study was to obtain a wider picture of the phenomenon, the case analysis method that investigates only one or a few companies would not be sufficient (Yin, 1994). On the other hand, there appeared to be only a limited number of organisations in Finland that have

implemented BI tools for PA on top of their ERP system, so a survey (and other quantitative) approaches were also inappropriate. Hence, we decided to conduct a cross-sectional field study to cover the 8 organisations that we identified as having implemented a PA tool for sales forecasting and having publicised this information.^v

According to Lillis and Mundy (2005), a cross-sectional field study rests somewhere between a broad-based survey and an in-depth case study. They suggested that this method can be particularly appropriate (compared to a survey) when there is any doubt about the precise specification and measurement of the variables, their empirical interpretation or the relationships between them. This was also the case for our study as the phenomenon we studied is largely overlooked by the prior literature. Additionally, relative to typical surveys, our adopted method also allowed us to pose important ‘how’ and ‘why’ questions. Specifically, face-to-face interviews allowed us to pose further questions, return to earlier questions, and cover in more detail certain aspects related to the initiation and implementation of PA software and predicting procedures within our case organisations. Further still, compared to a single case study, a field study allowed us to make cross-case comparisons using replication logic (Eisenhardt, 1989).

The eight case organisations represented seven different fields of activities (see Appendix 1). Their personnel numbers ranged from 500 to 30,000, and their net sales ranged from €70 million to €10 billion. Three of the organisations were publicly listed companies, two were private companies and state-owned companies, and one was a non-profit organisation. With regard to their ERP systems, used SAP, and two used other ERP systems. Five organisations had implemented IBM Cognos, and three had implemented SAS products as their PA tool. These implementations took place between 2008 and 2012.

In the research, 19 interviews (including interaction with 20 interviewees) were conducted in the case organisations (see Appendix 2). In every organisation, a minimum of two persons—with one typically representing accounting and the other representing operations and/or sales—were interviewed. According to prior reports (e.g., Loudhouse, 2013), accounting, sales and operations play important roles in PA projects. At least one of the interviewees per each company could be considered the (individual) initiator of the PA project in that particular organisation. We identified these persons with the aid of PA software vendors. Additionally, as shown in Appendix 2, the interviewees were also commonly involved with negotiating and decision-making to accommodate the implementation (in the adoption phase), developing the system (adaptation), and using system (acceptance)^{vi}. Further,

all the interviewees use forecasting information prepared with the PA tool. Our approach to interviewing different persons on the same topics and our opportunity to see the companies' internal project material clearly enhanced the validity and reliability of our study. We were able to triangulate between all the data sources and hence diminish the potential for having any issues related to memory bias, for example. Additionally, five highly knowledgeable consultants representing leading PA software houses and consultancy firms were interviewed.

All the interviews were conducted face-to-face, and they were recorded and transcribed (except for two). The interview structure was distributed to the interviewees about one week before the interview. The themes discussed during the interviews included aspects related to the initiation of the PA project (why/how/when/who). In all of them except for three, two or three interviewees were present simultaneously. Subsequently, all the authors gathered to share their views and discuss their interpretations of the gathered material. Interpretations continued to take shape between additional meetings, as all the authors independently continued performing analyses and taking into account the views of the others. The findings presented here were thus reached through collective interpretation that also included numerous iterations and reinterpretations.

4. Empirical Evidence: The PA Project Initiator and the Integration of Financial and Operational Sales Forecasts

In this findings section, we present and discuss the role of the initiators of the PA projects on the degree of integration between financial sales forecasts (i.e., budgeting/rolling forecasting) and operational sales forecasting. Our empirical analysis demonstrates that there were clearly two different sets of companies. In the first group (five companies: Cases A, B, C, D, and E), the common feature was the accounting department being the main initiator of the project, either alone or together with another department (see Table 1). All of these companies conduct rolling forecasting, and their sales numbers in these rolling forecasts and operational forecasts appeared to be tightly linked.^{vii} In the second group (three companies: F, G, and H), the role of the accounting department was very small in terms of initiating the PA project, or it had no role at all. These three companies used traditional annual budgeting, and no direct links between sales numbers in their budgets and operational forecasts seemed to exist. See Appendix 1 for the PA tools implemented by these companies. All eight companies extensively used external consultants during the different phases of the PA project. The consultants' role was one of a catalyst (Cobb et al., 1995) in the initiation phase when they contacted firms and presented their new solutions to improve forecasting.

INSERT TABLE 1 ABOUT HERE

Accounting department involved with the initiation

In Case A (paper), the PA project was an extension to the accounting department's Profitability Management System (PMS) project begun in the early 2000s. Now forecasting is fully integrated into the accounting department systems. Since 2008, the company has not had any traditional annual budgets, only rolling forecasting. At this stage, scenario management features were added to the PMS system.

According to the current SVP of business control and IT, the original initiator of the PMS:

“Our ideas were more mature then, and I thought that one thing is missing here, and it is the future. [...] We extended the PMS analyses to the future. We called it the scenario management system.”

This business is characterised by highly volatile sales and raw material prices that heavily influence profitability. Hence, it is understandable that the company wanted to have a tool to simulate and analyse different potential scenarios, even though only one of these was ultimately chosen to be the forecast. The operational sales forecasts primarily support production capacity management and the forecast interval is one month; the raw materials and final products do not have best-before dates. Even though the firm's forecasting system (scenario management), facilitated by a PA tool (i.e., SAS), was clearly initiated by accounting, a sales support manager from the sales support department did participate in developing the system during the adaptation phase.

Thus, the main objective for the PA project was to implement a complete profitability management system that included integrating operational and financial sales forecasts. The SVP of business control and IT further clarified the major impact of the PA tool for integrating operational and financial forecasts:

“We wanted to change the responsibilities of our controllers so that they would be in charge of all forecasting. Nevertheless, we did not succeed in that until we implemented our new tool [PA-system]. Now we have all forecasts integrated.”

However, it has not always been clear that the controllers would be responsible for sales forecasting as he continues:

“Sales steering, sales planning, production planning... They are all very closely related to accounting. Anyway, I remember when my business controller went earlier to one sales planning meeting. They said to him “Why do you meddle in our businesses; you are finance guys and we are sales guys.””

In Case B (blood products), the basic raw material is voluntarily donated blood. The main activities are the collection and testing of blood and the manufacturing and selling of blood products to hospitals. Even though the company manufactures tens of different products, red blood cells drive the forecasting. Their durability is about four weeks. The development director was the initiator of the forecasting project, and its original main objective was to improve operational sales planning. However, the accounting department already took over the responsibility for the design, coordination and management of the project during the initiation phase, long before the adoption decision was made. From the point of view of the accounting department, the major problem with the old system was its inability to support rolling forecasting. The company thus gave up using traditional annual budgets in 2009, and it is currently doing only rolling forecasts.

The CFO stated regarding the connection between PA and rolling forecasts:

“The people in operations are quite reluctant to update financial forecasts. They do like what they are told, but they cannot see the link between operations and Euros. They are not always synchronised, and I have begun to develop a philosophy of finding cost drivers for the linkages, thereby being able to present the operations people a view that he or she understands

Thus, in Case B, the accounting department was not the original initiator of the forecasting project, but it took over responsibility for the project (planning) immediately when the CFO understood that the PA project ideas could also be utilised to improve their rolling forecasting and not just their operational sales forecasting. Accordingly, the company was simultaneously able to take various data needs into account and integrate operational sales forecasting and rolling forecasting with the aid of the new tool.

In Case C (steel products), operations and accounting were both heavily involved with the PA-supported sales forecasting project from its early initiation. There was a close dialogical connection between the CFO and the director of supply chain management and sales planning. The overriding objective of the project was to achieve one set of numbers and integrate different sales forecasts within the firm, as the director of supply chain management and sales planning explained:

“We have made a tremendous effort to integrate data in our operative and financial planning systems. Before 2008, we had two separate processes. We always had different figures and people were very confused. Then we decided to integrate these. SCM took responsibility for

going through the volumes and prices, the whole production, and then we transfer these figures to our accounting systems.”

Hence, in this firm operational (sales) forecasts are integrated with rolling forecasts.

Notably, the business models of Case D (defence industry) and Case E (international construction services) differed from all the other cases because they operate mainly by doing project businesses and do not have two similar projects. The duration of their projects may also be quite long, e.g. 10 years. Thus, forecasting plays a very crucial role in their businesses. In Case D, the initiator of the PA project was the vice-president of business controlling:

“The reason why we originally started the project was very simple. We had huge projects and we used only Excel as our forecasting tool. It was always a one-man show. We didn’t receive any variance reports. It was always Excel.

She continued by discussing the integration of operational forecasting and rolling forecasting:

“In our systems, they are tightly coupled. For example, when we are planning strategic figures, I always receive input from our sales department ... They are long processes and they are very expensive ... It is quite systematic.”

In Case E (international construction services), the PA project was a joint endeavour; the SVP of finance (CFO) and the SVP of development services acted as the initiators of the project. The major objective was to improve sales planning and get rid of various Excel models. Operational forecasting and rolling forecasting were fully integrated in the firm. According to the SVP of development services:

“This is the first project in our group where the financial department and business have been working together. That is the reason why it works so well ... everything is integrated and we have been working together from the beginning of the project.”

The SVP of finance and international construction services confirmed this status, stating:

“They are fully integrated. We receive our cash flows at the project level. Then we have the inflow that comes from the customers and the outflow that goes to the constructions.”

Accordingly, the PA supported forecasting system was intentionally initiated and developed in close cooperation with accounting and operations so as to improve and integrate the various forecasts made within the company.

Accounting department not involved with the initiation

In the second group (i.e., non-accounting initiated projects), the most extreme was Case H (mail services), where the PA project was initiated by the development manager for (very) short-term

production planning. The development manager previously had worked as a controller at the local level, but in 2003 he moved to the company headquarters and began working as a development manager, with the implementation of an ERP system (SAP) as his main duty.

He states about their forecasts of required delivery volumes so as to plan their human resource needs for mail delivering, and he emphasises the need for very short intervals in their forecasts.

“A good day-to-day forecast helps us [in next day’s human resource planning]. It is specifically the fact that it is daily. We would not be satisfied with a weekly forecast. We have to have a daily forecast in each operational unit, so we wouldn’t be satisfied with a daily forecast either if it was nationwide.”

Hence, in practice, they would forecast the mail delivery volumes in all 500 of their business units for the next day. These forecasts helped them recruit the right amount of personnel for their business units and efficiently utilise the flex-hour potential stipulated in the employment contracts with their letter carriers. In this case, managing the deliveries by keeping stock was also not possible. In these companies, the sales forecasts were updated every day, and they were not linked to the other sales forecasting activities in the company. Accordingly, the main objective of the PA project was to gain support for optimising human resource needs for mail delivering, and thus the operational forecasting system has no links to budgeting/rolling forecasting or any other financial systems.

In Cases F (coffee products) and Case G (bakery products), the idea for the new PA-supported forecasting system came from their sales planning departments. In Case F, the main reason behind the project was the willingness to replace the existing tailor-made sales planning Excel model with a more standard application. They found SAP to be too inflexible for their forecasting purposes. The original initiator was the sales planning department, but in 2008 during the initiation phase, the accounting department informed them that they also needed a new system for (financial) sales forecasting. Nevertheless, co-operation between the sales planning and the accounting department was not close during the initiation or the later phases of the project. According to the sales planning manager in Case F:

“In practice, they were almost two different projects. Meaning we had a controller... the one who was the controller in the accounting department, and he kind of took care of the sales budget part of it. And we did our thing according to our own timetables, a bit of a different project, and this is a good point in that perhaps the two projects could have been more integrated. Let’s say we had bugs that resulted because of a communication failure, something they did in budgeting that affected us [in operational planning]... so at a certain level, [operational] sales forecasting and sales budgeting are now separate ... sales is forecasted at the product level, but budgets are prepared only at the brand level.”

Similarly, according to the business controller in Case F:

“In any case, the time period is different, our budgeting is annual, and our level of detail is much more aggregated ... Of course, we have had discussions on whether these two processes should be integrated.”

Hence, according to the interviewees, if the forecasting horizon was short, it was not worth the effort to transform forecasted sales kilograms into Euros and compare them against the budget. Even if this had been done, however, it would have been difficult to reconcile the sales figures, so the company would end up with multiple sets of unrelated numbers.

Likewise, in the bakery business (Case G), it is essential to be able to forecast sales as accurately as possible because stocking up on fresh bakery products is inherently problematic, and these products have to be sold within a couple of days after their production. The idea to implement the PA system originated with the sales department, and the main target was to improve the reliability of delivery. Nevertheless, the responsibility for the project shifted to the logistics department quite soon during the initiation phase. According to the manager of business development and logistics:

“Well, when we began all this, our [operational] forecasting team was part of our customer service centre, that is, under the sales department. And when we actually started the project, they were transferred to the logistics department. And one could think that after the project is finished, we are going back to the sales organisation.”

He further emphasised the different interests of operations and accounting:

“This was mostly a project for the production and the supply chain. Partly this may have been because [the] accounting department did not feel that they would have had any kind of clear role in it ... In any case, our payback is based on day-to-day forecasts.”

The major reasons for the disinterest of accounting in the PA project seemed to be their different requirements for the forecast interval and the particularity of forecasting. Accounting did not find it appropriate to forecast on a day-to-day basis and extend the forecasting to cover all the products; for their financial forecasting purposes it was sufficient to update forecasts on a monthly basis for the different product groups. As a consequence, there is now no integration between operational sales forecasting and budgeting.

Nevertheless, the development director of Case G (responsible also for accounting) saw the bigger picture of forecasting and stated, with some hindsight, that more efforts could have been made to develop both the operational and financial sales forecasting processes simultaneously to link them

better; however, also notes the above- mentioned challenges for that integration: *“Honestly, the departments have no interaction in this matter ... and I say that they should have.”*

Synthesis

Taken all together, it seems that the sales numbers in operational and financial forecasting are closely integrated in the above-described five cases where the accounting departments were the sole initiator (Cases A and D) or co-initiator (Cases B, C and E) of the PA projects. It is also common to them that they do not need very short intervals for their forecasts. Monthly, or even less frequent, updates appear to be sufficient. Hence, the data requirements for operational and financial forecasting do align with each other. Additionally, the common characteristic for these companies seems to be that they conduct their financial sales forecasting in terms of rolling forecasting. In these companies, the PA tool was introduced later to facilitate that rolling forecasting. The interviewees advocated the integration of forecasting figures, and that had typically also been their objective for the PA project. The holistic view of the accounting staff about their company and the awareness of the benefits of “one set of numbers” also seemed to drive their efforts toward integration.

In contrast to these companies, there seemed to be no actual integration of operational and financial sales forecasting in those companies where the accounting department was not the original initiator of the forecasting project and the companies used annual budgeting (Cases F, G and H). These companies need a very short operational sales forecasting interval in order to cope with their daily production planning requirements. Their interest is clearly in forecasting the number of units accurately, not their monetary values. Even though integration would be theoretically conceivable, it would be laborious due to the very different data requirements, and possibly unjustified from a cost-benefit point of view as well. Additionally, in our extreme example (mail services) there was little or no point to integrate the forecasts.

In four out of the five companies with integrated sales forecasting (A, B, D and E), accounting owns the forecasting processes, including both the financial and the operational forecasts (Table 1). It appears that the same quarters are the main players in both the initiation and the use of the systems. Thus, in our case companies we find a cluster characterised by accounting ownership, long term forecasting interval, and one set of numbers. While our data does not lend itself to causal explanations, we do provide evidence about the interplay of accountant initiators, forecasting intervals and data integration. Furthermore, in companies where the ownership of operational forecasting was outside the accounting department (i.e. cases F, G and H) the interviewed non-accounting owners did not

seem to prioritise data integration or even see it as desirable. Case C provided an interesting middle-range solution where the ownership of the operational part of the forecasting is located in operations, but the same figures are then transferred to the accounting systems for financial forecasting (accounting ownership).

5. Concluding Remarks

Advances in information technology have the potential to change the ways that accounting is carried out in firms (e.g., Taipaleenmäki and Ikäheimo, 2013). The aim of this study was to shed further light on the initiation of accounting information system projects and, specifically, to investigate the role of the project initiator in the eventual integration of financial and operational sales forecasts. This issue was studied in the context of introducing PA – a BI-enabled forecasting process – since recently more and more companies have adopted PA tools on top of their ERP systems to support their sales forecasting. By addressing this topic, we responded to calls by Elbashir et al. (2011) and Granlund (2011) to study the introduction of BI for management accounting purposes. Simultaneously, we also responded to Taipaleenmäki and Ikäheimo's (2013) call to address technology-driven changes in accounting, and investigate the crossroads and interfaces between the various functions, such as accounting and operations.

In addition to responding these more general calls, this study was specifically motivated by the fact that we knew relatively little about the initiator's role in the actual initiation of accounting information systems. Also, our understanding of the initiator's potential role in the integration of financial and operational forecasts is still in its infancy. With regard to data gathering, we interviewed accountants and other personnel involved in the initiation phase to examine the forecasting process in eight companies that have recently adopted PA tools for sales forecasting, and PA-consultants (a field study).

Generally speaking, our study adds to the scarce accounting literature on the initiation and integration of accounting information systems. It corroborates and extends prior studies by Anderson (1995), Kasurinen (2002), Krumwiede (1998), McGowan and Klammer (1997), and Shields (1995) where the role of human initiators was addressed as only one of the many factors affecting initiation. Not surprisingly, we found in line with Anderson (1995) and Siverbo (2014), that accounting staff can play a dominant role in initiating accounting technology projects. Additionally, similar to Arnaboldi et al., (2010), we found that consultants can be major catalysts in the initiation of these projects.

As also suggested by Hyvönen et al. (2012) and Siverbo (2014), our findings indicate that very close cooperation between different functions (accounting and operations, for example) in the initiation phase are indeed appropriate for a successful implementation. We obtained clear evidence that the centrality of the proposed solution regarding the job of the initiators boosts the initiators' interest and their authority to embrace changes within their area of responsibility (Anderson, 1995). Accordingly, it appears that later ownership of the (forecasting) process can play a major role in terms of who will initiate and drive the eventual change in accounting information systems, for example.

Specifically, this study extends our knowledge of the relationship between the initiators and the integration of financial and operational sales forecasts. To our knowledge, this study is the first attempt to explicitly focus on the integration of financial and operational forecasts and also on the initiator's role in this process. We also found that the initiator's role can be decisive in the integration. Accordingly, the initiators from the accounting function had a tendency to pay more attention to integration than representatives from operations functions, and hence, they would drive the design of the processes towards integration. This phenomenon seems to be related to their more holistic view of their companies' (potentially diverse) forecasting processes and awareness of the potential advantages of having just "one set of numbers." These findings are in line with Henttu-Aho (2016), who found that the role of accountants is important in initiating forecasting method development and also reconciling the different forecast processes. Nevertheless, based on our data, it appears that the accounting function is not necessarily active in initiation of PA projects and keen on driving integration of different forecasts, when they see that the differences between operational and financial data requirements (daily vs monthly) are large. In these cases, it is plausible to think that the daily data requirements play a major role as a driving force for a PA project.

Hence, the central contribution of the paper is showing that if the PA is initiated by the accounting department, then data integration is more likely. This result contradicts Hyvönen (2003), who showed how accountant project initiators were prone to oppose ERP implementations and advocate stand-alone BoB systems that resulted in low data integration. However, in a business environment where ERPs already do exist and PA tools are implemented on top of them, the role of accounting initiators changes and their involvement then becomes crucial for effective data integration.

We also extended the discussion on the appropriateness of data integration in the forecasting context. While data integration is a core question in ERP systems (Dechow and Mouritsen, 2005;), the integration of financial and operational sales forecasts appears to be more controversial. Our findings

are in line with those of Goodhue et al. (1992) and their arguments that data integration can have both costs and benefits. Accordingly, we suggest that under certain situations, a single integrated data structure may be beneficial, whereas in other situations it is not necessarily appropriate (c.f. Balkan and Goul, 2010; Elbashir et al. 2013). Specifically, if the company has a day-to-day need to update forecasts for production planning purposes and focuses on forecasting non-monetary figures, then integration is perhaps unjustified from a cost-benefit point of view.

Our findings also yielded managerial implications for those organisations who are struggling with fragmented data and “multiple sets of numbers”. Hence, it seems to be of the utmost importance to the integration of sales forecasts that accounting department also be involved with a PA- supported forecasting project already in its early phases. Further, our findings show that tight coupling of various forecasts is also not necessarily always appropriate.

There are several potential ways to extend our study. While we found interplay between accountant initiators, forecasting interval and data integration, our data does not support making causal explanations, for example. Therefore, it would be fruitful for further research efforts to develop hypothesis about these interaction and to test these with a larger number of companies. Additionally, the findings from our small sample indicate that the use of rolling forecasts is related to data integration and the use of annual budgets is related to data disintegration. It would be worth studying such a phenomenon and the reasons for it. Related to this issue, further studies could also address how the introduction of rolling forecasting has affected the initiation of a PA tool or vice versa. Our case companies represented various industries. Hence, one could address the kinds of similarities and differences found in the degree of integration of sales forecasts for operational and financial purposes within a certain industry (Messner, 2016). This would better enable us to assess the role of data requirements on the initiation of a PA project and data integration, for example. Furthermore, in this study we did not particularly address the challenges of using just one set of numbers. It would be worth studying in greater detail how companies manage situations when the same sales predictions are potentially used for “realistic” short-term predictions for production planning and for “ambitious” sales targets (Bourmistrov and Kaarbøe, 2013).

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ⁱ In our paper, we focus on the sales-related part of operational forecasting and financial forecasting (here: budgeting/rolling forecasting).

ⁱⁱ Alternatively, the relationship between sales forecasting and budgeting can be weaker, as is the case in the process of stretching targets (Bourmistrov and Kaarbøe, 2013). Authors like Bourmistrov and Kaarbøe (2013), Henttu-Aho and Järvinen (2013), and Becker (2014) illustrate the unbundling of target setting, forecasting and resource allocation decisions, which the companies in their case studies claim to enable better decision-making. Hence, if forecasting and budgetary processes become separate, the relationship between forecasted numbers and figures expressed as budgetary targets may begin to differ from each other, potentially resulting in multiple sets of sales numbers.

ⁱⁱⁱ See Lepistö (2015) for the use of rhetoric in promoting accounting information systems in the initiation phase.^{iv} See also Newman and Westrup (2005) for the role of accountants in the introduction of IT systems.

^v Lots of consultations took place with the main actors in the field (representatives of PA software houses and consultants) to identify the organisations in question. These persons also helped us identify the most knowledgeable persons with regard to the PA projects in the case organisations. None of the contacted organisations or persons refused to be interviewed.

^{vi} According to Cooper and Zmud's (1990) vocabulary for the six phases of implementation, design takes predominantly place in the adaptation phase and use of the system in the acceptance phase.

^{vii} Even though the rolling forecast companies say that they have abandoned traditional annual budgeting, they appear to “freeze” their rolling forecasts covering their fiscal year as a kind of “annual plan” (see e.g. Henttu-Aho and Järvinen, 2013). This frozen period of time (12 months) is used in communication with a Board of Directors, for example.

	Case A	Case B	Case C	Case D	Case E	Case F	Case G	Case H
Field of activity	Paper industry	Blood products	Steel products	Defense industry	Constr. industry	Food supplies (Coffee)	Food supplies (Bakery)	Post (Mail Services)
Main initiator(s) of the PA project	Accounting	Operations & Accounting	Accounting & Operations	Accounting	Operations & Accounting	Operations	Operations	Operations
Main objective(s) of the PA project	Complete profitability mgt system	Improve demand planning, Support RF	Achieve one set of numbers	Replace Excel model	Improve demand and sales planning	Replace Excel model	Improve reliability of deliveries	Improve planning of HR needs
Annual budget or rolling forecast (RF)	Rolling forecast	Rolling forecast	Rolling forecast	Rolling forecast	Rolling forecast	Annual budget	Annual budget	Annual budget
Operational and financial forecasts integrated	Yes	Yes	Yes	Yes	Yes	No	No	No
Forecasting ownership	Accounting	Accounting	Operations & Accounting	Accounting	Accounting	Operations	Operations	Operations

Table 1: Characteristics of sales forecasting in the case companies

Appendix 1: Description of the case organizations

	Case A	Case B	Case C	Case D	Case E	Case F	Case G	Case H
Field of activity	Paper industry	Blood products	Steel products	Defense industry	Constr. industry	Food supplies (Coffee)	Food supplies (Bakery)	Post (Mail Services)
Group net sales, M€	10000	70	2000	800	1800	900	1700	2000
Group employees	30000	500	9000	3600	6000	2000	15000	27000
Ownership	Listed company	Non-profit org.	Listed company	State owned	Listed company	Private	Private	State owned
Local/Int'l	Int'l	Local	Int'l	Int'l	Int'l	Int'l	Int'l	Local
ERP	SAP	Dynamics Navi	SAP (Multi-ERP)	Logica V10	SAP (Multi-ERP)	SAP	SAP	SAP
Predictive analytics (PA) tool	SAS	IBM Cognos	IBM Cognos	IBM Cognos	IBM Cognos	IBM Cognos	SAS	SAS
Implement. time	2009	2012	2009	2010	2008	2009	2010	2009

Appendix 2: List of interviewees and their functions in the implementation

	Interviewees, Managers	Initiation <i>Initiator</i>	Adoption <i>Negotiator</i>	Adaptation <i>Developer</i>	Acceptance <i>User</i>	Min's
Case A	SVP, business control & IT	X	X	X		60
	Business area controller			X	X	54
	Sales support manager			X	X	50
Case B	Development director	X	X	X	X	52
	CFO	X	X	X	X	59
Case C	Manager, corporate performance reporting			X	X	80
	Director, supply chain mgt & sales planning	X	X	X	X	75
Case D	VP, business controlling	X	X	X		59
	Controller				X	40
Case E	SVP, development	X	X	X		85
	SVP, finance ^a			X		48
Case F	Sales planning manager 1	X	X	X	X	90
	Supply chain planner			X	X	above
	Business controller				X	37
	Sales planning manager 2 ^b				X	57
	Supply chain development manager				X	above
	Key account manager				X	58
Case G	Manager, business development & logistics ^c	X	X	X	X	55
	Development director			X		70
Case H	Development manager	X	X	X		75
	Director			X		65

	Interviewees, Consultants	Min's
1	Consultant (SAS Institute)	50
2	Business advisor (SAS Institute)	above
3	Technical sales & services manager (IBM; Cognos)	80
4	Senior consultant (Via Group)	70
5	Vice President, online & analytics (Solita)	90

^{a,b} Successors of the initiators; ^c the initial ideas about the PA project raised by the superior (Sales Director).

All the interviews were face-to-face interviews and they were tape recorded (with the exception of Manager, corporate performance reporting (Case C) and consultant no. 5. Altogether 24h 19 min interviews.