Management Accounting and ERP Systems

Factors behind the Choice of Information Systems when Exercising Management Accounting

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Abstract

Accounting is an old discipline inherent to any business. Accounting is divided into Financial Accounting (FA) and Management Accounting (MA). Financial Accounting focuses on the pure processing of the economic data. Management Accounting focuses on the decision-making aspects of the accounting. Accounting industry has been tremendously transformed in the past two decades due to the implementation of Enterprise Resource Planning (ERP) systems. These systems integrate and unify an organisation’s business functions and processes into one complex computer system. Previous research suggests that the ERP systems’ main functionality primarily addresses the issues of Financial Accounting and much less the issues of Management Accounting. The purpose of this study is to explore the underlying factors behind the application of the Management Accounting Techniques through the ERP systems and to suggest a further development in the field. Five large Swedish companies were examined through the comparative case studies with semi-structured interviews. This study discovered that MATs were mostly implemented through spreadsheets, BI systems and custom-built software, i.e. outside of the ERP systems. The main reasons were inflexibility and standard design of the ERP systems, that did not fully suit the companies. Additionally, the customization of the ERP systems would be too costly when other tools, such as BI systems or spreadsheets, provided better functionality to a better price. The conclusion of this study is that it is impossible to build a universal ERP system that would suit all kind of companies, however, ERP systems can serve as a common base and a transaction engine for the MA. ERP systems can provide a data structure for the analysis parameters crucial to MA, such as profit centre, cost centre, unit, and other dimensionality aspects. Spreadsheets and BI systems win the MA battle by providing the flexibility, user-friendliness and the acceptable price, required by the users. Therefore, ERP systems must provide good integration possibilities with other software. One can further speculate if ERP system providers choose not to deliver flexible and visually appealing products, since they benefit from the income that the customer education and the customization of an ERP system implies.
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Glossary

ABC – Activity Based Costing
AI – Artificial Intelligence
AIS – Accounting Information System
BCS – Business Consolidation System
ERP System - Enterprise Resource Planning System
FA - Financial Accounting
IDC - International Data Corporation
IS – Information System
IIS – Integrated Information System
MA – Management Accounting
MAT – Management Accounting Technique
1. Introduction

The following section introduces the reader to the subject of the Accounting and the Enterprise Resource Planning (ERP) systems, and the development within the Accounting field due to the introduction of the ERP systems.

1.1. Accounting

Accounting is an old discipline and it has been practiced for many centuries. The existence of the accounting can be traced back to as long as 3.500 BC (Woods & Sangster, 2007). According to Woods & Sangster (2007) the accounting can be defined as “the process of identifying, measuring, and communicating economic information to permit informed judgements and decisions by users of the information” (p. 3). Put in other words, one can identify two main objectives of the accounting: 1) processing the economic data, i.e. “identifying, measuring and communicating economic information”; and 2) providing economic data for the decision-making process, i.e. “to permit informed judgements and decisions by users of the information” (ibid).

Financial Accounting (FA) deals with the first objective and involves bookkeeping and financial statements; Management Accounting (MA) is concerned with the second objective by providing necessary data for decision-making (ibid.).

Over time accounting as a discipline has evolved and the need for the standardization became more and more essential. Due to the globalisation and the need of standardization, the International Accounting Standards Committee (IASC) was founded in 1973 (Woods & Sangster, 2007). In 2000 IASC changed the name to the International Accounting Standards Board (IASB). This body issues International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS) (Woods & Sangster, 2007). At present 149 countries, including all the countries of the European Union, implement IFRS in some form or another (IFRS, 2017). In Sweden, the accounting standards and procedures are regulated by law, e.g. Bokföringslag (1999:1078) and Årsredovisningslag (1995:1554). Bokföringsnämnden is the Swedish Accounting Standards Board providing the guidance on the implementation of the accounting legislation (Bokföringsnämnden, 2017).

1.2. Enterprise Resource Planning Systems

An Enterprise Resource Planning (ERP) system integrates several business domains of an organisation in one by combining different business strategies with IT-supported solutions (Shtub & Karni, 2010). Roehl-Anderson (2010) defines an ERP system as “complex computer systems that manage financial and operational data and processes” (p. 300). The following functions can be included in the ERP system:
Customer Relationship Management (CRM), Product Lifecycle Management (PLM), Supply Chain Management (SCM), Human Resources (HR), Sales, Accounting Information System (AIS); the digital communication between the enterprise and its environment, e.g. customers, suppliers and other stakeholders (Mohamed, 2009; Shtub & Karni, 2010; Roehl-Anderson, 2010).

The ERP system is distributed throughout an organisation through a computer system with shared data stores that supervises and coordinates resources, information and functions of an enterprise (Roehl-Anderson, 2010). The ERP system can be provided as a web-based application, client server application or a hosted ERP system service (Mohamed, 2009). The business processes need not be managed entirely by an ERP system; other software could be integrated into an ERP system, thus comprising an Integrated Information System (IIS), consisting of several integrated software packages (Rom & Rohde, 2007).

The major benefits of the ERP systems are the unified and automated business processes and functions; and up-to-date information (Mohamed, 2009). However, there are some major difficulties associated with an ERP system implementation. The software is quite expensive and requires intensive personnel training, it can be very complex and difficult to customize to fit the business processes, centralised data stores could be a security risk (Mohamed, 2009).

1.3. Accounting Functionality in the ERP Systems

As described previously, the accounting practice is highly regulated and poses many requirements on an enterprise. This in turn creates a need for an accounting software, to help dealing with these requirements. An Accounting Information System (AIS) is a complete software suit consisting of several components that together manage and report financial data (Woods & Sangster, 2007). AIS in turn can be a part of a bigger system like ERP system (Roehl-Anderson, 2010; Trigo, Belfo & Estébanez, 2016).

The accounting industry has been tremendously transformed in the past two decades due to the implementation of the Enterprise Resource Planning (ERP) systems (Kanellou & Spathis, 2013). Implementation of an ERP system in general leads to more effective administration of the accounting information. Teittinen, Pellinen & Järvenpää (2013) found in their study that the accounting information required for a monthly profit-and-loss statement was gathered much quicker after implementing an ERP system and that accounting and book-keeping within the ERP system worked well in general. This evidence is supported in several studies. Kanellou & Spathis (2013) identified
several benefits arising from the implementation of an ERP system; among others, faster and easier collection of the accounting data; reduced time required for producing financial statements; monthly, quarterly and annual accounts could be closed sooner; more flexibility in creating reports; reduction of accounting personnel.

Taipaleenmäki & Ikäheimo (2013) argue that the IT-implementation within the accounting industry erases the boundaries between the FA and MA, making these fields more intertwined. They further argue that the FA and MA were more distinct historically, due to the lack of the tools that the information processing facilitates. Taipaleenmäki & Ikäheimo (2013) claim that the registered accounting information can be extracted from several information systems and be used for both FA and MA purposes, thus challenging the definition of whether the extracted data is FA data or MA data.

1.4. Problem Formulation

Kanellou & Spathis (2013) identified a few management accounting benefits arising from higher application of financial ratios and better control over the working capital owing to the ERP system implementation. However, their study suggests more FA benefits than MA benefits. Dechow & Mouritsen (2005) found that the implemented ERP system in their case provided good support for the Financial Accounting but showed little recognition of the Management Accounting. The major Financial Accounting benefit arising from the ERP system’s implementation in their study was the elimination of manual validation of accounting data. All the ad hoc MA analysis was handled by spreadsheets and sales reports were handled by a separate system (Dechow & Mouritsen, 2005). Even though their study was conducted over a decade ago, more recent studies provide similar results (Zarzycka, 2012; Uppatumwichian, 2013; Sánchez-Rodríguez & Spraakman; 2012). Therefore, there is a reason to question how well ERP systems have evolved in the recent years in terms of the functionality within the Management Accounting field.

Trigo et al. (2016) argue that the AIS’ and ERP system’s focus lies traditionally on the accounting transactions and not on the business processes. In other words, ERP systems and AIS were built to support the FA processes which focus on the transactions. Therefore, ERP systems and AIS are not well fit to match the business processes and therefore the MA processes (Trigo et al., 2016).

Management Accounting practices can ensure a successful performance of a company (AbRahman, Omar, Rashid & Ramli, 2016). Therefore, it is important to provide the Management Accounting
practitioners with relevant and suitable MA tools. Digitisation of the MA practices is a potential field for the researchers and the developers alike (Bromwich & Scapens, 2016).

1.5. Purpose
The purpose of this study is to investigate the support for the Management Accounting Techniques (MAT) provided by the ERP systems and identify the underlying factors for the use of these techniques through the ERP systems in order to suggest a further development in the ERP systems’ field.

1.6. Delimitations
Abdel-Kader & Luther (2008) found that larger companies tend to have more sophisticated Management Accounting practices. This study will benefit from more sophisticated MATs available, which is why the study focuses only on large-sized Swedish companies. The medium-sized companies are defined as those having between 50 and 250 employees and either a turnover of € 10-50 m or a balance sheet total of € 10-43 m (European Commission, 2017). The companies above the range are considered large, and the companies below the range are considered small. The studied companies are present in different industries, which might influence the ability to draw the coherent conclusions.
2. Literature Review

2.1. Management Accounting Techniques

Cadez & Guilding (2008) identified three major groups of Management Accounting Techniques: a) costing; b) planning, control and performance measurement; c) decision making. Armitage, Webb & Glynn (2016) identified 19 major MATs from the MA textbooks. These techniques fell into similar categories: a) product/service costing, b) budgeting, c) responsibility centre reporting and d) decision-making analysis. The most intensely used techniques in their study regarded costing (project or client), operative budgets, segment or business unit reports, cash-flow analysis and Financial Statement Analysis. Armitage et al. (2016) discovered one frequently used technique that was not on their list – forecasting. They identified three major factors influencing the extent of the use of the MATs. The first factor was the usefulness of the information in the decision-making processes. The second factor was the nature of the business and its needs. The third factor was the maturity of the business, where the younger companies required only the most critical and less complex information. These 19 techniques are summarized in the table 2.1, where each column represents a different category of the Management Accounting Techniques (Armitage et al., 2016). The techniques are then explained according to Bhimani et al. (2008).

Business Intelligence (BI) provides analytical tools for the decision-making purposes in several business domains (Gullkvist, 2013). Examples of the BI tools can be visualization, data mining, text mining, querying and report creation, online analytical processing (OLAP) and decision support systems (Gullkvist, 2013). Some BI tools can assist in the execution of the MAT, e.g. real-time cash flow analysis and profitability analysis (Nofal & Yusof, 2013). Gullkvist (2013) argues that the degree of integration between the BI tools and the ERP system may vary, which makes it difficult to measure the effect of BI on the change in MATs. She welcomes more research in this field.
<table>
<thead>
<tr>
<th><strong>Product/Service Costing</strong></th>
<th><strong>Responsibility centre reporting</strong></th>
<th><strong>Analysis for decision-making</strong></th>
<th><strong>Budgeting</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal costing system (job-order, project, process costing, hybrid)</td>
<td>Segment reporting – refers to a subunit of an organization</td>
<td>Variance analysis – difference between the budget sums and the actual outcome analysed through the accounting system.</td>
<td>Operating budgets – budgeted income statement.</td>
</tr>
<tr>
<td>Standard costs – carefully predetermined cost related to the unit cost of inputs or outputs</td>
<td>Responsibility centre reporting – reporting of a subunit of an organization where the assigned manager is accountable for a certain set of activities.</td>
<td>Capital spending analysis – discounted cash flow, Internal Rate of Return, Net Present-Value.</td>
<td>Flexible budgets – the budgets are developed using the budgeted revenues and costs that are adjusted with the variance computed.</td>
</tr>
<tr>
<td>Variable costing – direct costing, all variable production costs are included as inventoriable costs, the fixed costs are excluded.</td>
<td>Cost allocations – assignment of indirect costs to a specific cost object.</td>
<td>Overhead analysis – operating costs analysis; all costs except of the costs of goods sold.</td>
<td>Capital budgets – long-term planning budgets with investment decisions.</td>
</tr>
<tr>
<td>Target costing – target profit per unit minus the target price.</td>
<td>Transfer pricing – the price that one subunit of a company charges for a service/product to another subunit.</td>
<td>Cost behaviour analysis – changes in costs due to a change in a cost driver (e.g. production volume).</td>
<td></td>
</tr>
<tr>
<td>Quality costing – costs occurring to prevent a production of a low-quality product.</td>
<td>Balanced scorecard or other strategic tools – a business unit’s performance is valued through four perspective: learning and growth, financial, customer, internal business processes.</td>
<td>Financial statement analysis – analysing income statements and balance sheets, cash flow analysis.</td>
<td></td>
</tr>
<tr>
<td>Activity-based costing (ABC) – focus on activities as the main cost objects assigned to products, services, customers.</td>
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Figure 2.1. Most Common Management Accounting Techniques (Armitage, Webb & Glynn, 2016) defined by Bhimani et al. (2008).

2.2. The Influence of the ERP systems on the Management Accounting Techniques

Rom & Rohde (2007) performed a literature review on the correlation between the MA and the Integrated Information Systems (IIS). In several reviewed studies the MA was not affected by a new
IIS due to the lack of the initiative to use new IIS functionalities (Granlund & Malmi, 2002; Scapens & Jazayeri, 2003; cited in Rom & Rohde, 2007).

Scapens & Jazayeri (2003) studied the impacts of an ERP system’s implementation on the management accounting practices. The company in question implemented SAP as its ERP system in the US and the European offices. As the result, the accountants started working cross-functionally, setting up meetings with other departments to mirror the flow of processes in the organization. This cross-functionality gave better insight for the departments on each other’s activities. The US offices used SAP extensively on all levels, where the European offices used SAP below the Production Management level. All the senior level reporting in the European offices was conducted through spreadsheets, where bulks of data would be exported from SAP for processing. The European managers found the SAP’s functionality within the Management Accounting rather poor, especially within the Cost Accounting. As the underlying reasons, it was stated that it was time-consuming to set up a real-time queries and SAP provided too much unnecessary data. Additionally, the studied company prioritized the reporting function last in the SAP implementation, which is why the reporting functions were insufficient. SAP had a positive impact on budgeting, where the focus shifted towards forecasting and budget comparison instead of comparing the outcome to the budgeting. The SAP’s implementation did not lead to major changes in Management Accounting Techniques and did not result in introducing new sophisticated Management Accounting Techniques.

Although the abovementioned studies were conducted over a decade ago, and there has been a lot of development in the ERP system field since then, it is important to bear in mind that these older studies reflect the findings of several more recent studies.

Zarzycka (2012) investigated the effect of the ERP system implementation on the MA practices in six different enterprises. She found that in several studied companies, the controllers still relied on the spreadsheets. Some companies chose to perform MA tasks in different systems. The implementation of the ERP systems did not lead to a new and innovative use of MA practices, but rather allowed a streamlining and consolidating of the MA practices.

Uppatumwichian (2013) reviewed the budgeting process in eleven companies related to the ERP systems. In the studied companies, spreadsheets were chosen over the ERP system’s budgeting functions. The ERP system’s functionality was described as too standardised and not flexible, and hard to work with. The studied companies exported data from the ERP systems to spreadsheets to
manipulate the data in the budgeting process in the desired way. One of the respondents stated that the used ERP system was good for the Financial Accounting but less so for the Management Accounting. The controllers needed to perform complex forecasts which lacked the support and flexibility from the ERP system. Seethamraju (2015) confirms this notion stating that, recognising the limitations of the ERP technology, Excel and other tools are employed instead of the ERP system.

Sánchez-Rodríguez & Spraakman (2012) found that the ERP system’s implementation led to automation and standardization of the accounting data gathering and to a greater detail of the accounting information. This provided more accurate data for calculations and forecasts. In addition, the implemented ERP systems made the data collection process much faster in general, freeing time to data analysis. ERPs’ chart of accounts was one of the major speed factors. It allowed faster and more detailed data registration, resulting in more detailed data for the analysis. The respondents agreed that the ERP system implementation led to more effective and efficient application of the MATs. However, the ERP system implementation did not lead to the introduction of new MATs, the companies continued to use the same techniques as before.

Teittinen et al. (2013) studied the effects of an ERP system implementation on the management control systems in a medium-sized company. The Financial Accounting got sufficient support through the ERP system and could provide the management with financial reports that could be compared between different plants. However, some MATs as cost variance or product profitability were impossible to perform through the ERP system. The main factors for this were the ERP system’s inflexibility, shortage of time, lack of Information Systems skills and ERP system’s maintenance.
3. Research Problem

By reviewing the previous research, one can identify that the ERP systems improve the accounting practice through the enhanced administration of the accounting information (Teittinen et al., 2013; Kanellou & Spathis, 2013; Sánchez-Rodríguez & Spraakman, 2012). However, the evidence of the application of the ERP systems is stronger within the FA field than the MA field (Dechow & Mouritsen, 2005; Rom & Rohde, 2007; Trigo et al., 2016; Uppatumwichian; 2013; Zarzycka, 2012). This research aims to investigate the factors influencing the use of the MATs through the ERP systems. According to Armitage et al. (2016), the main factors, influencing the use of the MATs in general, are the usefulness of the MATs for the decision-making process, the nature of business and the maturity of business. Within the ERP systems paradigm, the ERP system’s flexibility is a factor influencing the use of the MAT through the ERP system (Uppatumwichian, 2013; Seethamraju, 2015). Another such factor is the lack of initiative to use the ERP system’s functionality (Rom & Rohde, 2007). Therefore, the ambition of the first research question to map the reasons to why the MATs are used within the ERP system’s functionality or outside of it.

**RQ1.** “What are the underlying factors that influence the use of the Management Accounting Techniques through the ERP systems?”

According to Uppatumwichian (2013), the ERP systems can lack the support for budgeting and complex forecasts. The ERP system’s functionality can be limited and require alternative solutions (Seethamraju, 2015). This gap between the required MA functionality and the available MA functionality in the ERP systems is the subject of the second research question. The ambition is to identify the obstacles for the ERP system’s application and to suggest the further development within the ERP system field in order to match the requirements of the Management Accounting Techniques.

**RQ2.** “How can the ERP systems functionality be matched to the required Management Accounting Techniques in case of a mismatch?”

This study will address these questions in a greater detail than any other study to the present knowledge, by investigating the ERP systems provided functionality for each different type of MATs. This detail level would contribute to a detailed mapping of the ERP systems functionality within the MA area, to be able to suggest further ERP system development for the respective areas of MA.
4. Research Methodology

4.1. Research Method

A qualitative study is suitable when an author tries to explore a situation from within (Holme & Solvang, 1991; Yin, 2009). It gives an insight from the insider’s perspective, i.e. emic perspective (Merriam, 2014). This is the chosen approach in this study, since the objective is to get the insider’s view on how Management Accounting Techniques are applied in different companies. The research questions are of an explorative character, which is why the qualitative study is chosen over the quantitative study. Quantitative research is representative in its nature (Merriam, 2014), some of the acquired data was analysed quantitatively for the representation sake and is further described in the analysis section.

The researcher can face a conflict between an actor role and the researcher role, when conducting a study (Holme & Solvang, 1991). This can be solved through three alternatives: a) giving up a researcher role and start acting immediately to solve the problem situation; b) use the results of a study to act upon the issue afterwards, i.e. action research; c) combine the research with the guidance to the studied group without acting upon it, often used in commissioned research (Holme & Solvang, 1991). The third option is chosen for this study, which requires the researcher not to intervene with the studied group and keep the researcher hat on (Holme & Solvang, 1991).

According to Merriam (2014), a case study is the optimal choice for answering the research questions since it accommodates for the complexity of a situation and helps to understand the phenomenon. According to Yin (2009), a finding of one case study can further be strengthened or weakened by conducting more case studies following a replication logic. More case studies (replications) can be conducted in the exact conditions or in slightly altered conditions that do not affect the original finding (Yin, 2009). This study uses five different cases in order to check the reliability and the general application of the results, i.e. External Validity (Yin, 2009). When a study consists of several cases, it is referred to as a comparative case study or a multiple-case study (Merriam, 2014; Yin, 2009). A study with multiple cases can be divided into two groups: multiple embedded studies or multiple holistic studies (Yin, 2009). Multiple embedded case studies imply analysis within each particular case, without pooling of data across the cases (Yin, 2009). Multiple holistic case studies, on the contrary, imply pooling of the survey data across the cases, thus comprising a larger unit of analysis (Yin, 2009). To be able to answer the research questions, multiple holistic case studies are chosen and referred to as a
comparative case study, since this study focuses on the phenomenon in general and not in a particular company. Merriam (2014) argues that the interpretation of the comparative case study gets more compelling, the more cases are included in the study and the greater the diversity is across those cases. Five large Swedish companies comprised five different cases of this study (table 4.1). The companies were chosen based on their large size and the diversity of the operations. These companies differed from one another, since they were active in different sectors (public or private) and different industries (Education, Logistics, Agriculture, IT-solutions and Manufacturing).

Construct Validity test identifies how appropriate the applied measurement parameters are to the studied phenomenon (Yin, 2009). The theoretical framework is used to ensure the construct validity of this study. To achieve the consistency, the study focuses on the 19 MATs (figure 2.1), using the framework developed by Armitage, Webb & Glynn (2016). The interviewees were asked to describe which of the 19 MATs were used in their company, through which domain (ERP system, spreadsheets or other) and the reasons behind the choice of the domain. This study expected the interviewees to cover certain questions, which required a structure from the interview format. At the same time, the researcher was expected to respond to the unveiling of the interviewee’s worldviews at hand and the new ideas about the subjects (Merriam, 2014). A semi-structured interview accommodated both requirements (Merriam, 2014), which is why a series of semi-structured interviews were chosen as a method for acquiring the necessary information. The aim was to unveil both explicit and implicit knowledge of the interviewees about the application of the Management Accounting Techniques through a specific domain in their company. For this purpose, open-ended questions were used, to explore the interviewees experiences and to avoid limiting the answers of the interviewees. Internal validity needs to be ensured in explanatory cause-and-effect studies (Yin, 2009). Since this study is more of an exploratory character, the internal validity is not an issue. The reliability of a study is measured by its documentation and the ability to come to the same results by redoing the same study by another researcher (Yin, 2009). For these purposes, a Case Study Protocol and an Interview Manual were created, the interviews were recorded and transcribed and the results were assembled in a spreadsheet.

When conducting a study, it is crucial to ask adequate questions; pilot interviews are an effective way to practice this and to test how good the questions are (Merriam, 2014). A pilot interview was conducted to test the questions’ suitability to the study. After conducting the pilot interview, the structure of the interview was altered, so that the interviewees would be asked about a certain
Management Accounting Technique’s usage in their company and the chosen domain for this MAT (ERP system, spreadsheets or other systems) in the same question section instead of dividing the usage of the MATs from the chosen domain for these MATs into two different sections of the interview. To achieve a consistency in the conducted interviews, an interview manual was used and the interviews were recorded with the interviewees’ permission. Five companies were investigated through comparative case studies, to be able to compare the results and to draw unbiased conclusions (see table 4.1).

The companies’ controllers were chosen as the interviewee group, due to their daily interaction with the Management Accounting. The interviews were conducted in Swedish, to make the interviewees comfortable in their own environment. Three interviews with two companies were conducted in person and three interviews with the other three companies were conducted through skype due to long travelling distances. All interviews except one, were conducted one-to-one. One group interview was conducted with the company E, where both controllers worked on the same level but in different segments and offered both to participate in the study.

The following section introduces the reader to the controller’s functions in a company. Bhimani et al. (2008) define three important functions of the Management Accountants.

1. Scorekeeping (data accumulation and communication of reliable results to all layers of management).
2. Attention Directing (visualizing opportunities and problems for the managers to act upon).
3. Problem Solving (analysing and comparing the best alternatives that answer the organizational goals).

A controller deals with the Management Accounting issues and links the accounting activities and the management activities in a company. Bragg (2011) compares a controller with a ship navigator, since the controller’s task lies in warning the Chief Executive Officer (CEO) of the problems ahead. The controller reports the performance of different divisions, sales, costs, and profits to the CEO; he/she controls the management of different transaction processing systems and is responsible for investigating the effects of different laws and regulations on the business itself (ibid.). The responsibilities of the controller are very broad and include auditing, budgeting, establishing control systems for accounting transaction processing, cost accounting and financial analysis, preparation of the financial statements and management of the fixed assets’ recording, management of the financial
policies and procedures, analysing financial processes, keeping financial records, tax preparations and proper management of the financial transactions (ibid.).

Scapens & Jazayeri (2003) discovered that the role of the management accountants in organizations was shifting more towards being analysts after adopting an ERP system. Although the automatization of the financial transaction processes led to diminishing basic skills within the studied company, the SAP implementation helped to spread the Management Accounting knowledge to managers and other non-accounting staff; SAP permitted the departments to regularly review their own costs. Chen, Huang, Chiu & Pai. (2012) found that the ERP system implementation resulted in the management accountants receiving more managerial tasks as personnel training and education and financial analysis. According to Rom & Rohde (2007) the tasks of the management accountants can include the maintenance of an Integrated Information System, and tasks of a general manager. They further argue that the IIS distinguish the Management Accounting from the role of the management accountant, since some management accounting tasks can be performed by general managers.

4.2. Data Analysis

According to Merriam (2014), data analysis is the process for answering one’s research questions, which includes making sense of the collected data. The Holistic Analysis is comprised of three phases: a) choosing a problem situation or a theme; b) question formulation based on the chosen theme; c) systematic analysis of the interviews (Holme & Solvang, 1991). When choosing a problem situation, one is often guided by the literature (Holme & Solvang, 1991). The problem situation (a) of this study regards the ERP system’s functionality for the application of the Management Accounting Techniques. The question formulation includes the specification of the chosen problem situation (Holme & Solvang, 1991). This studies question formulation (b) arises from the research questions. The systematic analysis of the interviews (c) includes reading the interview transcripts and taking notes on which problem situations are mentioned with page identification, highlighting important statements and grouping the statements into different themes (Holme & Solvang, 1991). This study’s systematic analysis is based on Merriam (2014) and is described in the next paragraph.

The first step in the data analysis is the Category Construction where one starts with the Open Coding, i.e. marking the interview transcripts with keywords in the page margins or a separate file as these keywords emerge through the interview transcript (Merriam, 2014). The next step is to group these open codes according to common patterns, called Analytical Coding, and registering these groupings
in separate file for each case (ibid.). These files are then merged one by one into a master file with a subset of common ground categories, thus constructing an initial outline of patterns and newly established categories (ibid.). The created categories are the abstractions that cover the examples across the cases; a piece of data put into a category includes identification parameters that can be traced back to the respondent (ibid.). According to Merriam, there are at least three sources providing the names for the categories: the researcher, the participant and the outside source such as a literature. These categories should correlate with the purpose of the study and be sensitive to the data, designed on the same abstraction level, be exhaustive and mutually exclusive (ibid.). According to Merriam, the greater level of abstraction with fewer categories helps to better illustrate one's findings and to increase readability with the help of visual models. In a comparative case study, the data is firstly analysed within a case for each case (within-case analysis), and afterwards with the cross-case analysis where the results between the cases are compared (ibid.).

Within-case analysis was used as a start of the data analysis, where the interview transcripts were analysed one by one in spreadsheets. Each case was registered on a separate sheet in the spreadsheets together with a pivot table for each of the sheets. Significant text in the transcripts was highlighted and the extracted data was registered in a spreadsheet table with the company code, interviewee number, page number, keywords in form of identifiable text from the transcript, and an open code. Data regarding the 19 MATs was especially outlined, in order to group the MATs according to the framework developed by Armitage, Webb & Glynn (2016). After registering this data in a table, open codes were grouped in different categories using pivot tables. Grouping functions in pivot tables made it easier to identify common denominators for different codes. Later the master file got updated with each new completed case, outlining common patterns. A pivot table was created for the master file, resulting in 36 different categories that the data was grouped into. The groupings were narrowed down to four themes by mapping similarities and using colour codes in a master file’s pivot table. The original 36 categories were merged in application choice factors attributed to these four themes and were compared to the previous research.

A separate pivot table was created to match the parameters of the 19 MATs. The answers were counted per company. Companies with two respondents were checked for consistency in answers and duplicate answers were deleted when it comes to 19 MATs. The data on different systems within the 19 MATs were split in two groups depending on the application of those systems: a) registration and allocation of data; b) analysis of data. Pivot diagrams were created based on the master file data.
The transcribed and interpreted answers were sent back to the interviewees to control the correctness of the interpretation. The table with the 19 MATs in the figure 2.1 (Armitage, Webb & Glynn; 2016) defined by Bhimani et al. (2008) was used as a canvas for the interview structure.

4.3. Basic Information About the Companies

The following section gives a short presentation of each company, that participated in the study. Table 4.1 summarises the participant’s characteristics.

4.3.1. Company A

Company A is a private Swedish University. Since it receives government funds, it is subjected to the public procurement. Company A has four main segments: Education, Research, Assigned Education and Assigned Research. The group consists of the Foundation as a parent company, four branches of schools, a preparatory education company and a University Services company. I have interviewed the Group Controller on the parent company level and an Accountant at the University Services company on a subsidiary level. The operations of this company are quite different from the others, since it does not meet the same level of uncertainty. The income consists of grants and is predetermined. The main costs arrive from the personnel costs. The Foundation consists of five employees and does not have much of accounting itself. The Foundation receives government grants that are then divided between the subsidiaries. The Foundation bills the subsidiaries for some of its activities, e.g. Dean-function and others. The University Services is the support function of Company A. It provides different services to the University’s students and employees, the management and external stakeholders; such as Library, Marketing, Finance, HR, IT and others.

4.3.2. Company B

Company B is a branch of an international logistics company. Company B provides warehousing solutions within the supply chain to its customers, such as storage, handling and transporting. The Nordics region consists of four countries which in turn are divided in different areas, consisting of different clusters. The clusters in turn consist of several sites. The interviewed Financial Controller is responsible for the South Sweden area, consisting of three clusters Gothenburg, Skåne and Jönköping.

4.3.3. Company C

Company C is a leading agricultural cooperative in the Northern Europe specialized in agriculture, bioenergy, food products and machinery. It acts as a business partner for agricultural companies, providing them with products and services ranging from machinery, feed, financing, etc. The company
also provides food products to consumers. Due to this wide variety of products, the company’s business can be considered rather complex. It has grown a lot through acquisitions and has more than 20 different businesses.

4.3.4. Company D
Company D is one of the leading providers of IT-solutions in Nordic countries with 14,000 customers in the private and the public sector. Company D provides IT services to the public and private sector within IT Management, Consulting and Operation services. The study focuses on one of its Swedish subsidiaries. Company D is characterized as a consulting firm, where the personnel costs are the major costs, and the hours spent on a certain project are billed to the customers.

4.3.5. Company E
The company is a world-leading provider of power solutions ranging from engines to propulsion. The company’s products are applied in marine transportation and in industrial sector, such as powerplants, irrigation plants or vehicle engines. Company E is a part of a bigger group, which influences the choice of the ERP system. The group strives for common dimensionality in Information Systems and in the set of rules to increase consolidation ability and comparability of different companies within the group. The company’s operations are divided in three regions where the interviewed controllers are responsible for the European region. One of the controllers is responsible for the parts sales sector and another one is responsible for the engines sales sector. Since both interviewees represent sales perspective, it is hard to draw the conclusions on the costs part.
<table>
<thead>
<tr>
<th>Company Description</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic information</strong></td>
<td>The organization is a private Swedish university with high focus on the internationalization and entrepreneurship. The company is a market leading service provider within the warehousing and logistics solutions. The company is an agricultural cooperative specialized in agriculture, bioenergy, food products and machinery. The company is one of the leading providers of IT-solutions in Nordic countries with 14,000 customers in the private and the public sector. The company is a world-leading provider of power solutions ranging from engines to propulsion systems for marine and industrial application.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERP System</td>
<td>Agresso Unit4</td>
<td>Oracle</td>
<td>Movex M3 &amp; Dynamics AX</td>
<td>Maconomy</td>
<td>SAP R/3</td>
</tr>
<tr>
<td>Interview Setting</td>
<td>In person</td>
<td>Skype</td>
<td>Skype</td>
<td>In person</td>
<td>Skype</td>
</tr>
<tr>
<td>Number of Interviews</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of Interviewees</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Position</td>
<td>Accountant and Group Controller</td>
<td>Financial Controller</td>
<td>Group Controller</td>
<td>Business Controller</td>
<td>Two Business Controllers (different segments)</td>
</tr>
<tr>
<td>Company Level Interviewed</td>
<td>Group level and subsidiary level</td>
<td>National regional level (several subsidiaries)</td>
<td>Group level</td>
<td>Subsidiary Level</td>
<td>International regional level (Europe)</td>
</tr>
<tr>
<td>Company Size</td>
<td>Large</td>
<td>Large</td>
<td>Large</td>
<td>Large</td>
<td>Large</td>
</tr>
<tr>
<td>Number of Employees</td>
<td>706</td>
<td>664</td>
<td>10,000</td>
<td>1939</td>
<td>771</td>
</tr>
<tr>
<td>Balance Sheet Total</td>
<td>€ 72 million</td>
<td>€ 42,5 million</td>
<td>€ 3,4 billion</td>
<td>€ 327 million</td>
<td>€ 446 million</td>
</tr>
<tr>
<td>Turnover Total</td>
<td>€ 93,5 million</td>
<td>€ 125 million</td>
<td>€ 3,8 billion</td>
<td>€ 382 million</td>
<td>€ 784 million</td>
</tr>
<tr>
<td>Industry</td>
<td>Education</td>
<td>Logistics</td>
<td>Agriculture</td>
<td>IT-solutions</td>
<td>Manufacturing of engines/propulsion</td>
</tr>
<tr>
<td>Sector</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
</tr>
</tbody>
</table>

*Table 4.1. Participant Characteristics.*
5. Empirical Findings

The interviewed companies were established in different industries, delivering different range of products or services to their customers and had different complexity of operations. This diversity in the studied companies is consistent with Merriam (2014), who states that a greater number of cases and a greater diversity in the studied cases can bring around more compelling interpretations of the results.

5.1. Information Systems

The studied companies used different setups of the Information Systems.

Company A was active within Education in the public sector and their ERP system was subjected to the public procurement. Agresso Unit4 was used as the ERP system for the payroll, invoicing, accounting, accounts payable and accounts receivable. Most of the analysis was handled through the spreadsheets and the group consolidation of the financial data was handled through the group-level system Kapell. At the time of this study, company A was investigating the need for the Project Module in the ERP System that would facilitate the financial follow-up of different research projects that would be ongoing over a period of several years. According to the Accountant, the ERP system required substantial personnel training due to its short commandos and functions that were not so obvious to inexperienced users. There was a thick user manual for the ERP system developed by the company’s Business System Administrator, but it was time-consuming to learn all the functions. The ERP system did not provide visually appealing and user-friendly reports or interface, which was why the data was first exported to the spreadsheets and manipulated according to the purpose. Excel was used mostly because it was more flexible and more users were proficient in Excel, than in a specific ERP system, and it was not as expensive as an alteration of an ERP system would be. The group controller wanted to have more Information System support and stressed the importance of the Excel limitations – redundancy and risk for the typing errors. Ladok – Swedish student registration system – was not integrated in the ERP system. It made it hard for the accounting department to check the number of students enrolled per course or program and to analyse it in the financial terms.

Company B was active within Logistics and used Oracle as the ERP system. Company B used a custom-built web-based interface SIRE (Secure Invoicing Reporting & Estimation), which was developed specifically for the company. It was used for the Management Accounting activities that were not supported by the Oracle. SIRE was not fully integrated with the Oracle. The Oracle data
must be exported to a spreadsheet, that would be uploaded to the SIRE, afterwards the manipulated document would be imported to Oracle, also in the spreadsheet form. Spreadsheets were used for some calculations. Warehouse Management system (WMS) was used for the management of the sites. A different clock-in system was used for the personnel, it was integrated with the payroll systems that produced journals for the import into the Oracle.

Company C was active within Agriculture and had a considerable number of different businesses in the group, which used different ERP systems. The group had grown a lot through acquisitions. According to the Group Controller, it could be as many as 80 different ERP Systems within the group. The current strategy was that if an acquired business had an ERP system present in one of the company’s subsidiaries, its system would be moved to that subsidiary’s ERP system. The two major ERP systems present were Movex M3 and Dynamics AX, which this study focuses on. The ERP systems were used for sales, orders, accounting and production. The data from the ERP Systems was regularly transferred to the data warehouses, connected to various BI systems such as IBM Cognos, Clickview or Microsoft Power BI. The company preferred to use its systems in the current setting where the ERP system was used for the registration of the financial data, but the analysis took place in BI systems. The ERP systems were required to provide a common ground in the dimensionality across the businesses.

Company D was active within IT and consisted of several companies prior to 2016 and Jeeves was used as the ERP system. Since the consolidation of all the companies, company D started using Maconomy as its ERP system. However, order and warehouse modules remained in Jeeves and were planned to be moved to Maconomy in the near future. Several modules were used outside of the ERP system: Eye-share was used for the invoice-scanning, Profitbase was used for the budgeting, Edge for CRM and Aditros for the payroll. Target was used as the BI system to exercise the Management Accounting and data analysis. The data was further extracted from the BI systems to Excel, for more flexible analysis of data. HFM system was used on the group level.

Company E was active in Manufacturing of engines and propulsion. Company E used SAP R/3, which was implemented over a decade ago. It was a group choice to use the same system throughout the group. Information from different companies was consolidated on the group level in SAP BCS (Business Consolidation System). SAP was chosen as a provider since it was a big company that could manage to deliver products and services on a large scale. Sales were managed in the SAP module CO-
PA. SAP R/3 provided an Excel-plugin for reporting. Reports were created in spreadsheets. Reports to the board were presented in PowerPoint.

5.2. Management Accounting Techniques

The following section presents the use of the MATs in the studied companies.

5.2.1. Product/Service Costing

In the company A the calculation for the personnel costs in projects were calculated manually in spreadsheets and then registered in the ERP system. Some of the direct costs were automatically assigned to projects through triggers in the ERP system according to the percentage of the cost that should have been divided between different projects. Each project had its own code in the system, that the costs could be assigned to. There was no implementation of the standard costs, target costing, quality costing or Activity-based costing.

Company B tracked its costs through Oracle and SIRE but it did not implement target costing, standard costing or quality costing. The ABC was used, where the employees clocked in on a certain activity when working and the data was imported into Oracle through a payroll journal.

The formal costing systems in the company C were defined by the ERP systems. There was a matrix for the chart of the accounts with specified profit centres, area, etc. The ERP systems created the framework for the rules. Standard costing was implemented through the ERP systems and analysed in BI systems. Not all the businesses applied the standard costing, and the ones which did, used various level of detail. Variable costing was analysed in BI systems. Target costing was performed through a combination of both the ERP systems and the BI systems. Quality costing was not applied. ABC was performed to some extent through the ERP systems and the BI.

Since the company D was a consulting based firm, it was easy to identify the direct costs as most of the costs were originating from the personnel costs and time they produced. The purchases that were made were assigned to different accounts according to the project, department, team and person in the Eye-share invoice scanning system. Standard costs were registered in the ERP system Maconomy, but were calculated in Excel, it consisted mostly of a standard cost per employee hour. Direct costs were analysed in the ERP system and BI. Target costing was used in the part of the company working with development of own products and Operation services. Quality costing was not used. ABC was implemented in a way, because each project in the ERP system was specified per each sub-project and task, but it was not followed up as ABC. Company D was using Self-costing calculation instead.
Company E used standard costs, where all direct and indirect costs were included. The standard costs were revised on a yearly basis and provided by the factory. The company did not differentiate between the direct costs or indirect costs, but used the standard cost as a universal measure. The interviewees were not aware if target costs, ABC or quality costing were implemented.

5.2.2. Responsibility Centre Reporting

In the company A, different department and research projects had assigned codes in the ERP system. Heads of the departments did have access to the ERP system, but it was hard for them to navigate in the system and find what they were looking for, if they were not accountants themselves. Therefore, the accounting department took out the data in spreadsheets and delivered the data for the reporting to the persons who required it. Indirect costs could be assigned in the ERP systems according to the unit, project, etc. Transfer pricing was applied in the form of the costs for the University Services and the Dean-office, which were calculated in spreadsheets and billed to the entities. Balance Score Cards were not used.

In the company B the reporting was detailed per site, but everything was reported to the same person through SIRE’s interface. Indirect costs were allocated in SIRE per customer or site with the help of different keys for specific costs, such as white-collar workers, blue-collar workers, transports, etc. Transfer pricing was only applicable with the branches abroad, that were invoiced through Oracle. Balance Score Cards were not used.

In the company C the profit centres and the cost centres were registered in the ERP systems, but the data was analysed in BI. There were managers with their own profit centres or cost centres that were responsible for a certain budget for these centres and were being followed up upon. The indirect costs were allocated mainly in the ERP systems directly, however, the companies with older ERP systems did that in BI that was cheaper to integrate to these old systems. Transfer pricing was performed in the ERP systems.

In the company D the segment reporting was implemented in all systems. The responsible manager of a specific responsibility centre could analyse its centre in Target. The indirect costs and transfer pricing were allocated in Maconomy. The Balance Score Cards was partly about to be implemented in Target.

Company E’s responsibility centres were constituted of different geographical markets (Europe; America; Africa, Asia and Oceania) and different sectors as marine or industry. The reporting was
managed through spreadsheets with data from the ERP system. Cost allocations were calculated in spreadsheets. Transfer pricing was not used in the company but it was used within a group and managed through the SAP. Balance Score Cards were implemented in spreadsheets.

5.2.3. Analysis for Decision-Making

In the company A each entity was responsible for the creation of its own budget. Different entities had different level of detail in the budgets. Some of the entities specified the budget down to the object and project level, but some did not. This affects how well the variance analysis could be implemented through the ERP system. Cash-flow analysis was not implemented, since the company enjoyed a stable cash flow and had no need to follow-up on the cash flow. Indirect costs were analysed in Excel. Neither internal rate of return nor net present value were implemented. The cost behaviour analysis had little implementation. A cost per student was calculated by the entities in spreadsheets based on the data from the ERP System and Ladok – a Swedish student registration system.

In the company B the income statement, variance and overhead analysis were applied through SIRE. Balance sheets were checked through Oracle. Capital spending analysis was not used. Cost behaviour analysis was performed through spreadsheets. The cash flow analysis was performed at the head office, and not in the areas.

In the company C the variance analysis and capital spending analysis was performed primarily through the BI systems. The ERP systems were used, when someone wanted to look at a particular detail on the transaction level. The overhead analysis, financial statements and the cash flow analysis were performed in BI. The cost behaviour analysis was conducted through both BI and the ERP systems.

In the company D the variance analysis was implemented in Target. The capital spending analysis was implemented in Target and the group-level Information System called HFM; Maconomy was used to some extent. Overhead analysis and financial statement analysis by the accountants (shared services) was performed in Maconomy, and by controllers in Target. Cost behaviour analysis was implemented to some extent in Maconomy.

In the company E the variance analysis was managed in spreadsheets with SAP BCS data. Capital spending analysis was not included in the interviewees tasks, but was managed elsewhere in the company. SAP provided cashflow analysis possibility. Overhead analysis was implemented through SAP. Since the company used standard costs, the cost behaviour analysis was not implemented. Financial statement analysis was performed in SAP by the accounting staff.
5.2.4. Budgeting

In the company A, there was no support for the long-term budgets or prognoses, that the research projects required. The operating budgets were created in spreadsheets and then uploaded to the ERP system. Flexible budgets were not implemented, but it was possible to upload a revised budget. However, it was not possible to get an overview of several budgets at once through the ERP systems. The long-term budget was currently available only in spreadsheets. This was the module that the company wanted to implement in the ERP system to be able to keep track of its projects that would last for several years.

In the company B, the budgets were created in Excel and imported into Oracle. There was no support for the flexible budgets in the ERP system. The forecasts were created in SIRE. Long-term budgets were only applied when a new customer was introduced, the calculation was performed in spreadsheets.

In the company C the budgeting was implemented in BI systems for the bigger companies and in Excel in smaller companies. Planning, forecasting and capital budgets were implemented in BI systems. The used BI systems were Cognos or Clickview. Flexible budgets were also managed through the BI systems.

In the company D, the budgets were created in Profitbase budgeting system. Flexible budgets were not implemented. Capital budgets were implemented in Excel and a group-level system HFM.

In the company E the operating budgets were created in spreadsheets and were imported to SAP BCS. The interviewed controllers were only concerned with budgets on sales and standard costs. Data for forecasts was exported from SAP BCS to spreadsheets to create reports and the forecast was then uploaded to SAP BCS. Capital budgets were managed on the group level.
6. Analysis

In the following section, the results for each group of the MATs are presented. The following diagram illustrates the usage of the different MATs through several application domains. Each company is specified by a distinct colour. The number of MATs used by a certain company through a specific domain are used as the Y-axis. Within Budgeting group, a Forecasting technique was added as it was frequently used, so the figure 6.1 covered 20 MATs in total.

The studied companies distinguished two processes when implementing MATs: a) Registration and Allocation of the economic data; b) Analysis of the economic data. The figure 6.1 summarizes all the Information Systems used for MATs application. In the figure 6.1 the application of the MATs is presented according to the four groups of MATs and the processes (a) and (b).

Figure 6.1. Management Accounting Techniques Application.

Within the Registration and Allocation process, the ERP systems were dominating. Registration and Allocation of the accounting data was an inherent part for the businesses to be able to exercise the MATs properly. To be able to analyse the data correctly, the data had to be correctly allocated according to preferred parameters. However, the Registration and Allocation of data is partially Management Accounting in terms of scorekeeping, but it is also partially the Financial Accounting, i.e. registration of the accounting data (Woods & Sangster, 2007). The Registration and Allocation of the economic data was the primary application of the ERP systems. Previous research suggests that
the ERP systems support the Financial Accounting more than the Management Accounting (Dechow & Mouritsen, 2005; Rom & Rohde, 2007; Trigo et al., 2016; Uppatumwichian; 2013; Zarzycka, 2012). This paper can confirm that the ERP systems were acting more as accounting transaction systems, rather than providing analytical tools for MATs.

Teittinen et al. (2013) found that the ERP systems provided good support for the creation of the Financial Statements. This study confirms it. Within the Analysis process the ERP systems were highly representative only within the MAT group Analysis for Decision-Making within the Financial Statement Analysis.

Forecasting was used frequently by all the companies, which is in line with Armitage et al. (2016). The ERP systems were not used for the creation of budgets or forecasts, the prepared budgets were imported to the ERP systems.

The empirical data analysis resulted in 36 categories. These 36 categories were narrowed down and grouped into four major themes by mapping similarities and using colour codes in a master file’s pivot table. These four themes identify common patterns in the analysed data and are presented below. The original 36 categories were merged in application choice factors attributed to these four themes and are compared to the previous research.

6.1. Business Complexity Impact on the IS and the MATs

Abdel-Kader & Luther (2008) found that larger companies tended to use more sophisticated MATs. This study focused on the large companies and can partially confirm this notion. However, the amount of the used MATs in this study was highly related to the complexity of the business. Company A had more stable operations, where the income was secured by the government grants. Company A did not face a high level of economic uncertainty, which led to fewer MATs being used. Company C had complex business operations with many subsidiaries within the agriculture sector. One can argue that company C faced higher level of uncertainty, which led to more MATs being used. Company C used almost all of the presented MATs except for the Quality Costing. Logistics company B and the manufacturing company E had fewer products and services and thus less complex operations, as a result they used fewer MATs. However, companies B and E were studied on the subsidiary level, so the results on the group level might be different. The IT-company D had a wide range of services and used almost all MATs, except for the Target Costing, Quality Costing and the Flexible Budgets. It
confirms the findings of Armitage et al. (2016) that more complex businesses require more complex information and the nature of business influences the extent to which the MATs are used.

Companies A, B and E with less complex operations used fewer IS for the MATs, than the companies with more complex operations. Company A used only the ERP system and the spreadsheets; Company B used the ERP system, spreadsheets and the custom-built interface; company E used the ERP system and spreadsheets. As compared to the agriculture company C and the IT-company D, which used a variety of BI systems in addition to the ERP systems and the spreadsheets.

6.2. Streamlining, Consolidation & Automation of the Management Accounting

Zarzycka (2012) found that the ERP systems allowed streamlining and consolidation of the MA practices. This study has found some evidence for that as well. For example, the manufacturing company E was very pleased with SAP being used as the only ERP system throughout the group.

“In general, we are happy with the system. There is a lot of functionality and so on, however, the downfalls are not dependent on the system but because we are a big company, i.e. our group. We must look after each other and there could be different needs. There could be problems associated with that, but it is not dependent on the system, I think […] We think it is beneficial to use the same systems and the same set of rules everywhere, otherwise it will be difficult to consolidate and to merge the figures and to do analysis across the different subsidiaries.” (Company E)

The agricultural company C was pleased with the ERP systems’ ability to streamline the data and to provide the framework for exercising the Management Accounting. However, different subsidiaries did things in different ways.

“When you set up the rules for how to work and how to set up the costs, then you do it in the ERP system […] If you take the title “Management Accounting in the ERP systems”, it [Management Accounting] is often formed there [in ERP Systems] and you have to build in detail in your ERP system to be able to do the Management Accounting and to register the transactions in a correct way. But the analysis itself takes place in 98% outside of the ERP systems, because the ERP systems are good at setting the parameters and to register the transactions that become the outturn.” (Company C)
Sánchez-Rodriguez & Spraakman (2012) found that the ERP system’s implementation led to automation and standardization of the accounting data gathering and to a greater detail of the accounting information. This study confirms this finding. All of the interviewed companies used different parameters for cost and profit centres, geographical and segmental units. All of the interviewees stressed the dimensionality of the economic data as a mandatory factor for the MATs.

“There are many dimensions we need to follow up upon.” (Company A Group Controller)

“To allocate the costs correctly, we use different keys. There are different keys depending on the type of the cost. There are blue-collar keys or warehouse workers, we have keys for the white-collar workers, keys for transports, etc.” (Company B)

“There are different dimensions depending on what type of cost it is, how you specify it and when. But there is a matrix with the accounts, depending on what profit centre, area and how the cost is set up. In this case M3 and Dynamics are critical.” (Company C)

“All purchases are entered in the books according to the project, account, division, team or person” (Company D)

“All the costs are assigned to the respective sales, i.e. market and region.” (Company E Business Controller in Engines Segment)

The automation is determined by special keys and triggers in the ERP systems.

“There are triggers and automatic transaction registrations in our system where we use automatic percental drivers” (Company A Accountant)

“There is barely anyone who types in things today, you export your data and analyse it, toss it around.” (Company D)

The education company A did not use the ERP system for the consolidation of subsidiary data. Each subsidiary was responsible for its own budgets and implemented the budgets on the different detail level.
“It is easier to analyse within one subsidiary [in the ERP system]. The subsidiary boundaries are complicated so we use Kapell for the consolidation. It is a program for the closing of the books.” (Company A Accountant)

Even the manufacturing company E and the IT-company D used a different IS for the consolidation of the accounts on the group level.

6.3. ERP Systems Sensitivity to Setup

Teittinen et al. (2013) found the ERP systems allowed to produce financial reports that could be compared between plants. However, the ERP systems are very sensitive to the setting of the parameters, which can make it difficult to produce a comparable data for analysis. Even though the ERP systems provide the tools for the standardization of the accounting data and the automation of its gathering, it is up to the people who set up the system to ensure the standardized processes across the organization. One of major agricultural businesses in the company C thought that they had implemented the ERP systems identically in all the subcompanies, but it turned out that the ERP system was set up differently in the subcompanies.

“The ERP systems in general are sensitive to how they are set up. We have companies that have set them up well, and they provide good support. We have companies that set them up in a complicated way, where we want to change them. One of our biggest businesses thought that they had switched to Dynamics five years ago and made all of their companies to work in the same way with the same chart of accounts and everything, but they have not been involved centrally in the implementation process in different countries. When they started looking at the details, they discovered that the countries interpreted things freely and it was not at all the same thing. Now they are giving it a second round with much more centralized control. However, they are satisfied with the system itself.” (Company C)

As beforementioned, the subsidiary schools in the company A were responsible for their own budgeting processes and their budgets differed substantially, making the comparison between the schools difficult.

“All the different subsidiaries create the budgets on the different detail level, which makes it hard to do the analysis in the system, depending on the detail level one has
chosen. [One of the schools] has a very detailed budget in the ERP system, very detailed budget in Excel […] they can follow up based on the year, project, object, human resource, account and person.” (Company A Accountant)

The same applies to the spreadsheets.

“There is always a vulnerability with the Excel and the manual manipulation, it is up to those who use Excel to do it in a right way.” (Company A Group Controller)

6.4. Choice of the IS for the MAT application

Spreadsheets and IS outside of the ERP systems were widely used for the MA practice in the studied cases, which is in line with the previous research (Scapens & Jazayeri, 2003; Seethamraju, 2015; Uppatumwichian, 2013; Zarzycka, 2012). The data was generated in the ERP systems and refined or simplified outside of the ERP system, according to the purpose.

“[The accounting data] is registered and produced in the ERP system and you have the flow of orders and production through the ERP system but then all these data are exported and refined in a BI system and it is there you look at it. You do not use the ERP as a tool to look at these data.” (Company C)

Company C and E stated that they use their ERP systems for accounting transactions mostly.

“SAP R/3 is our transaction system. […] We take them [reports] out in Excel and refine them, reformat them. Most of the reports are presented in PowerPoint to the board.” (Company E)

“ERP is a transaction engine when you look at the data outside of the ERP system.” (Company C)

In previous research, the inflexibility of the ERP systems was identified as a major factor for performing MATs outside of the ERP systems (Uppatumwichian, 2013; Teittinen et al., 2013). This is confirmed by this study; flexibility was frequently mentioned by the interviewees as the reasons to why the MATs were exercised outside of the ERP systems. High costs for customization of the ERP systems discouraged the companies from making the ERP system more flexible and adjusted to their operations. In line with the previous research (Scapens & Jazayeri, 2003), the speed of performing the calculations was another factor for choosing other systems rather than the ERP systems.
We have chosen Excel since it is a faster and a cheaper solution and we can get it [reports] as we want it. Otherwise you would have to build the reports in Agresso [ERP system], and that would be very expensive.” (Company A Accountant)

“It is much easier to do things over [in the BI systems], more flexible. To implement something new in the ERP system if you want to change the Management Accounting – it can be quite expensive and very complicated. You must be sure that you know what you want to do. […] You can test more in the BI systems, use different layers on top of each other, it is more flexible, you can test things and calculate things faster and new key figures outside of the ERP system. This is at least our experience.” (Company C)

Company A, however, considered even the BI systems as expensive and continued to use spreadsheets. As mentioned before, company A’s operations were very stable, since they could rely on the stable income from the government grants.

“We discussed [implementing BI systems] that it is not so bad, but it costs a lot. You must look at the usefulness for the operations. In this [Education] industry, the need is not so big.” (Company A Group Controller)

Uppatumwichian (2013) investigated the budgeting functions in the ERP systems, the study found that complex forecasts lacked the support in the ERP systems. Production unit in the agricultural company C required very detailed and complex analysis.

“Production makes very detailed analysis to be able to understand the raw material cost or low occupancy, if there are too many employees, too few employees. There is a lot of breaking down going on in the production. […] There are many systems involved there” (Company C)

Within budgeting and forecasting, the ERP systems provided least support, in line with Uppatumwichian research (2013). The budgeting data from previous years was exported to Excel or a BI system to inherit the dimensionality. The created budgets were then imported to the ERP systems. Forecasting was not possible in the ERP systems either, except for the cash-flow forecasts. Company A lacked especially the ability to use multiannual budgets for the multiannual research projects. The
ERP systems did not provide an interface to compare the economic data across different years and subsidiaries.

However, the present study found that some tasks could be too simple for using the ERP system for the MATs.

“We use Excel for quick calculations and to play around with figures and tables. It is much simpler.” (Company B)

The changing environment and the level of uncertainty a business faced were other factors for the choice of the IS for the MATs.

“In the changing environment we live in today, it is good to have flexible systems, where you can quickly reset. Excel is extremely flexible.” (Company D)

“We wish that our jobs were not required, that all the reporting would be created automatically, but it isn’t so. We must make sure to control the figures. [...] The prerequisites are frequently changing. Reorganizations take place from time to time. Our markets are changing, the customers require different things, the economic situation changes. Thus, we need to look at different figures at different times.” (Company E Business Controller in Engines Sector)

“Generally, the support for these techniques is very important for businesses where it is difficult to make forecasts. One can be grateful that this business is so static, you know the income and the costs to almost 90%. “(Company A Group Controller)

Visual presentability was another factor. Logistics company B used a custom-built interface SIRE for the presentation of reports.

“No, we do not use Oracle [ERP system], we use SIRE to compare [the outturn against the budget] in an easy way.” (Company B)

Company A used spreadsheets because it was easier to present the data in the spreadsheets than in the ERP system.

“We could for sure get it [reports] clearer in Agresso if we invested in it, but the system is not so pedagogical and it is not so nicely designed. It is not esthetical. We
have chosen Excel, because it is a faster and a cheaper solution and we can get it [the reports] as we want them.” (Company A Accountant)

According to Teittinen et al. (2013) the ERP system’s shortage of time, lack of Information Systems skills and the ERP system’s maintenance can influence whether the ERP system is used for the MATs. Agricultural company C named the system integrity and personnel training as the reasons for using BI systems.

“There are even other users that inspect the data, other than the accountants, these people you do not want to get into your ERP system. It will be too complicated to educate them.” (Company C)

The company A named the shortage of time and IS skills as the reasons for using spreadsheets.

“[Some things] you do not know, you have to learn them [in the ERP system]. There are good user manuals but they are several hundreds of pages long. […] More people can Excel than a certain system like Agresso, we had quite a turnover of staff. If you have a new person coming in, then they can Excel but it is not certain that they can this ERP system.” (Company A Accountant)

Companies A and B would prefer to have all in one system. Both companies used manual export and import of data. In case of the company A it was spreadsheets the data was exported to and imported from, and in case of the company B it was the custom-build interface SIRE and spreadsheets. Company C and company D were quite satisfied with their current setting. These companies C and D had a higher level of integration and automation between their ERP systems and BI systems. Company E wished that their jobs would not be required at all, that there would be some sort of automation of the reports creation, however, due to the changing prerequisites the economic data required human manipulation. Company E was satisfied with how things were, considering the size of the group.

“[It would be good] to have system support for everything, or as much as possible.” (Company A Group Controller)

“I’d rather have one single system for everything.” (Company B)

“You have to have some sort of common ground in the dimensionality and the accounts and so on. As little as possible should be entered in the books manually
and things should be integrated with BI systems. […] ERP is a transaction engine when you look at the data outside of the ERP system.” (Company C)

“I do not see any reasons to do things differently.” (Company D)

“You can always wish for something else, you always do; that things would look flashier, simpler and that everything would just roll on. The world does not work that way. We have our figures and we must toss the figures around back and forth. We have to do that. […] We use SAP and it works as it does. It could be as bold as some kind of Facebook, but that is not the case.” (Company E)
7. Discussion

This paper’s focus lies in investigating the factors that influence the use of MATs through the ERP systems and in suggesting a further development in the field.

The following factors have been identified in the studied companies in the relation to the first research question.

RQ1. “What are the underlying factors that influence the use of the Management Accounting Techniques through the ERP systems?”

1. **Business Complexity and the Level of Uncertainty** – the more complex businesses with higher level of uncertainty use more complex MATs and require more advanced tools for managing them. Abdel-Kader & Luther (2008) found that larger companies tended to use more sophisticated MATs and Armitage et al. (2016) found that more complex businesses require more complex information. This was demonstrated by the companies A in Education and C in Agriculture. The Company A acted in the public sector and used least MATs and only spreadsheets as an analysis tool, whereas Company C with more complex operations used nearly all of the presented MATs and a wide variety of BI tools for analysis.

2. **Presentability of the Economic Data and the Reporting Function** – the creation of the reports requires presentable format, understandable for non-accounting personnel. This factor was mentioned by all of the interviewed companies, except Company D, and was one of the frequently mentioned reasons for choosing other IS rather than ERP systems.

3. **Flexibility and Easiness of Use** – different businesses have different needs at different times. The controller should be able to manipulate the accounting data easily in a desired way. This factor was frequently mentioned by all of the interviewed companies. In previous research, the inflexibility of the ERP systems was identified as a major factor for performing MATs outside of the ERP systems (Uppatumwichian, 2013; Teittinen et al., 2013).

4. **Time Consumed** – the controllers choose the application domain for calculations that would require the least time. Companies A, B and C referred to ERP systems as more time-consuming than other IS which led to using BI tools and spreadsheets for analysis. This notion is in line with the previous research (Scapens & Jazayeri, 2003).

5. **Dimensionality and Consolidation of the Economic Data** – if the economic data in the ERP system is not registered accurately according to the required dimensions, it would be difficult to
consolidate the data for comparison. In case of a deviation, the analysis of data would take place outside of the ERP system. All of the interviewed companies stressed the importance of the accounting data being registered according to chosen parameters as project, cost and profit centres, and so forth. Sánchez-Rodríguez & Spraakman (2012) found that the ERP system's implementation led to standardization of the accounting data gathering and to a greater detail of the accounting information.

6. **Automation of the Economic Data Allocation** – if the ERP system provides the support for automatic allocation of income and costs, other Information Systems would not be required. Sánchez-Rodríguez & Spraakman (2012) found that the ERP system’s implementation led to automation of the accounting data gathering. Automatic data registers were stressed by all of the interviewed companies.

7. **Cost of Customization** – if the customization can be achieved by cheaper means (BI systems or spreadsheets) than through the ERP systems, other cheaper means are used. In case of the Company A in Education sector, spreadsheets were used as a cheaper alternative to the ERP system customization. Company C in Agriculture used BI tools as a cheaper alternative.

8. **Lack of Information Systems Skills and Personnel Training** – if the ERP systems are too complicated for educating the personnel how to use it, the ERP system will not be used. Companies A and C stressed how complicated it can be to educate personnel in the ERP systems. Companies A and D mentioned wide application of spreadsheets and that every accountant knows Excel, which makes it a universal tool. According to Teittinen et al. (2013) lack of Information Systems skills can influence whether the ERP system is used for the MATs.

9. **Data Integrity** – non-accounting staff is unauthorized to use the accounting functions in the ERP systems. As a result, the required economic data is presented to these unauthorized users in other domains, such as BI systems, Spreadsheets, PowerPoint or other Information Systems. Company C especially stressed this factor for choosing other IS rather than ERP systems.

The ambition of this paper was to look at the different groups of MATs and their application in the ERP systems and to suggest a further development in the field. In line with the previous research (Dechow & Mouriisen, 2005; Rom & Rohde, 2007; Trigo et al., 2016; Uppatumwichian, 2013; Zarzycka, 2012), this paper found more evidence for the Financial Accounting support in the ERP Systems rather than the Management Accounting. When exercising Management Accounting, the
companies in this study relied mostly on other tools as spreadsheets and BI, in line with Zarzycka’s findings (2012). Within the Product/Service Costing and the Responsibility Centre Reporting the ERP systems provided good support for the Registration and Allocation of Data. However, the analysis in these two groups of MATs was conducted in other systems. Within the MAT group Analysis for Decision-Making, the ERP systems provided good analytical tools only for the Financial Statements. Budgeting had least support in the ERP systems. The budgets were created in other IS and imported to the ERP systems.

Registration and Allocation of the Accounting data had higher application in the ERP systems than the analysis of the accounting data. This can be attributed to the automatic allocations and dimensionality features in ERP systems. This is in line with Sánchez-Rodríguez & Spraakman (2012) who found that the ERP system’s implementation led to automation and standardization of the accounting data gathering and to a greater detail of the accounting information. The analysis of the accounting data took place elsewhere. However, it is essential to consider if the ERP systems must be altered to match the MATs performed outside of these ERP systems or if it’s better to use alternative solutions. This paper found evidence that more complex businesses preferred to use the ERP systems as the transaction engine and to perform the MATs in a customized way in alternative systems. Businesses with simpler operations preferred to have an all-in-one solution, however those simpler businesses did not integrate the ERP systems with their alternative systems. One can speculate that if these simpler businesses had greater integration possibilities, they might not prefer all-in-one solutions.

The notion of the changing needs in the changing environments by the interviewees suggests using the ERP system as a solid base of the Integrated Information Systems in form of a transaction engine, and customizing the needs through alternative integrated sources. This notion is in line with Trigo et al. (2016) who argued that the ERP systems were built with transactions and not business processes in mind.

The following windows for the potential development of the ERP systems in the Management Accounting field have been identified in relation to the second research question. They were derived from the first research question.

**RQ2. “How can the ERP systems functionality be matched to the required Management Accounting Techniques in case of a mismatch?”**
1. **Intuitive and User-friendly Interface** – the ERP systems can improve the user-friendliness of the interface to make the training of the accounting personnel faster. User-friendly interface can help the non-accounting staff with limited user privileges to keep track of their own responsibility centres in a simpler way. One can speculate if the ERP system providers choose to deliver complex, not so intuitive and not so user-friendly interfaces, since they can increase their revenues by providing the additional personnel training to the customers.

2. **Visualization of the Reports** – the ERP systems could provide more advanced report administration tools to allow the controllers to create their own report layouts and to choose the data parameters for the reports.

3. **Multiannual budgets** – it should be possible to create multiannual budgets for subsidiaries, units or specific projects. The ERP systems should provide an interface for comparison and the sum of data across a period of several years.

4. **Better Dimensionality and Consolidation tools** – these tools could assist the companies in creating the desired parameters for the follow-ups and ensuring the identical implementation of the ERP systems across the organization. In the end, it is all dependent on the end-user as this study demonstrates and identical implementation may not be achieved. The ERP systems could provide tools, guidance and constraints for the identical implementation of the ERP systems across the subsidiaries of a group.

5. **Increased Integration Possibilities with Other Information Systems** – with more alternative solutions outside of the ERP systems, the requirements for the integration are rising.

6. **DIY Possibilities and the Cost of Customization** – the ERP system providers benefit from the customization of the ERP systems, since it implies extra revenue. Jeacle (2017) investigated the growth of the DIY activities from the Actor Network Theory point of view. The DIY came about as a solution to the shortages of labour and cost-saving which made companies provide DIY products and services to customers (ibid.). The DIY trend became subsequently a question of interest and alliances of stakeholders who shared a common goal (ibid.). Jeacle (2017) argues that the accounting as a discipline can act as a device for strengthening the network between the involved actors in the DIY, since it together with other calculative practices can highlight the money-saving aspect of the DIY and to strengthen the actors’ relationship and the bond to the DIY phenomenon. Based on the Jeacle’s findings, I could further argue that the accounting as a discipline can itself benefit from the DIY practices within the management Accounting, since the ERP system providers can save money on the
personnel and the ERP system users can save time and money by using DIY tools in the ERP systems. However, these DIY tools should not affect the integrity and security of the ERP systems. Additionally, it would require advanced Information Skills from the MA practitioners.

7. **Automation and Artificial Intelligence (AI)** - IDC predicts that 40% of the large companies will store at least 60% of their ERP in a public cloud and that 30% of Global 1000 CEOs will be planning a strategical shift from human resources to intelligent systems that will cut through organisations’ processes and functions by 2020 (North Rizza, 2016). This implies a shift towards machine-to-machine, less human-dependent cloud solutions. It is reasonable to assume that this shift will have a tremendous impact on the accounting as a profession. One of the interviewees expressed a wish that their jobs were not required and the MATs could be managed automatically in the future. MA deals with the decision-making and one can only speculate if the AI will take other the decision-making processes within the accounting industry. The ERP systems have already helped to save time and cut the accounting personnel within the Financial Accounting (Teittinen et al., 2013; Kanellou & Spathis, 2013). I could argue that with the help of AI, the ERP systems will do the same within the Management Accounting in a distant future.
8. Conclusion

Since the previous research suggested higher level of support for Financial Accounting rather than Management Accounting in the ERP systems (Dechow & Mouritsen, 2005; Rom & Rohde, 2007; Trigo et al., 2016; Uppatumwichian; 2013; Zarzycka, 2012), this study aimed to investigate the reasons behind the use of the Management Accounting Techniques though the ERP systems or other Information Systems and to suggest a further development in the field. This study addressed the phenomenon in a greater detail by covering all the major MATs (Armitage et al., 2016) and being able to map the application of the MATs through the ERP systems and other IS.

Application of the Management Accounting Techniques was studied in five large companies through a comparative case study. Qualitative study was chosen due to the exploratory character of the study. The studied companies differed in the complexity of the operations and the industry. The variation in cases and the greater number of cases are beneficial for the interpretation of the results (Merriam, 2014).

Trigo et al. (2016) argued that the ERP systems were built with the focus on the accounting transaction registration. This study can confirm, that the studied ERP systems acted as accounting transaction generators. The main conclusion of this study is that the large companies benefit from using the ERP systems as their accounting transaction engines, where all the accounting data is registered according to the desired dimensionality parameters, and using other customised integrated systems for the analysis of the accounting data. In this way, large companies can achieve the consolidation of data and streamlining of the MA practices, together with the flexibility that other systems, like BI, offer. It is important to consider in which direction ERP systems should develop in the future: towards consolidation and serving as standard transaction engine or towards customization and giving the customization tools to the users.

The ERP systems in the studied companies provided good tools for the registration and allocation of the accounting data, which is a combination of the FA practice and the MA practice, in line with the previous research (Sánchez-Rodríguez & Spraakman; 2012). However, most of the analysis was performed outside or the ERP systems in BI systems, spreadsheets or a custom-built software. By complementing the ERP systems with other systems, the companies could achieve a satisfying level of customization to an acceptable price. Companies with non-integrated systems were less satisfied.
with the ERP systems implementation than the companies with high level of integration of their Information Systems.

Among the main factors influencing the use of the MATs through the ERP systems are

1. Business complexity and the level of uncertainty,
2. Presentability of the economic data and the reporting function,
3. Flexibility and easiness of use,
4. Time consumed,
5. Dimensionality and consolidation of the economic data,
6. Automation of the economic data allocation,
7. Cost of customization,
8. Lack of information systems skills and personnel training,
9. Data integrity.

The ERP systems can be improved in terms of the MA functionality in the following fields:

1. Intuitive and user-friendly interface,
2. Increased visualization of the reports,
3. Multiannual budgets,
4. Better dimensionality and consolidation tools,
5. Increased integration possibilities with other information systems,
6. DIY possibilities and the cost of customization,
7. Automation and Artificial Intelligence.

The author welcomes the future of DIY software where users could build their own ERP systems with modules much like the LEGO® blocks by drag-and-drop functions, create flexible reports in a similar way directly in the ERP systems, and use as little manual data entry as possible.

The accounting information and practice in general are sensitive to disclosure. The interviewed companies may not have revealed their practices and routines completely, and therefore limited the interviewees’ answers. The scale of this study was rather small, which might make it harder to draw definite conclusions. The qualitative nature of this study might not allow the application of the results to the broader scale. The studied companies were large in size, so the findings might not be applicable to smaller companies.
It was my profession that inspired the research topic as I find ERP systems and Management Accounting very fascinating. However, as a practicing accountant myself, it was important to separate my profession from this research, as to avoid bias. To do this, the role of an actor and a researcher had to be separated, which is why I chose not to act on the research but to summarise the findings with the guidance according to Holme & Solvang (1991). I tried to keep the interview questions open as not to lead the interviewees and let the interviewees to check how correctly their answers were interpreted. From a professional point of view, this research has contributed to my understanding of IS choice when exercising Management Accounting and the dilemma of standardization vs. customization of ERP systems.

Due to the short timeframe, the participating companies were interviewed only once. It would be interesting to conduct a second round of the interviews and to discuss the present findings with the participants. With the current findings at hand, it would be interesting to extend the study to a quantitative form and to test the present findings through the hypotheses testing in large companies. In that way, the findings could be further generalized or disregarded. Future studies can use these findings for studying the ERP system providers and their views on the future of ERP systems.
References


Appendix 1 Case Study Protocol

The layout is adopted from the “Table of Contents of Protocol for Conducting Case Studies of Innovative Law Enforcement Practices” (Yin, 2009).

Glossary

MA – Management Accounting

MAT – Management Accounting Technique

ERP – Enterprise Resource Planning system

A. Introduction to the Case Study and the Purpose of the Protocol

1. Research Questions
   a. “What are the underlying factors that influence the use of the Management Accounting Techniques through the ERP systems?”
   b. “How can the ERP systems functionality be matched to the required Management Accounting Techniques in case of a mismatch?”

2. Assumptions
   Though the case study does not involve hypotheses testing, it is built on some assumptions.
   a. The ERP system's functionality is not optimised for the Management Accounting Techniques.
   b. There are different reasons to why ERP systems do not provide sufficient MA functionality.
   c. The ERP system’s functionality can be improved with respect to the Management Accounting Techniques.

3. Propositions
   a. To interview controllers in 5 companies.
   b. Map WHAT Management Accounting Techniques are used most frequently (identify from literature beforehand).
   c. Map through (HOW) which domain the MATs are used (ERP, spreadsheets, etc.)
   d. Map WHY the MATs are used as they are used.
   e. Suggest improvements for the future ERP development (Big Picture).

4. Theoretical framework
   a. Management Accounting Techniques in general.
b ERP application in Management Accounting and factors affecting it.
c The Management Accountant role.

5. Role of the Protocol
a To provide guidance for the study.
b To keep focus on the big picture.

B. Data Collection Procedures
1. Companies to be visited and the contact persons
   a University
   b Logistics company
   c Agricultural Company
   d IT-company
   e Manufacturing Company
2. Data Collection Plan
   a After the research questions approval, contact the companies.
   b Schedule the interviews in April (Skype or in person).
   c Transcribe the interviews.
   d Send the transcribed material to the respondents to double check the correctness.
3. Preparations before the visits
   a Make a list of the MA Techniques from literature.
   b Prepare the Interview Manual.
   c E-mail the Case Study information to the participants.
   d Bring the Interview Manual.
   e Paper, pen, voice recorder.

C. Outline of the Case Study Report
1. MA techniques used.
2. Chosen domains for the MA techniques (ERP, spreadsheets, etc.).
3. Factors influencing the ERP systems application within the MA techniques.
4. Room for the ERP systems improvement.

D. Case Study Questions to be answered by the investigator of the case
1. What MA Techniques are used?
2. What are they used for?
3. Through which domain are MA Techniques used (ERP, spreadsheets, other software)?
4. Why are MA techniques used through this domain?
5. How do the participants wish to use these techniques?
6. How can the use of the MA techniques through ERP get better?

E. Evaluation

1. What major factors, influencing the ERP application in MA techniques, have been identified?
2. What major obstacles have been identified for the use of the ERP within the MAT field?
3. How can the ERP systems be improved to assist the MA techniques?
Appendix 2 Interview manual

Glossary
MA – Management Accounting
MAT – Management Accounting Technique
ERP – Enterprise Resource Planning system

Interview Questions

1. Basic information about the company.
   1.1. Company Name
   1.2. Employee Name
   1.3. Position
   1.4. Number of Employees
   1.5. Balance Sheet Total for 2016
   1.6. Turnover Total for 2016
   1.7. Industry
   1.8. Year of Establishment
   1.9. Confidentiality clause – Yes/No

2. What Enterprise Resource Planning (ERP) System is used at your company?
   2.1. When was the ERP system implemented?
   2.2. Are you satisfied with the ERP system? Why or why not?

3. What Management Accounting Techniques (MAT) are used in your company and how do you use these techniques? i.e. which tool do you use to apply the used Management Accounting Techniques respectively (Spreadsheets, Enterprise Resource Planning System, third-party software, etc.)? Examples below.

   **Most Common Management Accounting Techniques (Armitage, Webb & Glynn, 2016)**
   defined by Bhimani, Horngren, Datar, & Foster (2008).

<table>
<thead>
<tr>
<th>Product/Service Costing</th>
<th>Responsibility centre reporting</th>
<th>Analysis for decision-making</th>
<th>Budgeting</th>
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<tbody>
<tr>
<td>Formal costing system</td>
<td>Segment reporting – refers to a subunit of an organization</td>
<td>Variance analysis – difference between the budget sums and the actual outcome analysed through the accounting system.</td>
<td>Operating budgets – budgeted income statement.</td>
</tr>
<tr>
<td>Standard costs – carefully predetermined cost related to the unit cost of inputs or outputs</td>
<td>Responsibility centre reporting – reporting of a subunit of an organization where the assigned manager is accountable for a certain set of activities.</td>
<td>Capital spending analysis – discounted cash flow, Internal Rate of Return, Net Present-Value.</td>
<td>Flexible budgets – the budgets are developed using the budgeted revenues and costs that are adjusted with the variance computed.</td>
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<td>Variable costing – direct costing, all variable production costs are included as inventoriable costs, the fixed costs are excluded.</td>
<td>Cost allocations – assignment of indirect costs to a specific cost object.</td>
<td>Overhead analysis – operating costs analysis; all costs except of the costs of goods sold.</td>
<td>Capital budgets – long-term planning budgets with investment decisions.</td>
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<tr>
<td>Target costing – target profit per unit minus the target price.</td>
<td>Transfer pricing – the price that one subunit of a company charges for a service/product to another subunit.</td>
<td>Cost behaviour analysis – changes in costs due to a change in a cost driver (e.g. production volume).</td>
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<td>Quality costing – costs occurring to prevent a production of a low-quality product.</td>
<td>Balanced scorecard or other strategic tools – a business unit’s performance is valued through four perspective: learning and growth, financial, customer, internal business processes.</td>
<td>Financial statement analysis – analysing income statements and balance sheets, cash flow analysis.</td>
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<tr>
<td>Activity-based costing (ABC) – focus on activities as the main cost objects assigned to products, services, customers</td>
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4. Are there any MATs you wish to perform, that are not currently performed?
5. Why are these MATs not used by your company?
6. What are the reasons for applying these techniques in that way? (Why spreadsheets and not the ERP for example).
7. Do you plan to change the application of these techniques (new software, etc.)?
8. In a perfect setting, how do you see these MATs performed?  

*Thank you for participating!*