

The Purposes of Performance Dashboard Use: A Case of a Procurement Performance Management SaaS Provider.

Information Systems Science

Master's thesis

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ABSTRACT

Objectives of the Study

The main objective of this study is to find out how do end-users of the Case Company use performance dashboards to support decisions for measuring and managing procurement performance.

Academic background and methodology

Performance dashboards are a type of performance management system that brings together key performance metrics of an organisation or an individual on one display. A visual interface of performance dashboards is just a small part of what most users see. However, this information system for decision support is built on business intelligence technology as well as performance management and measurement principles. The relevant theory on performance dashboards, procurement performance management based and instruments of evaluating Information System Use were reviewed. Furthermore, a case study in the form of an online survey and semi-structured interviews was conducted with three client companies of the Case Company that provides its procurement performance management dashboards on software as a service basis. The Doll and Torkzadeh's tool for multidimensional measurement of system-use was applied in an online survey to identify usage purposes. The results from the survey were qualitatively confirmed and enriched with the evidence from the semi-structured interviews conducted with the selected end-users.

Findings and conclusions

The main finding of the research was that the Case Company's application was most extensively used by strategic level employees, primarily for communication and decision rationalizing purposes. Moreover, the application is most valued by the client companies for enabling a consolidated view on purchasing by integrating data from different sources of an organisation; its ability to tackle an analysis of direct and especially indirect spend; and its function as a convenient communication platform between different business and geographical units of an organisation.

Keywords

Performance Dashboards, Procurement Performance Management, Procurement Performance Measurement, Spend Analysis, Purposes of Dashboard Use, Information System, Decision Support System, Business Intelligence

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Finally, I would like to especially thank my friends and colleagues for proof-reading this paper. I let the reader decide which chapter has Canadian English, American English, British English, Mexican or Finnish influence.

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LIST OF ABBREVIATIONS

BI - Business Intelligence

CPO – Chief Procurement Officer

DSS - Decision Support Systems

ERP – Enterprise Resource Planning

etc. – from Latin *et cetera* (and so on)

e.g. – from Latin *exemplum gratia* (for example)

i.e. – for Latin *id est* (that is)

IS - Information Systems

ISU – Information System Use

IT – Information Technology

KPI - Key Performance Indicators

MIS - Management Information Systems

OLAP – Online analytical processing

PC - Procurement Controlling

SCM - Supply Chain Management

SPM - Savings Program Management

SCS - Supply Chain System

1. INTRODUCTION

Executive Information Systems (EIS) introduced in the 1980's were predecessors of modern dashboards and were the first attempt to deliver relevant information to executives at their fingertips. However, that was not their time back then as the technology could not deliver the appropriate visual and functional capabilities. Meanwhile, the technology progressed with revolutionary speed. Managers became surrounded by an increasing amount of information (Paine, 2004). Armed with significantly more advanced Business Intelligence architecture and taking into force Performance Management as a powerful strategic ally, dashboards returned to the business world in the 2000's, this time with huge success. Dashboards were finally able to deliver a much needed relief to information overloaded managers in the fast changing business environment. (Sauter, 2011; Rasmussen et al., 2009)

This chapter will start with the background and motivation for this study followed by formulation of the research problem, the thesis structure, and glossary of the key concepts used in this paper.

1.1. Background and Motivation

Enabled by rapid development in information systems and technology, companies nowadays create a massive amount of transaction data. McAfee and Brynjolfsson (2012) insist that an increased availability of relevant data is changing decision-making cultures in organisations. The past analytics, which due to unavailability of needed quantitative data often relied on intuition and experience of management, are being replaced by decisions based on facts. Performance of an organisation can now be better measured and managed. While the previously mentioned abundance of data helps managers to make better decisions, it also burdens them with information overload. Performance dashboards successfully address this problem with an effective visualisation of large amounts of data to allow managers to slice-and-dice it for better analysis, insight and discoveries. Additionally, it helps to reduce the cognitive pressure of information overload by keeping focus only on selected key performance parameters.

Performance dashboards are, in fact, performance management systems that display key performance metrics on one screen. They intersect two powerful disciplines: business intelligence and performance management. If performance management takes care of principles and processes for business execution, business intelligence delivers technical solutions. (Eckerson, 2011)

The previously mentioned trend also influences performance management and measurement in procurement and supply chain management (Monczka et al., 2011). While there are consultant-oriented materials about dashboards and some textbooks (Few, 2006; Eckerson, 2011, Rasmussen et al., 2009), the academic world is relatively quiet about which decision purposes dashboards are used for (Pauwels et al., 2009; Yigitbasioglu and Velcu, 2011). Even less is known about how performance dashboards are used in procurement performance management.

To find out for which purposes performance dashboards are used in procurement performance management, a case study was conducted by the author. To the author's knowledge, this will be the first case study on performance dashboards in procurement performance management. The Case Company provides procurement performance management dashboards as a service. There is not much known about how the end-users use the Case Company's application to support their day-to-day decisions (Service Manager, Project Manager, the Case Company, 13.12.2012, interviews). Together with management of the Case Company, three client companies were chosen for online survey and interviews.

Information system use (ISU) is critical for an information system (IS) success and links directly to the user satisfaction with the system (e.g., DeLone and McLean, 2003). As it was previously mentioned, the Case Company provides its procurement performance dashboards as a service, which means that user satisfaction with the system is of a high importance for this business model. This study will benefit the Case Company as it would narrow the gap between the company's knowledge of the software capabilities and the extent the end-users actually use the software. Moreover, this information could be used by application engineers, project managers and service managers of the Case Company to ensure continuous improvement of the system, service, customer support, and training practices. Furthermore, this case study would supplement the research gap on how performance dashboards are used in procurement

performance management. To the author's knowledge, the majority of the literature on integrating end-user requirements for decision support systems such as performance dashboards concerns the design and implementation phases (e.g., Bremser and Wagner, 2013). However, software vendors increasingly deploy new business models such as offering dashboards as a service (Pauwels et al., 2009) which raises the need for revisiting user requirements in the post-implementation phase as a part of a better service (Wilkin and Davern, 2012).

1.2. Research Problem and Objectives

The aim of this thesis is to narrow the gap between the Case Company's knowledge of the capabilities of their software and the extent end-users actually use it to support their decisions. The extent of an information system's use is directly linked to customer satisfaction and an information system's success (DeLone and McLean, 2003), which is essential for the Case Company as it provides its software as a service. Furthermore, this thesis addresses the gap in measuring and managing procurement performance and information system research on performance dashboard use for decision support. The following research problem has been identified for the scope of this thesis: How do end-users of the Case Company use performance dashboards to support decisions for measuring and managing procurement performance?

To answer the above-mentioned research question, the author has set the following objectives for this study:

- 1) Reviewing relevant literature on performance dashboards to find out what is known about their use purposes;
- 2) Setting the context of performance dashboard use in measuring and managing procurement performance;
- 3) Selecting and evaluating an appropriate tool to measure the extent of an information system's decision support;
- 4) Identifying the end-user groups of the Case Company's software;
- 5) Finding out for which purposes and to what extent end-users use the Case Company's application to support their decisions.

1.3. Thesis Structure

Due to the limited amount of academic publications on performance dashboards, their use purposes in general and in particular on their application in the context of procurement performance management, the first part of this thesis (chapter one to four) is dedicated to building a theoretical background for understanding the context of procurement performance dashboards rather than a literary review.

Due to the limited amount of academic publications on performance dashboards, their use purposes in general, and in particular on their application in the context of procurement performance management, the first part of this thesis (chapters one to four) is dedicated to building a theoretical background for understanding the context of procurement performance dashboards rather than a literary review.

The first part of the thesis starts with this chapter, explaining the background and motivation of the work, as well stating the research problem and providing a glossary of the key concepts used in the paper. Chapter two explains what performance dashboards are, how they are connected to business intelligence and performance management, as well as their underlying architecture. Chapter three introduces procurement performance management enabled by spending analysis to give a business case of the Case Company's solution and dashboard business use. Since performance dashboards are in core information systems, chapter four lists information system evaluation tools, followed by chapter five, in which research design is discussed, an appropriate tool is selected for the case study, and method for data collection is chosen.

The second part of the thesis is a case study with three of the Case Company's clients taken as practical examples on how dashboards are used in procurement performance management. In chapter six, the Case Company is introduced and findings from the survey and interviews are discussed.

Chapter seven concludes the thesis with implications for practical and theoretical contribution.

1.4. Glossary of key concepts

Balanced Scorecards. The central idea behind balanced scorecards is that performance measurement should be tied to a strategic direction of an organization with the help of four perspectives: financial, customer, internal business processes, and learning and growth (Turban, 2011; Kaplan, Norton; 1996).

Business Intelligence (BI). Negash and Gray (2008, p.175) define BI as a data-driven Decision Support System for data gathering, data storing, analysis and knowledge management to support the decision process.

Data Warehousing. Data warehousing is collecting, integrating and organizing data from various sources in the organization to enable decision support, access to the business information, and business insight creation. (Turban, 2011)

Decision Support Systems (DSS). Some definitions of DSSs emphasize the hardware and software aspects; while others are focused on the decision maker. There are also definitions that describe DSS from user interface, data flow, and job function description. (Ogle and Yeagley, 2006) This essay views DSSs from the analytical lens. Hence, for the purpose of this essay, the following definition will be used: “*A Decision Support System (DSS) is an interactive computer-based system or subsystem intended to help decision makers use communications technologies, data, documents, knowledge and/or models to identify and solve problems, complete decision process tasks, and make decisions.*”(dssresources.com, 07.01.2013)

Information System (IS). Simply defined, an information system is a combination of components, such as hardware and software for data processing and information creation. (Oz, 2009, p.13).

Information System Use (ISU) in this thesis is referred as the extent that user utilizes the IS to perform the activities at work which this system was created to support (Sun and Teng, 2012, p.1564).

Key Performance Indicators (KPIs). Key performance indicators are strategic objectives and performance measures against the goal. They can be lagging (outcomes, e.g. profitability) or leading (drivers, e.g., sales and costs). KPIs have a variety of features: they are strategic objectives; measure against specific targets; have performance ranges; are encoded in software to

enable visual display, have time frames and benchmarks. (Eckerson, 2011) KPIs are used in balanced scorecards developed by Kaplan and Norton (1996).

Performance Dashboards. In essence, performance dashboards are visual and interactive performance management systems that gathers the KPIs and most important information on one display (Yigitbasioglu and Velcu, 2011). Eckerson (2011, p.11) explains a performance dashboard as an information system that displays information to users so that they can monitor, measure and manage business performance more efficiently. His definition recognizes an interactive nature of modern dashboards as tools powered by business intelligence, their functionality as an information system and the performance management principles they represent. In this paper, performance dashboards are referred to as performance dashboards, and dashboards interchangeably.

Performance Management System. Business performance management is a series of business processes and applications designed for optimizing development and execution of the strategy. In performance management there are two main aims to be accomplished: an effective strategy execution by facilitating the creation of key performance metrics and objectives; and supporting management of performance to reach those goals (Frolick and Ariyachandra, 2006). Business performance management can be referred to as corporate performance management, enterprise performance management, operational performance management, or strategic enterprise management (Turban et al., 2008; Rasmussen et al., 2009). Many refer to business performance management (e.g., Eckerson, 2011) with a more generic term- performance management- which will be used throughout this thesis.

Performance Measurement System. Performance measurement systems help decision makers in measuring implementations of business strategy by comparing achieved results against the organizational goals and objectives. They consist of systematic methods of setting business goals and periodic feedback reports to indicate progress against goals (Turban, 2011). Performance measurement systems rely heavily on key performance indicators and balanced scorecards. According to Quinn (2010), performance management uses business intelligence's tools such as performance dashboards to communicate and monitor strategy and its progress towards the goals. For instance, top management may define KPIs (both financial and non-financial) to be monitored and achieved and communicate them down the organizational hierarchy and monitor

them with the help of dashboards. KPIs may be linked to balanced scorecards to monitor KPIs; and consequently to strategy maps to identify relationships between different KPIs (Kaplan and Norton, 1996).

Procurement Performance Management. Procurement Performance Management has not been defined or mentioned yet as a concept in the literature or in scientific publications. However, this concept exists as a solution offered by the Case Company. In this thesis procurement performance management is referred as a set of key performance measures and objectives for procurement performance strategy execution as well as conceptual and technical support in reaching those goals. Hence, procurement performance management is closely tied to procurement performance measurement, but provides solutions for the strategy execution based on those measures.

Procurement Performance Measurement. Procurement performance measurement is an approach to monitor and evaluate purchasing performance. This is enabled by setting different performance measures in order to compare and track the actual progress against the historical or/and benchmark performance or/and the objective. Procurement performance measurement provides a systematic approach to evaluate and monitor purchasing performance and enables better decision making, supports better communication, provides performance feedback as well as motivates and directs employee behaviour towards desired results. (Monczka, 2011)

Spend Analysis. Spend analysis according to Monczka's et al. (2011) definition is a tool to track an organization's spend according to who is buying, how much is being spent, what is being bought and from which suppliers. The ability to access, manage, and analyze spend based on timely, accurate, and detailed data is the first instance in developing sound sourcing strategies, spotting savings opportunities and areas of critical importance, monitoring contract compliance, comparing against the allocated budget, and communicating strategies to top management. (e.g., Minahan, 2005; Limberakis, 2012; Turner, 2011; Dwyer, 2010)

Super User. A Super User is a user that is responsible for the application in the company and is trained to teach other users how to use the software. The Super User is usually the key contact for the other users.

2. PERFORMANCE DASHBOARDS

2.1. Definition

There is ambiguity of terms referring to dashboards, balanced scorecards, drill-down reports and similar performance reporting tools. The variety in terms could be partly explained by the fact that Information Systems as an academic field is interdisciplinary, with decision support system being one of its disciplines (Adam and Pomerol, 2008). It is a boiling pot where psychology, computer science, management and many more disciplines cross to serve the information society. Moreover, consultants and dashboard software providers add more labels for dashboards in a constant race to market and re-market their products and services (Few, 2006). In this paper performance dashboards are referred as performance dashboards, and dashboards interchangeably.

Dashboards conceptually resemble dashboards used in automobiles by simplistically representing the current and past key performance metrics of a company in forms, e.g., gauges, tables and charts. They are typically showed on one screen, in a web browser, use colours (like traffic light colours) to indicate the progress towards the goal, and use a high data-to-ink ratio (meaning that the pixels which are used for representing relevant information outweigh the pixels used for decorative purposes). They are not a static representation of information, but are updated regularly, for example, hourly, weekly, monthly, quarterly etc., depending on end-user needs and/or capabilities of a system. They are powerful tools that rely on human cognition principles to improve comprehension with the help of visualization. (Few, 2006; Negash and Gray, 2008; Yigibasioglu and Velcu, 2011). When referring to the visual features of the dashboards, the main point of reference is Few (e.g., Sauter, 2010; Yigitbasioglu and Velcu, 2011). Few (2006, p.26) emphasizes the importance of visualization that dashboards provide: “*A dashboard is a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen, so the information can be monitored at a glance.*” Many guides for dashboard developers recommend to rely on ‘gestalt’ or i.e. unity principles (such as similarity, proximity, continuity, closure, past experience, a focal point) that leverage human cognition of seeing first the whole and only then the detailed parts. For example, a ‘gestalt’ principle of proximity refers to a perception of objects that are closer together to be

related; a principle of continuity- seeing objects as related if they are arranged on a line; a principle of similarity- perceiving similar things to be more related; closure- seeing patterns in arranged objects; past experiences- relying on past experiences for grouping objects, a focal point- keeping attention on the emphasized point (e.g., Bremser and Wagner, 2013).

Some scholars (e.g., Turban, 2011) refer to Eckerson when providing a definition of what performance dashboards are. Performance dashboard is an umbrella term that holds various types of dashboards like drill-down reports, drillable charts, graphs, and gauge like dashboards. Eckerson (2011, p.11) defines performance dashboard as “*a layered information delivery system that parcels out information, insights, and alerts to users on demand so they can measure, monitor, and manage business performance more effectively*”. This definition recognizes the interactive nature of modern dashboards as the tools powered by business intelligence, their functionality as an information system and the performance management principles they represent. This will be discussed more in detail in the next section “The tip of an iceberg”.

An application of dashboards is broad across such industries like telecommunications, aviation, manufacturing, services, public organizations (e.g., Negash and Gray, 2008; Rasmussen, 2009) as well as in departments of an organization such as sales, marketing, finance or logistics (Sauter, 2011). Figure 1 is an example of some dashboards used in health-care. There is an abundance of vendors that supply businesses with business intelligence based dashboards, to name a few, IBM Cognos, Oracle BI Foundation Suite, SAS Enterprise Intelligence Platform, SAP Business Object BI Platform, MicroStrategy, QlikView and WebFocus (Rusaneanu, 2013).

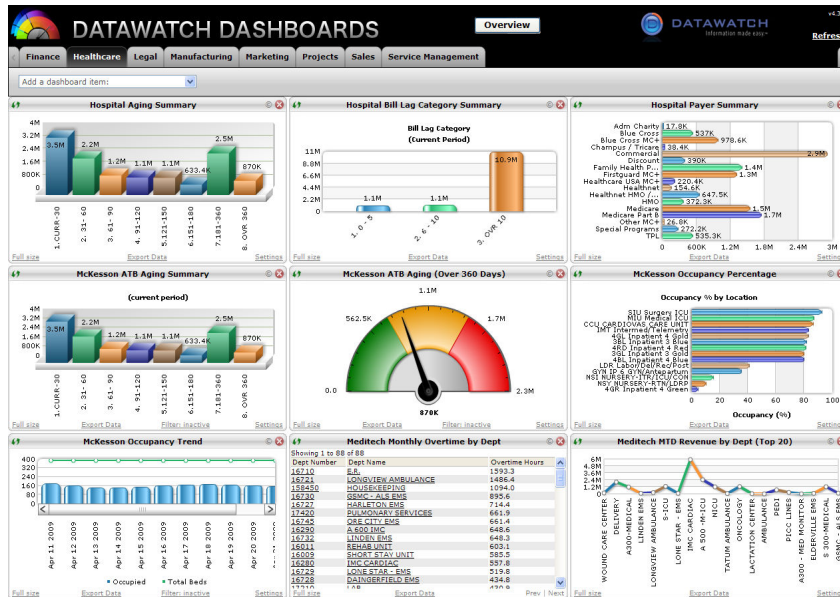


Figure 1: An example of performance dashboards (www.dashboardinsight.com).

2.2. The Tip of an Iceberg

A visual interface of performance dashboards is just the tip of an iceberg (Yigitbasioglu and Velcu 2011). Nowadays companies produce a massive amount of transactional information which requires integration and manipulation in data warehouses to be displayed. Spread sheets and other conventional office programs are just not meant for handling that much data. Nevertheless, spread sheets are the most widely used performance management tools. (Neely et al., 2008; Kawamoto and Mathers, 2007; Pandit and Marmanis, 2008) Therefore, most dashboards are powered by business intelligence (BI) and data integration technology that is able to deal with this challenge. Performance dashboards are the new face of BI. They intersect two powerful disciplines in a marriage of business intelligence and performance management. While performance management takes care of principles and processes for business execution, business intelligence delivers technical solutions. (Eckerson, 2011) The next two subsections will explain dashboards' connection to each of its parents.

2.2.1. Dashboards' Connection to Business Intelligence

In essence, performance dashboards are information systems for decision support. According to Pauwels et al. (2009), performance dashboards are related to decision support systems (DSS). Yigitbasioglu and Velcu (2011) agree with Pauwels et al. and regard dashboards as data driven decision support systems. Namely, performance dashboards are enabled by business intelligence (BI) which is a discipline under a decision support system umbrella term.

DSSs as a part of the Information Systems (IS) field have been studied since 1970's (Kendall and Kendall, 2008). DSSs form the core of ISs and have evolved from data processing and information systems management. Similarly to any field of ISs, DSSs can be studied from various approaches: behavioural, economic, analytical, technical, and conceptual. Furthermore, all ISs field reference disciplines (Knowledge Management, Computer Science, Strategic Management, Organizational Behaviour, Operations Management, Quant Methods) impact and are impacted by the advances in DSSs. Please regard figure 2 to see the DSS discipline's place in ISs field.

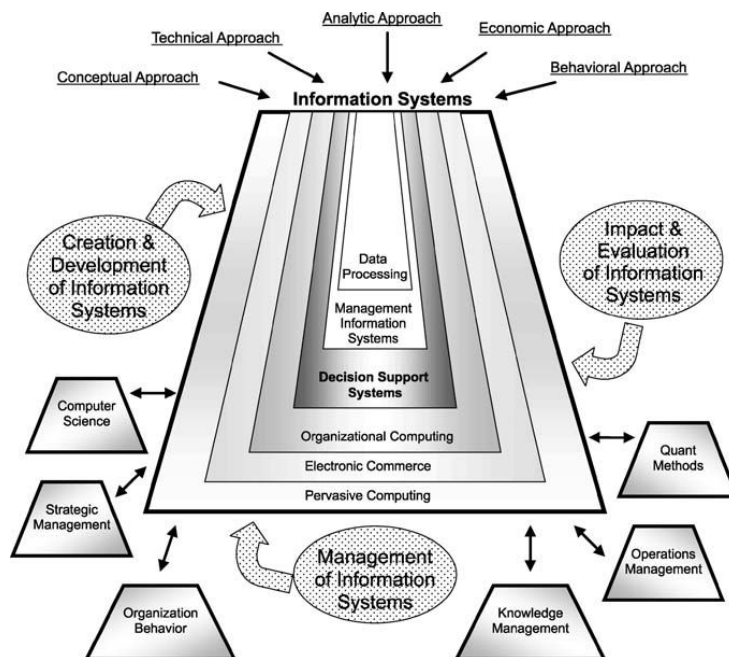


Figure 2: Decisions Support Systems as a part of the IS field (Burstein and Holsapple, 2008).

2.2.2. Dashboards' Connection to Performance Management and Measurement

Business performance management consists of business processes and applications for optimizing development and execution of a strategy. There are two main tasks performance management aims to accomplish: facilitating a creation of key performance metrics and objectives as well as supporting management of performance to reach those goals (Frolick and Ariyachandra, 2006). As yet another discipline highly populated with industry buzzwords, business performance management can be referred as corporate performance management, enterprise performance management, operational performance management or strategic enterprise management (Turban et al., 2008; Rasmussen et al., 2009). Many refer to business performance management (e.g., Eckerson, 2011) with a more generic term: performance management.

Eckerson (2011) identifies performance dashboards as an integral part of performance management systems that can assist managers in planning and execution of a strategy in all four stages of a performance management cycle: strategizing, planning, monitoring, and acting/adjusting. Strategizing is a phase when executives define vision, mission, values, objectives, and incentives. Key drivers and their measures called key performance indicators (KPIs) are sometimes mapped to strategy maps. The planning phase is developing plans and allocating resources to support a strategy. After the implementation of the strategy has taken place, monitoring in a timely manner and analyzing with the help of performance dashboards should take place. Finally, in the act/adjust phase, the process of deciding, acting, forecasting, developing scenarios, and adjusting the strategy should be performed. Please regard figure 3 to see all four stages of a performance management cycle.

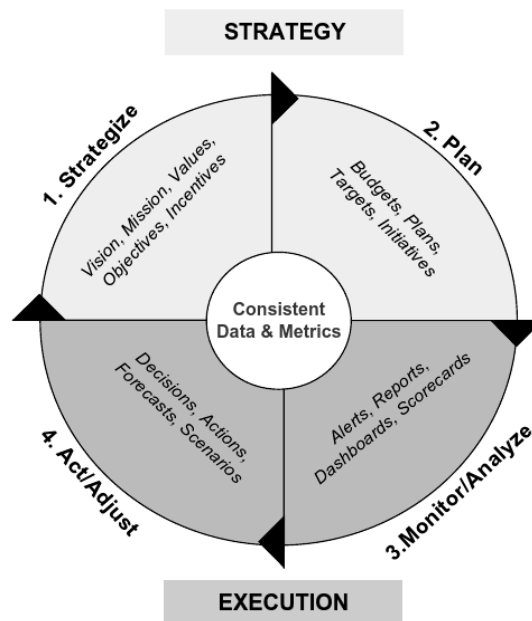


Figure 3: A Performance Management Framework (Eckerson, 2011).

The core of the above-mentioned framework is consistent data and metrics which are enabling performance measurement across all dimensions of an organization. This might be what links performance management to performance measurement. According to Folan and Browne (2005) performance measurement is initiated by performance management as well as followed by it. As Lempinen (2013) unravels the previously mentioned relationship of performance management to performance measurement of Folan and Browne (2005), performance management gives the context to performance measurement. A performance measurement system supports managers in monitoring the execution of business strategy and compares actual results against strategic goals and objectives. It indicates the progress towards the goal by providing the methods for setting the goals and receiving feedback (Turban, 2011).

Performance measurement systems rely heavily on key performance indicators and balanced scorecards. Key performance indicators are strategic objectives and performance measures against the goal. They can be lagging (outcomes, e.g. profitability) or leading (drivers, e.g., sales and costs). KPIs have a variety of features. They can include strategic objectives; measure against specific targets; have performance ranges; can be encoded in software to enable visual display, have time frames and benchmarks. KPIs are used in balanced scorecards that are

developed by Norton and Kaplan. The central idea behind balanced scorecards is that performance measurement should be tied to the strategic direction of the organization with the help of four perspectives: financial, customer, internal business processes, and learning and growth (Turban, 2011; Kaplan and Norton, 1996).

According to Quinn (2010), performance management uses business intelligence's tools such as performance dashboards to communicate and monitor strategy and its progress towards the goals. For instance, top management may define KPIs (both financial and non-financial) to be monitored and achieved and communicate them down the organizational hierarchy and monitor them with the help of dashboards. KPIs may be linked to balanced scorecards to monitor KPIs; and consequently to strategy maps to identify relationships between different KPIs (Kaplan and Norton, 1996).

A recent case study of sales managers in Finland by Yigitbasioglu and Velcu-Laitinen (2012) found a connection between the use of dashboards and productivity, which ascertains that dashboards are indeed effective tools for monitoring, problem solving, rationalizing, communication, and consistency in performance management and measurement. Dashboards have evolved from simple performance measurement tools to more sophisticated performance management tools. Nowadays, they incorporate such additional functions as drill-down and drill-up capabilities (meaning moving from a summary information to more detailed data by focusing on something and vice versa), flexible presentation formats (table vs. graphs), and scenario analysis. Yigitbasioglu and Velcu (2011) speculate that in the future dashboards would be integrated into workflow management systems and would advise users on further actions based on decisional trees.

2.3. Dashboards' architecture

McAfee and Brynjolfsson (2012) in their Harvard Business Review article argue that companies produce a huge amount of data. Management should be able to use this data to support their decisions, which is a rational way as opposed to following blindly their intuition. The authors go further by stating that data-driven decisions are resulting in better performance.

In the previous section it was mentioned that modern performance dashboards are powered by business intelligence, which itself is rooted in Information Systems field as a decision support system. Therefore, it is relevant to know the components of the system that makes performance dashboards technically possible, which is essential when it comes to explaining their capabilities. For example, in order for dashboards to be updated, data has to go through a whole data warehousing process. Thus, the speed with which the whole process can be done determines how often dashboards can be updated. Another example is collecting and transforming data into a consistent database from various data source systems in an organization, which can be facilitated by using business intelligence architecture.

Rasmussen et al. (2009) emphasize that in order to survive in the data-overloaded environment of today, it is essential for dashboards to be based on a proper back-end infrastructure such as warehousing and online analytical processing (OLAP). Business intelligence is enabled by data warehousing. Data warehousing is collecting, integrating and organizing data from various sources in an organization to enable decision support, access to the business information, and business insight creation. (Turban, 2011)

The illustration on the next page provides a process view of a generic data warehousing process. The process starts when data is collected from various independent sources of an organisation (e.g., ERP, legacy systems, external data). The data is then, with the help of custom written code or a commercial software selected, extracted, transformed, integrated and loaded (this process is commonly known as ETL- extract, transform, load) into a data warehouse. From the data warehouse the data can be directly passed to a software application that creates a user interface for better visualization. Alternatively, the data from the warehouse can still be sorted into several data marts (e.g., according to their use or department structure) and through

middleware to software applications for visualization. Please regard figure 4 to see the previously described simplified framework of a data warehouse.

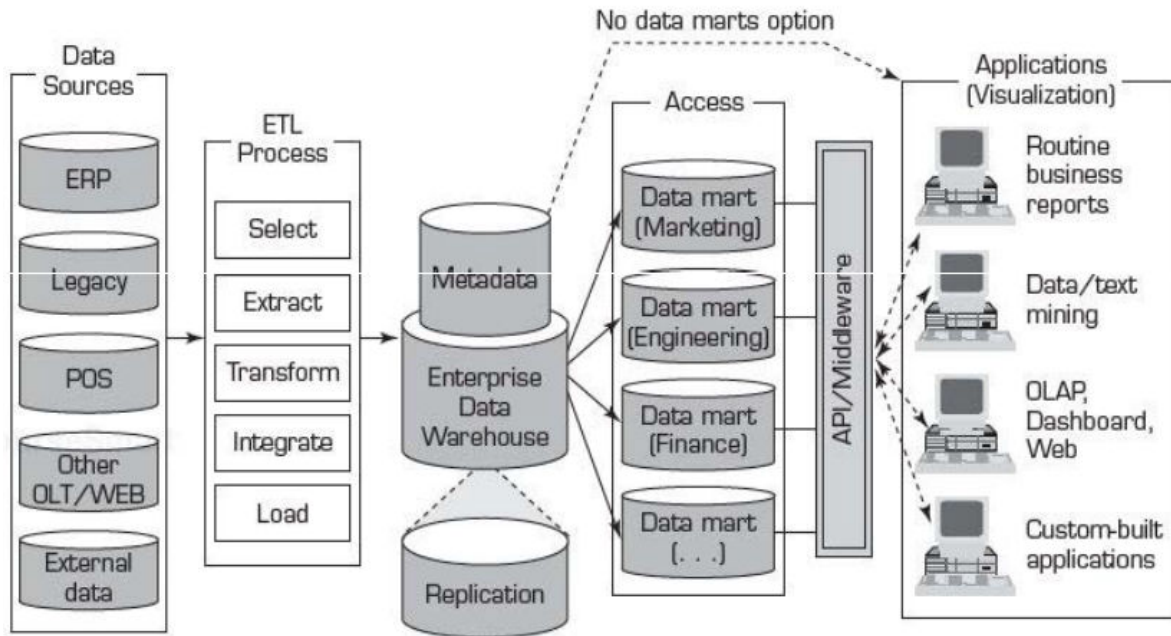


Figure 4: A Framework of a Data Warehouse (Turban, 2011).

2.4. Purposes and Features of Performance Dashboards

This chapter presents first the purposes of dashboard use and later their main features.

2.4.1. Purposes of Performance Dashboard Use

While there are plenty of consultant-oriented materials about dashboards and some textbooks (Few, 2006; Ericson, 2011, Rasmussen et al., 2009), the academic world is relatively quiet about what type of decision purposes dashboards are used for (Pauwels et al., 2009; Yigitbasioglu and Velcu, 2011). In the following text the author discusses three theoretical propositions of how analysis of purposes of dashboard use can be categorized: according to dashboard strategic, tactical and operational use purposes (Eckerson, 2011); according to functional use purposes (e.g. Pauwels et al., 2009); and according to the nature of a problem that needs to be solved (Adams and Pomerol, 2008).

Strategic, Tactical and Operational use of Dashboards

Eckerson (2011) divides the performance dashboards into three types:

- 1) Strategic (mainly targeted at executives for monitoring).
- 2) Tactical (mainly middle manager oriented for analysis);
- 3) Operational (for frontline workers to manage).

Furthermore, Eckerson (2011) states that on any previously mentioned hierarchical level dashboards can be used for monitoring, analysis, and management. He refers to monitoring as following up the strategy by comparing the desired with the actual performance and sometimes utilizing alert systems for signalling performance deficiencies. Dashboards are then used for analysis to identify what has caused an unacceptable performance. Finally, dashboards are utilized to communicate information across the entire organisation for collaboration and decision making.

As figure 5 illustrates, the application or functionality of the three types of dashboards corresponds to needs of users. For instance, executives mainly use the monitoring function of dashboards, managers/analysts- for analysis, and operations staff- for management on a more detailed level. However, borders of an application use are not strictly defined for each group of users because the most progressive dashboards allow users to drill down or up for a better perspective on an issue. In fact, according to McAfee and Brynjolfsson (2012), access to data affects how decisions are made and who makes them. When data is scarce, decisions are usually done by a person with most authority, who relies mostly on his/her intuition. In contrast, an access to data is a liberator because more people, often on a lower hierarchy level, can access the necessary data to make a decision, which is based on facts.

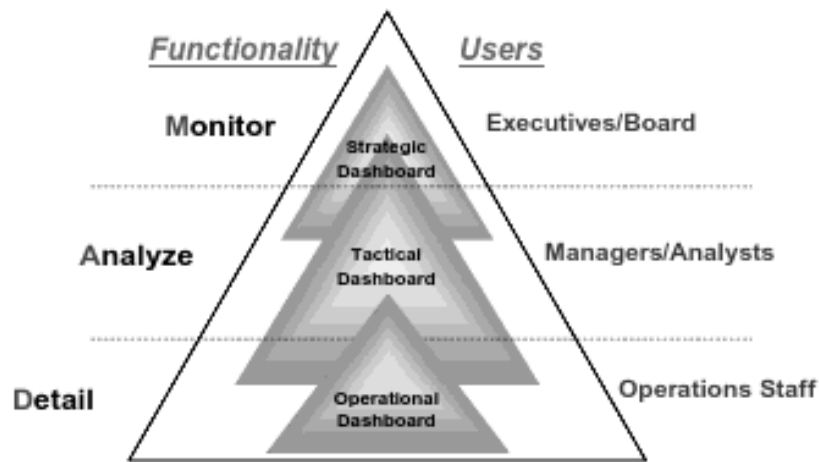


Figure 5: Mapping Users to strategic, tactical, and operational Dashboards (Eckerson, 2011).

Dashboard Use According to Functional Use Purposes

Pauwels et al. (2009) are consistent with Eckerson's identified use purposes, but group them a bit differently according to their functional use. He argues that dashboards serve primarily four purposes:

- 1) Bringing consistency in measures across an organization, its departments and business units;
- 2) Helping to monitor performance;
- 3) Planning using scenario analysis;
- 4) Communicating to important stakeholders.

Literature on performance dashboards mentions monitoring as the most fundamental feature (e.g., Rasmussen et al., 2009; Few, 2006; Yigitbasioglu and Velcu-Laitinen, 2012). Monitoring means following KPIs and other performance metrics to spot when a corrective action is needed, how good a performance was against a target or/and a benchmark and what can be learnt from this. A consistency in measures is necessary to be able to measure and compare the performance across the organisation and its business units. Planning is setting the goals and strategies for the future. Dashboards can be used for planning, for example, by performing various scenarios, and for sharing the observations, results and strategy with others.

Some of the Pauwel's et al. performance dashboards use purposes have been earlier stated by Clark et al. (2006). However, very little is known about how performance dashboards are really used in organizations and how effective they have been. This problem was approached by Yigitbasioglu and Velcu-Laitinen (2012) with a case study about dashboard use in performance management. Their findings have confirmed the four proposed uses mentioned by Pauwels' et al. (2009). Mainly the study has found out that dashboards were used for monitoring, problem solving, rationalizing, communication, and consistency. The study showed a correlation between the dashboard use and the higher productivity of users and once more emphasized data quality as a main driver for using or not using dashboards.

Since the dashboards are business performance management tools (as stated in the section "The tip of an iceberg"), one can relate Wiersma's (2009) case study and findings about balanced scorecards use. Wiersma (2009) identifies four purposes of the balanced scorecards use: decision making and decision rationalizing, communication, consistency, and self-monitoring. Decision making and decision rationalizing means that managers can use the information for decision making purposes and justify those decisions to themselves or/and their superiors. Performance can then be communicated vertically and/or horizontally across an organization through consistent measurement. Self-monitoring is also important to track own progress against the goals and make corrections, if necessary.

Dashboard Use According to the Nature of a Problem

Adams and Pomerol (2008) distinguish three purposes of business intelligence dashboard use for decision purposes, which are reporting, scrutinizing, and discovering. Reporting is used when questions and answers are known and managers just need to monitor the performance. Scrutinizing is used when questions to be made are known generally; however, manager needs to find the evidence to support them. Finally, when questions to be answered are not known at all, managers can use dashboards to discover them.

They further suggest that the three purposes of dashboards need to be matched against the level of manager's understanding of what the problem is. For this purpose they suggest to use five representation levels of Humphreys and Berkeley (1985). Those levels represent the development of managers' thinking as they progress towards a decision. The first level is cultural

and psychological, managers have an idea about the problem, but they cannot express it. At this level, no model can help. On the second level, the problem can be formulated and a number of sub-problems are identified. At this level, data mining can become handy to formalize ideas and test hypotheses. On the third level, a problem is clear and models are developed to solve it. On the fourth level, various models are tested to determine which one is the best to solve the problem at hand. On the fifth level, a model is chosen and suitable values that represent a problem are found and report templates are created. The first two levels are specific to executives and are mostly targeted at a strategic problem definition. The rest of the levels are more tactical and operational. (Adam and Pomerol, 2008) The five levels of the managerial understanding of a problem and the three purposes of dashboards are represented in figure 6.

Although, Adam and Pomerol's (2008) paper is targeted at dashboard developers, this model may give some insight into how to work with clients in post-implementation phases. As a new business problem arises, a new performance dashboard might be needed to be developed or updated and, eventually, this process needs to be repeated.

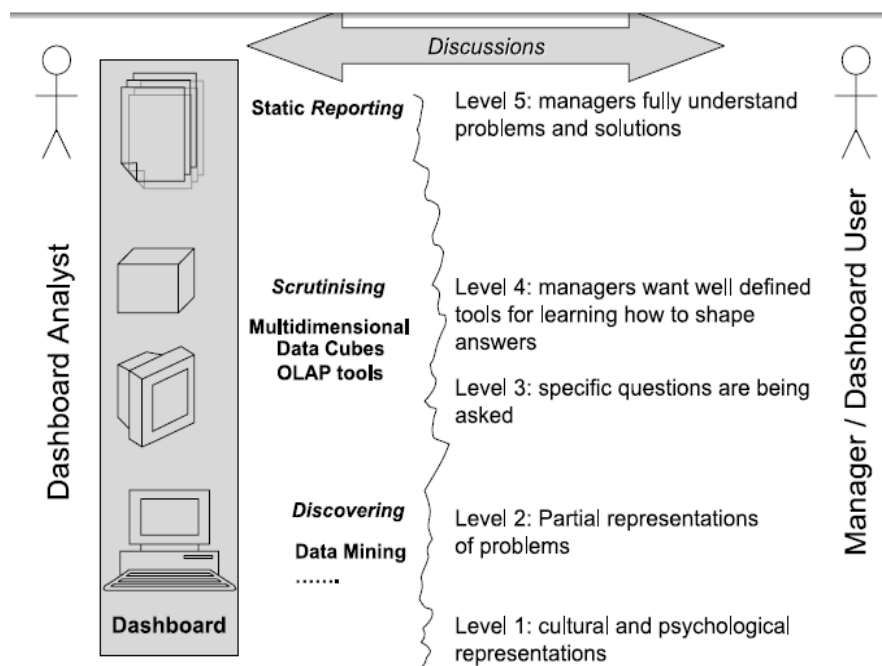


Figure 6: Matching Dashboard Content to Managerial Needs (Adam and Pomerol, 2008).

2.4.2. The Features of the Performance Dashboards

Yigitbasioglu and Velcu (2011) distinguish between visual and functional design features. An effective and efficient visualization helps decision makers by enhancing the cognition since complex data can be processed more efficiently, i.e., the maximum amount of data is perceived in a minimum amount of time. Yigitbasioglu and Velcu (2011) argue that dashboards use visualisation to communicate complex data to decision makers. They use a cognitive fit theory from Vessey and Galetta (1991) to explain how to choose a representation format (tables versus graphs) based on the knowledge about a task and an individual's decision making skills. Vessey and Galetta (1991) identified that, on the one hand, spatial tasks such as comparison, pattern recognition, and forecasting are better supported by graphs. On the other hand, tables are best fit for more number-oriented persons such as financial analysts dealing with symbolic tasks. A right fit then delivers better decisions. Besides the visual fit, dashboards should fit decision makers functionally (what dashboards can do). That is, dashboard functional design features such as presentation format, presentation flexibility (tables versus graphs), scenario analysis, automated alerts, theory guided format selection, drill down and drill up, and external benchmarking must fit the purpose a decision maker is using a dashboard for. A poor functional fit can result in poor decisions by providing incomplete decisions clues and symbols. Dashboards' functional design features' link to dashboard purposes, and decision making and performance management is indicated to be a research path not explored yet (Yigitbasioglu and Velcu, 2011).

2.5. Chapter Summary

There is ambiguity of terms referring to performance dashboards as they cross several academic disciplines, for example, Information System Science and Performance Management and Measurement. Performance dashboard is an umbrella term that can refer to various types of dashboards such as drill-down reports, drillable charts, balance scorecards, graphs or gauge-like dashboards. Dashboards rely on human cognition principles to improve comprehension by utilizing visualisation. Literature on performance dashboards refers mainly to two definitions: one coined by Eckerson (e.g. Turban, 2011; Yigitbasioglu and Velcu, 2011; Lempinen, 2013)

and the other one formulated by Few (e.g., Yigitbasioglu and Velcu, 2011). The definition of Eckerson (2011) recognizes an interactive nature of modern dashboards as tools powered by business intelligence, their functionality as an information system and performance management and measurement principles they represent. On opposite, Few (2006) emphasizes mainly the visualization features of dashboards.

A visual interface of performance dashboards is just the tip of an iceberg (Yigitbasioglu and Velcu, 2011). Nowadays, companies produce a massive amount of transactional information which should be integrated and manipulated to be displayed. Spread sheets and other conventional office programs are just not meant for handling that much data, although according to a study of enterprise performance management systems, spread sheets were the most widely used performance management tools. (Neely et al., 2008; Kawamoto and Mathers, 2007; Pandit and Marmanis, 2008) Therefore, most dashboards are powered by business intelligence (BI) technology that is able to deal with this challenge. BI is a discipline under Decision Support Systems, which itself is a part of the Information Systems field. Performance dashboards are the new face of BI. They intersect two powerful disciplines in a marriage of business intelligence and performance management disciplines. If performance management takes care of principles and processes for business execution, business intelligence delivers technical solutions to support performance management. (Eckerson, 2011)

While there are many consultant-oriented materials about dashboards and some textbooks (Few, 2006; Ericson, 2011, Rasmussen et al., 2009), there is little academic research about what type of decision purposes dashboards are used for (Pauwels et al., 2009; Yigitbasioglu and Velcu, 2011). There are some theoretical propositions like those of Eckerson (2011) and Pauwels et al. (2009). However, there is not enough academic literature, for example, on how dashboards are used in organizations, how do they support decision makers, nor how do they contribute to a performance improvement of a decision maker or an organization. It seems that most of the academic literature traces back to a very small group of dashboard researchers: Eckerson, Few, and Pauwels et al. More recent research on dashboards comes from a literature review of Yigitbasioglu and Velcu (2011) and the first case study on dashboards use for decision support came from the same authors.

According to the literature reviewed, primary purposes of dashboards use are consistency in measures, monitoring performance, planning, and communicating (Pauwels et al., 2009). Monitoring is often mentioned as the most fundamental purpose of using dashboards by following KPIs and other performance metrics to spot when a corrective action is needed (e.g., Rasmussen et al., 2009; Few, 2006; Yigitbasioglu and Velcu-Laitinen, 2012). However, little is known about how dashboards are actually used in organisations. By the time the thesis was written, the author was aware only of one case study on this subject conducted by Yigitbasioglu and Velcu-Laitinen (2012) on how sales managers in Finland use dashboards, which confirmed the previously mentioned purposes of use as proposed by Pauwels et al. (2009).

3. PROCUREMENT PERFORMANCE MEASUREMENT AND MANAGEMENT

The financial crisis of 2007-2008, the recent Great Recession following it, as well as continuous pressure from competitors worldwide, globalization, increase in commodity prices, disruptions in supply chains and other factors that drive margins of companies' to razor sharp levels have driven the C-suite's attention towards spend cuts, savings programs, and procurement strategy alignment with overall corporate goals. While Chief Procurement Officer's (CPO's) role as a strategist has risen (Pandit and Marmanis, 2008), they still lack tools to prove procurement's strategic importance and contribution to the organization. In a research study about the CPO as collaborator, innovator and strategist, the Aberdeen Group found that 67% of respondents think that the most important competency of CPOs is to be able to communicate procurement value. The research also emphasizes a shift from spend management to spend optimization (Aberdeen.com, 2012). An earlier research of the Aberdeen Group has also indicated that a main focus of CPOs is reducing costs and ensuring supply availability, but an increasing emphasis is put on their contribution to product innovation, compliance to regulatory requirements, and market expansion. Therefore, procurement is now expected to add value (Minahan, 2005; Accenture, 2011).

3.1. Procurement Performance Measurement and Management

According to Monczka et al. (2011), procurement performance measurement is an approach to monitor and evaluate purchasing performance. This is enabled by setting different performance measures in order to compare and track the actual progress against the historical progress, the benchmark performance and/or the target. Procurement performance measurement provides a systematic approach to evaluate and monitor purchasing performance, and enables better decision making, supports better communication, provides performance feedback as well as motivates and directs employee behaviour towards desired results. There are a number of measures that can be used to evaluate purchasing performance. Monczka et al. (2011) groups the measures into the following categories: price performance measures; cost effectiveness; revenues;

quality; time/delivery/responsiveness; technology and innovation; physical environment and safety; asset and integrated Supply Chain Management (SCM); administration and efficiency; governmental and social; internal customer satisfaction; supplier performance, and strategic performance. Hence, measures can be both quantitative and qualitative.

The concept of procurement performance measurement relies mainly on quantitative measures such as price performance (e.g. actual price against the planned price/ market index/ price paid in other operational units/ target prices achieved); cost-effectiveness (cost changes and cost avoidance); revenue (e.g. royalty revenues generated from suppliers, supplier contribution to the new business, number of patent granted through the supplier contribution etc.); time/delivery/responsiveness; administration and efficiency measures (e.g., budget and its adjustment, purchase orders processed, headcount etc); supplier performance (e.g. quality, cost and delivery or other measures in suppliers' score cards) (Monczka et al., 2011). Some of the most popular measures of procurement performance are related to costs component as performance measurement, e.g., negotiated savings, realized savings, spend under management and cost avoidance (Avery, 2011; Accenture, 2011). However, cost component perspective might not be the best and the only, in fact, procurement can add value across organisation and contribute to the revenues (Avery, 2013). For example, a 2011 study of Accenture has seen a shift from measuring a total cost of ownership (TCO) towards evaluating a total value of ownership (TVO).

The concept of procurement performance management is used in many organisations and exists as a solution offered by the Case Company and other procurement performance management tool providers. Procurement performance management as any performance management concept relies mainly on four stages of performance management cycle as described by Eckerson (2011): strategizing, planning, monitoring/analyzing, and acting/adjusting (please see chapter 2.2.2. of this paper for more detail). Consistent data and metrics form the core of this model. In this paper, procurement performance management is referred to as a set of key performance measures and objectives for procurement performance strategy execution as well as a conceptual and technical support tool in managing and reaching those goals. Hence, procurement performance management is closely tied to procurement performance measurement as well as precedes and follows it. Namely, procurement performance measurement can be

viewed as a tool for managing procurement performance. Although, procurement performance measurement as a term is often used to refer to procurement performance management, measurement itself does not provide the answers of why something happened and what to do next. Therefore, the author prefers to use the term performance management in this thesis.

The interpretation, extent and scale of procurement performance management can vary from company to company. Furthermore, one can manage both financial and non-financial performance of procurement. In the solution provided by the Case Company, the financial contribution of procurement management to the bottom-line is measured based on cost reduction, cost avoidance, and impact on the working capital, which is a long-lasting challenge in procurement management that was addressed by the Case Company with a unique methodology of procurement contribution to financial performance. (Vice President of Operations, the Case Company, interview, 20.09.2013.).

To illustrate how procurement performance can be managed, the author would like to use an example on how savings, one of the most popular measures of procurement performance, can be managed with the help of the Case Company's solution. Firstly, the potential savings are identified by gaining visibility into the company's spend by performing a spend analysis (which will be discussed more in detail in the following section). The identified savings need to be evaluated and approved based on their possible impact and needed resources for their realization. The approved savings are then monitored, budgeted and controlled to find out whether they came into realization and contributed to the company's bottom line. The previously mentioned steps of savings management are based on consistent data and metrics as well as a method developed by the Case Company to prove savings contribution to the financials (Vice President of Operations, the Case Company, interview, 20.09.2013.). Furthermore, communication plays a major role as an impetus for making the otherwise inert procurement management cycle spin and gain momentum in the organisation, i.e., to move from one step to the next one. For instance, in order to be approved, the identified savings must be communicated and justified to the relevant stakeholders and sponsors, i.e., savings ideas must be "sold" internally and externally. The approved savings must then be monitored to communicate the progress or to initiate a corrective action, if needed. Furthermore, to get acknowledged into the budgets, the savings programs must be defended by procurement in front of finance. Finally, the realized savings must be again

communicated across the organisation to justify past and existing savings programs to make sure the procurement has its credibility in the organisation and contributed to the company's bottom-line. One way of ensuring communication is to align procurement strategy with the overall corporate strategy. According to Accenture (2011) research, best procurement practitioners have their strategies aligned with the corporate strategies, therefore, ensuring that they are understood, involved in critical decisions, their contribution is recognized as well as their metrics and accountability is easier to communicate across the organisation. Please regard figure 7 to see the illustration of the previously mentioned example.

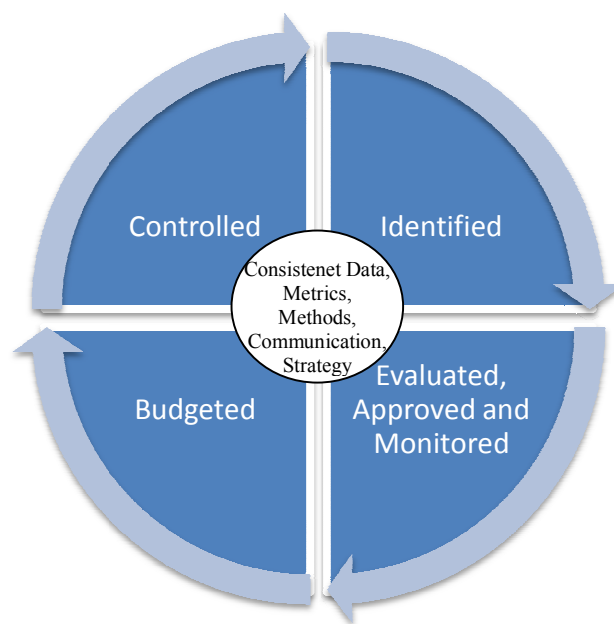


Figure 7: An example of savings management in procurement performance management.

3.2. Spend analysis

One of the most critical points in procurement performance measurement and management, as identified in the previous section, is spend analysis (Monczka et al., 2011; Turner, 2011). Spend analysis is the first step to spend visibility, compliance and control (Pandit and Marmanis, 2008). Spend analysis, according to the Monczka et al. (2011) definition, is a tool to track an

organization's spend according to who is buying, how much is being spent, what is being bought and from which suppliers. An ability to access, manage, and analyse spend based on timely, accurate, and detailed data is the first instance in developing sound sourcing strategies, spotting savings opportunities and areas of critical importance, monitoring contract compliance, comparing against the allocated budget, and communicating strategies top-down and/or bottom-up. (e.g., Minahan, 2005; Limberakis, 2012; Turner, 2011; Dwyer, 2010)

Spend analysis as an expression, however, has been used as an umbrella term in literature (e.g. by Pandit and Marmanis, 2008; Monczka et al., 2011; Turner, 2011) to cover not only spend analysis per se but also some areas of procurement performance measurement and management. Spend analysis according to practitioners (Vice President of Operations, the Case Company, interview, 23.09.2013) is only a part of procurement performance management. Spend analysis is vital for identifying, for instance, potential savings. However, to become realized, savings need to be managed. Savings management would require in this context not only identification, but also communication to the relevant stakeholders, approval, monitoring and controlling which goes beyond the competences a spend analysis could provide and would better fit under the umbrella term "procurement performance management". Moreover, savings in procurement do not come solely from management of spend, but also from various other sources where potential savings can be identified such as inventory, payment terms, and contract data.

A research paper of the Aberdeen Group titled "Dynamic Procurement: CPO as Collaborator, Innovator and Strategist" indicated that for 67% of 132 CPOs surveyed, spend analysis is a high or top priority. Interestingly, when only the C-suite executives were analysed, the percentage of respondents claiming that spend analysis for them is high or top priority rose to 88%.

Industry reports about spend analysis come mainly from the Aberdeen Group (e.g., Limberakis 2012; Dwyer, 2010). One of the latest publications in this field was conducted in 2011 and titled "Spend Analysis: The Nexus of Spend Management". Another study of the previously mentioned group "Spend Analysis: Transforming Data into Value" was conducted in 2010. This research was done based on surveys and interviews with the representatives of 132 organizations across diverse industries and geographical areas.

3.2.1. Architecture of Spend Analysis

To convey a spend analysis, one needs firstly to have access to purchasing transactions data, which often comes from different sources in an organization, from several geographical regions (in case of international companies) or even external sources such as suppliers. Usually, special software programs are used to collect this data. Many such programs are based on the data warehousing architecture described in section 2.3. of this paper, that is, data is extracted from various data sources of an organization, transformed (cleansed, supplemented, organized), and loaded into a staging database. (Turner, 2011; U.S. Government Accountability Office, 2005; Limberakis, 2012; Singh et al., 2005)

Purchasing transaction data can be obtained from different data sources such as Accounts Payables systems, procurement systems, material management systems, material resource planning systems, contract management systems, freight transactions, market research, supplier management systems, benchmarking data, suppliers and contract manufacturer data, and any other source of information that contains the necessary data. Available data depends on the systems a company uses for its analysis needs (Pandit and Marmanis, 2008). According to an interview with the Vice President of the Case Company (23.09.2013), the most comprehensive data source for spend analysis is General Ledgers as that contains all and financially accurate information of company's expenditure. This data however should be enriched with data coming from other procurement specific sources such as purchasing systems, contract management systems etc. to increase the data granularity to needed level.

Additionally, for a spend visibility analysis, a "slice-and-dice" functionality as well as the drill-down and drill-up functionality described in the second chapter of this paper is necessary. Furthermore, for an aggregated view, spend data is consolidated and classified across different dimensions such as according to supplier, country, product and other categories of a company's taxonomy to create data cubes with customized dimensions drills. Some literature refers to supplier consolidation as supplier name normalization. Supplier consolidation means that all different names and entities of a supplier or misspelled names are mapped to this supplier. Differences in supplier names may arise from reasons such as different locations, different business relations to a supplier, parent and child relations, mergers and acquisitions, typographic

errors and different ways of writing a supplier's name. Supplier consolidation can be automated with the help of a taxonomy comparison to, e.g., already existing supplier lists, unique tax identifiers, address, and contact information. However, in many cases such data is not available or is incomplete. Therefore, often a manual consolidation is required and a taxonomy list can be developed on the fly or i.e. while actually consolidating suppliers. (Singh et al., 2005)

Product classification is sometimes referred to as product or commodity mapping and it means product mapping to a right category. Product classification can be automated with the help of company-specific product codes or some other standard codes. According to those codes, products can be mapped to a company-predefined taxonomy. This is done by mapping a company's taxonomy to a standard taxonomy and then mapping products to a standard taxonomy or directly classifying products to a proper taxonomy item (which is a more manual process). While companies may use self-developed commodity taxonomies, some authors like Pandit and Marmanis (2008) advice to use industry standard schemas such as UNSPSC (United Nations Standard Products and Service Codes), eOTD (ECCMA Open Technical Dictionary), RUS (Requisite Unified Schema) and others. The use of standard classification schemas could potentially benefit companies in the future to benchmark with other companies in the industry using the same classification taxonomy. However, such schemas are often too general and holistic, which hinders a granular enough view on a specific company's spend and hinders the supplier-material centric view as specific to a particular company. Therefore, practitioners in the industry often develop a client-specific classification schema (Vice president of Operations, Case Company, interview, 23.09.2013).

Consolidation and classification is a process that is often performed manually by setting rules or by manual mapping (Singh et al., 2005). Please regard the figure below to see a generic spend analysis process flow. Only about 85% of spend can be classified using automated solutions, the rest must be done manually (Sollish and Semanic, 2010).

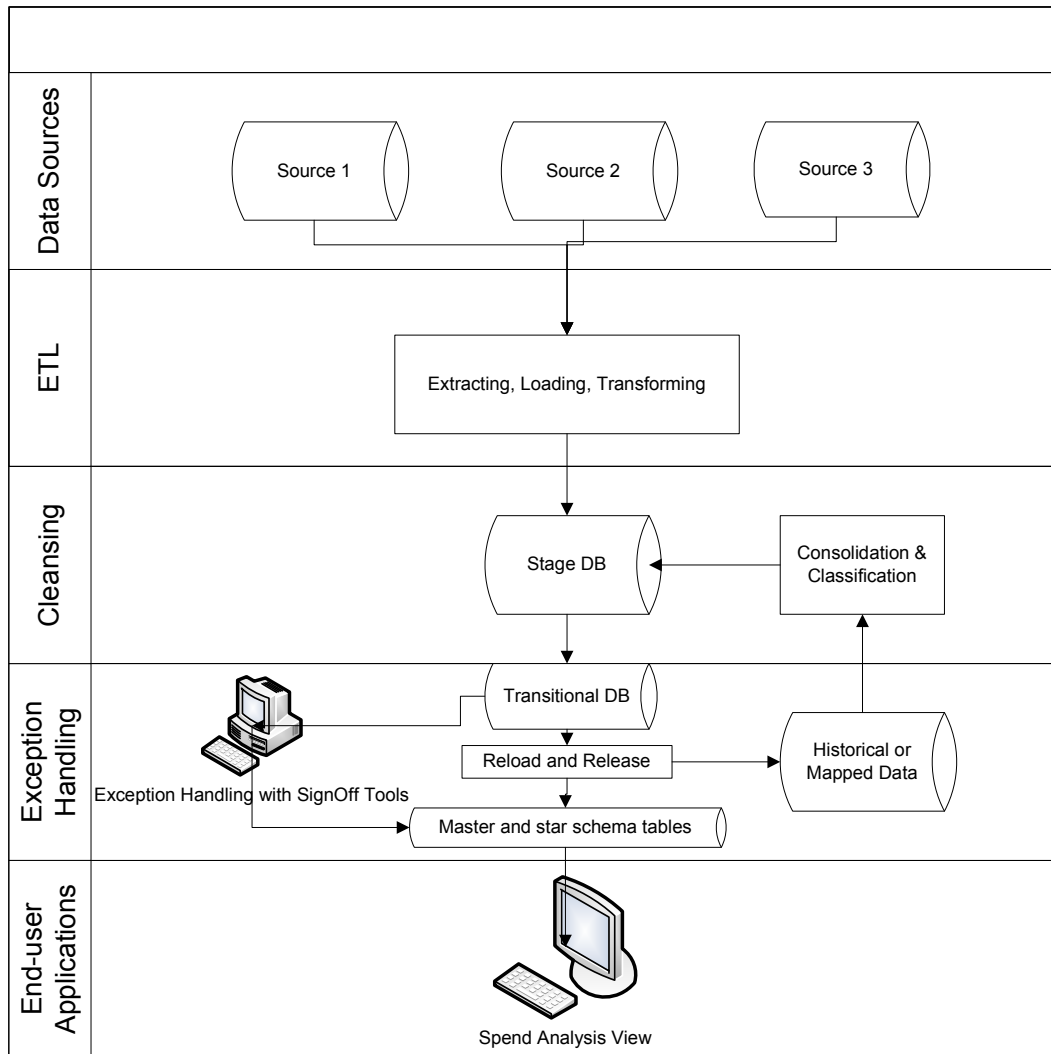


Figure 8: Spend Analysis process flow (Singh et al., 2005).

In figure 8 one can see a generic spend analysis developed by IBM and described by Singh et al. (2005). First, data is extracted from all the relevant data sources of an organization. Data may come from different ERPs, legacy systems, external data and other sources as well from different countries or regions, in the case of multinational organizations. This data is then transformed (e.g., formatted, cleansed from duplicates, adjusted according to the currency rates, missing data is supplemented etc.) and loaded into a staging database.

The data is later consolidated and classified based on the historical or mapped data or unmatched data. Fallouts are handled as exceptions with the help of SignOff tools, meaning that

data is consolidated and classified manually. The data is then loaded or reloaded onto master tables and star schema tables from where through different end-user applications for visualization (such as web-based reporting tools and dashboards mentioned in the first section of this paper about the performance dashboards) it is available to end-users for analysis.

3.2.2. Key success factors for Spend Analysis Implementation

To successfully implement a spend analysis initiative, key success factors are: commitment of top-management, cooperation between several business units in an organization (like IT, finance, supply chain, purchasing), a sound technological basis, appropriate data processes as well as an ability to integrate several data sources of an organization (Limbarakis, 2012; Singh et al., 2005, Pandit and Marmanis, 2008).

The Aberdeen Group's research in 2011 (Limbarakis) identifies that the best-in-class performers in spend analysis have higher adoption rates than the less successful performers in five categories of spend analysis technical enablers: data extraction, data cleansing, spend visibility, data enrichment, and data classification (Please regard figure 9). An earlier Aberdeen Group's research (Dwyer, 2010) indicated that the best-in-class organizations had on average higher adoption ratios than the rest in the following solution functionalities: automated data collection from multiple sources, standardized reports for spend analysis, configurable reporting tools for spend analysis, automated data classification and cleansing, and online dashboards to track key spend and savings metrics. Additionally, the research indicated that the best-in class performers in 2009 had 76% of spend under management, a sourcing cycle time of 32 days, cost savings of 12% and contract compliance rate of 74%.

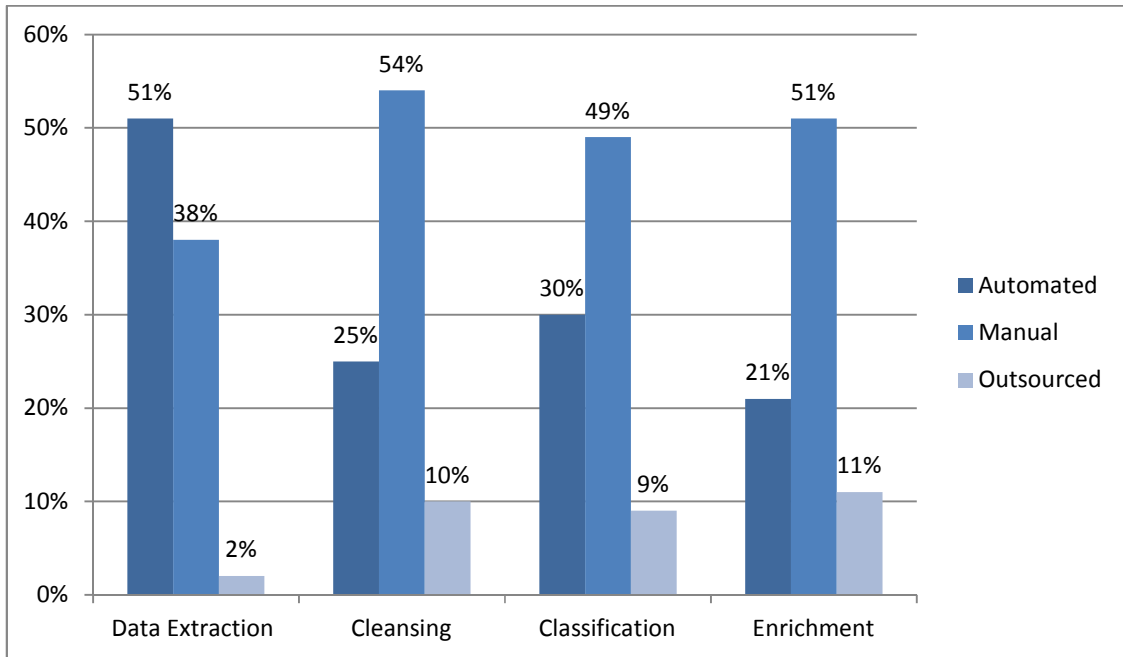


Figure 9: Automation in Spend Analysis, Aberdeen Group 2011 (Limberakis, 2012).

According to Limberakis (2012), Pandit and Marmanis (2008), companies still have problems to get a comprehensive picture of their spend. The main problem with implementing spend analysis in organizations is getting the needed data. Organizations may have several systems where transaction data may be stored and often basic spreadsheets are used. Even after overcoming the technical challenge of extracting data from multiple sources (e.g. general ledger), the data may still have low quality information or lack completeness. This, in return, requires additional data supplements from other or external sources, which often is not possible. The automation of data collection and spend analysis is identified as the main enabler of successful spend analysis initiatives. However, many organizations lack technical expertise to automate in-house. Therefore, some opt for outsourcing spend analysis. Please regard figure 8 which depicts automation levels (automated, manual or outsourced) of data extraction, cleansing, classification, and enrichment in organisations in 2011 according to the Aberdeen Group’s research.

According to the Aberdeen Group’s survey in 2011 (Limberakis, 2012), top pressures for spend analysis initiatives are data quality, an inability to identify and forecast savings

opportunities, percentage of spend visibility, data collection and management, an inability to identify and prioritize the top spend categories, and an inability to track the success of savings initiatives. Please regard figure 10 to see the top pressures for spend analysis.

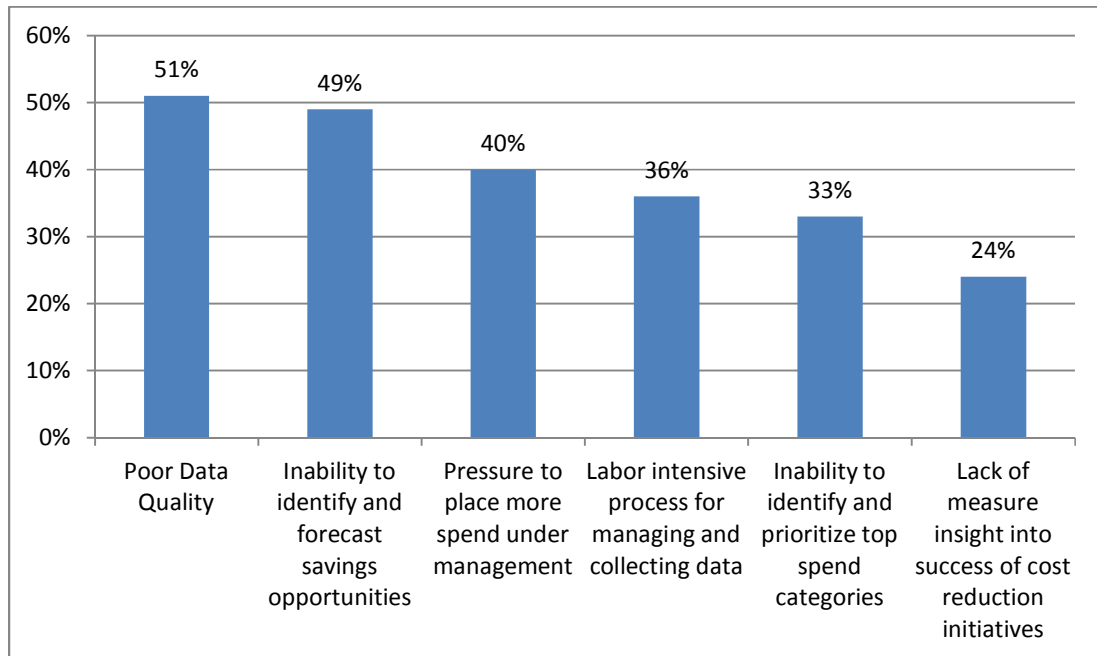


Figure 10: Pressures for Spend Analysis Initiatives, Aberdeen Group 2011 (Limberakis, 2012).

3.2.3. Impediments to spend analysis

To conduct a spend analysis one needs data about what has been purchased, when and by whom. The main obstacle to performing a spend analysis is getting the right data. Purchasing information may reside in the different ERPs of a company, often not cleansed, organized, or consolidated. Generally, data is finance-centric, meaning that it is often organized for financial analysis, e.g., data about accounts payables transaction. However, in order to be useful in procurement, the data should be organized in a procurement-centric view, e.g., according to spend categories (Pandit and Marmanis, 2008).

In some companies data can be found in ERPs (especially spend on direct materials). However, Payne et al. (2011) argue that when it comes to indirect data, information is often more difficult to obtain as often purchase orders are missing, indirect purchases were not registered in the system or are stored in a paper format. Indirect spend is often treated as one-off purchases

procured based on a three-bid strategy and viewed as non-critical because per-item prices are relatively low and transaction data is often hard to obtain. Nevertheless, indirect data should be sourced strategically as according to Rudzki et al. (2006) indirect spend categories offer up to 30% of savings opportunities.

Besides the technical challenge, the absence of a strategic mindset towards procurement process in organizations and the lack of knowledge on how to approach such initiatives are some of the main impediments to a spend analysis implementation (Pandit and Marmanis, 2008).

3.3. Enabled Benefits of Procurement Performance Measurement and Management

Not only can spend analysis contribute to the bottom line, but it can also create a competitive advantage, create new thinking for more strategic sourcing, and facilitate the development of strategic partnerships (Verespej, 2005). Rudzki et al. (2006) estimated that savings management based on spend analysis in a form of a consolidating procurement by buying only from preferred suppliers, reducing maverick buying and increasing spend compliance leads to cost savings. Table 1 depicts potential cost savings in some product categories as identified by Rudzki et al. (2006).

Table 1: Potential Savings in Product Categories According to Rudzki et al. (2006).

Category	Potential Savings
IT	15-30%
Packaging	10-20%
Indirect Materials and Services	10-20%
Media, Marketing, Promotional items	10-20%
Professional services	8-15%
Capital Project	7-15%
Logistics and Transportation	7-15%
Other Indirect Costs	5-15%
Raw Materials	2-5%

Following are the descriptions of the main benefits that a procurement performance management can enable: spotting, monitoring, and communicating savings opportunities; reducing and avoiding costs; contract compliance; supplier measurement, management, development, and collaboration; optimizing payment-terms, lead times, and procure-to-pay processes; and benchmarking.

3.3.1. Spotting, Monitoring, and Communicating Savings Opportunities

Spend management enables to measure and manage procurement performance. Furthermore, it helps CPOs to identify and track savings because only when one knows where, by whom and on what the money is spent, one can also identify where it can be saved. Because of the “slice and dice” functionality provided by many spend analysis software providers, spend can be easily tracked by category, supplier, business unit etc. almost instantaneously compared to the time one would need to obtain and manipulate the same information by an analysis of accounts payables or general ledger which have a finance-centric view on spend.

Moreover, monitoring savings can ensure that the negotiated savings are realized and can be communicated to defend a savings program necessity in front of stakeholders. Savings can be communicated also by tying them to general ledger accounts categories to prove that they indeed contributed to the bottom line or if more products are bought for the same amount of money. Additionally, an access to aggregated and detailed information across multiple dimensions can be quickly and easily communicated through dashboard reports (Pandit and Marmanis, 2008).

3.3.2. Reducing and Avoiding Costs

Turner (2011) refers to an organization’s overall spend analysis and management as one of the best-in-class strategic supply management technique that differentiates the best companies from mediocre performers. A U.S. Government Accountability Office study in 2005 has indicated that spend analysis helps organizations to save around 10-20% of procurement costs. Pandit and Marmanis (2008) claim that a proper spend analysis may result even in 2 to 25% of the spend volume in savings. The study of the Aberdeen Group in 2011 (Limberakis, 2012) has revealed that spend analysis helps to increase spend visibility, leads to better sourcing decisions, and can help to spot savings opportunities. Partida (2012) identifies the benefits of spend

analysis also in cost effectiveness, cycle time, process efficiency, and staff productivity. In this context, it is also important to identify not only cost reductions but also cost avoidance. Some solution providers have developed methods on how to measure and prove financially savings coming not only directly from cost reductions, but also from cost avoidance.

Better prices and terms can be negotiated if a company buys a commodity from several suppliers and decides to reduce the number of the suppliers for a certain commodity and by doing so leverages volumes for discounts. Similarly, if various commodities are bought from one supplier, an aggregated view can help to identify the scope of demand aggregation to one supplier or to a supplier of a particular commodity with more preferable terms. (Pandit and Marmanis, 2008)

Companies may have listings of vendors and suppliers that have different names but in reality refer to the same supplier (U.S. Government Accountability Office). Additionally, the names of materials being purchased can be different but be functionally equal. This blurs the view on a detailed spend analysis. Therefore, supplier names need to be consolidated and material names classified to the right categories. This enables organizations to identify the same materials under different names purchased from different vendors and to create an opportunity to select one or several preferred suppliers for a material. Volume can be leveraged to negotiate a better price and have more beneficial contract terms. (e.g., Singh et al., 2005; Bragg and Roehl-Anderson, 2011)

3.3.3. Contract Compliance

Contract Management is essential as it helps to compare spend compliance with contract terms, and analyse contract performance (e.g. Minahan,2005; Pandit and Marmanis, 2008). Contract management combined with spend visibility is an effective tool to deal with such well known issues such as maverick buying (Rudzki et al., 2005). Often, compliance management is a part of spend visibility software (Turner, 2011).

There are situations when there is a contract with favourable terms (e.g., volume discounts, better prices, better terms) in place, but other vendors are used in purchasing the same goods (i.e. non-compliance). Therefore, this reduces the benefits which would have occurred if the spend would have been compliant to the existing contract. This is referred to as maverick buying.

(Pandit and Marmanis, 2008; Bragg and Roehl-Anderson, 2011; Monczka et al. 2011) Moreover, in large corporations, different business units may have separate contracts with the same supplier due to, for example, the international fragmentation of an organization, recent mergers and acquisitions, or some other reasons for poor contract management. An aggregated view on commodities through spend analysis helps to identify such cases (Monczka et al., 2011).

According to Pandit and Marmanis (2008), a spend analysis based on transaction analysis, besides the previously mentioned off-contract spend spotting, also enables the spotting of other contract-level violations such as contract start and end date violations, and quantity violations that can lead to unnecessary additional costs. Moreover, delivery date violations can be spotted, which is crucial for companies that practice Just-In-Time management and therefore try to avoid the additional costs of back-orders or surplus inventory. This analysis is simplified if accounts payables transactions are integrated with contract information.

Benefits from contract compliance can be easily calculated using a compliance multiplier (Rudzki et al., 2006) by multiplying the percentage of non-compliant spend by the total potential savings from the contract and arriving at the monetary amount of the lost opportunity.

3.3.4. Supplier Measurement, Management, Development, and Collaboration

As mentioned before in the contract compliance section, strategic supplier management offers such benefits as contract and price audits, price comparison, rebate management, better terms, and volume commitment risk management. However, even if there is no contract in place, a proper supplier management can yield similar benefits and additional savings.

Spend analysis is a helpful tool to track supplier performance on such quantitative measures as price development, delivery terms and volumes. Procurement managers use this information for preparing for negotiations with suppliers. Moreover, it helps to monitor the performance of such initiatives as a supplier number reduction per category. (Category Director, Direct Materials, 22.03.2013, interview; Category Director, Global Materials, 26.03.2013, interview; Sourcing analyst, Logistics sourcing, 13.03.2013, interview). Furthermore, Monczka et al. (2011) emphasizes that an effective measurement of suppliers is the first step to a supplier base rationalization because it helps to identify the weakest performers both on the quantitative and the qualitative parameters.

Spend analysis can help to identify spend with preferred and non-preferred suppliers. Spend with non-preferred suppliers is known as “spend leakage”, or maverick buying, which is occurring due to the terms and prices with preferred suppliers often being better than with non-preferred suppliers. Non-purchase-order spend and exceeding PO limits are violations of a purchasing process and can lead to a “spend leakage” and procurement from the non-preferred suppliers. (Pandit and Marmanis, 2008). Similarly, a spend analysis can identify poorly performing suppliers and suppliers with low credit ratings if a software vendor offers such an opportunity (Pandit and Marmanis, 2008).

3.3.5. Optimizing Payment terms, lead times, and procure-to-pay process

Spend analysis can help to reduce lead times (from a moment a purchase order has been submitted to purchase goods received). This could be explained by a closer relationship with suppliers and the weeding out of inefficient suppliers (Partida, 2012).

Monitoring payment terms can yield some savings as well. With payment term management, one can spot when invoices were paid and what was the actual date they should have been paid. Not only could a better payment management reduce overdue payment fees, but most importantly, the money that would have been paid out to suppliers too early could be invested in the short-term to gain additional revenues. In large corporations, millions of such savings opportunities can be identified (Pandit and Marmanis, 2008, Monczka et al., 2011).

Pandit and Marmanis (2008) have noted that a procure-to-pay process (P2P) is often neglected. However, it may bear lucrative savings opportunities. Those opportunities might be seized by analysing how many payments were made to each supplier (e.g. per month), and consolidating those payments into one to reduce processing costs. Additionally, a company can utilize a procure-to-pay process analysis to spot if buyers comply with P2P process guidelines, e.g., whether they systematically buy under the limit (by cutting expenses to several POs), that according to a corporate policy needs to be approved. This behaviour can increase processing costs of POs, which can signal that buyers are avoiding the corporate policy to have more freedom in purchasing.

3.3.6. Benchmarking

According to Minahan (2005), access to pricing and performance **benchmarking** is a powerful tool to monitor procurement performance progress against its peers or internal benchmarks, setting optimal negotiation strategies, and getting support for procurement initiatives from upper management. Benchmarking commodities against peers could be a powerful tool, but that would require a spend software vendor to have information from clients in a similar industry, and it could be best utilized and more easily compared if commodity classification taxonomies would be standardized for each industry by using standardized classification taxonomies such as UNSPC (United Nations Standard Products and Service Codes), eOTD (ECCMA Open Technical Dictionary), RUS (Requisite Unified Schema) and others (Pandit and Marmanis, 2008). However, as mentioned before often classification schemas are developed together with customers to fit the specific needs of a particular client. In such cases, a potential solution for benchmarking could be finding a common denominator that would allow comparing the price movements of a particular commodity between the companies (Vice president of Operations, the Case Company, interview, 23.09.2013).

3.4. Chapter Summary

This thesis looks at performance dashboard use through the lens of procurement performance management. Some of the most popular measures of procurement performance are related to costs component as performance measurement, e.g., negotiated savings, realized savings, spend under management and cost avoidance (Avery, 2011; Accenture, 2011). However, cost component perspective might not be the best and the only, in fact, procurement can add value across organisation and contribute to the revenues (Avery, 2013). For example, a 2011 study of Accenture has seen a shift from measuring a total cost of ownership (TCO) towards evaluating a total value of ownership (TVO).

Procurement Performance Management exists as a practice in organisations and as a business intelligence tool offered by the Case Company and other procurement performance management solution providers. In this thesis, procurement performance management is referred to as a set of key performance measures and objectives for procurement performance strategy

execution as well as conceptual and technical support in managing and reaching those goals. Hence, procurement performance management is closely tied to procurement performance measurement both by providing the context and preceding it, and providing solutions for a strategy execution and management based on those measures. Namely, procurement performance measurement can be viewed as a tool for managing procurement performance. Although, procurement performance measurement as a term is often used to refer to procurement performance management, measurement itself does not provide the answers of why something happened and what to do next.

One of the most critical points in procurement performance management is spend analysis (Monczka et al., 2011; Turner, 2011). Spend analysis is the first step to spend visibility, compliance and control (Pandit and Marmanis, 2008). An to measure and manage procurement performance based on timely, accurate, and detailed data is a first instance in developing sound sourcing strategies, spotting savings opportunities and areas of critical importance, monitoring contract compliance, comparing against the allocated budget, and communicating strategies top-down and/or bottom-up. (e.g., Minahan, 2005; Limberakis, 2012; Turner, 2011; Dwyer, 2010)

The main benefits that spend analysis enables are: spotting, monitoring, and communicating savings opportunities; reducing and avoiding costs; contact compliance; supplier measurement, management, development, and collaboration; aggregated view on suppliers and commodities; optimizing payment-terms, lead times, and procure-to-pay processes; and benchmarking. However, the main obstacle to performing spend analysis is getting the right data. Purchasing information may reside in different ERPs of a company, often not cleansed, organized, or consolidated. Generally, data is finance-centric, meaning that it is often organized for financial analysis, e.g., data about accounts payables transaction. However, in order to be useful in procurement, data should be organized in a procurement-centric view, e.g., according to spend categories (Pandit and Marmanis, 2008).

4. INSTRUMENTS FOR EVALUATING INFORMATION SYSTEMS USE (ISU) IN DECISION SUPPORT

Taking into consideration the information system use (ISU) is critical for an information system (IS) success (e.g., DeLone and McLean, 2003); as such many scholars have directed their attention to this field. Already in 1977 Barkin and Dickson argued that the system use is a central construct in information systems. According to DeLone and McLean (2003) ISU is among the most frequent measure of an information system success. Burton-Jones and Straub (2006) claim that up to now ISU has been conceptualized in four information system domains: IS success, IS for decision making, IS acceptance, and IS implementation. Below are some examples of researchers investigating the ISU in each of the four domains:

- 1) IS success (e.g. DeLone and McLean, 1992 and 2003; Goodhue, 1995; Lucas and Spitler, 1999),
- 2) IS for decision making (e.g., Barkin and Dickson, 1977, Szajna, 1993; Yuthas and Young, 1998),
- 3) IS acceptance (e.g., Davis, 1989; Straub et al., 1995; Venkatesh et al., 2003),
- 4) IS implementation (Lucas 1978; Ginzberg, 1981; Barki and Hartwick, 1994).

Burton-Jones and Straub (2006) explain that although the research has been done in four different domains; ISU measures are generally universal and include such measures as extent, duration, nature and frequency of use, features used, and tasks supported. However, the construct for measuring information system use itself has not been a subject of scrutiny (Burton-Jones and Straub, 2006; Barki et al., 2007). In this thesis, ISU is examined from the perspective of to which extent a user utilizes a system to support his/her decisions and tasks that the IS was designed to support. This angle is best defined by Sun and Teng (2012) in the following section.

Literature on the motivation for dashboard use is heavy on consulting materials. However, there is little contribution from academics on case studies about dashboard use in specific companies (e.g., Miller and Cioffi; 2004), industries or practices (e.g., Yigitbasioglu and Velcu, 2011; Pauwels et al., 2009). There is even less academic literature on how to evaluate dashboards'

decision support. For instance, Reibstein (2005) has noted that future research should look at how dashboards support decision makers. Even though, he relates this to the marketing context, this can be generalized to other fields as well. Since dashboards are rooted in decision support systems and information systems as well as performance measurement and management (as discussed in section 2), one can search for help from similar studies in the previously mentioned fields. For example, a multidimensional measure of system-use developed by Doll and Torkzadeh (1998) can help to analyze the gap between the potential system use (the capabilities of the system) and the actual use.

This chapter will begin by highlighting the central point that ISU occupies in evaluating IS success since any IS strives to be successful. The later paragraphs will present four instruments that consider the information system use from the perspective of the purposes individuals in organisations use ISs for supporting their activities on the job and their decisions. Finally, the last chapter will present the reasoning of the author for choosing one particular instrument for the case study.

4.1. ISU as a Central point of IS Success

One of the most prominent models for measuring an information system's success was developed by DeLone and McLean in 1992 and updated in 2003. The model has been tested and applied by various scholars (e.g., Iivari, 2005; Nyagowa, 2010; Almutairi and Subramanian, 2005). DeLone and McLean (2003) in their revised model of information system success claim that information system use is one of the central points of an information system's success and is associated with system quality, information quality, user satisfaction, individual impact and organisational impact (please regard the figure below). Declining use can indicate that a system is losing its usefulness. Although, it is not enough to say that simply more use leads to the success of an information system- the extent, nature, quality, and appropriateness of the system use must be considered. The new framework divides the use into intended and actual use. Please regard figure 11 to see DeLone and McLean's (2003) updated information system success model.

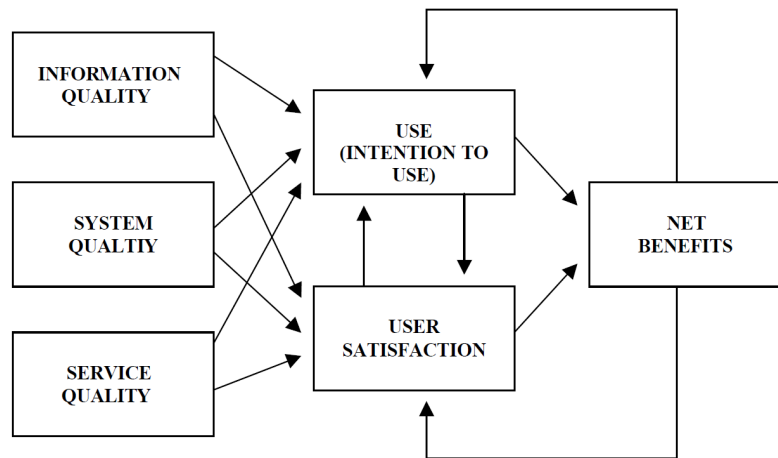


Figure 11: DeLone and McLean’s (2003) updated information systems success model.

Pick (2008) agrees with DeLone and McLean (2003) that it is not enough to simply monitor the system use or make a user satisfaction survey to see the benefits of a decision support system for the user. For example, duration of sessions can be a sign of a system’s usefulness, but at the same time it can identify that the user cannot find the needed information efficiently. Similarly, short sessions can mean either that the users did not know how to use the application and exited or on the other hand found quickly exactly what they needed. Moreover, users can be satisfied with a system, but at the same time do not have any benefit from it.

4.2. A Two-step Information System Use Instrument

Burton-Jones and Straub (2006) propose a two-step approach to construct an instrument for measuring information system use: definition and selection (see figure 12 below). This instrument is a response to a lack of theory underlying the measures of the use; no definition of the information system use; and an absence of an accepted approach from selecting the relevant content of use. This instrument can be used in various theoretical contexts. A definition of a system’s use and its characteristics must be flexible to the context applied and comprised of three elements: a user (subject using the IS); a system (object being used); and a task (function being performed). In the structure phase, the researcher must choose which combinations of the three elements are relevant. Finally, the relevant measures of the chosen elements must be selected.

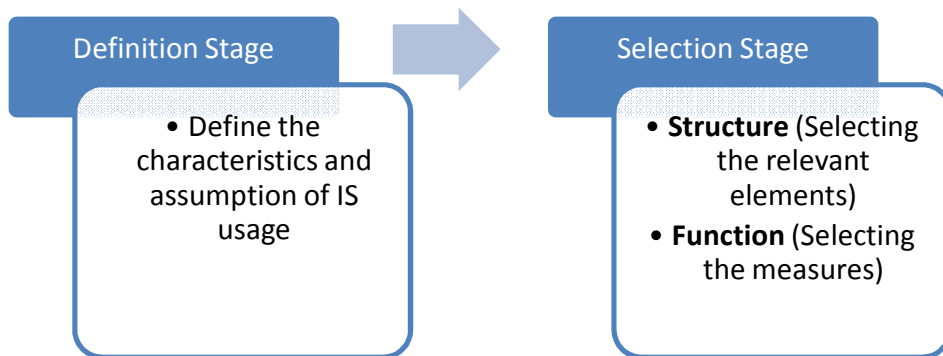



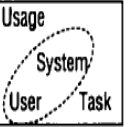




Figure 12: Burton-Jones and Straub's (2006) two-staged ISU measurement construct.

Depending on what the elements of the use have been selected for the measure, the richness of the measure (please see the table below) can range from a very lean -measuring just the use- to very rich, which measures all three elements. As the table 2 indicates, the system use always involves the system. The very lean model is used to measure the presence of the use, e.g., the use versus the non-use. The lean model measures the extent of the use or the duration. The somewhat rich model helps to measure the extent to which the system is used and could denote the number of the features used. The rich model measures two elements, the system and the user, and details the scale the user utilizes the system or cognitive absorption. The rich level also measures two elements (the task and the system) in the context of to which extent the system is used for accomplishing the task, for example, the variety of the use. Finally, very rich model measures all three elements, the system, the user and the task, to find out the scale of which the user employs the system for work. (Burton-Jones and Straub, 2006) Please regard table 2 to see each of the richness of measure, its domain of content measure, the example and the references to the scholars proposing them.

Table 2: Reach and lean measures of use (Burton-Jones and Straub's, 2006).

Richness of measures	1. Very lean	2. Lean	3. Somewhat rich (IS)	4. Rich (IS, User)	5. Rich (IS, Task)	6. Very rich (IS, User, Task)
Type	Presence of use	Extent of use (omnibus)	Extent to which the system is used	Extent to which the user employs the system	Extent to which the system is used to carry out the task	Extent to which the user employs the system to carry out the task
Domain of content measured*						
Example	Use/nonuse	Duration; extent of use	Breadth of use (number of features)	Cognitive absorption	Variety of use (number of subtasks)	None to date (difficult to capture via a reflective construct)
Reference	Alavi and Henderson (1981)	Venkatesh and Davis (2000)	Saga and Zmud (1994)	Agarwal and Karahanna (2000)	Igbaria et al. (1997)	

While all the six levels of the measure richness have been addressed in academic literature, the construct for the sixth level where the scope of how much a user employs the system to do a task has not been developed by the time the article was written. This level, however, is later addressed by Barki et al. (2007) in their information system use-related activity (ISURA) construct, which will be explained in the following section. This instrument has raised a wide attention from IS researchers (e.g., it has been cited 91 times in Thomson Reuters Web of Knowledge). The tool has been tested in the same paper by the authors using Excel sheet as an object of research.

4.3. Individual-Level Information System Use-Related Activity (ISURA)

The information system use-related activity (ISURA) concept was developed by Barki et al. (2007). It targets the sixth level of the Burton-Jones and Straub's measure richness model (please refer to paragraph 4.2. for more details) and relates to the task-technology fit and activity theory. As mentioned previously, at this level all the three elements (user, task, and system) are measured.

According to Barki et al. (2007), Individual-level ISURA investigates what individuals do to perform tasks and for which purpose they use IT to accomplish those tasks. The ISURA construct is based on three behaviour categories:

- 1) Technology interaction behaviours;
- 2) Task-technology adaptation behaviours;
- 3) Individual adaptation behaviours.

Technology interaction behaviour is an analysis of all the actions taken by an individual to accomplish individual or organizational tasks. Task-technology adaptation behaviours are behaviours that are related to changing the IT to suit the tasks. The individual adaptation behaviour is about individuals changing themselves to adapt to the technology.

This thesis is concerned with the first category of the individual-level ISURA model which is technology interaction behaviour. This part of the construct is based on the Doll and Torkzadeh's (1997) five categories (problem solving, decision rationalizing, vertical integration, horizontal integration, and customer service) and 30 sub-tasks for which a system can be used. This model is explained in paragraph 4.4. Additionally, two reflective questions are added: why is IS essential in accomplishing the tasks at hand; and what percentage of the time users use the IS to perform the tasks they know the system can support. Please regard Appendix I to see the full list of questions that were used to access the three categories of the behaviour.

4.4. Multidimensional measure of system-use

Doll and Torkzadeh (1998) developed a multidimensional measure that evaluates three functions of information system use: decision support, work integration, and customer service (please regard figure 12). Decision support can be evaluated on two levels: problem solving (the extent the system is used for analysis of cause and effect relationships); and decision rationalization (the extent the system is used to explain/justify decisions and improve decision making process). The work integration refers to which extent the system enables horizontal or vertical control, monitoring, and coordination of work, and communication. Finally, customer service is measured by the extent the system enables the serving of internal and/or external

customers. Figure 13 depicts the previously mentioned levels of the information system use. Please regard Appendix II to see the list of questions that are used by Doll and Torkzadeh (1997) to evaluate each of the five categories.

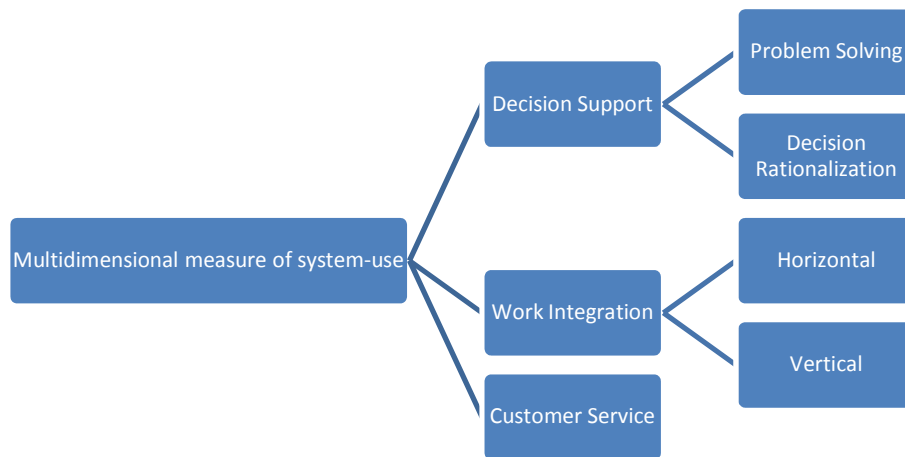


Figure 13: Three areas of IT evaluation based on Doll and Torkzadeh’s multidimensional measure of system-use (1998).

The Doll and Torkzadeh’s framework is one of the main points of reference in the academic literature when examining the IS’s use purposes (e.g., Burki et al., 2007; Sun and Teng, 2012). This framework has also been utilized by Wiersma (2009), and Yigitbasioglu and Velcu-Laitinen (2012) in the case study on the purpose of balance scorecard, and dashboard use respectively. Thus, it might be useful (when adjusted to serve dashboard evaluation needs) for case studies that evaluates the use of dashboards.

4.5. Construct for Evaluating ISU from Sun and Teng

One of the latest additions to the ISU construct development for evaluation ISU purposes is the work from Sun and Teng (2012). The tool they have developed is holistic because it targets all ISs and organizational IT an individual can utilize while at work: Information reporting systems (IRSs), Decision Support Systems (DSSs), and Group Support Systems (GSSs). This tool is based on several questions targeted at the use evaluation of each of the system types. Please regard Appendix III for the full list of questions. Sun and Teng (2012) tested the tool

empirically and proved its viability. However, it has not yet been cited or tested by other academics.

4.6. Chapter Summary

In the previous sections, the author has reviewed four instruments: a two-step approach to construct an instrument for measuring information system use from Burton-Jones and Straub (2006); information system use-related activity (ISURA) developed by Barki et al. (2007); Doll and Torkzadeh's (1998) multidimensional measure of system-use; and Sun and Teng's (2012) construct for evaluating ISU. Unfortunately, the construct for measuring information system use itself has not been a subject of scrutiny yet (Burton-Jones and Straub, 2006; Barki et al., 2007).

The aim of this thesis is to find out how performance dashboards are used by end-users of the Case Company's software to support their decisions. Therefore, ISU is examined from the perspective of to which extent a user utilizes a system to support his/her decisions and tasks that IS was designed to support. This angle is best viewed through the multidimensional measure of system-use tool from Doll and Torkzadeh (1998) (this model was explained in paragraph 4.4.). Additionally, two reflective questions are added: why is IS essential in accomplishing the tasks; and what percentage of the time users use the IS to perform the tasks they know the system can support. Therefore, this thesis targets the first category of the individual-level ISURA model from Barki et al. (2007) which is technology interaction behaviour and will measure all the actions taken by an individual to accomplish individual or organizational tasks.

For the purpose of this study, the author had considered also the ISU construct development for evaluating the ISU purposes from Sun and Teng (2012) as it is more holistic and considers how IS and IT tools are used for information reporting, decision support and group support. However, by the time the case study was designed, this instrument had not been tested, cited, or evaluated by any researchers. Furthermore, the use purposes measured by this instrument are too general to answer the research question in more detail. Thus, the author decided to choose the Doll and Torkzadeh's framework which is one of the main points of reference in the academic literature when examining the IS's use purposes (e.g., Burki et al., 2007; Sun and Teng, 2012) and was used by Yigitbasioglu and Velcu-Laitinen (2012) in the case study on the purpose of dashboard use.

5. THE CASE STUDY

5.1. The Case Company

5.1.1. The Case Company

The Case Company is a procurement performance management software as a service provider. It helps organisation to firstly gain spend visibility into, i.e., what, how much, from whom, by whom is being purchased. The solution the Case Company provides enables organisations to not only increase their efficiency, but also their effectiveness by allowing to identify and capture savings from procurement and most importantly giving procurement managers tools to measure, manage, control, forecast, communicate and bring savings to the company's bottom line, which is still one of the biggest challenges faced in procurement. The Case Company possesses both the data warehousing and the business intelligence technology (as described in chapter 2 of this paper), the top-of-the-art visualisation solutions (dashboards as described in chapter 1 of this paper), as well as savings calculation and procurement performance management methodologies.

The Case Company provides all the technical enablers for spend analysis that according to the Aberdeen's Group research are adopted by the best-in-class performers: data extraction, data cleansing, spend visibility, data enrichment, and data classification (Limberakis, 2011). The Case Company also offers all the solution functionalities that have been identified by the group in 2009 and that the top players utilize: automated data collection from multiple sources, standardized reports for analysis of spend, configurable reporting tools for spend analysis, data classification and cleansing, and online dashboards to track key spend and savings metrics (Dweyer, 2010). Please refer to chapter 3.2.2. of this paper for more detail.

Currently, the Case Company offers four functional areas of its software: Spend Visibility, Savings Program Management (SPM), Spend Budgeting and Forecasting, and Procurement Controlling. Each of the four solution areas corresponds to the four stages in savings management: identifying, approving, budgeting, and controlling savings. Each solution area can be and is often configured to suit a particular customer's needs and differs from customer to customer. Below is a brief description of each solution area.

Spend Analysis.

Spend analysis or Spend Visibility solution area is based on data warehousing, data enrichment and visualization (in form of dynamic dashboards) technology. Data is usually extracted, transformed and loaded into a database, where additional data management is performed, e.g., translations, consolidation, and classification. Beyond spend analysis, this solution area provides possibility to do payment term and inbound inventory analytics, i.e., to analyse how a working capital is affected. This tool helps to identify savings both in spend and payment terms.

Savings Program Management.

After savings are identified, Savings Program Management solution area helps to collect savings ideas across the organization as well as manage, monitor, track the progress, communicate, and verify savings related projects.

Spend Budgeting and Forecasting.

Spend Budgeting and Forecasting solution enables procurement managers to budget and forecast their future spend. With the help of the customer configurable input forms, spend can be easily forecasted and budgeted in the tool as well as communicated across the organization. Also this solution is supported by dashboards for slice-and-dice analysis of future spend.

Procurement Controlling.

Procurement Controlling solution area enables automated calculation of savings procurement has been able to generate in the past. The calculation follows Procurement Contribution to Financials (PCF) methodology created by the Case Company. PCF aims at replacing the many non-uniform measures that one can find within procurement with one formal, universally recognized and fair standard method. As the name indicates the method focuses on measuring savings that have financial contribution to a company.

5.1.2. Position Relative to other Supply Chain Management Systems

To understand which role the Case Company's procurement performance management application plays among other supply chain management systems, it is useful to look at a Supply Chain Management (SCM) Systems map of Monczka et al. (2011). SCM systems can be distinguished by the level of the functionality they provide (strategic decision making, supply chain planning, tactical decision making, transaction processing) as well as directions of linkages

of the company with its suppliers, internal supply chain, customers and logistics on horizontal axes. The procurement performance management application of the Case Company best fits the upper left corner of Supplier Relationship Management (SRM) applications (please regard figure 14). SRM application can be either functionality provided by the company's ERP system or be bolted-on. At the moment, SRM applications of the most ERP systems are able to serve the needs of tactical decision makers as their functionalities in the SRM area is limited. Bolt-on solutions are more functionally developed and can serve the needs of not only tactical decision makers, but also strategic decision makers and can aid in supply chain planning. However, Monczka et al. (2011) argue that ERP solution providers are working on extending and increasing functionalities of their own SRM systems, which poses a question regarding weather in the future ERPs will be able to compete in functionalities with SRM vendor providers.

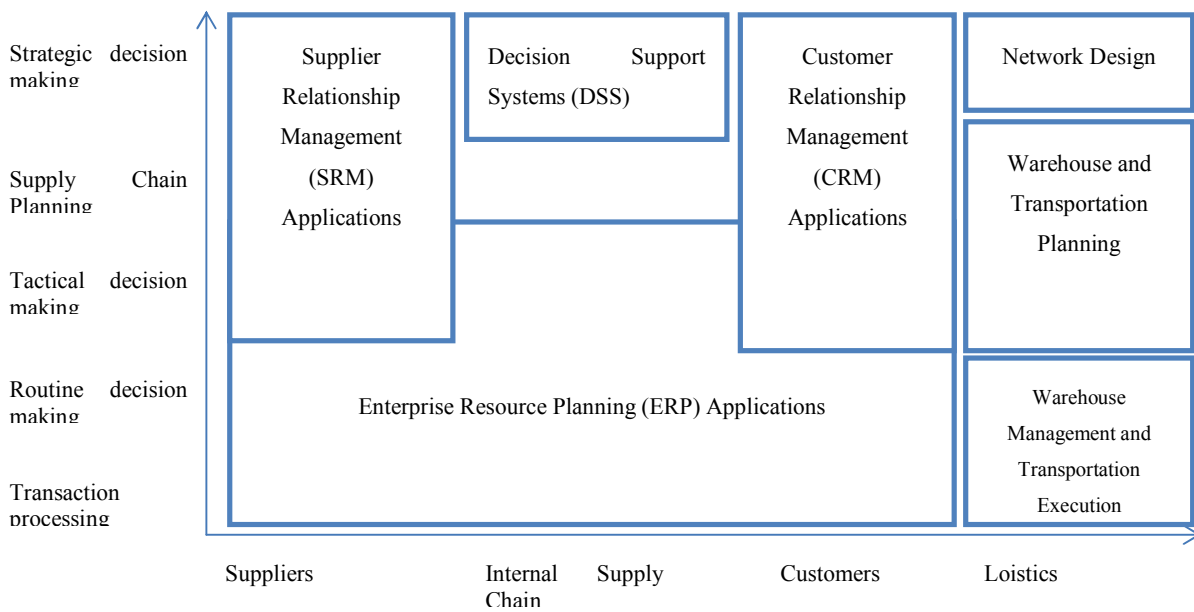


Figure 14: SRM Systems by Monczka et al. (2012).

Spend analysis depends on technology in use. According to the Aberdeen Group's research in 2011 (Limberakis, 2012), organizations rely mainly on stand-alone programs for spend analysis, spend analysis as a part of an ERP System or as a part of a strategic sourcing suite. Less common are customer-developed applications, spend analysis as a part of an e-procurement/Supplier

Resource Management suite or as a part of a supplier management solution (please regard figure 15). Overall, 68% of the organizations surveyed use an on-premise software while 32% use software as a service solutions (SaaS). Interestingly, that from the stand-alone solutions, 52% were on-premise solutions and 42% were SaaS. However, proportion of on-premise versus SaaS solutions when spend analysis is a part of an ERP solution is 94% and 6% accordingly. This indicates that investment in ERP platforms strongly affects the later choice of a spend analysis solution.

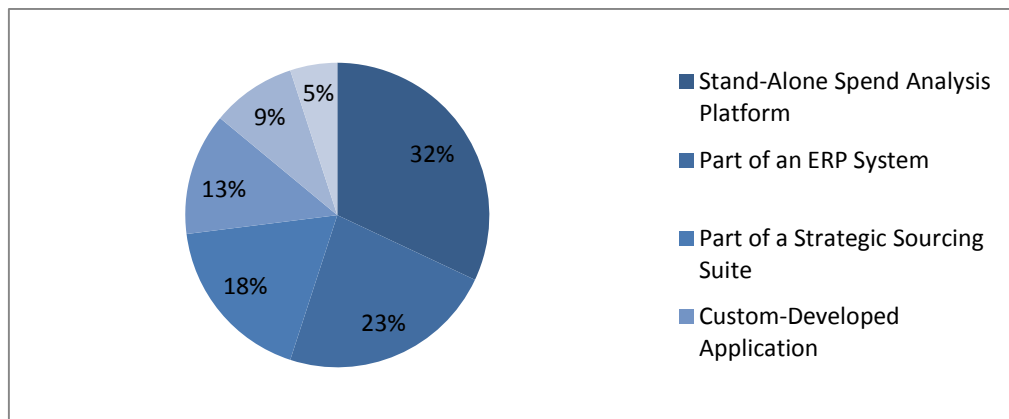


Figure 15: Deployment of Spend analysis solutions, Aberdeen Group (Limberakis, 2012).

5.2. Research Design and Data Collection

The research was divided into six steps: interviews with employees of the Case Company, interviews with Super Users of each company, online survey to the Super Users, online survey to selected end-users, interviews with some of the end-users that took part in the survey, and analysis of the survey results and interviews. Please regard figure 16 to see the six steps of the conducted research and the timeline of the study. Each step will be briefly discussed in the following sections.

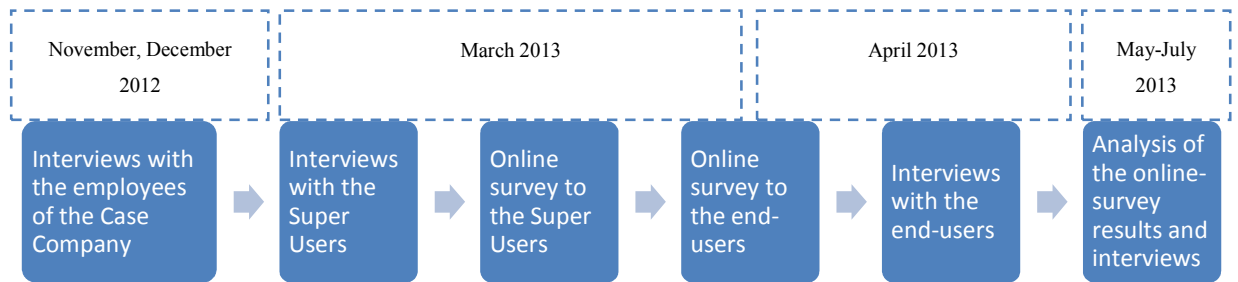


Figure 16: Research steps of the case study.

In order to identify how much is known about the end-users' use of the system as well as to select companies for the research, the author first conducted semi-structured interviews with Case Company's employees: a Service Manager (13.12.2012), the Solution Consultant (13.12.2012.), the Vice president of Operations (16.11.2012.), and the co-founder of the company that acts as a Vice President of Business Development (28.12.2012).

Three companies that actively use the Case Company's system were chosen based on their purchasing volume per year: small, medium, and large. Company A is a Finnish manufacturer that operates worldwide and comprises of several independent business areas. It had a purchasing volume of over 7 bn in 2012 and 17 source systems from which data is collected. Company A has two solution areas in use: Spend Visibility and Savings Program Management. Company B is a Finnish manufacturer and service provider that is an established player in Nordic countries, the Baltics, and Russia with a purchasing volume over 1 bn in 2012 and 7 source systems. Company B uses following solution areas: Spend Visibility, Savings Program Management and Procurement Controlling. Company C is a global bioscience company with a purchasing of over 300 million (EUR) in 2012 and one source system. Company C has two solution areas in use: Spend Visibility and Procurement Controlling.

After the companies to be analysed were identified, Super Users from each of the three client companies were first interviewed to identify users to be surveyed and interviewed based on internal agreements with the management, processes the companies were going through and other considerations. They were later asked to complete an online survey (with the same set of questions about purposes of application use as to the end-users).

The questioning of end-users was divided into two parts. The first part was a structured online survey to all the users to identify purposes of the Case Company's application use based on a Doll's and Torkzadeh's (1997) model of multidimensional system use and five evaluation categories: problem solving, decision rationalizing, vertical integration, horizontal integration, and customer service. The wording was adjusted to serve specific application evaluation needs. Additionally, questions regarding perceived usefulness (based on Davis, 1989) and perception of data quality (Yigitbasioglu and Velcu-Laitinen, 2012) were asked. Please regard Appendix IV to see the questions asked. Interviewees were asked to rate each question based on a Likert scale from 1 to 5 (1- I strongly agree; 2- I more agree than disagree; 3- I don't agree or disagree; 4- I more disagree than agree; 5- I strongly disagree). In the second part, a semi-structured interview tool was used to gain a more qualitative insight into how the system is used. Firstly, from each company a Super User was interviewed with the same set of questions as to the normal users, and additional questions to identify the end-user groups and the representatives of each group for further interviews. Secondly, users from each of the end-users group were interviewed.

Initially, the survey questions were intended to be asked during the interviews. However, for the sake of convenience and saving the respondents' time, the survey was set online, where users could rate statement under each question. Hence, the results from the survey are meant for a qualitative rather than a quantitative analysis, which is supplemented by additional questions asked during the interviews. Please regard Appendix IV to see the questions asked.

Answers from the survey were collected and analysed with a visual business intelligence mining tool (QlickView) that has a slice-and-dice functionality and a proper visualisation to identify patterns, relationships between questions, and a simplified view on data from different perspectives. When analyzing the results, the data was enriched with the answers from the interviews to get a more thorough understanding of the application's use.

5.3. SURVEY RESULTS

5.2.1. Response rate

As mentioned in the previous section, the purpose of the survey was to find out uses of performance dashboards. For this purpose ten questions were asked (Please regard Appendix IV to see the list of questions). The online survey was sent to 54 users that had been actively using the Case Company's software during three months (Jan-March 2013) prior the survey. 28 responses were returned which makes an approximately 52% response rate. However, there were 224 users in the three companies from January to March 2013 in total which makes the sample of the surveyed users to be 12.5%. Please regard the table below to see distribution of respondents and response rates per company. The number of the targeted users depended on the number of users Super Users allowed to contact due to internal agreements with the management, ongoing restructuring processes and other reasons.

Table 3: Distribution of Respondents and Response Rates per Company.

Case Company	Number of targeted respondents	Number of responses received	Response rate	Number of active users (Jan-Mar 2013)	Surveyed users vs active users (Jan-Mar 2013)
Company A	5	3	60%	149	2%
Company B	44	20	45.5%	54	37%
Company C	6	5	83.3%	21	23.8%

5.2.2. Participants

28 respondents answered the survey. From figure 17 one can see all the respondents from the three companies divided according to their job title into strategic, tactical, and operational level users. Please regard Appendix V to see the list of users according to the company, their job titles, rank, and user group.



Figure 17: Respondents according to hierarchical rank.

5.2.3. Answers

Question1: Data Quality

Data quality question referred to any figure that can be seen by users in reports. Users were given four statements to evaluate (from 1 to 5, where one is I strongly disagree and 5 is I strongly agree) their perception of accuracy, reliability, completeness and timeliness of data. As one can see from figure 18, users from Company C have the best perception of data quality in all the previously mentioned dimensions. Whereas users in Company A and B are neutral about data quality except users from Company A think that data is unreliable.

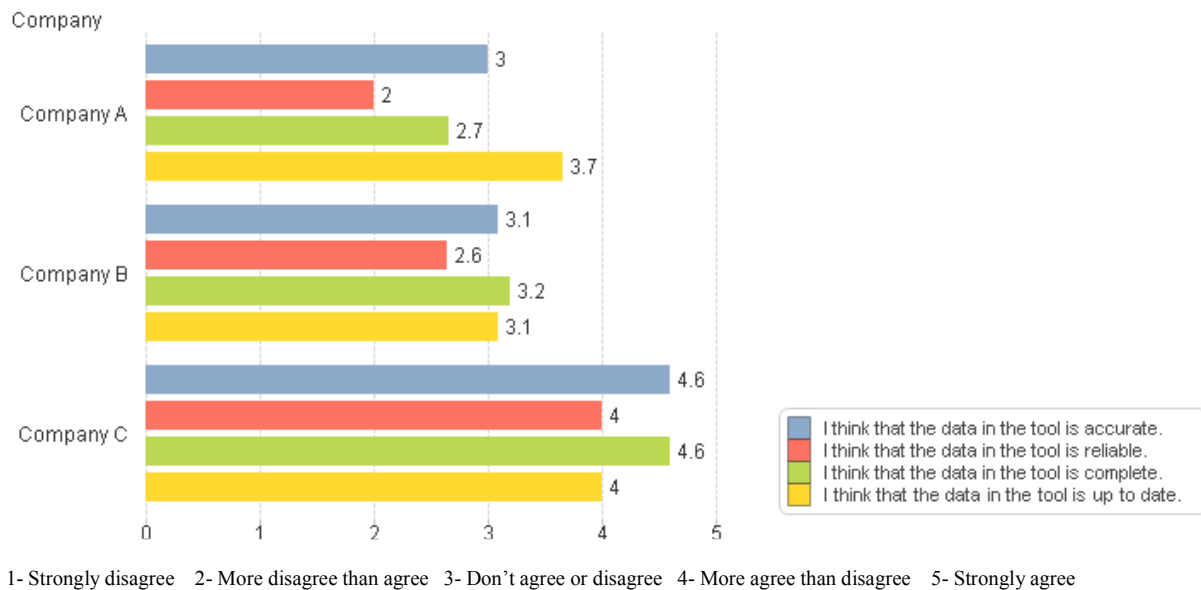


Figure 18: Data quality perception per company.

When looking at the answers by dividing the users into the strategic, tactical and operational level users, it becomes apparent that the perception of the data quality depends on the hierarchical level of the user (Please regard figure 19). The strategic level users perceive the data quality to be more accurate, reliable, complete, and up-to-date than the operational and the tactical level users.

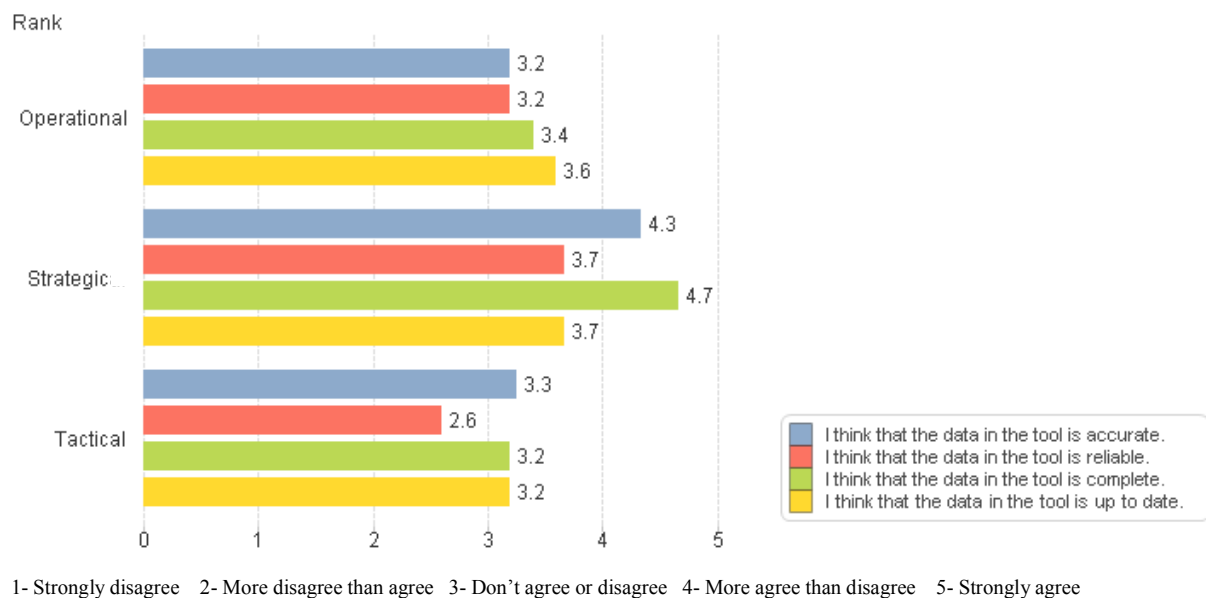
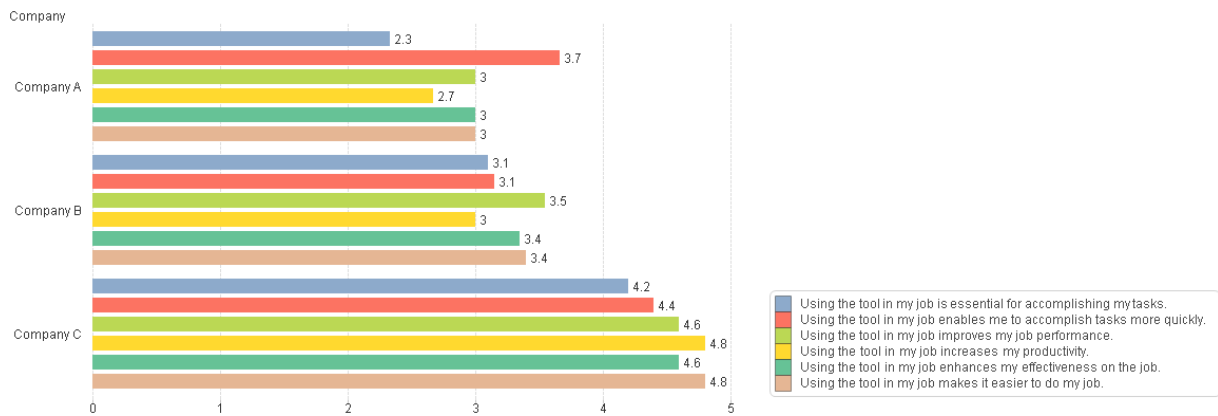


Figure 19: Data quality perception per hierarchical rank of users.

Question 2: Usefulness

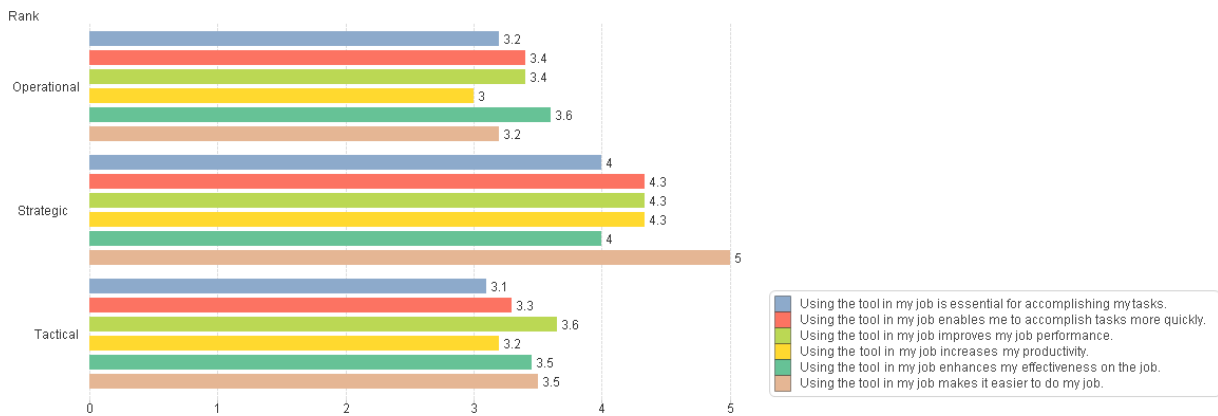
Usefulness in this questionnaire refers to how useful respondents perceive the application in their job. Respondents were asked to rate (from 1 to 5, where one is I strongly disagree and 5 is I strongly agree) their perception of the application's usefulness for: accomplishing their tasks, accomplishing their tasks more quickly, improving their job performance, improving their productivity, enhancing effectiveness on their job, and making it easier to do their job. Based on the answers received, the most useful the application is perceived by users in Company C in all the previously mentioned dimensions. In Company A and Company B, users are more neutral about the usefulness. Please, regard the figure 20.



1- Strongly disagree 2- More disagree than agree 3- Don't agree or disagree 4- More agree than disagree 5- Strongly agree

Figure 20: Usefulness perception per company.

However, similarly as in the case of data quality, the perception of the application's usefulness depends on a hierarchical rank of a user. As one can see from the figure 21, strategic level users perceive the application to be useful on all the previously mentioned usefulness dimensions. However, tactical and operational level employees are neutral about the application's usefulness.



1- Strongly disagree 2- More disagree than agree 3- Don't agree or disagree 4- More agree than disagree 5- Strongly agree

Figure 21: Usefulness according to hierarchical rank.

Questions on purposes of using the application

Questions three to seven were based on five dimensions of the Doll and Torkzadeh's (1997) model of multidimensional system use: horizontal integration, vertical integration, problem solving, decision rationalizing, and customer service. To fit the Case Company's application evaluation needs, the wording had been adjusted to respectively: communication, management, problem solving, decision rationalizing, and supplier service. Please regard appendix III to see the list of statements that users were asked to evaluate (from 1 to 5, where one is "strongly disagree" and 5 is "strongly agree") in order to measure each of the five dimensions. The average scores from all the three companies show that there is no strong predisposition towards any of the five use purposes. As shown in figure 22 the average score for all the dimensions is neutral ("Nor agree, nor disagree").

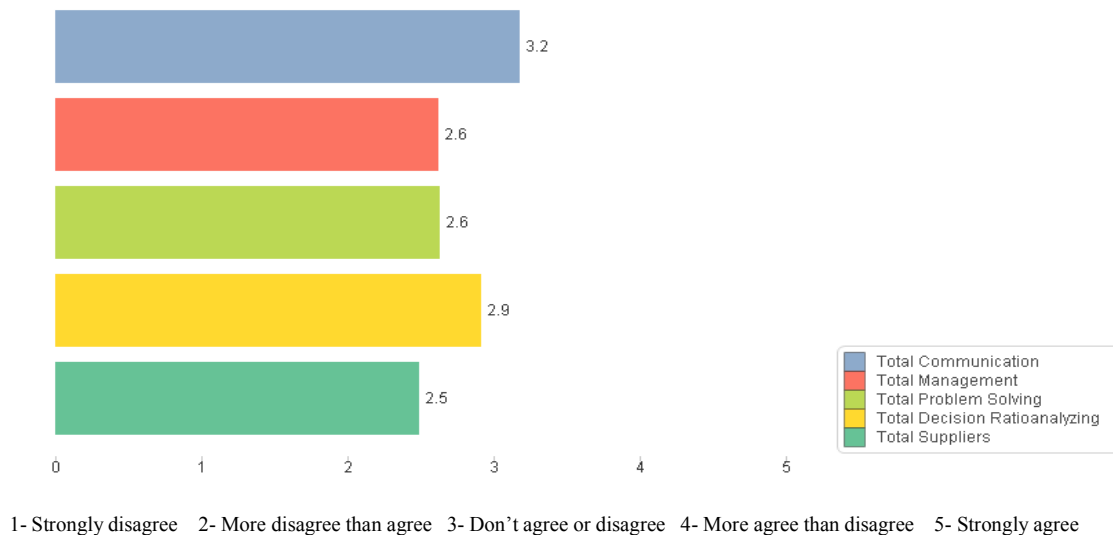


Figure 22: Average scores for Doll and Torkzadeh's dimensions of use in all the companies.

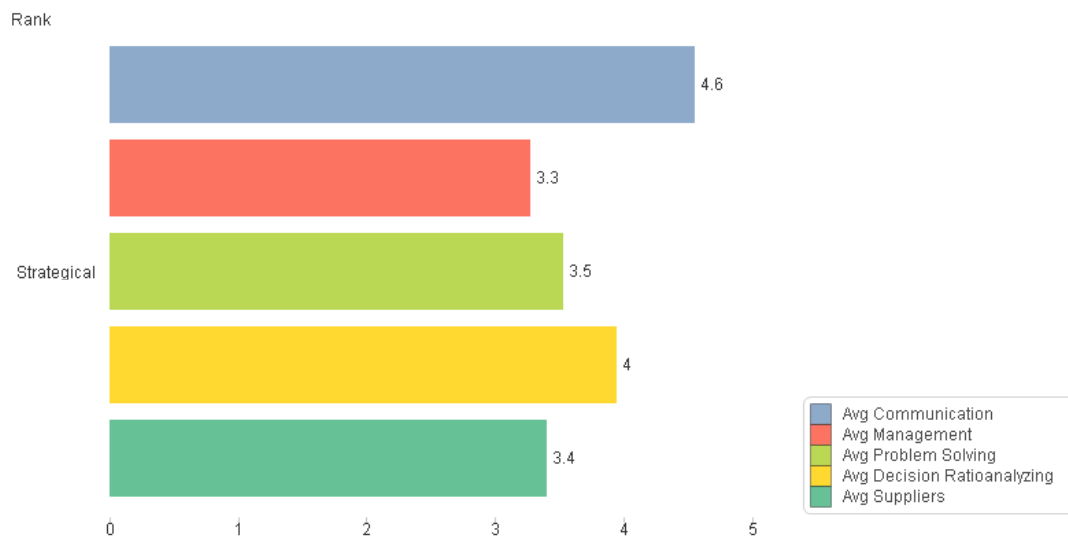
However, when looking at all the dimensions evaluated by all the user groups according to their hierarchical rank in the organization, it becomes apparent that the application is most extensively used by the strategic level users (please regard figure 23). Hence, the further analysis will be focused on the ways strategic users use the application.



1- Strongly disagree 2- More disagree than agree 3- Don't agree or disagree 4- More agree than disagree 5- Strongly agree

Figure 23: Doll and Torkzadeh's dimension evaluation based on user hierarchical rank.

When zooming in and taking a look only at strategic level users (please regard figure 24), communication is identified as the top purpose of the application's use, the second most highly scored purpose is decision rationalizing.



1- Strongly disagree 2- More disagree than agree 3- Don't agree or disagree 4- More agree than disagree 5- Strongly agree

Users use the application to communicate to people that report to them, people they report to, and with their work group. Users evaluated the highest the following purposes for decision rationalizing: to rationalize the decisions, to help to explain the decisions, to make explicit the reasons for the decisions, and to improve effectiveness and efficiency of the decisions.

Management, problem solving, and dealing with suppliers did not score enough on average per category to be seen as a purpose of use. However, some statements that were beneath those categories were evaluated by users as the way they use the application. Users rated high that the application is helping them in managing their work, making sense of procurement and procurement performance, and coordinating activities within the workgroup. Strategic level users use the application for dealing with suppliers by exchanging some information with them. Please regard figure 25.

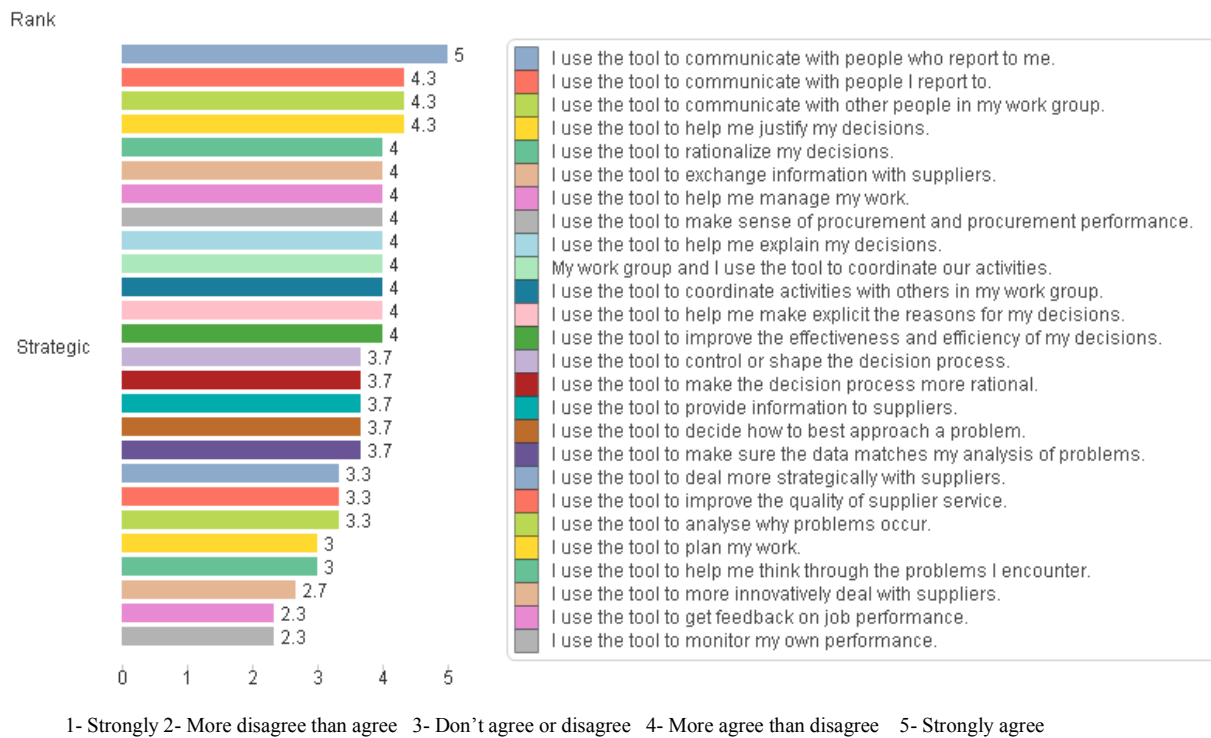


Figure 25: Application usage purposes on the strategic level on all usage categories.

5.4. Interviews

In total, 12 users were interviewed from the three client companies (please regard attachment VI with the information about when, where and with whom the interviews took place). From 12 participants four were business analysts, two - category directors, three-sourcing managers, one- senior sourcing manager, one- manager of group sourcing, and a sourcing development specialist. The interviews were conducted in March and April 2013 and the reference time period for user monitor observation is the first quarter of 2013 (January – March 2013).

5.4.1. Company A

Company's sourcing units were in the process of restructuring, therefore, just three users were interviewed: a sourcing analyst (Direct Material), a sourcing analyst (Logistics sourcing),

and a business analyst. First a business analyst who is also a Super User of the application was interviewed followed by the interviews with two sourcing analysts. All the three users are tactical level users (please regard figure 26).

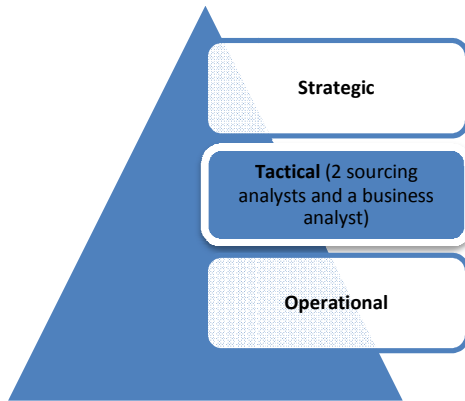


Figure 26: Users interviewed in Company A according to their hierarchical level.

User groups and use.

Company A has two solution areas in use: Spend visibility and Savings Program Management. Spend Visibility is the most used module with spend reports, spend overview, and spend transaction data being the most utilized reports. Altogether, according to the user activity monitor for Q1 of 2013 there were 149 users and 1780 sessions with a total duration of sessions amounting 1050 h, which makes an average duration of a session 0.59 h and approximately 43 selections per session. According to the business analyst (Business Analyst, Controlling and Reporting, 1.3.2013, interview), the application is used in sourcing functional units mainly by four business analysts.

Sourcing unit is divided into several sub-units according to material groups: Direct Material 1, Direct Material 2, Logistics and Sourcing, Engineered Materials, Indirect Materials, and IT. All sourcing sub-units report to the business controlling department. The application is used the most in the Direct Material 1 unit for spend report analytics. The Engineered Materials sourcing unit and the Logistics Sourcing unit are not using the Case Company's solutions so much, only the Savings Management module (Business Analyst, Controlling and Reporting, 1.3.2013, interview).

Business Analyst (Super User).

As a business analyst (Business Analyst, Controlling and Reporting, 1.3.2013, interview), her main areas of responsibility are management reporting for sourcing management, long-term planning, development needs, savings reporting, and internal controls. She has been using the application for about a year and is the most frequent user of the tool with the longest duration of use per session. She mostly uses Savings Project Management (SPM) and Spend Visibility solution areas with the spend reports, SPM savings reports, and SPM savings project details to be the most used reports by her. She uses the application for different ad-hoc analysis initiated by her, customers or her management as well budgeting, internal control, and business control. For example, a customer once requested to find out if the company was sourcing from Japan as the pre-caution measures after the March 2011 earthquake and the following radiation breakouts from the damaged nuclear plants. She was able to fulfil the request by looking at all the materials that had been sourced from Japan. This example makes explicit that there are many ways a spend analysis can be used not only for direct purposes, but also for more and more significance gaining corporate responsibility management.

Sourcing analysts.

As it was mentioned before, two sourcing analysts were interviewed: one from Direct Material department and one from Logistics department. The sourcing specialist from the Direct Material uses mainly Spend Visibility module on at least weekly basis for short checks of payment terms, supplier analysis and consolidated view on all the company's data sources. On parallel, she also uses the company' ERP for the direct materials and transaction data information. However, she turns to the Case Company's application for a more consolidated view. She explains that also category managers use the Case Company's software in a similar way. (Sourcing analyst, Direct Material, 13.03.2013., interview) The sourcing analyst from the Logistics Sourcing uses the Case Company's application for KPIs and savings reporting on weekly basis. He also uses the tool for optimization studies regarding their sourcing network e.g. in relation to which parts or which ship carriers they use. He mentions that because he does not trust data, he avoids using the Spend Visibility solution area. (Sourcing analyst, Logistics sourcing, 13.03.2013., interview)

Solution areas

Spend Visibility

The ERP extracts are widely used by business analysts and sourcing analysts to perform a spend analysis as it is believed by tactical level users to be more precise. As interviews have revealed, the distrust in data precision arises from an inconsistent consolidation and classification. However, when consolidated view on spend coming from different systems is needed, the Case Company's application is an alternative. Business analysts analyze payment data in the Case Company's application to find out what they should do to improve processes. Furthermore, as mentioned earlier, Spend Visibility solution are is also used for various ad-hoc analysis needs and supplier analysis. (Business Analyst, Controlling and Reporting, 1.3.2013, interview). Also the analysis in Spend Visibility solution area is often supplemented with an analysis in the Excel sheets. (Sourcing analyst, Logistics sourcing, 13.03.2013., interview).

Savings Project Management (SPM)

Savings module is the most used module because monthly reporting and bonuses are tied to savings. Most of data needed for taking decisions is taken from the Case Company's application. The software is mainly used for reporting the savings. Calculation of savings is usually done in other tools like Excel and added as attachments to the SPM tool. A business analyst is then responsible to check if savings calculations are done according to the Company's guidelines. Afterwards realized savings are reported back to the Case Company's application. Company A does not use SPM as a project tracking tool. For example, such feature as project tracking (whether the project is on track or delayed) is not used. The application is mainly used as a reporting tool to report realized savings. (Business Analyst, Controlling and Reporting, 1.3.2013, interview; Sourcing analyst, Direct Material, 13.03.2013., interview; Sourcing analyst, Logistics sourcing, 13.03.2013., interview)

KPIs

The KPIs for the sourcing functional unit are set yearly by the business controlling unit's manager, the manager of the sourcing business, and management team members (e.g. sourcing vice president). Business analysts report the previously mentioned KPIs on a monthly basis. This year main KPIs followed in the Case Company's application were EBITDA, sourcing savings, long-term savings, supplier amount, payment terms (joint target setting with the finance unit), strategic sourcing strategy goals for each material category. Also other KPIs are followed as requested from the finance department (Business Analyst, Controlling and Reporting, 1.3.2013, interview; Sourcing analyst, Logistics sourcing, 13.03.2013., interview).

All the interviewees admitted that KPIs are very easy to follow in the Case Company's application. However, the company has strict visual corporate guidelines how graphs must look like. Therefore, graphs cannot be copied straight from the application for the reporting purposes but have to be re-built in other tools, such as power point.

Improvement in performance, operations, and economic value

The Case Company's tool is valued in Company A because it helps to track performance. Some benefits of using the Case Company's application mentioned by the business analyst were tracking the performance of the suppliers; RFQ checks; comparing spend across the different units and find causes of why some units spend less or more, which suppliers are used for which materials; following the payment terms; and checking contract compliance to avoid maverick buying. In 2010, the tool proved to be very useful to track the progress of a company-wide initiative to reduce the number of suppliers. The Case Company's tool has also improved the communication in the organisation as savings and all figures are available online for everyone in the organisation who has the access to the application. (Business Analyst, Controlling and Reporting, 1.3.2013, interview; Sourcing analyst, Direct Material, 13.03.2013., interview; Sourcing analyst, Logistics sourcing, 13.03.2013., interview)

Future needs

The interviewed users have expressed the following wished for the future: better compliance with Company's A visual guidelines; what-if analysis functionality to play the scenarios of, e.g., changing a supplier; and forecasting possibilities directly in the tool. Furthermore, a more accurate consolidation and classification is required to persuade analysts about the quality of data. A process measurement is also something Company A would really want to implement, but the current security policy does not allow it yet and data is usually communicated in PowerPoint slides. It would be beneficial that when opening the tool, bookmarks could be already open (Business Analyst, Controlling and Reporting, 1.3.2013, interview; Sourcing analyst, Direct Material, 13.03.2013., interview; Sourcing analyst, Logistics sourcing, 13.03.2013., interview)

5.4.2. Company B

In Company B, six people were interviewed: a senior manager, two sourcing managers, the group sourcing manager, the director of sourcing development, and a sourcing development specialist. Please regard figure 27 to see the interviewees grouped by their hierarchical rank.



Figure 27: Users interviewed in Company B according to their hierarchical level.

User groups and use.

Company B uses three solution areas: Spend visibility, Savings Program Management and Procurement Controlling. Similarly as in Company A, Spend Visibility is the most utilized module, followed by Savings Project Manager, and Procurement Controlling. The top three reports used during the first quarter of 2013 were Spend Reports, Savings Project Manager Project List and Spend Compliance Reports.

The structure of the sourcing function is decentralized. Business units are separated depending either on their geographical location or on the business area. However, there is a centralized group sourcing department that overlooks the sourcing operations of the business units, initiates and coordinates strategies, and optimizes sourcing. The group sourcing unit is concerned with finding opportunities in grouping purchases and contracts together. It is not a profit organization in a sense that the group sourcing unit is not literally purchasing, but it negotiates better conditions with suppliers and results are passed to business units. Each business unit can see only data related to its operations in the Case Company's application. Only the centralized group sourcing unit has an access to an overview of the whole company's spend. Although each business unit has an access to every solution area, it depends on a business unit which module they use more and which less. The most used application across all the business units is SPM at the moment. (Senior Manager, 6.3.2013, interview; Manager, Group Sourcing, 2.4.2013., interview) According to the user activity monitor for Q1 of 2013 there were 54 users and 1535 sessions with the total duration of sessions amounting 893 h, which makes an average duration 0.58 h and an average of 35 selections per session.

Super Users

The company has several Super Users. During the time the study was conducted, three active Super Users were interviewed. One of the Super Users is a senior manager in the Group Sourcing and has been using the software for three to four years. She is one of the most active users of the application. Spend visibility is the most used solution areas by her, followed by SPM and Procurement Controlling with spend reports, SPM project lists, and compliance reports being her most used reports. She is mainly responsible for collecting monthly KPIs packages from

SPM and compliance. Therefore, she uses the application mainly on a monthly basis, especially intensively during several days of month when she collects KPIs. She also takes part in the yearly KPIs setting with the management team where she proposes how to collect and report data. (Senior Manager, 6.3.2013., interview)

The second Super User is a director of the sourcing development. Together with the first Super User he is responsible for the reporting tools in the organization and the sourcing development. He has been using the software already for three years, mainly few times a month. He uses most actively Spend Visibility and SPM solution areas with spend reports, SPM project lists, and SPM project reports being the most used reports. He is also responsible for an own commodity category. Therefore, he follows the necessary indicators for the development of his commodity sourcing in the tool. (Director, Sourcing Development, 8.4.2013., interview)

A specialist in Sourcing Development is the third Super User. He is responsible for Spend Visibility module and the technical side such as monthly loadings and projects. He has been using the software for two years on daily bases. His daily responsibilities are getting data, reporting, and solving problems from other users. The most frequently, he uses spend reports, spend transaction data, and compliance reports. He uses Spend Visibility solution to monitor spend levels, price development and what has been purchased. He answers ad-hoc requests from the Finance unit and other users and uses PDM. PDM is a technical module of the application that is used for such purposes such as supplier consolidation, product classification, data source management and many more technical aspects. (Specialist, Sourcing Development, 8.4.2013., interview)

Sourcing managers, Group Procurement.

During the study, two sourcing managers (one responsible for direct materials and one responsible for indirect materials) and the manager of the Group Sourcing were interviewed. The manager responsible for the direct materials uses the software couple of times per month after each tender round has been completed. She mainly uses the following solution areas: Spend Visibility and SPM. Her most actively used reports are spend reports, SPM project reports and SPM project lists. She mainly uses the software for reporting purposes and for preparing information for tender rounds. (Sourcing Manager, Direct Materials, 2.4.2013., interview)

The sourcing manager responsible for the indirect materials uses the application daily. She utilizes almost exclusively Spend Visibility solution area with spend reports, spend overview, and spend compliance being the most used reports by her. The Case Company's software is the only application that enables her to view spend in the indirect material categories. (Sourcing Manager, Indirect Materials, 2.4.2013., interview)

Manager, Group Sourcing

The manager of the Group Sourcing uses the software every week after each tender round and when savings projects need a final verification. He is the one who approves savings projects. He mainly uses SPM solution area with the SPM project lists, SPM overview, and SPM project Gantt chart being his most used reports. (Manager, Group Sourcing; 2.4.2013., interview)

KPIs

KPIs are set yearly during sourcing days organized at the beginning of autumn. The Group Sourcing unit together with the management team decide which KPIs to follow. A Super Users' role is mainly to propose how data will be collected and reported. During the time the study was conducted, the main KPIs followed in the Case Company's application were procurement benefits (savings), contract compliance, hedging results, supplier assessment, and procurement management (e.g. spend coverage). Additionally, questionnaires are sent to suppliers to assess quality measures. The results are reported in the tool to have the transparency on how many of the suppliers are pre-audited. KPIs are easy to follow in the application, however, some KPIs (such as the previously mentioned quality assessment) cannot be measured in the tool and other sources such as questionnaires are used to assess the performance. Both the director of the Sourcing Development and the Senior Manager of the Group sourcing agree that KPIs are easy to follow in the tool especially the ones in Spend Visibility solution area. However, there are some usability issues in SPM module. (Senior Manager, 6.3.2013., interview; Director, Sourcing Development, 8.4.2013., interview)

The Case Company's tool is mainly used as a data base. Meaning that data is taken out from the tool or is used for spotting the areas to focus on. Afterward, an analysis is made

somewhere else (e.g., in Excel, Project Management Tools etc.). The results are then reported back to the tool for a better company-wide communication. (Manager, Group Sourcing; 2.4.2013., interview)

Improvement in performance, operations, and economic value

The Case Company's software enabled Company B to manage savings projects more efficiently. Prior to the introduction of the software, each unit had calculated saving using Excel sheets. Communicating savings across the organization meant sending around the Excel files once a month which often caused inconveniences and misunderstandings. Now, savings are reporting in one place and everyone in the organization using SPM has an access to an up-to-date information and calculus of savings. It also brought more transparency to savings projects and their development. The managers can now more easily track the progress of the team, their subordinates, and the projects. Furthermore, the application enables users to follow the same KPIs (Senior Manager, 6.3.2013., interview; Manager, Group Sourcing, 2.4.2013., interview) SPM gives *“a good overview of savings and where to focus the efforts. Good way following the ongoing projects and the way to communicate”*. (Director, Sourcing Development, 8.4.2013., interview)

The manger of the Group Sourcing (Manager, Group Sourcing; 2.4.2013., interview) is convinced that partly because enabled by the Case Company's software, Company B is one of the most developed in the sourcing processes. He especially values that the application integrates all the data sources and therefore provides a consolidated view on sourcing. Furthermore, the application enables to discover opportunities for savings as well as improvements and problems. He thinks that SPM has increased their efficiency as purchasing information is more transparent in the organization and is more easily communicated through the tool. Ever since they have one tool, the variation in the process has been minimized. The tool is also used for following KPIs and to retrieve information for various initiatives. As a sourcing specialist notes: the Case Company's application *“saves time to people by letting them look up the information on their own rather than asking around about it.”* (Specialist, Sourcing Development, 8.4.2013., interview).

The application enables a consolidated view on the whole organisation, because it brings together all the sources in the organisation. As the director of the Sourcing Development mentions, it is enough to have SAP and the competitor's tool when one needs analysis only about direct materials of one business unit. However, when it comes to an indirect spend analysis or analysis across several or all units, the Case Company's application is the only tool that enables the consolidated view. (Director, Sourcing Development, 8.4.2013., interview) Nevertheless, the company is in the transition towards just one ERP platform. After this change has been in place there is no need for a system that consolidates the sources, but still there would be a need for an application that helps to monitor, manage, analyze, and communicate spend and various KPIs. (Manager, Group Sourcing; 2.4.2013., interview)

By the time the study was conducted, there had been an initiative in the Sourcing Development to reduce the number of suppliers and maverick buying especially in the indirect spend. The Case Company's software aids the managers to follow the number of the suppliers per category, spot incompliant spend, see spend per supplier or category, and to spot areas and categories to focus on next. (Senior Manager, 6.3.2013., interview)

Future needs

Super Users are heavy users of PDM. However, compared to the reporting tool, PDM is slow and not very user friendly. From the Super User perspective it is seen as the weakest point of the application. The classification in PDM is lengthy and cumbersome. (Specialist, Sourcing Development, 8.4.2013., interview)

The contract compliance tool and especially PDM is not developed enough: it is complicated to load data via PDM. Super users rely heavily on the Excel sheets still because they are used to and at the moment it is the most convenient way. They hope that in the future compliance reporting would be easier and more user friendly and lengthy process of importing data through PDM could be avoided by directly correcting information in the reporting tool. E.g., if one notices a supplier that does not have a contract and knows the supplier has a contract, one can go directly to change the status in the reporting and not going to data manager to do it. To address this problem, they have already implemented a contract compliance management for one

business unit directly in ERP. (Senior Manager, 6.3.2013., interview) The director of the Sourcing Development (a Super User) sees benefits if some of PDM functionalities would be migrated and integrating into the reporting. He thinks that in the future it would be a great advantage if the reporting is more interactive. For instance, if re-classification could be done directly in the reporting. (Director, Sourcing Development, 8.4.2013., interview)

A competitor's software that in some solution areas overlaps with the Case Company's software is used to handle direct material management coming from ERP from some business units. However, only the Case Company's software is capable of integrating all the data sources and handle also the indirect spend of the company. (Senior Manager 6.3.2013., interview) The Case Company's application is the best available tool in the company to manage the indirect spend. However, often analysts supplement their analysis when a more granular data is needed by looking up invoices in ERP. (Sourcing Manager, Indirect Materials, Case Company B, Finland, 2.4.2013.) The senior manager (a super uses) sees a potential future value in being able to do dashboards on her own. (Senior Manager, 6.3.2013., interview)

The director of Sourcing Development thinks that data is more or less reliable; the problem is more in the source systems of the company. Average users do not trust data if they spot that at least one item is wrong or contradicts their view, they lose trust in the whole system. If something is wrong, users do not have an initiative to fix it, instead they disregard the whole data set. (Director, Sourcing Development, 8.4.2013., interview)

5.4.3. Company C

Three users were interviewed from Company C: a sourcing business analyst, a category director (direct materials), and a category director (Global Sourcing). All three interviewees represent tactical hierarchical rank (Please regard figure 28).

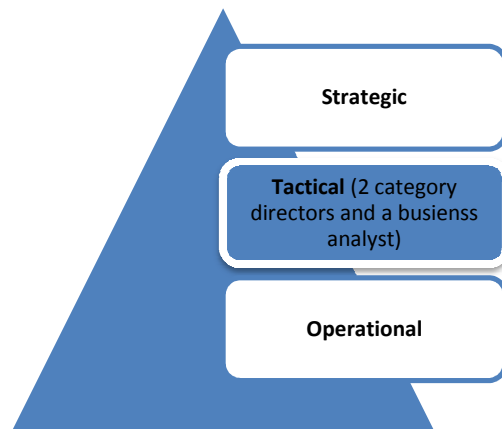


Figure 28: Users interviewed in Company C according to their hierarchical rank.

User groups and use.

Company C has two solution areas in use: Spend Visibility and Procurement Controlling. During the first quarter of 2013, Spend Visibility module was used almost exclusively (91% of the total use of the application). The top three reports were spend reports, transportation spend reports, and spend overview. According to the user activity monitor for Q1 of 2013, there were 21 active users and 672 sessions with the total duration of sessions amounting 407.4 h, which makes an average duration of a session 0.61 h and average of 41 selections per session.

An access to the application is limited to a small group of users (during the time the study was conducted, there were 21 users in total). This has been promoted by a Super User that prefers to handle requests and analysis himself. Departments that request information from the Super User are the compliance department (information about suppliers and contract compliance), sustainability department (information on transportation and CO2 emission data), quality department, and finance department. Interestingly, the finance department do not trust data from the tool and prefer to extract data from ERP directly. Procurement is the only department that can access the tool directly and check information in the tool. However, they too often request an analysis from the Super User.

Business Analyst (a Super User).

The Super User of the application in Company C is a business analyst who provides data to different departments as mentioned before. He was in the company when the procurement performance management software of the Case Company was introduced in 2007. The first two years he got to know the tool from being a user of the software in the packaging department. Later he became a business analysts and a Super User of the tool.

Similarly as other Super Users in the other two companies researched, he is the most active user of the tool. He mostly works with Spend Visibility solution area and spend reports, product classification reports as well as payment time reports.

As an employee in the packaging department, he used to use the tool monthly for quickly checking supplier information and spend history before talking to suppliers. As a Super User of the tool, the time he spends using the application is higher and tasks he performs are different. He is intensively working in the tool at the beginning of each month as he is responsible for loading new data and classification of spend and does some monthly analysis. Moreover, he uses the tool daily to shortly check some data.

The Case Company's tool is critical at his job as the nature of his work requires to do analysis and reports from data available in the tool. Furthermore, his personal KPI is a classification status of spend available in the tool. He composes reports and analysis to the purchasing department and his management as well as he does various ad-hoc analysis (e.g., number of suppliers per category). As he mentions, 90% of data for his analysis comes from the Case Company's application. However, as in the cases of previous two companies, he supplements data with looking up transaction data in the company's ERP. (Sourcing business analyst, Department of Sourcing, 13.03.2013., interview)

Category Directors

The category director for direct materials, uses only Spend Visibility solution (spend reports and spend overview). He works with suppliers and contracts and has been using the tool for four years. Main purposes of using the tool is preparing negotiations, preparing tenders with suppliers, and go through the numbers (what was sourced, what was the average price, what were the payment terms). Main parameters he looks up from the tool when preparing for negotiations

with suppliers are volumes purchased from supplier, sourcing history (e.g., how much and what has been purchased from a supplier in the past 12 months), prices, and spend per category.

He takes some graphs directly from the tool. However, he performs some analysis by extracting data from the tool and supplementing his analysis with calculations in the Excel. For example, he does forecasting calculation in the Excel, based on information extracts from the tool. (Category Director, Direct Materials, 22.03.2013., interview)

Similarly to the category director mentioned previously, the category director of the Global Sourcing uses only Spend Visibility module (spend reports and spend overview). He is responsible for strategic global sourcing of certain direct materials and has been using the application since it was introduced five years ago. The tool is not critical for performing his daily tasks. However, it is faster and easier for him to use the tool for his spend analysis needs as well as slicing-and-dicing data. His main purposes of using the tool is to get an overview of spend and figure out where to focus his efforts. He also uses the tool to divide responsibilities among his team, to check how much they spend and how many supplier they have per each category. Furthermore, he uses graphs from the reporting tool directly in his reporting presentations. The Case Company's tool is the first point of analysis to get an overview and he often uses the combination of Excel + Case Company's solution + ERP to get to the core of an issue. (Category Director, Global Sourcing, 26.03.2013., interview)

KPIs

The Super User reports to the director of Sourcing. His personal KPI is a classification status of products in the tool (he tries to keep the classification level at 98%). He also prepares KPIs for other departments and purchasers and reports them to the director of Sourcing. (Sourcing business analyst, Department of Sourcing, 13.03.2013., interview)

The category director of Global Sourcing is mainly following a development in spending. He used to focus very much on savings, but now the focus has shifted to optimizing capacity utilization. However, he estimates that when they have reached the capacity goals, the focus might shift back on savings in couple of years. (Category Director, Global Sourcing, 26.03.2013., interview)

All the interviewees note that following KPIs in the tool is very easy. However, the tool is not used for communicating the KPIs company-wide (Category Director, Direct Materials, 22.03.2013., interview)

Improvement in performance, operations, and economic value

Using the tool has improved efficiency by enabling a quick and easy access to relevant information across the organisation. Visualisation and speed of the tool is superior to the solutions provided by ERPs right now. (Category Director, Direct Materials, 22.03.2013., interview)

According to the Super User, the application used to be very relevant in the past when initiatives such as reducing the number of suppliers and gaining spend visibility to figure out where to focus their efforts were a priority. Although, the tool has slightly lost its importance, it is still relevant for them to monitor developments in the procurement. He speculates that the need for the application might increase again when the focus will be shifted back to such initiatives. He notes, that the application is very helpful not only for reducing the number of suppliers, but also in analysing spend categories to find out where to concentrate their efforts, improving accounts payables on-time-payment level, and identifying priority suppliers. (Sourcing business analyst, Department of Sourcing, 13.03.2013., interview)

Future needs

PDM and the data classification tool should be developed more to ease the use by the Super Users. For example, options such as product classification per selected time period would help to focus classification efforts only on time period in question. (Sourcing business analyst, Department of Sourcing, 13.03.2013., interview)

5.5. Key Findings

This section presents the key findings of the case study: on purposes of procurement performance management dashboard use; on perceived usefulness and improvement in performance, operations, and economic value; and on perceived data quality.

5.5.1. On Purposes of Procurement Performance Management Dashboard Use

The Case Company's procurement performance management dashboards are most extensively used by strategic level users with communication being the top purpose of the application use. Strategic users employ the tool to communicate to people that report to them, people they report to, and with their work group. The previously stated was confirmed also during the interviews. For example, the application was used for reporting, following and communicating different KPIs across the entire organisation as well as for communicating savings. It enabled managers to follow progress of projects, teams and subordinates. Additionally, interviewees reported better communication between team members. The application is often used as a database and as a company-wide information exchange medium. For instance, data is often extracted from the tool, then analysis is performed in some other application (such as Excel), and finally reported back to the tool so the information can be conveniently accessed and shared across entire organisation. Quite often, to get to the core of some issue, a combination of the tool, transaction data from ERPs, and Excel is used (Category Director, Global Sourcing, 26.03.2013., interview). Moreover, all the three case companies have noted that the application has enabled them to easily follow and report KPIs.

Decision rationalizing was the second most important purpose of use for: rationalizing decisions, helping to explain decisions, making explicit reasons for decisions, and improving effectiveness and efficiency of decisions. The interviews supplemented the survey results by showing examples of how exactly the software aids in decision rationalizing. For instance, the tool can support decision makers in procurement by providing data for supplier negotiation and tenders (e.g., historical prices, quantities, delivery times, spend per category, supplier count per commodity), supplier base rationalization purposes, reducing the number of suppliers, cut maverick buying, increasing contract compliance, lower the violations of payment terms,

enabling spend comparison between different business or regional units, corporate social responsibility analysis, and discovering savings opportunities.

Management, problem solving, and dealing with suppliers did not score enough on average per category to be seen as a purpose of use. However, some use purposes underneath those categories were highlighted by the users. Users noted that the application helps in managing their work, making sense of procurement and procurement performance, and coordinate activities within the workgroup. Moreover, strategic level users use the application in dealing with suppliers by exchanging information with them.

5.5.2. On Perceived Usefulness and Improvement in Performance, Operations, and Economic value

For analysis purposes, interviewees were required to give their job titles to be later divided into strategic, tactical, and operational level users. This division of analysis in previously mentioned hierarchical levels helped to identify that the Case Company's application is the most useful on strategic level, whereas tactical and operational level employees are neutral about application usefulness. From the interviews it became apparent that tactical level employees such as business analysts and Super Users often receive analysis requests from strategic level users. Therefore the role of tactical level users cannot be diminished and their needs should be better addressed by the Case Company.

Strategic level employees perceive the application to be useful on all the usefulness dimensions they were asked to rate: usefulness to accomplishing their tasks, accomplishing their tasks more quickly, improving their job performance, improving their productivity, enhancing effectiveness on their job, and making it easier to do their job. Whereas tactical and operational level employees are neutral about the application's usefulness. The results also show that employees in Company C perceive the application as useful while in Company A and Company B the respondents are neutral about the application usefulness. However, the results might have been affected by the higher proportion of the strategic users in Company C and the number of source systems.

In all three case companies, interviewees emphasized the tool's main advantage of integrating all data sources in a company and enabling a consolidated view on purchasing,

superior visualization and drill-down solutions. Interviewees in all three companies admitted that while the direct materials can be managed using existing ERPs and bolt-on solutions known to them, the Case Company's tool is right now the only application that can handle indirect spend analysis on such a level of granularity. Furthermore, the application enables to discover opportunities for savings as well as improvements and problems. Another value of using the tool identified by the interviewees was the increased efficiency they have experienced in communicating savings, in accessing quickly and easily relevant information and following strategic KPIs as well as a possibility to perform an ad-hoc analysis not only for spend analysis, but also for such increasing importance gaining corporate responsibility analysis and requests coming from different units in an organization (e.g. purchasing, finance, controlling, legal department, compliance, corporate responsibility departments etc.).

Interviewees shared their vision and wishes that the future use of the dashboards would allow increased interactivity by enabling them to modify data directly in the reporting tool (e.g., correcting suppliers in the contract compliance, classifying and reclassifying the products direct in the tool, or similarly consolidating and unconsolidating the vendors). Super Users also would like to have more control in dashboard design and an option to design dashboards internally.

The Case Company's application proves to be rather a strategic tool for procurement performance management. As the interviews have confirmed, the tool is the first level entry to perform analysis and get an overview on where to focus the efforts. The tool therefore provides enough granularity for strategic level analysis.

5.5.3. On Perceived Data Quality

As the results have showed, a data quality perception of strategic users is higher than of tactical and operational level users. This could be partly explained by the nature of the analysis each group conducts and the granularity of the data needed for this analysis. As later interviews have shown, the main concern about data quality arises from the granularity of product classification and supplier consolidation. For example, an item can be categorized to a higher level of dimension of classification hierarchy which is granular enough information for a strategic user to get an overview. However, users at the tactical and operational level need more granular information and would require an item to be classified to a lower level of hierarchy.

The next problem the users associate with low data quality is supplier consolidation. As described in the theoretical part, a supplier consolidation theoretically is simply mapping all vendors that belong to the same supplier under one supplier. However, in practice this often means that the machine simply looks-up and matches similar names. Nevertheless, a judgment of a man-in-loop often is needed to find out if a vendor belongs to a certain supplier which is done by a manual consolidation of exceptions in sign-off tools. The interviews revealed that mistakes that arise from an incorrect consolidation affect their judgment on data quality. For example, if a wrong vendor is seen under a certain supplier, an average tactical user would reject the whole data set and lose the trust in the whole system. Unfortunately, an average user does not have a proactive attitude to request corrections of mistakes. (Director, Sourcing Development, 8.4.2013., interview)

5.6. Discussion

Performance dashboards solutions provided on a software as the service basis anywhere via cloud computing are the future of the reporting. They provide a simple, but a clear visual solution with slice-and-dice capabilities for an in-depth analysis and easy reporting accessible from anywhere (as opposed to solutions behind fire-walls). Those are the other reasons besides the consolidated view the interviewees valued in the tool.

One might argue that integration of sources of different ERPs might lose its importance in the future as the trend indicates that companies are thriving to move towards only one ERP platform across the entire organisation. Nevertheless, such transformations are hard to implement and usually take a number of years to be accomplished. Moreover, new mergers and acquisitions always increase a need for data integration. Furthermore, cross-department integration and co-operation remains one of the main stumbling points in performance management (LaPointe, 2005). Therefore, a consolidated view might still be a main driver of the tool's adoption. Monczka et al. (2011) identifies another trend in Supply Chain Information Systems. He speculates that also in Supply Chain Management Systems, integrated systems and more comprehensive e-sourcing solutions will replace the stand-alone applications. For example, ERPs that are right now losing to bolt-on Supply Chain Management solutions in visualisation, speed, consolidated view and functionalities (Category Director, Direct Materials, 22.03.2013.,

interview), are working on extending their capabilities to be able to provide extended functionalities. Also comprehensive procurement solutions are being extended to provide a whole procurement management process from spend analysis to contract compliance. Furthermore, there is an on-going consolidation not only between different procurement performance management software providers and e-sourcing suites, but also ERPs joined the pursuit of acquiring Supplier Relationship Management vendors to enhance their current procurement performance dashboard solutions (Pandit and Marmanis, 2008).

As it was identified in the case study, the Case Company's bolt-on application is most extensively used by the strategic level employees and provides enough data granularity for their analytical needs, whereas tactical level employees often need a more granular data for their analysis. This explains why sometimes tactical and operational level users turn to ERPs to get transaction level information as ERPs are designed for analysis of transaction level information and sometimes provide enough data for tactical level decision makers. However, as mentioned earlier in the section about SCM application positioning in organisations, currently ERPs fail to serve the needs of strategic level users and do not provide as specialized solutions for strategic analysis of procurement as the bolt-on Supplier Relationship Management applications do.

Higher satisfaction with data quality by strategic level employees could be one reason why users in Company C are more satisfied with data quality than users in Company A and Company B. The percentage of the strategic users to the tactical and the operational level users that took part in the survey in Company C was 20%, while in Company B there were only 10% of the strategic users who answered the survey. In Company A, all users that took part in the survey were tactical level employees. The second possible reason was identified in a discussion with the Vice President of Operations of the Case Company (23.09.2013.). Namely, the number of the source systems was identified as one of the key factors that could affect a perception of data quality and thus user satisfaction with the application. An increased number of sources (and often different languages the transactions in this source data is) complicates processing and classification as well as increases a risk of data being incomplete or wrongly classified. Interestingly, the interviewed representatives of the client companies acknowledged that the data they provide to the Case Company is incomplete and that they realize that many of data quality problems are partly related to that. Indeed, Company C (the company with the highest

satisfaction with data quality indicated in the survey) has just one data source, while Company A and B have 17 and 7 data sources accordingly

As mentioned previously, questions for the questionnaire were adapted from the Doll and Torkzadeh's (1998) multidimensional measure that evaluates three functions of information system use: decision support, work integration, and customer service and can identify five dimensions of the application use: problem solving, decision rationalizing, vertical integration, horizontal integration, and customer service. This tool has been useful to identify the main use categories, which were communication and decision rationalizing, and that the application is mainly used by strategic level users. Of course, such generic purposes of use can't explain how exactly the tool was used, for example, what information is communicated and what kind of decisions are supported. However, the interviews helped to find this out and prove that the dimensions of use identified in the survey are indeed the true purposes of the application use. Interestingly, during the preliminary interviews with the employees of the Case Company, the interviewees identified monitoring the KPIs and decision support as the supposed main purposes of the application use. The co-founder (the Case Company, 28.12.2012.) was convinced that the application has no business case as a communication platform, yet communication was identified as the primary application use purpose and one of the key valued features of the tool by the end-users. Hence, Doll and Torkzadeh's (1998) tool was found to be useful in identifying the true use purposes of the application.

6. CONCLUSIONS

The aim of this thesis was to find out how end-users of the Case Company use performance dashboards to support decisions for measuring and managing procurement performance. To answer this question, a multiple-case study of three international clients of the Case Company was made in the form of an online survey and semi-structured interviews. Before conducting the case study, relevant literature on performance dashboards, procurement performance management and measurement, and instruments for evaluating information system use in decision support were reviewed. The author will start this chapter with the theoretical contribution of this thesis and implications for practice, and will finish the conclusions by presenting the limitation of the study and future research.

6.1. Theoretical Contribution

This study supplements the research gap on how dashboards are used for performance measurement and management by presenting findings from a multiple-case study of one procurement performance dashboard solution provider and three of its client companies. To the author's knowledge, this would be the first case study on performance dashboard application in procurement performance management. This study will benefit academic research by giving more evidence for comparison on how dashboards are used in different industries and strengthening the understanding of dashboard use in decision making. Moreover, the study supplements research on performance measurement and management systems by describing how performance dashboards are used in procurement performance management.

This thesis complements research on user requirement revision in software adoption and post-implementation phases. The majority of the literature on integrating end-user requirements for decision support systems concerns pre-implementation and implementation phases. However, software vendors increasingly deploy new business models such as offering software as a service, which creates the need to revisit user requirements in adoption and post-implementation phases (Wilkin and Davern, 2012) as a part of offering better service. Information system use is critical for an information system's success (e.g., DeLone and McLean, 2003). This shows how software use purposes can be re-evaluated with the help of the Doll and Torkzadeh's multidimensional

system-use measurement tool by its practical application in the context of procurement performance management dashboard use.

This study differentiates itself from Eckerson's (2011), Yigitbasioglu and Velcu-Laitinen's (2012), Pauwels et al. (2009), and Adams and Pomerol's (2008) studies on performance dashboard use (e.g.,) by analysing dashboard use based on hierarchical ranks of end-users: strategic, tactical, and operational. Such division was helpful during analysis for identifying differences in use purposes of each end-user group and unique problems each group faces. Moreover, the study looked at dashboard use through the lens of procurement performance management, a perspective that has not yet been mentioned in academic literature.

The case study confirms the performance dashboard use purposes as identified by Pauwels et al. (2009) and Eckerson (2011). Namely, dashboards are used for bringing consistency in measures, monitoring performance, planning, and communicating. Moreover, it supports the findings from the previously mentioned research of Yigitbasioglu and Velcu-Laitinen (2012) that found that dashboards are used for monitoring, problem solving, rationalizing, communication, and consistency.

This study has established that communication was the primary purpose of the Case Company's tool usage. Communication as a dashboard's use purpose resonates with the Yigitbasioglu and Velcu-Laitinen's study (2012) on performance dashboard use by sales managers in Finland, which also identified communication and consistency as being the primary use of dashboards. This strengthens the view that dashboards are primarily used as a communication platform and a collaboration tool between different end-users and units of an organisation.

The case study has also confirmed the dashboard use purposes as identified by Adams and Pomerol (2008). Namely, dashboards of the Case Company are used for reporting, scrutinizing, and discovering information to match the five representation levels of managerial understanding of the problem by Humphreys and Berkley (1985). Static reporting was used when questions and answers were known and users just needed to monitor performance. The end-users often used the tool for scrutinizing when they knew the questions to ask and needed evidence to support their answers. Finally, data drilling sometimes helped users discover problems of which they would have otherwise not been aware.

6.1. Implication for Practice

This study benefited the Case Company as it narrowed the gap between the Case Company's assumptions about end-user groups and how they use the software and the actual use of the tool. Direct feedback from the interviews and surveys was passed forward in the form of a report, which was utilized by the Case Company's application engineers and service managers to improve the product and service offering. Furthermore, the new perspective on the end-user groups based on their hierarchical rank (strategic, tactical, and operational) helped the Case Company to better understand and address their needs.

The study has identified that the Case Company's procurement performance management dashboards are most extensively used by strategic level users for communication and decision rationalizing purposes. As mentioned previously, questions for the survey were adapted from the Doll and Torkzadeh's (1998) multidimensional measure that evaluates three functions of an information system's use: decision support, work integration, and customer service. Furthermore, it can identify five dimensions of the application use: problem solving, decision rationalizing, vertical integration, horizontal integration, and customer service. As the interviews have confirmed, the previously mentioned use purposes are indeed true purposes of use. Thus, the tool is useful in evaluating performance dashboard use purposes.

The study on the purposes of the Case Company's tool use revealed that user needs evolve after the adoption and use of software. Therefore, when software is provided on the basis of being service, the user requirements set during design and implementation phases should be regularly revisited to serve evolving customer needs in adoption and post-implementation phases (Wilkin and Davern, 2012).

The Case Company's application proves to be rather a strategic tool for procurement performance management. As the interviews have confirmed, the tool is the first level entry to perform analysis, to get an overview on where to focus the efforts and its main benefit is consolidate view on procurement. As the results have showed, a data quality perception of strategic users is higher than of tactical and operational level users as it provides enough data granularity for a strategic-level analysis. The tendency of tactical- and operational-level users to refer to ERPs for more details and transactional-level information further confirms Monczka et al.

(2012) positioning of Supplier Relationship Management (SRM) applications as mainly strategic decision-making tools and ERP support functions as mostly applications for tactical- and operational-level decision making, with tactical-level users often being in need to combine SRM application information with data from ERPs. Thus, the case study identified that ERPs currently fall short in serving the needs of strategic-level users and do not provide as specialized solutions for strategic analysis of procurement as bolt-on Supplier Relationship Management applications do. Vice versa, SRM applications often do not provide enough data granularity to serve the needs of tactical- and operational-level users.

The results have showed that a consolidated view is still a main driver of the tool's adoption. On contrary, data quality was the main impediment to the tool's adoption and use. This might apply not only to the context of the Case Company's tool, but also to SRM applications in general as many of them rely on transactional data from ERPs.

The study sheds more light on how a change from static to interactive reporting based on business intelligence technology in the form of dashboards affects procurement performance management practices in organisations and what the benefits and possible drawbacks are. This study can benefit other companies that are considering a possible procurement performance dashboard implementation in the future.

This thesis will be further distributed to the three participant companies of the case study, which should allow them to compare their position relatively to the extent the tool is utilized by other companies.

6.2. Limitation of the Study and Future Research

The results of the survey need to be interpreted with caution because only 3 respondents (or 11% of those who completed the survey) were strategic-level users. It is possible that if more companies would have been included in the survey and more strategic users would have taken part, the results would show a more diverse use of the Case Company's software. Moreover, strategic users who took the survey are representing only two companies from the three companies surveyed: two VPs of sourcing from Company B and a director of sourcing from Company C. This limits the analysis and comparison on how the application is used in Company A by strategic-level employees.

The scope of the thesis is limited to performance dashboard use in procurement performance management by the three client companies of the Case Company. There are number of procurement performance dashboard providers in the industry with different functionalities of their software and underlying software solutions. Therefore, the results from this case study cannot be generalized to the whole area of procurement performance management and are limited to the software functionalities that are provided by the Case Company.

More case studies about how performance dashboards are used in procurement performance management and measurement, as well as the comparison of different performance dashboard providers would benefit the research. Moreover, it would be interesting to study how dashboards are used in other industries as the trend clearly moves away from static reporting to more dynamic, interactive, slice-and-dice visual reporting available to users at all times, anywhere, and on any electronic device.

Originally, the author intended to research end-user groups and their purposes for the Case Company's application use to find out how use purposes evolve from design and implementation phases to the post-implementation phase. Unfortunately, it was not possible to reconstruct information on the initial user groups, user requirements, and intended purposes of use, neither in the design and implementation phases of the tool or the Case Company's internal resources, nor from interviews with end-users. However, it would be of high interest for future research to find out how end-user groups and their purposes of use evolve with changes in the system and how the system evolves during post-implementation phases to suit the evolving needs of users.

The study was concerned only with the actual extent of the system use and did not give answers to why users do not use the system to its full capabilities. It would be interesting for future research to investigate why the full system capabilities are not utilized by the end-users, e.g., whether it is due to narrow job specifications of end-users, resistance to information system adoption, usability issues or any other reasons.

Performance dashboard use has not been studied extensively by academics. Therefore, there is no certainty or possibility of comparison to analyse whether Doll and Torkzadeh's concept is the best tool to evaluate use purposes in decision-making. Furthermore, there is no basis for a comparison of dashboard use in procurement performance management or the

comparison of procurement performance dashboard use between multiple providers of such software.

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APPENDICES

APPENDIX I - Question Items for Individual-Level ISURA

Table 4: Question items for individual-level ISURA (Barki et al., 2007)

Technology interaction behaviors	<p>—<i>Formative items: I use this system (or application) to...</i></p> <p>TI01: solve various problems. TI02: justify my decisions.* TI03: exchange with other people. TI04: plan or follow up on my tasks. TI05: coordinate activities with others. TI06: serve customers.</p>
Source: Doll and Torkzadeh (1998), Hartwick and Barki (1994)	
11-point scale (0–10) (not at all to very much) and % (0 to 100)	<p>—<i>Reflective items:</i></p> <p>TI07: For accomplishing my tasks, this system is essential. TI08: When you perform a task that you know the system supports, what percentage of time do you use the system?</p>
Task-Technology adaptation behaviors	<p>—<i>Formative items: How much effort (in time and energy) did you spend recommending or suggesting...</i></p> <p>TTA01: improvements to this system's functionalities. TTA02: improvements to this system's interface. TTA03: improvements to this system's hardware. TTA04: modifications to your tasks so that they better fit this system. TTA05: modifications to this system so that it better fits your tasks.</p>
Source: Rice and Rogers (1980)	
11-point scale (0–10) (a little to a lot)	<p>—<i>Reflective items: Overall, how much effort (in time and energy) did you spend so that...</i></p> <p>TTA06: your system and your business processes fit each other? TTA07: your system and your business processes would be in harmony with each other?</p>
Individual Adaptation behaviors	<p>—<i>Formative items:</i></p> <p>IA01: I communicated with colleagues in order to better understand how this system operates. IA02: I communicated with IT specialists in order to better understand how this system operates. IA03: I researched, on my own initiative, in order to increase my knowledge and my mastery of this system. IA04: I explored several information sources, on my own initiative, concerning this system.*</p>
Source: Rice and Rogers (1980)	
11-point scale (0–10) (a little to a lot) (not at all to very much) (disagree to agree)	<p>—<i>Reflective items:</i></p> <p>IA05: How much effort (in time and energy) did you spend to learn about this system? IA06: I invested much effort (in time and energy) in order to better use this system.</p>
Perceived Individual Benefits	<p>PIB01: Knowledge gained using this system will be helpful to me with other systems in the future. PIB02: Using this system allows me to be more efficient at my job.* PIB03: Knowing how to use this system makes me more marketable.</p>
Source: Seddon (1997), Staples et al. (2002)	
Perceived Organizational Benefits	<p>POB01: Overall, the benefits of this system for my organization are: POB02: This system improved the operations of my organization. POB03: This system improved the performance of my organization.</p>
Source: Seddon (1997), Staples et al. (2002)	

APPENDIX II - QUESTION FOR MULTIDIMENSIONAL MEASURE OF SYSTEM-USE

Table 5: Measures of system use (Doll and Torkzadeh, 1997)

Problem solving

- P1 I use this application to decide how to best approach a problem
- P2 I use this application to help me think through problems
- P3 I use this application to make sure the data matches my analysis of problems
- P4 I use this application to check my thinking against the data
- P5 I use this application to make sense out of data
- P6 I use this application to analyze why problems occur

Decision rationalization

- R1 I use this application to help me explain my decisions
- R2 I use this application to help me justify my decisions
- R3 I use this application to help me make explicit the reasons for my decisions
- R4 I use this application to rationalize my decisions
- R5 I use this application to control or shape the decision process
- R6 I use this application to improve the effectiveness and efficiency of the decision process
- R7 I use this application to make the decision process more rational

Horizontal integration

- H1 I use this application to communicate with other people in my work group
- H2 My work group and I use this application to coordinate our activities
- H3 I use this application to coordinate activities with others in my work group
- H4 I use this application to exchange information with people in my work group

Vertical integration

- V1 I use this application to help me manage my work
- V2 I use this application to monitor my own performance
- V3 I use this application to plan my work
- V4 I use this application to communicate with people who report to me
- V5 I use this application to communicate with people I report to
- V6 I use this application to keep my supervisor informed
- V7 I use this application to exchange information with people who report to me
- V8 I use this application to get feedback on job performance

Customer service

- C1 I use this application to deal more strategically with internal and/or external customers
- C2 I use this application to serve internal and/or external customers
- C3 I use this application to improve the quality of customer service
- C4 I use this application to more creatively serve customers
- C5 I use this application to exchange information with internal and/or external customers

APPENDIX III - QUESTIONS FOR ISU CONSTRUCT EVALUATION OF SUN AND TENG

Table 6: ISU instrument by Sun and Teng

<ul style="list-style-type: none"> • Information Reporting applications provide basic information reports for routine activities through pre-formatted information reports, such as purchase order reports, production scheduling reports, project status reports, promotion tracking reports, and customer accounts reports • Please consider how you use Information Reporting applications in your job, and circle a number between 7 (all the time), 4 (half of the time), and 1 (rarely): 	<p style="text-align: center;"><i>I use Information Reporting applications from Corporate IS.</i></p> <p><u>When I perform routine and repetitive works</u></p> <p><u>When I need to monitor status of day-to-day operations (e.g. cost, sales, projects, customer relations, etc.) for deviations from standards</u></p> <p><u>When I need to take immediate corrective actions based on the monitoring of current status</u></p> <p><u>When I plan my daily or weekly work activities</u></p> <ul style="list-style-type: none"> • Decision Support applications facilitate analysis for better decision making, and this is provided by applications such as Excel models, data warehouse, business intelligence, data mining, OLAP (or-line analytical processing), business analytics • Please consider how you use Decision Support applications in your job, and circle a number between 7 (all the time), 4 (half of the time), and 1 (rarely):
<p style="text-align: center;"><i>I use Decision Support applications from Corporate IS.</i></p> <p><u>When I need to conduct analysis (e.g. analysis of sales trend, customer defection patterns, what-if scenarios, etc.) for better decision making</u></p> <p><u>When I try to pinpoint cause of certain problems related to my decisions</u></p> <p><u>When I attempt to explore more alternatives in decision making</u></p> <p><u>When I need to acquire crucial information and knowledge related to decisions</u></p> <ul style="list-style-type: none"> • Group Support applications facilitate communication and collaboration with your colleagues and customers. It includes applications such as GroupWare, e-mail system, wikis, Instant Messaging, Video Conference • Please consider how you use Group Support applications in your job, and circle a number between 7 (all the time), 4 (half of the time), and 1 (rarely): 	<p style="text-align: center;"><i>I use Group Support applications.</i></p> <p><u>When I communicate with my co-workers</u></p> <p><u>When I engage in joint efforts or projects with co-workers</u></p> <p><u>When I attempt to explore more alternatives in decision making</u></p> <p><u>When I need to share information and knowledge with co-workers</u></p>

APPENDIX IV – ONLINE SURVEY

Introduction

Dear user,

With the kind consent of _____ you are invited to contribute your valuable input to help _____ in understanding your business needs. This will take just a few minutes of your time. The survey consists of 5 questions and is part of my master's thesis about procurement performance management.

The results will be used to analyse for which purposes and extent _____ is used by users in different functional areas. I am kindly asking you to share your job title for more qualitative data analysis. The results will be absolutely anonymous (both your job title and company name will be concealed).

If you have any questions about the survey, you are welcome to contact me directly.

Thank you for your time
Yours faithfully,
Viktorija Lohringa

Background

***Your job title.**

Data Quality and Usefulness

Please rate the statements below.

Data Quality (Data quality refers to the figures you can see in reports).

I think that the data in _____ is accurate.	Strongly agree	More agree than disagree	Don't agree or disagree	More disagree than agree	I strongly disagree
I think that the data in _____ is reliable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think that the data in _____ is complete.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think that the data in _____ is up to date.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Usefulness (Usefulness refers to how helpful you think _____ is in your job).

Using _____ in my job is essential for accomplishing my tasks.	Strongly agree	More agree than disagree	Don't agree or disagree	More disagree than agree	I strongly disagree
Using _____ in my job enables me to accomplish tasks more quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using _____ in my job improves my job performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using _____ in my job increases my productivity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using _____ in my job enhances my effectiveness on the job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using _____ in my job makes it easier to do my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Decision Support

Please rate the statements below.

Communication (Communication refers to any form of communication and information exchange).

I use _____ to communicate with other people in my work group.	Strongly agree	More agree than disagree	Don't agree or disagree	More disagree than agree	I strongly disagree
I use _____ to communicate with people who report to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to communicate with people I report to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Management (Management refers to how the application helps you to plan, analyse, manage, get feedback on your job, and coordinate activities with others).

I use _____ to help me manage my work.	Strongly agree	More agree than disagree	Don't agree or disagree	More disagree than agree	I strongly disagree
I use _____ to monitor my own performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to plan my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to get feedback on job performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My work group and I use _____ to coordinate our activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to coordinate activities with others in my work group.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Problem Solving (Problem solving refers to any task, problem, situation, decision, question you need to solve that requires an analysis in reporting).

I use _____ to decide how to best approach a problem.	Strongly agree	More agree than disagree	Don't agree or disagree	More disagree than agree	I strongly disagree
I use _____ to help me think through the problems I encounter.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to make sure the data matches my analysis of problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to make sense of procurement and procurement performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to analyse why problems occur.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Decision Rationalizing (Decision rationalizing refers to how you use : reports to explain and justify your decisions).

	Strongly agree	More agree than disagree	Don't agree or disagree	More disagree than agree	I strongly disagree
I use _____ to help me explain my decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to help me justify my decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to help me make explicit the reasons for my decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to rationalize my decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to control or shape the decision process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to improve the effectiveness and efficiency of my decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to make the decision process more rational.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Suppliers (Please refer to how helps you in dealing with suppliers).

	Strongly agree	More agree than disagree	Don't agree or disagree	More disagree than agree	I strongly disagree
I use _____ to deal more strategically with suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to provide information to suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to improve the quality of supplier service.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to more innovatively deal with suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use _____ to exchange information with suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reports

Please answer the question below in your own words.

Please specify in text boxes below your three most commonly used reports from: and the purpose you are using them for.

Report 1

Report 2

Report 3

End of Survey

Thank you very much for your participation!

If you have any comments or feedback, please share it here.

APPENDIX V - List of Questionnaire participants

Company	Your job title	Rank	User group
Company A	Analyst	Tactical	Normal user
Company A	Analyst, Global Logistics, Sourcing	Tactical	Normal user
Company A	Business Analyst, Reporting & Controlling	Tactical	Super User
Company B	Buyer, operative	Operational	Normal user
Company B	GSM	Tactical	Normal user
Company B	Purchaser	Operational	Normal user
Company B	Senior Manager, Sourcing	Tactical	Normal user
Company B	Senior Manager (50 % of time Group development team and 50 % of time Finance controlling)	Tactical	Super User
Company B	Senior Manager, Facility Services	Tactical	Normal user
Company B	Senior Manager, Group Sourcing	Tactical	Normal user
Company B	Senior manager, sourcing	Tactical	Normal user
Company B	Senior specialist, Sourcing development (Super User)	Operational	Super User
Company B	Sourcing Manager	Tactical	Normal user
Company B	Sourcing manager	Tactical	Normal user
Company B	sourcing manager	Tactical	Normal user
Company B	Sourcing Manager, Local	Tactical	Normal user
Company B	SVP Sourcing , Group Sourcing	Strategic	Normal user
Company B	Vice President, Group Sourcing	Strategic	Normal user
Company C	Business Analyst	Tactical	Super User
Company C	Category Director	Tactical	Normal user
Company C	Category director	Tactical	Normal user
Company C	Director of Sourcing	Strategic	Normal user
Company C	Sourcing Specialist	Operational	Normal user

APPEND VI – LIST OF INTERVIEWEES

Date	Interviewee's job title	Location, type of interview	Company
1.3.2013.	Business Analyst , Reporting and Controlling	Finland, in person interview	Company A
13.03.2013.	Business Analyst (Direct Material), Business Analyst (Logistics sourcing)	Finland, in person interview	Company A
6.3.2013.	Sourcing Manager , Group, Sourcing	Finland, in person interview	Company B
2.4.2013.	Sourcing Manager (responsible for direct categories in Finland), Group Sourcing Manager , Sourcing Manager (responsible for indirect categories in Finland)	Finland, in person interview	Company B
8.4.2013.	Director (Sourcing Development), Specialist (Sourcing Development)	Finland, in person interview	Company B
14.03.2013.	Sourcing Business Analyst (department of sourcing)	France, online meeting	Company C
22.03.2013.	Category director	Denmark, online meeting	Company C
26.03.2013.	Category Director (Global Sourcing)	Denmark, online meeting	Company C

APPENDIX VII - LIST OF INTERVIEW QUESTIONS

1. What is your position within your organization?
2. What is your area of responsibility? (What are the decisions you make and the tasks you perform?)
3. How long have you been using the Case Company's tool? How frequently? What is an average duration of your sessions?
4. How important is the Case Company's tool for you to accomplish the tasks and make the decisions? What decisions/tasks? Why?
5. For which tasks/ad-hoc analysis/purposes/decisions/problems do you use the Case Company's tool for?
6. How much of your decisions/tasks (in the Case Company's tool relevant area) do you support by using The Case Company's tool (approximately in %)? What decisions/tasks? Why?
7. How much of your decisions/tasks (in The Case Company's tool relevant area) do you think you could support by using the Case Company's tool (approximately in %)? What decisions/tasks? Why?
8. What tools do you use to support the rest of your decisions/tasks? What decisions/tasks (in the Case Company's tool relevant area)? Why?
9. Which additional aid (e.g. excel sheets) do you use to support your decisions/tasks when using the Case Company's tool? At what decisions/tasks? Why?
10. Which reports do you use most frequently? For which purposes?
11. What KPIs do you follow? How often do they change? Who sets the KPIs?
12. Do you find it easy to follow KPIs in the Case Company's tool? Why?
13. Do you think the Case Company's tool helped in improving operations and performance of your organization? Why? How?
14. How do you use the Case Company's tool to improve economic performance of your department and/or organisation? (e.g., using compliance reports to reduce maverick purchasing)

15. Were you involved in design and/or implementation phase of the software? If no. If you had been involved, would you have done something differently? What would you do differently if you designed the reports /KPIs now?
16. Do you think that using the Case Company's tool empowered you to delegate more decisions to your subordinates? Why? And on the other hand, did the Case Company's tool enabled your manager to delegate more decisions to you? Why?
17. Do you have any suggestions for the Case Company's tool?
18. Who were involved from your company during the design and implementation phase? Why?
19. What are the clusters of user groups you have right now? (drawing a map according to their business function)
20. How those clusters have developed from original user groups intended in implementation phase? Why?
21. What purposes do those groups use the Case Company's tool for? (e.g., strategic, tactical, operational). What KPIs each group follow?
22. How are the new groups of users and individual users trained in using the Case Company's tool and by whom?
23. Do you think it would be beneficial to adjust the Case Company's tool according to the hierarchy/function/tasks the group belongs to? Why? How?