

MASTER'S THESIS

Sini Koivisto 2017

LAPPEENRANTA UNIVERSITY OF TECHNOLOGY
School of Business and Management
Master's Programme in Supply Management

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Dynamic Performance Measurement System for Indirect Procurement:
Design and Implementation Process

Master's Thesis 2017

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ABSTRACT

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Title:	Dynamic Performance Measurement System for Indirect Procurement: Design and Implementation Process
Faculty:	School of Business and Management
Major:	Supply Management
Year:	2017
Master's Thesis:	Lappeenranta University of Technology, 84 pages, 8 figures, 20 tables
Examiner:	Professor Jukka Hallikas Tuukka Kulha, Msc. (Econ. & Bus. Adm.)
Keywords:	indirect procurement, performance measurement, performance management

The main objective of the thesis is to describe the value elements of indirect procurement and to propose an approach to designing and implementing dynamic performance measurement systems (PMS) within indirect procurement. Single case study method is utilised to complement theoretical findings. The study focuses on internal performance of companies operating in manufacturing industry. The balanced scorecard approach directs the performance measurement perspective of the thesis.

Theoretical and empirical findings are utilised as the foundation for practical PMS design and implementation process proposals. The strategy map method is suggested as a method for aligning performance measurement with strategy. Recommendations for PMS structure and indirect procurement metrics are also presented.

The thesis provides observations of indirect procurement value elements and practical recommendations for designing and implementing performance measurement systems. The processes are not implemented, and hence their benefits and challenges have not been identified.

TIIVISTELMÄ

Tekijä:	Sini Orvokki Koivisto
Opinnäytteen nimi:	Dynamic Performance Measurement System for Indirect Procurement: Design and Implementation Process
Tiedekunta:	Kauppateieteellinen tiedekunta
Pääaine:	Supply Management
Valmistumisvuosi:	2017
Pro gradu -tutkielma:	Lappeenrannan Teknillinen Yliopisto, 84 sivua, 8 kuvaa, 20 taulukkoa
Tarkastaja:	Professori Jukka Hallikas Tuukka Kulha, KTM
Avainsanat:	epäsuora hankinta, suorituskyvyn mittaus, suorituskyvyn hallinta

Opinnäytteen päätavoite on epäsuorien hankintojen arvoelementtien kuvaus sekä prosessien tarjoaminen dynaamisen suorituskyvyn mittausjärjestelmän suunnitteluun ja implementointiin epäsuoran hankinnan yksikössä. Teoreettisia löydöksiä täydennetään yksittäisen tapaustutkimuksen löydöksillä. Tutkielma keskittyy sisäiseen suorituskykyyn valmistavan teollisuuden yrityksissä. Tasapainotetun tulokortin (balanced scorecard) periaatteet ohjaavat tutkielman lähestymistapaa suorituskyvyn mittaukseen.

Teoreettisia ja empiirisiä havaintoja hyödynnetään käytännönläheisten suorituskyvyn mittausjärjestelmän suunnittelu- ja implementointiprosessien perustana. Strategiakarttamenetelmää (strategy map) ehdotetaan käytettäväksi suorituskyvyn mittauksen sitomiseksi strategiaan. Tutkielmassa esitetään myös suosituksia suorituskyvyn mittausjärjestelmän rakenteeksi ja epäsuorien hankintojen mittareiksi.

Tutkielma esittää huomioita epäsuorien hankintojen arvoelementeistä sekä käytännöllisiä suosituksia suorituskyvyn mittausjärjestelmän suunnitteluun ja implementointiin. Tutkielmassa ehdotettuja prosesseja ei simuloida, josta johtuen niiden etuja ja haasteita ei voida raportoida.

ACKNOWLEDGEMENTS

First, I wish to offer my sincerest thanks for my examiners; professor Jukka Hallikas for providing helpful comments during the different stages of the process, and for Tuukka Kulha for always offering support and substantial insight. I could not have hoped for a better coach and sparring partner.

The interviews were a vital part of the thesis. I thank each person I interviewed for the time you took from your daily work to support me. Your professionalism and extensive knowledge had a significant impact on the thesis, but also greatly expanded my understanding of indirect procurement.

I also wish to thank my dearest fellow student Jani Inkilä for the peer support during the years. The meaningful discussions, and the less meaningful ones, were always a good enough reason to drive the 300 km to Lappeenranta and back.

And last but not by far the least, I want to thank my family for the continuous support and understanding. Father and mother, your confidence in me is my rock. And mother, without the help you provided with childcare and everything else, I probably wouldn't have graduated before the next decade.

My husband and daughter deserve the greatest gratitude. I don't have the adequate words to express how thankful I am for the love and patience you've displayed, and for the smiles you always cause.

Sini Koivisto

Loviisa 10.9.2017

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ABBREVIATIONS

BSC	Balanced Scorecard
CPO	Chief Procurement Officer
CS	Customer Service
EBITDA	Earnings before interest, taxes, depreciation and amortisation
HSE	Health, Safety and Environment
KPI	Key Performance Indicator
PMS	Performance Measurement System
PO	Purchase Order
PR	Purchase Requisition
PM	Project Management
R2P	Request-to-Pay
RFP	Request for Proposal
RFx	Request for information, proposal, or quotation
TCO	Total Cost of Ownership
YTD	Year-to-date

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1 INTRODUCTION

While indirect procurement is a significant contributor to organisations' performance, it has not been studied as widely as direct procurement. Procurement performance management has traditionally focused on materials contributing to direct spend, as their financial impact is easier to evaluate (Fedele & Dolan, 2004; Carter, Beall, Rossetti & Leduc 2003, 2.). Estimations on the average share of indirect spend of total spend differ in research; indirect spend is reported to contribute to between 20 to 50 percent of total spend, with variation between industries (Cox, Chicksand, Ireland & Davies 2005, 40; Cartel, et al. 2003, 6; Payne & Dorn 2011.).

This thesis is conducted to increase the understanding of indirect procurement and indirect procurement performance measurement. The aim of the thesis is to develop a framework for constructing and implementing a performance measurement system (PMS). The processes are designed to support strategy and to measure indirect procurement holistically to monitor the various value elements of the function. Hence the thesis also seeks to recognise the value elements of indirect procurement from both the indirect procurement function's, and its stakeholders' perception.

In the first section, the current extent of literature on indirect performance measurement is reviewed, after which the research problem and objectives are described, followed by conceptual and research frameworks, and delimitations effecting the scope of the research and applicability of the results. Methodology is introduced in the second section of the thesis. In the third section, general theory on performance measurement is presented, with emphasis on enablers and challenges of performance measurement, recommended characteristics of a performance measurement system, general structure of a PMS, and approaches and considerations for designing a PMS. The fourth section focuses performance measurement on indirect procurement, and starts by introducing indirect procurement as described in literature, and continues onto explore performance measurement in indirect procurement and to introduce context applicable measurements found by reviewing the literature. After the theoretical background has been defined, practical observations from the case company are introduced to further focus the scope on manufacturing industry. The observations include stakeholders, main processes, and perceived value of indirect procurement, as well as user requirements for an indirect procurement PMS.

The theoretical and practical foundations are utilised in the dynamic performance measurement system design and implementation processes, which are introduced and described in the sixth section of this thesis. These are succeeded by recommendations for an indirect procurement PMS structure and potential metrics. The results are concluded and topics for possible future research discussed in the eight section.

1.1 Assessment of the extent of current research

Performance measurement has traditionally evaluated to the performance of a company in terms of value produced to shareholders. However, the performance of indirect procurement is only indirectly impacting shareholder value and therefore different performance measurements and emphasis need to be applied. For this thesis the theoretical foundation for measuring indirect procurement performance is constructed by examining literature on; general principles of performance measurement, the different dimensions of performance to be measured, the process of forming a measurement system, and performance measurement in indirect procurement context. In this section, the current state of literature concerning procurement and indirect procurement performance measurement is briefly reviewed.

Academic literature on procurement performance and its measurement exists, but is far scarcer than supply chain performance related literature - for example, keywords 'procurement' and 'performance' produce 1 925 hits, while 'supply chain' and 'performance' produce more than 10 000 hits in ProQuest Central database alone. The amount of literature is even lower when limiting the focus to performance measurement and/or indirect procurement. Figure 1 and table 1 represent the query results from four common databases; SpringerLink, EBSCOhost, ProQuest, and Scopus. The results demonstrate the scarcity of research focused on indirect procurement performance; of the total count, only 10 percent of academic articles regarded indirect procurement performance (5 %) and its measurement (5 %).

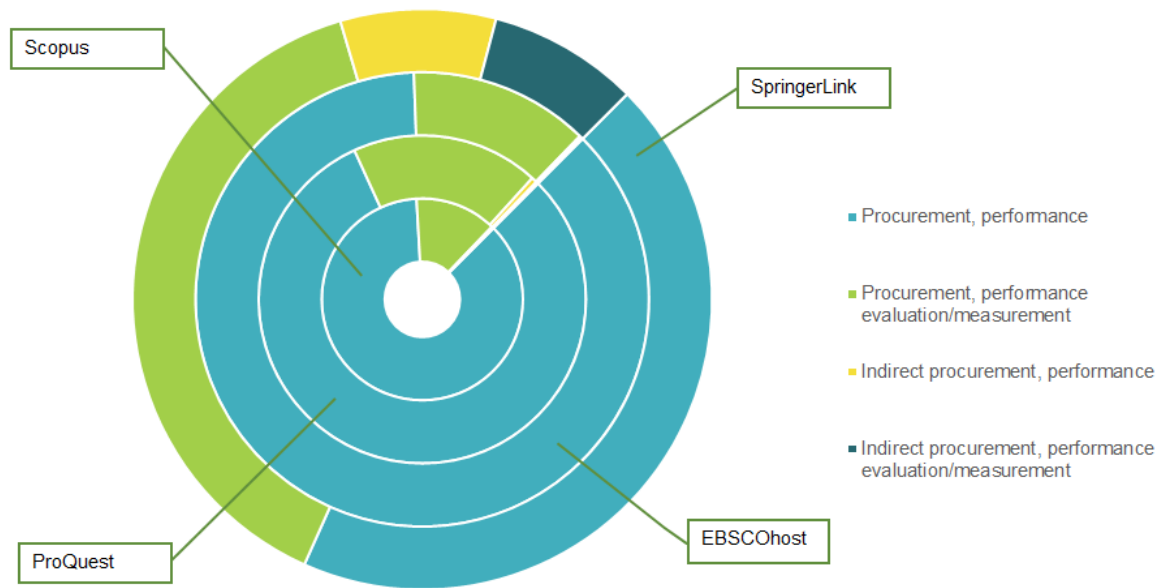


Figure 1. Literature database query results

The keyword combinations used in the queries were: 'procurement' and 'performance', 'procurement' and 'performance measurement' or 'performance evaluation', 'indirect procurement' and 'performance', and 'indirect procurement' and 'performance measurement' or 'performance evaluation'. Only peer reviewed academic articles were included. The total hit count presented in table 1 may contain duplicates, as articles may be found in several source databases. Themes discussed in the procurement performance articles include buyer-supplier relationship (e.g. Hollos, Blome & Foerstl 2012; Villena & Craighead 2016; Chatain 2011), public procurement (e.g. Kiage 2013; Patrucco, Luzzini & Ronchi 2016; Schiele 2005), e-procurement (e.g. Rotchanakitumnuai 2013; Gardenal 2013; Ramayah, Roy, Jantan, Zbib & Ahmed 2007; Vaidyanathan & Devaraj 2008) and healthcare (e.g. Kumar, Ozdamar & Chai 2005).

Table 1. Literature database query results

	Scopus	ProQuest	EBSCOhost	SpringerLink	Total
Procurement, performance	555	1925	1998	3742	8220
Procurement, performance evaluation/measurement	84	443	295	3282	4104
Indirect procurement, performance	2	13	2	735	752
Indirect procurement, performance evaluation/measurement	-	5	4	711	720

Internal procurement performance in general is less researched, but for example Brandmeier and Rupp (2010, 10) have identified procurement levers, value creating procurement practices, and used the degree of application of the levers to indicate procurement performance maturity. And while the research concerning supply chain performance is more abundant, it often fails to recognise sourcing and purchasing performance. For example, Gunasekaran, Patel and McGaughey (2004) introduce a framework for supply chain management performance measurement, discussing customer and production perspective extensively, while the supply perspective focuses on supplier evaluation and does not observe internal process performance nearly as comprehensively.

The lack of research on indirect procurement, and indirect procurement performance management is evident. Yet, organisations have been placing more attention on indirect procurement as a source of potential business benefits (Cox et al. 2005, 40.). This thesis aims to fill the research gap by offering insight into the value and performance management of indirect procurement in manufacturing industry to support managers to successfully manage indirect procurement operations.

1.2 Research problem and objectives

The main objective of the study is to provide a two phase framework for constructing a performance measurement system for indirect procurement. The first phase is to design the PMS and the second phase is the implementation itself. The resulting system would consist of a set of measurements based on strategy and targeting performance drivers creating the

most value. Implementing both of the suggested processes – design and implementation – would produce a PMS to support continuous development and long and short-term strategy of indirect procurement.

The main research question the thesis aims to answer is;

1. *How should indirect procurement performance measurement system be constructed for it to capture the total value produced by the function?*

The main research question will be supported with sub-questions;

- a. *What is the perceived value of indirect procurement in different business functions (procurement, internal stakeholders)?*
- b. *What processes exist within indirect procurement?*
- c. *How is value created within these processes?*
- d. *What factors impact the formation of indirect procurement performance measurement system?*
- e. *What qualities are required to make the system dynamic, i.e. to ensure the system can be easily updated according to strategy/organisational changes?*

In addition to answering the questions presented above, and to presenting PMS design and implementation process proposals, the objective is to provide recommendations for PMS structure and potential indirect procurement performance metrics.

1.3 Conceptual framework

Four key concepts frame the thesis; (1) indirect procurement and spend, (2) internal performance, (3) value, and (4) performance measurement (see figure 1). For the purpose of the thesis, definitions are derived from several sources and merged. Figure 2 depicts the relationship between the concepts. Indirect procurement is examined in terms of the value it produces as a result of internal performance. Performance measurement is studied with the focus on internal performance and holistic value production, i.e. multidimensional performance measurement is emphasised.

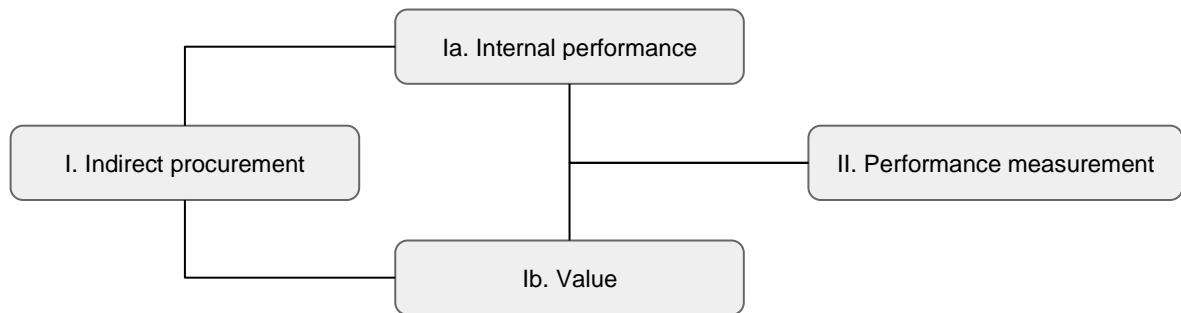


Figure 2. Conceptual framework

1.3.1 Indirect procurement and spend

Indirect procurement and spend are often used interchangeably, albeit the first implies action and the latter signifies consequence. Indirect procurement and spend are generally defined as the procuring and cost of items and services that do not directly affect the finished product or service, or that do not directly affect revenue formation (e.g. Payne & Dorn 2011, Gebauer & Segev 2000, and Carter *et al.* 2003). As indirect spend items generally cannot be assigned to any end product or service entirely, they contribute to an organisation's overhead costs. Common indirect procurement categories include, for example:

- Equipment, machines, and systems,
- Repair and maintenance,
- ICT expenses (e.g. software and hardware)
- Utilities, e.g. electricity,
- Professional services,
- Office supplies
- Facility expenses.

The above list is not comprehensive and the classification between direct and indirect spend depends on the industry and organisation.

For the thesis, indirect procurement is defined as *the activities related to procuring of products, systems and services that do not directly affect revenue generation*, and indirect spend as *the cost of such items, systems, and services*.

1.3.2 Value

Alike performance, without context value is an ambiguous concept; current definitions in Merriam-Webster and Oxford Dictionaries range from monetary worth to the relative duration of a musical note. Most general definitions demonstrate value as an imprecise measurement unit with phrases such as relative worth and fair return, which also indicate subjectivity. The definition and perception of value thus depend on context and perceiver.

In the context of the thesis value is defined as *the quantified worth of an outcome determined by calculation or measurement relative to effectual objectives*.

1.3.3 Internal performance

The definition of performance is context dependent; senior management may evaluate performance primarily based on financial indicators, plant management on process efficiency indicators. The basic principle is same regardless of context; performance indicates the effectiveness and/or efficiency of a system, process or action (Lohman, Fortuin & Wouters 2002, 268; Neely, Gregory & Platts 2005, 1229). Lebas (1995) expands the definition to refer to present and future capability of e.g. an organisation to deliver its objectives by managing the components that impact the ability to achieve said objectives.

Internal is defined in Merriam-Webster and Oxford dictionaries as something existing or occurring within the limits or inside a structure. Combined with the core properties of different performance definitions internal performance for the purpose of the thesis is defined as *capability to efficiently perform processes managed within an organisation*.

1.3.4 Performance measurement

In literature, performance measurement is defined as: the process of quantifying action in terms of its efficiency and affectivity (Neely et al. 2005, 1228; Braz, Scavarda & Martins 2011, 752). Performance measurement is executed on strategic as well as operational level (de Lima, da Costa, Angelis & Munik 2012, 526.). The two levels of measurement should not be isolated, but both should be derived from organisation's strategy to stimulate desired

actions (Neely et al. 2005, 1231.). Lebas (1995) reminds that performance measurement cannot be separated from performance management, for it is also a process of collecting information to enable evaluation of past decisions and improve future decisions.

To sum up the different definitions and aspects presented in literature, I will define performance measurement as *a continuous process to record performance data and to steer resources in order to achieve strategic objectives.*

1.4 Research framework

The research is focused and limited with theoretical and managerial, or practical, frameworks, within the context of indirect procurement and internal performance. The research framework is presented in figure 3. The managerial framework consists of (1) internal objectives and existing systems and processes, which are defined through internal interviews, and (2) pitfalls and success factors, and present best practices of indirect procurement value measurement, which are defined by reviewing existing literature and professional publications. As a result, the limitations and possibilities, as well as the strategy, value drivers, and measurable benefits of the case company's indirect procurement are defined.

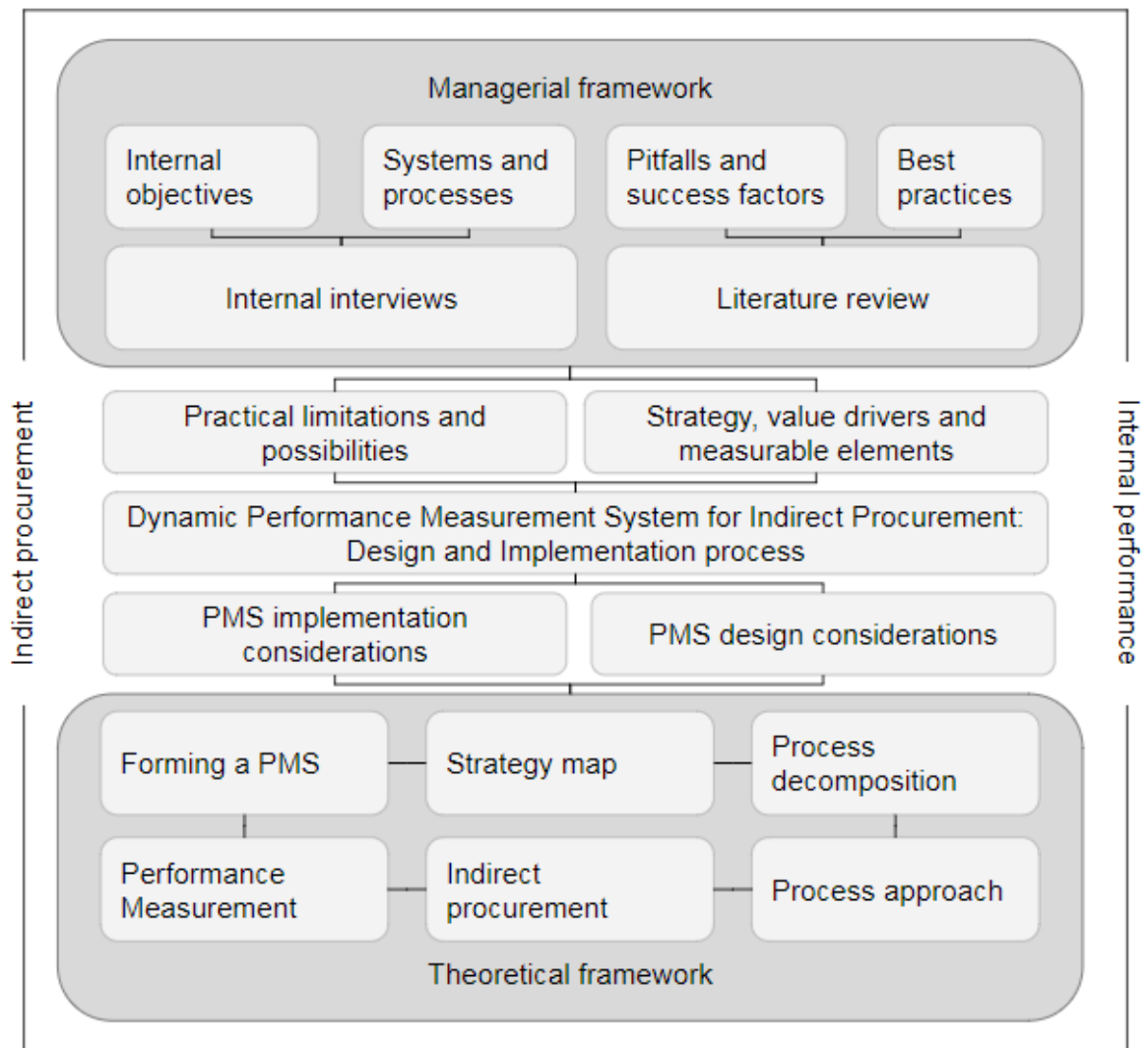


Figure 3. Research framework

The theoretical framework consists of theories in performance measurement and indirect procurement within the context of internal performance. Regarding performance measurement theory, the key general principles and considerations are applied to the context of the thesis. The performance measurement method to be utilised is the Balanced scorecard (BSC), introduced by Kaplan and Norton in 1992, for it is widely known, supports strategy implementation, and evaluates performance on multiple dimensions. As the objective of the thesis is to create a framework for designing and implementing a dynamic performance measurement system for indirect procurement, literature regarding forming a PMS is examined. Also, tools to be used in the design phase are discussed; process decomposition for defining measurable elements, or activities, and strategy map for structuring objectives, activities and metrics, and aligning them with strategy.

1.5 Delimitations

The thesis focuses on private manufacturing industry. The procurement categories, value creation logic and thus cost allocation in service industry differ from manufacturing industry significantly. Therefore, service industry is excluded from the scope of the study. Public organisations are also excluded due to the legislation expressly affecting public procurement, which are not considered in this study. Any practical implications suggested by the thesis are not expected to apply in service industry or public procurement.

The PMS design and implementation processes are intended for internal performance evaluation and while supplier performance measurement can be included as an indicator of supplier performance management success, evaluation of supplier performance is not discussed in this thesis. Furthermore direct procurement is excluded from the scope. This is due to practical limitations - the studied case - and because direct and indirect procurement create value differently. The value impacts of direct procurement performance are simpler to indicate, as it directly affects the cost of producing a product and hence pricing.

The scarcity of the literature on procurement performance measurement and management, with even less research focused on indirect procurement and internal performance, restricts the validation of the results and conclusions of the research. The proposed processes are not implemented during the thesis process, which excludes the evaluation of their applicability, potential benefits and defects.

2 METHODOLOGY

Existing literature and professional publications are reviewed to define performance measurement principals, success factors and challenges, as well as indirect procurement properties and performance measurement potentials. The main methodology utilised in the thesis is case study, which is required to expand on the findings of the literature review, and to focus the thesis on the intended context. Case study is utilised to determine factors impacting performance measurement of indirect procurement in manufacturing industry, as well as to examine the value drivers of indirect procurement. Literature review and case study findings together are used to develop a PMS design and implementation process.

2.1 Case study method

Dubois and Araujo (2007) state that case studies are important for developing purchasing and supply management theories and providing examples that can be utilised in future research. Kähkönen (2011) supports the previous claim and commends the case study method for its ability to provide extensive and profound data regarding the researched subject – when implemented systematically. The use of case study is advisable, when the studied phenomenon cannot be completely separated from context because the boundaries are not evident, or when understanding the dynamics affecting the phenomenon within the particular context is required (Kähkönen 2011, 32-33.). A guideline process for case study implementation is presented by Kähkönen (2011):

1. Review existing literature
2. Define research question
3. Select research methodology
4. Select the case(s)
5. Choose data collection method
6. Collect data
7. Analyse data

Review of existing literature allows researchers to understand the topic, and to identify theoretical concepts, previous arguments and research gaps (Kähkönen 2011, 32; Dubois & Araujo 2007, 179.). In order to add to the existing body of literature, case studies should

pursue to validate theoretical concepts against empirical evidence (Dubois & Araujo 2007, 179.). Hence, the empirical findings should be compared to theory to identify divergences.

The choice of data collection method is advocated in literature; interviews provide in-depth empirical data and a profound understanding of the phenomenon (Kähkönen 2011, 33.). Interviews have been identified as the prevalent data collection method in case studies in the area of supply chain performance and sustainable supply chain management in a research conducted by Seuring (2008), when examining research papers utilising the case study method. In the same study the author argues, that single and multiple case studies are used equally. Dubois and Araujo (2007) offer a contradictory claim that the comparable multiple case approach was already the predominant approach in 2007. The reason for the increase in multiple case studies may be that the body of literature is growing, creating grounds for generalisation and more extensive application of the theoretical concept. Hence the single case study is a valid option when the targeted phenomenon has not been researched extensively, and research benefits from exemplars, detailed cases presented with background and context (Dyer & Wilkins 1991, 613.).

Considering the scarcity of previous research on indirect procurement performance and indirect procurement performance measurement, the single case study method is applied in this thesis. Data will be collected through semi-structured interviews. Taking into account the limitations of single case study generalizability, certain aspects of the case are excluded from the development of the design and implementation process and recommendations to increase their applicability. The aspects that inhibit generalizability include organisational culture and organisational structure.

3 PERFORMANCE MEASUREMENT

Performance measurement has been recognised as a prerequisite for evaluating the success of strategy and decisions, as well as an enabler of continuous improvement (Chan & Qi 2002, 180; Lohman et al. 2004, 267.). As a continuous process it has been shown to generate better decisions and better performance (Evans 2004, 226.). As Lord Kelvin (1824-1907) famously stated; “If you cannot measure it, you cannot improve it”. And the ability to constantly improve is vital for maintaining and developing business operations.

A well-designed performance measurement process contributes to improved resource allocation, communication and mutual understanding (Chan & Qi 2002, 182-183.). Even further, performance measurement directs actions of affiliated people, and therefore it can be used to support strategy and promote desired behaviour (Neely et al. 2005, 1231.). As the PMS matures, it can also be expected to have a positive impact on customer’s and financial results (Evans 2004, 229.). Systematically measuring performance can also be expected to enable better data management, as the data volume is compressed and enriched in the reporting process (Melnyk, Stewart & Swink 2004, 211.).

3.1 Performance measurement enablers and challenges

Performance and performance measurement are quite context specific; industry, company culture and size, and operating environment among other variables impact the appropriate measurement systems and processes (Evans 2004, 220.). Therefore PMS of one company or findings from one research cannot be readily duplicated in another, but they can be used as guidelines and can help anticipate challenges and identify premises for success.

Success factors and challenges discussed in existing literature are listed in table 2. Communication, clarity, collaboration, commitment and resources are often mentioned as factors deciding the success of a PMS initiative. Defining organisation’s or business function’s strategy, objectives and processes, together with roles and responsibilities, enhances common understanding when communicated to the whole organisation. The performance drivers, or value creation mechanisms, can also be properly identified once strategy and processes have been described in sufficient detail, which creates a good foundation for measurement. Additionally, success requires organisation’s culture to support improvement and change.

Table 2. Success factors and challenges for PMS initiation

Success factors	Challenges
Clearly defined and communicated strategy and objectives (Brewer & Speh 2000, 82)	Uncertainty of what to measure (Lohman et al. 2004)
Common understanding of performance drivers (Lebas 1995, 27)	Poor communication between PMS designers and users (Lohman et al. 2004)
Common understanding of processes, roles, and responsibilities.	Lack of structure in operations, e.g. causality between processes and objectives unknown (Bititci, Turner & Begemann 2000, 694.).
Allocation of resources for PMS design, implementation and update (Bourne, Mills, Wilcox, Neely & Platts 2000, 767; Lohman et al. 2004, 283)	Overlapping, inflexible and dispersed information systems (Lohman et al. 2004; Bourne et al. 2000, 762)
Information systems allowing data collection and reporting (Kennerley & Neely 2002, 1242)	Lack of necessary resources and capabilities (Kennerley & Neely 2002, 1227)
Organisational culture supporting continuous improvement.	Lack of senior management commitment (Bourne et al. 2000, 760)
	Resistance to change (Kennerley & Neely 2002, 1227)
	General resistance to measurement (Bourne et al. 2000, 762)

Challenges or obstacles for PMS initiation include lack of clarity and communication, insufficient resources and capabilities, and unsuitable organisational culture. These challenges, if not solved, do not only result in an inefficient PMS, but also extend the time of the design phase and reaching PMS maturity. Poor communication between PMS users and designers results in designers not having adequate understanding of the intended use of reports, leading to poor quality of the entire PMS (Lohman et al. 2004, 272.). Communication should be prioritised when initiating the PMS design and during implementation to ensure that the system corresponds to users' requirements. Detailed descriptions of measurements, and sharing them, proved vital for PMS success in a study conducted by Lohman et al. (2004).

Understanding of measurements increases personnel's capability to validate their appropriateness, which again enables the system to be dynamic, as inappropriate measurements can be adjusted or removed (Kennerley & Neely 2002, 1240.).

Cultural factors may create obstacles as well. Some organisations may face general change resistance, as well as resistance from management and other personnel, who do not wish their area of responsibility to be evaluated more accurately (Kennerley & Neely 2002, 1240). However, the challenge can be overcome by aligning incentives with measures, and by clearly communicating the relationship between measurements and business objectives (Kennerley & Neely 2002, 1240; Lebas 1995, 27.). The purpose of measurement should be portrayed as a common objective to improve performance, rather than a means to monitor individual performance. A culture that appreciates measurement and improvement efforts can only be present, if management supports PMS design and implementation (Tung, Baird & Schoch 2011, 1287.).

Apart from challenges originating from people and culture, IT systems may cause severe challenges for PMS. Dispersed systems inhibit the collection, comparison and reliability of data because of different formats and even overlapping data. In addition, some systems may not be initially intended for reporting purposes at all and do not provide data at reasonable effort or cost. The described problems intensify when designing measurements to cover several functions or companies. (Lohman et al. 2004, 272.)

3.2 Desired characteristics of a PMS

To obtain the benefits a successful PMS can enable, certain characteristics should be included. In its core, a performance measurement system should; (1) complement an organisation's or business function's current strategy, (2) be a roadmap and schedule for reaching the objectives, (3) be responsive to changes in operating environment or objectives, (4) contribute to continuous improvement and strategic long-term planning and (5) provide information on both the past and current situation, (Kaplan & Norton 1996; Melnyk et al. 2004, 213; Lebas 1995, 27.).

On a more practical level, performance measurement should be balanced, as dimensionally narrow systems - e.g. those focusing solely on financial performance - tend to be less effective, less supportive of continuous improvement, and emphasise one stakeholder group

at the expense of others (Neely et al. 2000, 1119; Quagini & Tonchia 2011, 1-2; Chan & Qi 2002, 182.). Evans (2004) supports the argument by reporting that dividing measurement focus between financial and customer perception improves performance.

Metrics can target outcomes of activities and the activities, or performance drivers, themselves, and the question of which to focus on has been debated in literature. The two are not mutually exclusive though, but both should be measured, as outcomes are dependent on how efficiently activities are performed (Chan & Qi 2002. 182.). Kaplan and Norton (1996) argue, that outcome measurements do not indicate the success of strategy implementation early enough to enable corrective manoeuvres. Vice versa, focusing solely on activities fails to demonstrate the impact of their improved or decreased performance on core outcomes such as ROI (Kaplan & Norton 1996, 66.). Therefore, identification and validation of correlation between activities and outcomes, i.e. cause-effect relationships, are vital (Evans 2004, 220.). All measurements should also be linked to objectives to ensure that strategy is implemented and to monitor its success (Melnyk et al .2004, 213; Kaplan & Norton 1996.). Main characteristics of an effective PMS as discussed in existing literature are summarised in table 3.

Table 3. Characteristics of an effective PMS

Desired characteristics of a PMS
The system reflects and enforces strategy by aligning measurements with strategic objectives (Kaplan & Norton 1996; Melnyk et al. 2004, 213.).
The system reflects and demonstrates cause-effect relationships (Lebas 1995, 35; Kaplan & Norton 1996.).
The measurements are coordinated and not conflicting (Melnyk et al. 2004, 213.).
The system consists of multidimensional measurements (Tung et al. 2011, 1300.).
Calculation formulas of measurements, are known by users (Braz et al. 2011, 753.).
The system is responsive to changes in strategy and environment (Lohman et al. 2004, 277; Kennerley & Neely 2002, 1242.)
The system is responsive to user requirements (Lohman et al. 2004, 283.)
The system reflects relationships between decisions and performance (Neely et al. 2000, 1248)

In order for a PMS to be dynamic, it should be responsive to changes in strategy and environment, and adaptable to emerging user requirements. Strategy related change requirements should be identified when strategic objectives or business mission change (Lohmann et al. 2004, 227.). If the PMS is not adjusted accordingly, the PMS will no longer support the organisation or business function sufficiently. Environment related change requirements emerge when, for example, legislative or regulatory requirements change (Kennerley & Neely 2002, 1241.). User requirements are also important to include in PMS maintenance, as to be truly effective the PMS should be embraced by its users. Hence user feedback should be encouraged, and it can be collected during performance review meetings, for example. (Lohman et al. 2004, 283.)

3.3 Structure of a performance measurement system

Various performance measurement system frameworks have been introduced emphasising different perspectives of performance; including the DuPont model, Performance Prism, the Strategic Measurement Analysis and Reporting Technique (SMART), and the Balanced Scorecard. Yet regardless of the approach, a performance measurement system consists of three levels;

1. *Individual measurements* which indicate the capability to efficiently perform an activity managed within an organisation.
2. *Set of measurements* to assess the organisation's capability to manage all its core processes.
3. *A supporting frame consisting of information system infrastructure, organisational structure, and a systematic process* to record performance data and to steer resources in order to achieve strategic objectives and continuously improve capabilities. (Kennerley & Neely 2002, 1237.)

These three different levels require different design methods as each possess characteristic challenges and considerations. Once each level of PMS has been aligned, the PMS should prove to be a tool for implementing and communicating strategy, monitoring business performance, supporting continuous improvement, improving organisation culture, and for providing an enhanced understanding of business and customers (de Lima et al. 2013, 529.).

Individual measurements

Measurements are used to; allow better control over resources and processes, to communicate performance, and to improve processes and behaviour by identifying performance gaps (Melnyk et al. 2004, 211.). Neely, Gregory and Platts (2005) suggest the following questions to be considered when deciding on individual measurements;

1. Does the measurement support strategy and objectives?
2. What is the measurement used for?
3. How much does it cost?
4. What benefit does it provide?

An important practicality to consider when deciding on measurements to be used is data availability. Difficulty or even impossibility of obtaining data for one or more measures may render the whole PMS useless (Lohman *et al.* 2004.). Difficulty of obtaining data is also likely to increase the cost of implementing the measurement.

Measurements should be derived from the processes and activities creating the most value, or contributing most to the achievement of objectives (Kaplan & Norton 2005.) These are called performance drivers, and several approaches can be used to identify them, such as; decomposing processes as suggested by Chan and Qi in *Feasibility of performance measurement system for supply chain: a process-based approach and measures* (2002), or using the strategy map method (Kaplan & Norton 2001) as suggested by Ukko, Pekkola, Saunila and Rantala in *Performance measurement approach to show the value for customer in an industrial service network* (2015), or conducting interviews and facilitated workshops.

Measurements are commonly designed to measure one of the dimensions listed in table 4, although the requirements and focus areas differ between industries and companies. In addition to dimensions, measurements may also be divided into different perspectives. In a Balanced Scorecard, these perspectives are; Financial, Customer, Internal processes, and Learning and growth.

Table 4. Common performance measurement dimensions

Dimension	Possible measurements
Financial	Revenue Return on investment
Cost	Inventory carrying cost Cost of products
Quality	Process deviation rate Number of defective deliveries Customer satisfaction
Time	Order lead-time Response time Time to market
Safety	Total recordable injuries frequency (TRIF) Process safety event rate (PSER)
Resources	Personnel retention rate IT system availability

For measurements to be effective in directing behaviour, the personnel should be aware of the measurements structure and the concept of performance, i.e. what performance driver is the measurement evaluating and how it is relevant in reaching objectives (Lebas 1995, 27.). Attributes that should be used to describe a metric include name, objective, scope, target, definition, calculation formula (quantitative) or evaluation method (qualitative), unit of measure, frequency, data source, owner, drivers, and explanatory comments. (Lohman et al. 2004, 283.).

Set of measurements

A set of measurements is a coherent collection of interrelated individual measurements that together indicate the performance of the targeted entity as a whole. Arranging measurements into a set and potentially further categorising them under different perspectives improves the intelligibility of a PMS (Lohman et al. 2004, 283.). Including multidimensional measures - i.e. both quantitative and qualitative, long-term and short-term, time, quality and cost, human, process and finance measurements- is highly recommended and it has been linked with PMS effectiveness and increased performance (Tung et al. 2011, 1300.). Neely, Gregory and Platts (2005) provide questions to consider when constructing measurement sets;

1. Are all appropriate dimensions covered with the intended measurements?
2. Are both long and short-term objectives covered?
3. Are the measurements integrated and non-conflicting?

Once these questions can be answered positively, the PMS should be able to align measurements and strategic objectives, and to coordinate the measurement of various processes and activities without conflict (Melnik et al. 2004, 213.). It should also be able to show the impact of decisions on performance results (Neely et al. 2005, 1248).

Lohman et al. (2004) argued that a metrics dictionary proved essential for constructing and implementing PMS - even more so than presentation and structure of scorecards and reports. However, structuring enables better display of the reciprocal relationships between measurements and objectives, which should also be included when describing measurement sets. Even further, structured presentation of a PMS supports the communication of the PMS and measurement results.

A supporting frame consisting of information system infrastructure, organisational structure, and a systematic process

The system needs to be designed to fit the operating environment in which it is to be implemented (Neely et al. 2005, 1229.). To ensure the set of measurement - initial PMS - can be successfully implemented and benefits obtained, at least the following aspects should be considered;

1. Does the PMS support strategy? (Neely et al. 2005.)
2. Does it match organisations culture? (Neely et al. 2005.)
3. Is it consistent with current reward system? (Neely et al. 2005.)
4. Does the current IT landscape enable implementation?
5. Does the organisation possess the resources with required skills to implement the PMS?

Depending on what the answers to these questions are, the initial PMS or the supporting frames components may need to be adjusted accordingly.

Information systems and tools are vital for collecting, manipulating, and storing data, and to create and deliver performance reports. The challenges of dispersed and overlapping systems can be overcome by reviewing the system usage to identify what data is created where, and to decide which data source or sources are used for each measurement. Of course some information is not collected into organisation's information systems, but should be stored somewhere (i.e. survey results, stakeholder communication). The process of collecting and storing such information needs to be decided accordingly.

A key factor influencing the effectiveness of a PMS is management's support. The structured framework and data collection processes create the premises for success, but management's commitment is required to motivate personnel's action (Tung et al. 2011, 1287.). Management's attitude towards performance measurement does not affect implementation stage only, but can seriously inhibit the design phase as well (Bourne et al. 2000, 760.). Allocating sufficient resources for the design phase and for the continuous implementation and maintenance of PMS is required (Kennerley & Neely 2002, 1227.). To ensure availability of resources, management's support is again required. The benefits expected to be achieved with an effective PMS should thus be communicated to management before initiating the process to confirm their support.

3.4 Designing a performance measurement system

The initial construction of a performance measurement system can be a strenuous process, and especially for global actors, the operating environment can change frequently leading to changes in strategy and long-term objectives. Additionally, short-term business objectives are usually re-evaluated annually. PMS design should be expected to take several months - three to four according to Bourne, Mills, Wilcox, Neely and Platts (2000). In the same research by Bourne et al. (2000), reaching the level of maturity where the system is continuously implemented and reviewed was reported to take additional 9 to 13 months, depending on the encountered challenges. Therefore, rather than repeatedly executing the entire process, the foundations should be designed to support dynamic performance measurement. (Lohman et al. 2004, 277.)

When initialising PMS design, the current state of organisation should be reviewed to identify the limitations and possibilities created by the operating environment. The existing man-

agerial and organisational enablers and possible challenges to overcome must also be defined before initiating the PMS design. For example, forming a dynamic PMS requires a structured framework with objectives and processes, as well as the causality between them, understood and defined (Bititci et al. 2000, 694.). The key enablers and challenges were listed in table 2.

Several approaches can be used to form a performance measurement system. Defining the approach depends on various factors, including maturity of structured framework, organisational culture, and current state of performance measurement. Braz, Scavarda and Martins (2011) evaluated an existing PMS by defining the current system via semi-structured interviews and analysing company data, evaluating the PMS with structured interviews based on the results of the previous step, and finally creating an improvement proposition with non-structured interviews and workshops. The proposal was then validated against historical data. The authors proposed a simple procedure for continuously updating the PMS - annual review with director and managers of each performance area - but do not present for example expectations for time required nor the following steps.

Chan and Qi (2002) propose a process based approach for designing a performance measurement system for supply chain. The process of defining the measurable processes, activities and outcomes consists of seven phases. While the suggested process is comprehensive, applying it in practice might prove quite burdensome and would likely require additional resources if implemented. Still, the resulting understanding of current processes and causalities within an organisation could serve as beneficial foundations for similar less intense exercises in the future. The authors also state that the process does not only provide performance measurements, but enables also benchmarking within a supply chain. They continue to argue that using a process based approach supports continuous improvement, facilitates communication, and creates a selection of measurements that holistically capture the different dimensions of measurement.

Like Chan and Qi (2002), Neely, Mills, Platts, Richards, Gregory, Bourne and Kennerley (2000) also present a process based approach for designing a balanced performance measurement system. They highlight that using a process based approach forces management to clearly define performance priorities and to demonstrate the relationships between measurements and priorities, and between the different priorities. Additionally, collaboratively deciding which measurements to use permits an organisation to expose differing perceptions. The authors present a list of desired characteristics of a PMS design process,

which suggests that the measurement system should be constructed collaboratively based on strategy and organisational characteristics, each measurement should be linked to an objective, measurement calculation should be clearly defined and communicated, and the process should provide the basis for re-adjusting the measurements as requirements change. The suggested final process consists of 10 phases, starting from product grouping, continuing to defining and deploying high-level business objectives and their measurements, onto identifying key performance drivers of said business objective measurements and defining measurements for the drivers.

4 PROCUREMENT PERFORMANCE MEASUREMENT

An evident challenge in measuring indirect procurement as a whole is caused by the diversity of categories; for example, the process of purchasing and managing services and of goods differs greatly. Furthermore, indirect procurement has been identified as a source of business value only recently, and thus benchmarks are not plenty. The challenge is accentuated by the different division of direct and indirect procurement between industries and companies.

Earlier I defined indirect procurement as all *the activities related to procuring of products, systems and services that do not directly affect revenue generation*, and indirect spend as *the cost of such items, systems, and services*. Depending on industry, indirect procurement can be quite complex in terms of governed items and services. Additionally, indirect procurement activities are often performed by both the procurement unit and internal stakeholders that are not procurement specialists (Gebauer & Segev 2000, 109.). Indirect items and services may even be purchased not according to organisation's official purchasing processes (Carter et al. 2003.). Majority of the items and services are unrelated to end-product production volumes, and accurately forecasting long-term demand is thus challenging, or even impossible. However, indirect procurement and spend can be better managed with consistent category strategies and data collection and analysis.

Indirect procurement is highly intertwined with other functions, and managing internal stakeholder relationships is an integral part of it. Collaborating with internal stakeholders enables indirect procurement to leverage its supplier base to better correspond to their needs, as well as to proactively search for new suitable suppliers and solutions. Cross-functional teamwork has in fact been identified as a cause to high performance, as well as positioning procurement as a strategic function within the organisation (Brandmeier & Rupp 2010, 5; Gebauer & Segev 2000.). Efficient supplier relationship and performance management is also an indicator of strong performance (Brandmeier & Rupp 2010, 5.). Recruiting and retaining capable resources is also important prerequisite for high performing indirect procurement, as is the continuous training of the resources (McKenney & Parekh 2012, 55; Brandmeier & Rupp 2010, 5.).

While only a minority of performance measurement literature focuses on indirect procurement or spend, appropriate measurements can be derived from articles and professional

publications concentrating on procurement and supply chain management. As the performance measurement method utilised in the case company is Balanced Scorecard, developed by Kaplan and Norton in 1992, the measurements are grouped under the four perspectives of BSC adjusted for indirect procurement requirements; Financial, Procurement Stakeholder, Internal Processes, and Learning and Growth. The Procurement Stakeholder perspective replaces the Customer perspective and covers both the internal customers and suppliers.

4.1 Financial measurements

In indirect procurement, financial measurements mainly monitor cost savings (reduction in expenses compared to a baseline) cost avoidance (resistance to unplanned expenses), and cost of operations (CIPS 2013.).

Evaluating cost savings obtained by indirect procurement function are an integral part of measurement. Procurement savings are calculated by comparing evaluation period's results to a baseline, which can be for example last comparable period (i.e. year-year, quarter-quarter) when evaluating cost savings of continuous purchases, and best offer before negotiations for spot buying (goetzpartners 2013.). Procurement savings can also be determined by comparing the previous agreement prices to the agreement prices of renewed agreement. Other possible baselines include budget value, expense estimate, forecast, and planned expense (CIPS 2013, 1.). The previous baselines can be used to evaluate savings in investment projects. The same calculation can also be used as one indicator to evaluate the effectiveness of negotiations.

Realised Savings monitors the actualisation of negotiated prices, and the post-contract compliance, as the better a new contract is implemented, the higher the realised savings as off-contract buying decreases (Coupa 2016.). On average, 30 percent of contracted savings remain unrealised because of non-existent or inadequate follow-through (Accenture 2014.).

Cost avoidance entails soft savings, such as increased stakeholder and employee satisfaction, increased safety and sustainability, enhanced process efficiency, and successful risk management (GEP 2017.). These improve an organisation's ability to respond to or avoid events that could cause expenses directly or indirectly - for example, improving the sustainability of supply chain safeguards against loss of image and resulting decrease in sales.

Inventory Carrying Costs can be decreased with more effective purchasing and demand planning processes (GEP 2017.). However, it may prove challenging to reliably demonstrate the actual impact of procurement on reduced inventory, and the measure should be included as a joint measurement keeping in mind that it does not apply to service purchases alike to supplies.

Contract coverage can be monitored based on spend, suppliers or transactions covered by contracts. Monitoring the share of contracted spend makes spend more visible and allows recording of the above discussed realised savings, while safeguarding organisations against procurement risks. Top performers govern approximately 60 percent of their spend with contracts (Coupa 2016.).

The cost of procurement operation should be monitored in relation to one or more suitable variables, such as spend, number of transactions, complexity of transactions, or number of suppliers. For example, the development and cost can be compared to the development of number of suppliers or spend per employee. Internal Transaction Costs measures the costs related to completing a transaction, and may monitor the whole requisition-to-invoice path or only a part of it, for example the cost of creating and submitting an order (Gunasekaran et al. 2004, 339.). This measurement may be included in the Cost of Operations measurement, or reported as a separate measurement. Accurate evaluation of transaction costs is likely especially challenging in indirect procurement, due to the variety of categories, and thus its applicability should be thoroughly examined before implementation.

Total Indirect Spend and Indirect Spend by Category may also be coupled with other measures such as number of suppliers and number of employees. For example, spend can be divided with the number of employees, or between suppliers. The share of maverick spend, i.e. unmanaged spend, represents purchases for which negotiated contract terms nor required processes and policies have been utilised. Decreasing the share of maverick buying can help organisations increase negotiating power and reduce compliance risk (goetzpartners 2013.). Alternatively, the share of managed spend can be measured.

4.2 Procurement Stakeholder measurements

The stakeholders of indirect procurement are here defined as internal customers and suppliers. The measurements intended to evaluate performance from internal customer perspective are determined by the stakeholders' definition of indirect procurement value. Monitoring the performance and satisfaction of suppliers provides indication if supply base's capacity is sufficient to sustain company's operations.

The satisfaction of internal customers is a significant indicator of indirect procurement performance. Customer satisfaction may be affected by, for example, query time and flexibility (Brewer & Speh 2000, 86; Gunasekaran et al. 2004, 338.). Customer Query Time measures the time it takes to provide a sufficient response to customer query (Gunasekaran et al. 2004, 338.). Supply Flexibility measures the internal customers' perception of the product and service range made available by procurement. The perceived quality of the supply base could be measured likewise.

Depending on the organisation structure, inventory turnover may be positioned as a customer or internal process measurement. Inventory Turnover is strongly related to inventory carrying costs; increasing the turnover decreases inventory carrying costs. The same considerations that were discussed in connection with inventory carrying costs apply; procurement's contribution and applicability to different categories.

Supplier performance measurement is executed separately, but performance development should be monitored as a KPI to assess the impact of supplier management activities. Delivery Accuracy may be used to evaluate suppliers' delivery compliance, when it also contributes to overall supplier performance, but may be included as an independent measurement as well. It can be calculated as the difference between promised delivery date and actual delivery date. Contract Compliance is another indicator of supplier performance that can be included as a stakeholder measurement if required by internal customers, or if it not included in supplier performance measurement. Contract compliance can be determined by e.g. evaluating a supplier's performance against service level agreements, invoicing accuracy, and response time (Fedele & Dolan 2004.).

4.3 Internal Process measurements

Internal process measurements are used to evaluate the efficiency and effectiveness of internal processes and changes made to them.

Purchase requisition-to-order and invoice approval lead times both indicate the efficiency of procurement processes. Monitoring and limiting the time it takes from an employee submitting the request to it being approved and converted into a purchase requisition decreases frustration and resulting maverick buying (Coupa 2016.). The invoice-approval time is calculated from the moment an invoice enters the system to when it is approved for payment. Shortening the approval time may lead to improved payment time compliance (Coupa 2016.). The Coupa benchmarking report of 2016 reports that industry leaders maintain the average of 6.2 hours from requisition to order, and 23.1 hours to approve invoices.

Digitalisation and automatisisation decrease manual processing of paper and shorten lead times, while improving data quality and thus traceability of spend and purchasing behaviour. Process automation and data utilisation is deemed vital for improving indirect procurement and spend performance (Carter et al. 2003.). Depending on the digitisation rate of an organisation, different digitalisation measurements are appropriate. The share of electronic transactions should be monitored, as electronic processing decreases the amount of errors when less manual data entry is required. Automation can be used to support the digitisation of various processes. The leaders process 91.8 percent of POs and 76 percent of invoices electronically (Coupa 2016.).

4.4 Learning and Growth measurements

One reason to include measurements regarding employee satisfaction is that satisfied employees are more likely committed to common objectives and to the company. Further, employee satisfaction correlates positively with customer satisfaction and general performance (Evans 2004, 223.). Kaplan and Norton (1996) also name employees as one of three main sources of organisational learning and growth, and suggest employee related measures to be used to ensure organisation's sustainability. Such measures may evaluate employee satisfaction, retention, training and skills.

As indirect procurement can employ organisation's suppliers to produce innovations, Supplier Innovation Capacity can be measured. Supplier innovations in indirect procurement may include, for example, improvements to make logistical processes more efficient, to increase operational safety, and to enhance resource efficiency. The measurement should not only look at the number of innovations submitted by suppliers, but also their effectiveness and feasibility. Innovations produced by employees can also be measured when organisation wishes to motivate personnel to produce new or improved solutions for indirect procurement or stakeholders.

4.5 Summary

As can be deduced from the previous chapters, the division of metrics into the different BSC perspectives is greatly affected by strategy and organisation specific perception. Further we can observe, that financial metrics are still emphasised in performance measurement, regardless of the ongoing criticism towards such an approach. The underlying reason can likely be found in business requirements, which accentuate the importance of financial performance. The impact of non-financial performance on financial results is indirect and often delayed, while the so called quarter economy directs focus to actions that produce prompt results, rather than sustainable results. Nevertheless, the ultimate objective of companies is to provide its shareholders with stable value, but as long as the monetary impact of non-financial performance cannot be clearly demonstrated, it will be easily dismissed as less important. The discussed metrics are summarised in table 5 below.

Table 5. Potential indirect procurement performance metrics in literature

Perspective	Measurements
Financial	Procurement Savings (goetzpartners 2013) Realised Savings (Coupa 2016) Contract Coverage (spend) (Coupa 2016) Inventory Carrying Cost (GEP 2017) Cost of Operation Internal Transaction Costs (Gunasekaran et al. 2004, 339) Total Indirect Spend Indirect Spend by Category Maverick Spend (goetzpartners 2013) Managed Spend
Procurement Stakeholder (Customer)	No of Suppliers (goetzpartners 2013) Stakeholder Satisfaction Supplier Performance Delivery Accuracy Contract Compliance (Fedele & Dolan 2004) Customer Query Time (Gunasekaran et al. 2004, 338) Inventory Turnover (Busch, Lamourex & Mitchell 2017, 5) Supply Flexibility (Gunasekaran et al. 2004, 338; Brewer & Speh 2000, 87)
Internal Processes	PR-to-PO Lead Time (Coupa 2016) Order Lead Time (Gunasekaran et al. 2004, 338) Invoice-Approval Cycle Time (Coupa 2016) Electronic PO Processing (Coupa 2016) Electronic Invoice Processing (Coupa 2016) Contract Coverage (transactions/suppliers) Inventory Turnover (Busch et al. 2017, 5)
Learning and Growth	Employee Satisfaction (Evans 2004, 223) Supplier Base Innovation Capacity Personnel Innovation Capacity

The various metrics presented in the preceding chapters represent only those identified in literature examined for this thesis. Moreover, the appropriateness of the metrics was evaluated in the context of the thesis. As a result, different observations regarding the emphasised performance perspective can be made when examining other literature, and additional metrics may also be identified for a different context.

5 EMPIRICAL STUDY

To complement the theoretical observations, as well as to focus the thesis towards manufacturing industry, empirical observations obtained from the case company are utilised. The case company is a global actor in manufacturing industry, which affects the emphasis and objectives of its procurement activities. In the case company the main objective of indirect procurement is to ensure that the safety, quality, schedule compliance and availability of required items and services correspond with company's preconditions and stakeholder needs, while optimising costs.

Semi-structured interviews are the primary data collection method. The internal interviews will aim to identify the value drivers perceived as important, the challenges related to indirect procurement performance measurement, and the desired characteristics of performance measurement. Internal databases, guideline documents and process descriptions are used in designing the interviews and describing the case specific properties. The interviews are targeted at procurement management, but representatives from the succeeding organisational levels are also interviewed to further understand the processes and to record desired PMS practicalities from different levels.

The company has defined an operating model for procurement, consisting of several processes; internal stakeholder management, category management, demand management, strategic sourcing, supplier management, request to pay, contracts and claims management, and procurement data management. Three of these are defined as core processes; strategic sourcing, supplier management, and request to pay. The emphasis of the processes differs between categories, but the three core processes are widely recognised as key processes. Managers also emphasised the significance of category management, demand management and internal stakeholder management and collaboration.

5.1 Indirect Procurement value elements

The interviewees in indirect procurement organisation were asked to describe what value the key processes produce for stakeholders and for the organisation. The core value created by indirect procurement according to the interviewees is securing material and service availability, ensuring cost effective and safe operation, optimising plant operationality and

usability, and ensuring optimal performance of business enablers such as logistics, ICT and retail facilities. It was emphasised, that the most value is created when all aspects of an acquisition are considered; safety, quality, schedule, and cost.

Value creation begins in supplier selection, where choosing a supplier with a clean background, consistent performance and/or sufficient supply offering is seen as important in mitigating risks related to company image, safety, schedule, costs and quality. Managing and recording supplier performance provides procurement with improved understanding of supplier capabilities which is essential for choosing the best possible supplier according to stakeholder needs in different cases. The improved understanding is also seen to bring value by providing the company with alternative suppliers to replace current ones. Evaluating and managing compliance is another value adding activity. Auditing is used to ascertain supplier compliance to stakeholder and company requirements. Contractor compliance monitoring is required to make sure that the company is only invoiced for actual working hours. Utilising suppliers' capacity for innovation and improvement by capturing supplier innovations is another value adding activity performed by procurement, according to procurement management.

Negotiating and forming contracts and agreements, and enforcing terms and conditions are also perceived as a tool for ensuring cost, schedule, quality, and safety compliance. In addition, successful negotiations ensure that the company receives optimal conditions from suppliers as defined by stakeholders. Where negotiations cannot be used to impact the price, procurement creates value in attempting to manage used volumes to reduce spend. Such purchases include commodities that's price is determined by current market price. Contracts are further assumed to produce value to stakeholders by decreasing the complexity of purchase requisition formation.

5.2 Stakeholder value elements and requirements

In the case company, procurement has defined stakeholder requirements via a recent survey. The principle properties held in high regard by the respondents are flexibility, efficiency, experience and/or understanding of the stakeholder's business function, proactiveness, schedule compliance, communicativeness and transparency. The requirements can be divided into three different aspects; communication and collaboration, procurement skills and knowledge, and requirement related to certain procurement processes.

5.2.1 Procurement Stakeholders

Procurement stakeholders are defined as representatives of business, common functions, or other functions, who require or will use an item or service in their work. Procurement manages risks by producing and maintaining frame agreements and contract terms, and partakes in the sourcing process of all acquisitions exceeding a predefined monetary value. Procurement objectives and risk management measures are designed to ensure high plant reliability and operability, as well as good cost performance.

As part of the interviews, management personnel were asked to name the main stakeholders within their category. The stakeholders are shown in figure 6, with y-axis listing the stakeholders and x axis the number of management representatives who named the stakeholder in the interviews. Most interviewees named production, maintenance, and investment management as their key stakeholders, while the rest were divided between different categories. The variety of stakeholders is a good example of the complexity of indirect procurement. Similar perceptions may be expected from other indirect procurement functions within process industry.

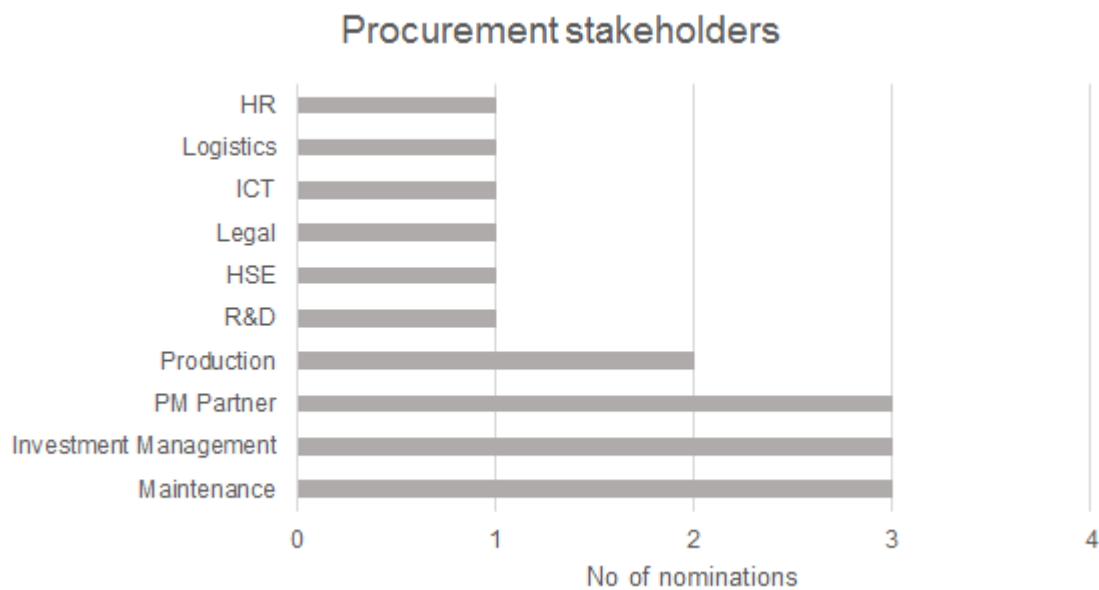


Figure 4. Stakeholders of indirect procurement

Stakeholder management practices vary between categories, but generally indirect procurement collaborates actively with its stakeholders. In addition to routine communication, more intense collaboration is initiated when procurement strategies are former or reformed for a (sub) category. Thus, for all strategic sourcing projects, cross-functional teams are formed to ensure that the relevant stakeholders are involved in defining requirements and decision making.

5.2.2 Communication and collaboration

Internal stakeholders view continuous collaboration as a value creating activity because it increases procurement personnel's understanding of its stakeholder's business function's processes and requirements. It's also seen important for supporting goal congruence – working together towards common goals, as one company. The importance of procurement understanding stakeholder requirements is recognised in different levels, from managerial to operational. Constant collaboration also ensures that procurement can observe and prepare for future needs. Thus procurement is also able to take part in project planning in early stage, a requirement that was mentioned frequently b stakeholders in the survey.

A vital part of collaboration is active communication. The respondents especially value being informed about order and RFP status and possible changes. Importance of receiving frequent information on status increases as the duration of the purchasing or RPF process increases. The requester also requires information on changes such as changes to confirmed delivery date, or if a similar, yet different item is acquired as the requested item is no longer available. When procurement identifies a commercial reason for changing any properties of an order, these are welcomed but need to be discussed with the stakeholder and decided together. Here, again, understanding the requirements of stakeholders is vital; for example, all project or turnaround purchases of the same item or from the same supplier cannot be consolidated if one order quantity is required to complete project activities on a critical path. In terms of strategic sourcing and supplier selection stakeholder's value knowing the reasoning behind reached decisions. Therefore, transparency in procurement activities is required by making the processes known and by providing the appropriate stakeholders with the analysis and data on which decisions are based.

Stakeholders also value having access to general information regarding procurement operations. Understanding of what processes and issues procurement manages and whom to

contact with which request streamlines the process and decreases the time as information flows smoothly. Hence the roles and responsibilities should be communicated openly, and the process descriptions should also be accessible to procurement stakeholders.

5.2.3 Skills and resources

Certain valued skills and knowledge were named by the stakeholders. These skills are believed to improve procurements ability to understand its stakeholders, and to support common objectives. Sufficient number of resources is values, as it enables flexibility and faster reaction time, properties which are highly valued by the stakeholders. The experience or knowledge of stakeholders business is perceived as a valuable quality of procurement personnel. However, the commercial understanding is also valued, such has market insight and knowledge of relevant legislation.

As for specific skills, the stakeholders mentioned project management related skills most frequently. Project scheduling skills or knowledge are highly valued skills in ensuring that procurement understands the limitations affecting projects and potential consequences of delays. Another project planning skill that some respondents perceive is useful for procurement to possess is calculation of total cost of investment.

In addition to the project skill mentioned above, the respondents also see supply chain thinking and total cost of ownership thinking as important skills for procurement. Utilising TCO calculations ensures that procurement decisions are based on a broader set of variables than the direct acquisition price, hence producing purchases that produce value throughout their lifetime. Practicing supply chain thinking is also a valued trait of procurement professionals, as understanding the limitations and causalities within a supply chain decreases the chance of adverse effects, such as layered delays or excess use of storage.

5.2.4 Processes

The respondents perceive certain processes as the most relevant for them in terms created value. These processes are; contracts and claim management, request-to-pay and especially expediting and delivery management, strategic sourcing and especially tenders, and

supplier management especially terms of relationship, supply risk, and performance management.

Delivery monitoring and expediting were the most frequently mentioned activities related to operational purchasing, in addition to active communication discussed earlier. Being informed of the confirmed delivery date is required to prepare and plan maintenance work, for example. In addition to timely deliveries (not too early, not too late), the respondents value proactive efforts in verifying that the right amount and quality will be and are delivered to the right place. As for strategic sourcing, and supplier selection, the main value driver is involving the relevant stakeholder(s) when defining the objectives and/or selection criteria. The message is that with technical, and in some case budget, requirements the stakeholders arguments should be overruling, while commercial aspects can be defined by procurement, although taking into account the stakeholders needs regarding delivery times etc.

Negotiation and maintenance of contracts and frame agreements is seen as an important facilitator of uninterrupted operations, and contracts that are designed to be flexible are especially valued. For example, designing contracts so that additional work can be easily issued is important. Another specific valuable attribute regarding contracts is sanctions; including and acting upon sanctions in contracts are seen as an important tool of risk mitigation and for ensuring contract compliance. Procurement's role in managing claims is another valuable aspect, when it is done quickly, strictly and professionally. Furthermore, the stakeholder's value having access to relevant contracts, and claim and negotiation documentation and status updates. Receiving status updates and outcome reports was expressively appreciated regarding claims.

When it comes to supplier, and supply, management, stakeholders feel that multidimensional supplier evaluation is a source of value. When suppliers are evaluated beyond costs, it is more likely to receive higher quality, better safety performance, complete solutions, and more flexibility. As part of multidimensional and thoughtful supplier evaluation, stakeholders appreciate second-party audits performed by procurement, on both local and global level. Managing supplier relationships and performance and actively scanning the supplier markets produces significant value to the stakeholders by securing: sufficient supplier capacity and availability, wide product and service offering, and possibility to use alternative suppliers. Furthermore, the stakeholders value procurement's proactive search for new alternatives and solutions, when these can produce benefits to the stakeholders.

5.3 Requirements for Indirect Procurement Performance Measurement

Several indirect procurement representatives were asked to describe what they require from performance measurement in terms of what to measure and how to report results. Several people mentioned the need for supply chain level metrics, which would provide timely information about, for example, delivery accuracy through the chain. More detailed information is also desired. While measuring the performance on supply chain level would be preferable, it is excluded from the scope of the thesis as the focus is on developing performance measurement practices on business function level.

The interviewees named several areas and activities they hoped to be measured systematically. The time elapsed from purchase requisition (PR) being turned to a purchase order (PO) was named as a useful metric. However, the PR-to-PO lead-time may be increased due to factors unrelated to procurement, for example inadequate purchase requisition information such as item description. It was also noted that the metric should also separate direct PR-to-PO from processes where a request for proposal (RFP) is required before creating a PO. It was observed, that lead-time measurement may not be beneficial with service acquisitions due to the fundamental differences between services and physical items. Another time focused metric is delivery accuracy, which is required to evaluate suppliers' delivery capability and reliability. Delivery accuracy can only be implemented on delivery of physical items.

Management requires tools for monitoring personnel's workload, and monitoring purchasing volumes in purchase order rows is one metric for the purpose. However, due to the variance of indirect procurement purchases such metric may provide false information about a person's actual workload when focusing solely on number of rows. The metric and result reporting should be designed so that the complexity of the acquisition is taken into account; frame contract purchases are far less complex than engineer-to-order items such as pumps and investment acquisitions. Evaluation of data update frequency is required to know e.g. how promptly purchasers update the system as per suppliers order confirmations. Measuring data update frequency may prove challenging when email is used to receive confirmations, as hence the information is in the purchasers email and thus unattainable. Other data management related measurement areas include supplier data status, i.e. is supplier information up-to-date and adequate, and order quality, i.e. orders are created according to guidelines. Data management measures can be coupled with purchasing volume metrics to produce a more profound indicator of personnel's workload.

The interviewee's value detailed and informative spend and purchasing data to support category management; what has been bought, and how spend and volume of a subcategory or item has developed. Related metrics should serve as tools for reducing scattered purchases and to support consolidation, and should allow identification of trends and help forecast demand. Detailed data is also required to compare invoiced prices to agreement prices to ensure that contracts are utilised and suppliers are complying with agreed terms. Furthermore, spend visibility is required to track expense level development in general.

Investment projects are another area requiring specific metrics. The main challenge when measuring investment projects from indirect procurement perspective is determining which aspects can be impacted by procurement, what is procurements contribution and how to measure it in a meaningful way. When the performance drivers and appropriate metrics are identified, a baseline should be created against which to evaluate performance. Investment project metrics should be used as joint metrics together with investment management and other involved stakeholders. Joint metrics enable users to identify in which stage performance deviations have emerged, e.g. what is the cause of delay in schedule.

An important part of procurement is contracts and claims management. One critical part of contracts management is negotiating beneficial terms and conditions. Measurement to evaluate the success of negotiations beyond, but not excluding, achieved price decreases or price premiums is desired. However, as negotiations are more or less unique events with different requirements, value elements, initial settings, participants, and dynamics, any intended metrics should be carefully designed to reflect the properties of negotiations. Measurement to indicate the performance of claims management is also required, and one aspect to measure is the share of the claims processed by Procurement to result in arbitration.

5.4 Requirements for PMS result reporting

The interviewees desire visual reports constructed from factual, numerical data where possible. The report should be delivered frequently and comprise of strategic metrics, but allow access to more detailed analysis behind the metrics as well. Several interviewees favour the use of an online dashboard with traffic light or scorecard indicators for common procurement metrics. The dashboard should be updated frequently to ensure that the results are

as up-to-date as possible. Separate team dashboards are required to review team performance in team meetings. Team dashboards are also necessary when team specific metrics are used. Team specific metrics are desired to support managers better manage their team and category. Consecutively, one interviewee pointed out that teams should not be compared to each other in measurements that do not take into account the differences between various purchases, for example, purchasing volume in terms of absolute number of purchase order rows.

Apart from reports, interviewees presented their preferences regarding collective presentation of the results. Presenting the results in recurrent general procurement meetings is favoured by some interviewees, while most feel that the review of result in such a setting remain superficial and/or distracted with other topics. Several persons suggest that the results would be reviewed in team meetings, but the approach was also criticised; if information that concerns the whole procurement is communicated in team meetings, which occur at different times, the information is received at different times. But as discussed earlier, team specific metrics may be used and thence presenting the results in team meetings is appropriate. It was also suggested that a recurring meeting concentrating only on PMS results and objective status should be arranged, either weekly, bi-weekly or monthly. The meeting should be interactive and promote discussion regarding the measurement, results and the reasons behind the results. Another interviewee felt that monthly or quarterly informing of performance results is adequate when no critical deviations are observed. When performance deviations are observed, the results can be communicated more frequently and corrective actions discussed. If person specific deviations emerge, team leaders can discuss the results and solutions with the person directly.

Furthermore, the interviewees provided insight on what information to share alongside results. The importance of transparency of measurement was emphasised; that the calculations, targets, raw data and data source must be known and accessible by all. One requirement is to always communicate results in conjugation with the targeted objective, and some feel that the calculation formula should also be presented together with the results. However, it was also suggested that presenting the calculation formula or evaluation logic behind the metric should be done only annually, or when introducing new metrics.

Overall, users require timely information on performance, immediate notification of any deviations, to interfere and correct performance. The metrics should provide relevant information about performance on various aspects, and should also serve as tools to support management.

6 DYNAMIC PERFORMANCE MEASUREMENT SYSTEM FOR INDIRECT PROCUREMENT: DESIGN AND IMPLEMENTATION

The theoretical and practical observations have been utilised in the construction of the proposed design and implementation processes. The processes have been designed from a practical viewpoint and each phase is appropriately complemented with potential execution methods, required input and recommended output.

6.1 Methods to support PMS design

Certain methods are suggested to support the design process. Process decomposition is only meant to be conducted if the necessary level of information regarding indirect procurement processes is not yet available. The use of the strategy map method, however, is recommended throughout the design process. The use of different facilitation techniques is recommended, but none are presented here in detail as the choice of techniques depends on the organisation and workshop participants.

6.1.1 Process decomposition

Process decomposition is used to identify measurable elements of the case company processes. Chan and Qi (2002) introduce a seven step process for analysing and decomposing processes:

1. *Identify and connect involved processes* - The identified processes are connected to a function, project, objective or other factor.
2. *Define the core processes* - The decision should be based on added value, strategic significance and ability to manage the process, i.e. ownership of the process should be within the company
3. *Define objectives, responsibilities, and functions of core processes* - Define and communicate the responsibilities and objectives of core processes and link them to strategy. This provides managers with guidelines on what to manage and measure.

4. *Decompose and identify sub-processes* - For example, operational purchasing can be decomposed into several sub-processes, e.g. order processing and delivery control.
5. *Define responsibilities and function of sub-processes* - Much like defining core processes, except the definitions of sub-processes are more detailed and closer to operational level, whereas definitions of core processes are more abstract and closer to strategic level.
6. *Decompose and identify the activities of sub-processes* - Identifying activities of sub-processes allows detailed understanding of the processes and identification non-value-adding activities. For example activities of order handling include order entry, order follow-up, order receipt, etc. These activities are measurable elements.
7. *Link core processes, sub-processes and activities to objectives* - Objectives also need to be decomposed before linking them with core processes, sub-processes and activities. For example objectives related to each level of the operational purchasing core process might be; Improved operational purchasing - Decreased order handling time - Automated order entry.

The above described process is illustrated in figure 4 below. The main objective of the exercise is to produce a detailed understanding and definition of processes implemented within the examined organisation.

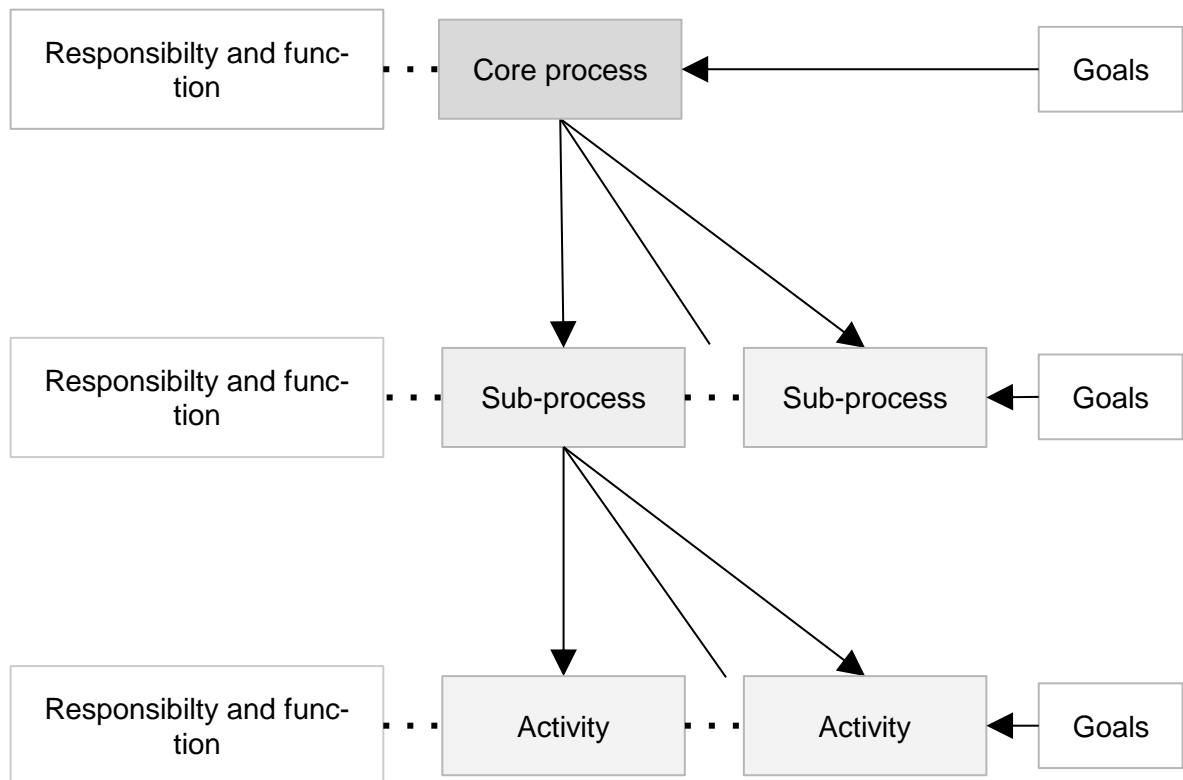


Figure 5. Process of decomposing processes (adapted from Chan & Qi 2002)

6.1.2 Strategy Map method

The strategy map method, developed by Kaplan and Norton as a tool for supporting the construction and use of balanced scorecard. It was created to translate and communicate strategy and, coupled with BSC, to measure the success of strategy implementation (Lueg 2015, 35.). Creating a strategy map validates and visualises the relationships between strategy and objectives, and between objectives. Figure 5 demonstrates a simple example of strategy map. The strategy in the imaginary case is simply to increase profitability by improving employee skills and capabilities to improve customer satisfaction and thus revenues, while improving production reliability and lead times to improve delivery accuracy and decrease costs. The lines between the objectives demonstrate inter-relational causalities.

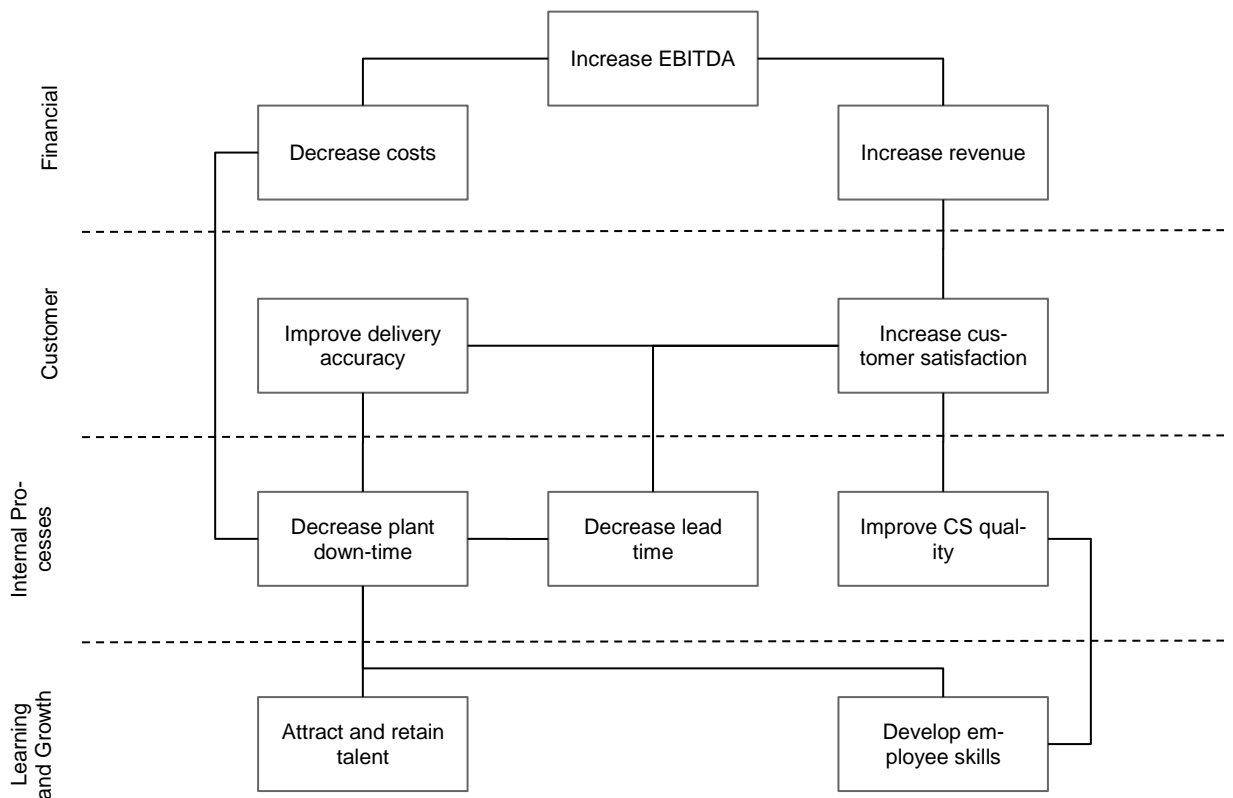


Figure 6. Strategy map

The BSC measurements are derived from the objectives mapped in the strategy map. Using the strategy map facilitates discussion regarding strategy and objectives, ensuring it is understood and agreed upon. Furthermore it ensures that objectives and measurements support the defined strategy and that they are not contradicting as the method requires users to identify and justify causal relationships (Kaplan & Norton 2004.). For example, employee satisfaction could be selected as a KPI to support revenue increase with the justification that improving employee satisfaction improves customer service, which leads to enhanced customer satisfaction and increased revenue. However, the assumed cause-effect relationships must be verified during strategy and PMS implementation to verify that the original assumptions were correct and to correct the PMS if needed.

6.2 Indirect procurement PMS design process

“Strategy without metrics is useless; metrics without a strategy are meaningless.”

The above citation from Melnyk, Stewart and Swink (2004) represents the objective of the proposed PMS design process. The objective is to create a performance measurement system that directs indirect procurement activities to support the business functions strategy and consequently the company’s strategy. Moreover, an assumption is made that strategy aims to optimise value creation and hence the design process seeks to ensure that the PMS focuses on value creating performance drivers. The outline of the process is described in figure 7. The design process phases and methods to be implemented depend on; whether or not the organisation is currently deploying an indirect procurement PMS, if processes are properly defined, and the level of hierarchy within the organisation. Moreover, phases may be combined instead of arranging each phase as a separate event when deemed appropriate.

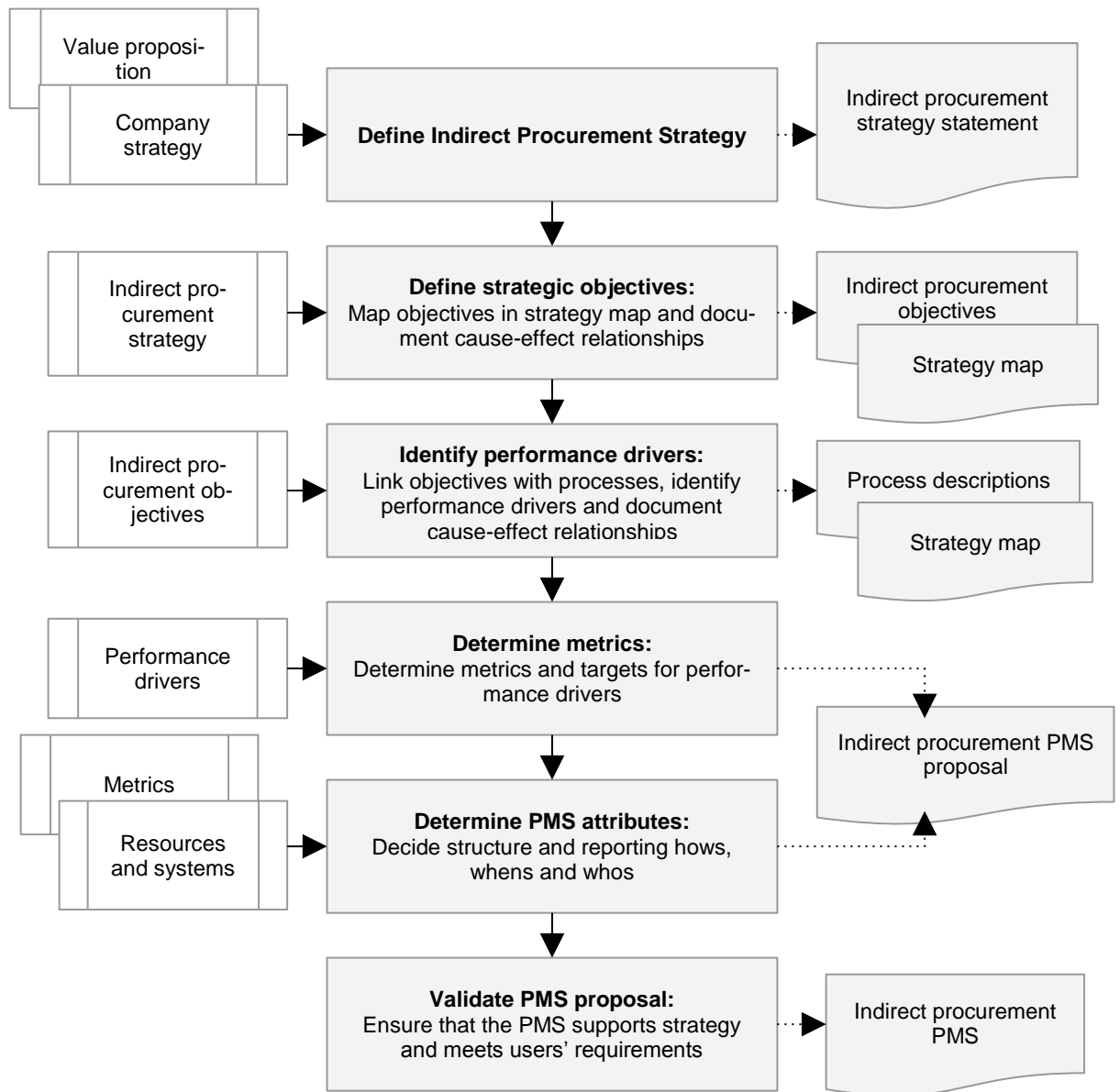


Figure 7. Proposed PMS design process

The process is intended to be implemented within a relatively short time, but the total length of the process depends on organisational characteristics, and, as observed by Kennerley and Neely (2002) and Bourne et al. (2000), may be prolonged when general resistance to change is present, and considerably hindered if the process is opposed by management representatives. The resulting PMS should not be considered as a static system, but as a constantly evolving tool for measuring indirect procurement's success.

6.2.1 Define indirect procurement strategy

Indirect procurement strategy must be derived from company's strategy in order for the function to support company objectives. This also provides premises for connecting company objectives and indirect procurement objectives, and ensures that indirect procurement produces value for the company as the objectives are aligned. Hence, the first phase requires company strategy as input, complete with mission, vision, and objectives. Depending on the organisational hierarchy, indirect procurement strategy can be constructed in a management team workshop, executive workshop, or by the chief procurement officer alone. The strategy should clearly reflect current and future focus areas, high-level objectives, and indirect procurement value. The input and output, as well as suggested methods and participants are outlined in table 7.

Table 6. Phase 1: Define Indirect Procurement Strategy

Input	Company strategy
Method	Workshop OR Statement
Participants	Management team OR Executive team OR CPO
Output	Indirect Procurement Strategy

Statement refers to a strategy statement developed and issued independently by the highest ranking procurement officer whom is ultimately in charge of indirect procurement performance. If the strategy is constructed in a collaborative workshop, it should be governed by the highest ranking procurement officer, and participated by procurement management team. The table below introduces some potential questions to support the process of defining the strategy.

Table 7. Phase 1: Supporting questions

Question	Condition
How can indirect procurement support company's strategy and objectives?	Indirect procurement strategy must principally support company strategy.
How does indirect procurement create value for its stakeholders?	Indirect procurement must balance its operations so that it can produce the optimal level of value for each of its stakeholders.
What is required to sustain ability to create value?	Indirect procurement must retain and develop the properties required to produce value for its stakeholders.
Where do you see indirect procurement be in X years?	Indirect procurement strategy must support long-term planning and sustainable value creation during its intended life-cycle.

This phase is not required as a part of PMS design process when the strategy has been defined prior to initializing PMS design. However, depending on how recently strategy has been defined, it may be beneficial to revisit the strategy to make sure it still supports the operation of the company and business function in regards to internal and external factors.

6.2.2 Define strategic and operational objectives

Defining indirect procurement objectives requires indirect procurement strategy as an input, regardless of whether or not the first phase of the process has been executed. The suggested method for defining the strategic objectives is a management team workshop, where the participants define objectives based on strategy, and map them on a strategy map. Utilising the strategy map ensures that the different Balanced Scorecard perspectives are covered. Table 9 summarises the essentials of the second phase.

Table 8. Phase 2: Define Objectives

Input	Indirect procurement strategy
Method	Workshop Strategy map
Participants	Management team
Output	Indirect Procurement Objectives
Document	Strategy map

The long-term and short-term objectives can be combined in one strategy map or separated. Regardless of how the objectives are mapped, the two sets of objectives should be communicated in conjunction and the cause-effect relationships explained. The short-term objectives can be defined for the entire planning period, or periodically. Commonly the short-term objectives are set for one year.

The suggested participant group for the objective workshop is indirect procurement management team, but depending on the organisational culture the workshops may also be designed to involve the entire indirect procurement personnel, or selected individuals from each category and team. A facilitator should be used to promote inclusive discussion especially if the number of participants is relatively high. Graphic facilitation techniques such as the causal loop diagram are also recommended when identifying and justifying the cause-effect relationship and constructing the strategy map. The table below offers some supporting questions for the workshop, together with the conditions they are designed to target.

Table 9. Phase 2: Supporting questions

Question	Condition
What is the road-map to ensure the strategy succeeds?	Strategy must be translated into a concrete plan with milestones and priorities.
What sustained actions are required to support the strategy?	Strategic, long-term objectives are needed to ensure sustainable value creation and to promote farsighted decision-making.
What immediate actions should be taken to implement the strategy?	Tactical, short-term objectives are required to ensure that the required actions are taken to support the long-term objectives.
Are the proposed objectives pragmatic?	The objectives must be reachable within the intended schedule and with the possessed resources.
Are the proposed objectives understandable and sufficiently specific?	The objectives must be unambiguous to make certain that they are interpreted as intended by everyone.
Do the objectives require changes to be performed?	The need for additional resources, ICT investments, trainings, process redesign or creation, or organisational changes need to be identified.

This phase is obsolete if the organisation has defined objectives together with strategy, but revisiting the objectives to verify they are still valid is recommendable. When the periodic objectives are defined for a coming period, the phase is executed again but with less intensity. If the short-term objectives have been predefined for coming periods, they should be reviewed before the next period starts to ensure they are still aligned with the intended long-term objectives and organisational capabilities. If they will be defined periodically, the last four questions and conditions in table 10 should be considered. The strategy map should be updated correspondingly as the short-term objectives are updated.

The outputs of the second phase are indirect procurement objectives and the first version of indirect procurement strategy map. The strategy map may be a beneficial tool even when a different PMS model is used. In such a case the perspectives should be adapted to support the chosen PMS. If strategy map is not used, another model which reflect cause-effect relationships should be used, such as a process diagram. As the thesis focuses on BSC principles as performance measurement guidelines, the possible adaptations for different PMS's are not discussed here in more detail.

6.2.3 Identify performance drivers

Once the objectives have been defined, the processes and activities which have the greatest impact on the objectives need to be identified. The intention is to determine which performance drivers contribute to the achievement of objectives defined in the previous phase. In other words, which activities create the required value? To illustrate, if an objective is to improve internal stakeholder satisfaction, performance drivers could include supplier performance management, claim handling, response time and request-to-pay lead-time. The choice of performance drivers need to be justified and the cause-effect relationships explained and illustrated with the strategy map.

Table 10. Phase 3: Identify Performance Drivers

Input	Strategy, Objectives
Method	Workshop <i>Process decomposition</i> Strategy map
Participants	Management Team <i>Category Teams</i>
Output	Performance drivers <i>Process definitions</i>
Document	Strategy map <i>Process diagrams</i>

If a process is not well understood, it is not possible to reliably define where value is produced. Subsequently, the precondition to identifying performance, or value drivers, is to understand what is perceived as indirect procurement value. The value proposition of indirect procurement varies between organisations, and should be known before constructing the strategy and PMS. Process decomposition should only be executed when a process lacks a detailed process description.

The objective of the workshop(s) should be to first determine which core processes have significant impact on the objectives, after which these core processes are examined to identify performance driving sub-processes and activities – where value is concretely created. Supporting questions for this phase are presented in the table below. These questions are intended to be used when indirect procurement processes are structured and there is a

common understanding of the processes. The questions are intended to reveal the long-term key performance drivers as well as the short-term performance drivers. The contribution of the core processes, sub-processes, and activities need to be described and verified. If the contribution cannot be credibly presented, it is a relevant performance driver. Furthermore, the measurement should evaluate performance drivers that can be directly impacted by indirect procurement. Therefore, if the contribution of indirect procurement to a performance driver cannot be verified, it should either not be evaluated in indirect procurement PMS or it should be measured jointly with other contributing functions.

Table 11. Phase 3: Supporting questions

Question
Which core processes contribute consistent value to the organisation?
What and how significant value?
Which core processes contribute to the current objectives?
What sub-processes and/or activities do the core processes include?
Which of these contribute consistent value to the organization?
What and how significant value?
Which sub-processes/activities contribute to the current objectives?
Can the contribution to objectives be reliably verified?
Can indirect procurement impact the performance driver and how much?
How great is the performance driver's contribution to the objective?

If process decomposition is performed, the process presented by Chan & Qi (2002) may be followed. If the core process is known, the process should be started from step 4; *Decompose and identify sub-processes*. If, however, indirect procurement processes have not been properly mapped before, the process should be followed from the beginning, either as a separate process preceding PMS design or as part of the design process. The former

approach is recommended to assure better decision making in the previous phases. A detailed description of the seven step process decomposition process shown below can be examined in chapter 6.1.1. *Process decomposition*.

1. *Identify and connect involved processes*
2. *Define the core processes*
3. *Define objectives, responsibilities, and functions of core processes*
4. *Decompose and identify sub-processes*
5. *Define responsibilities and function of sub-processes*
6. *Decompose and identify the activities of sub-processes*
7. *Link core processes, sub-processes and activities to objectives*

Process decomposition should be performed as a group exercises in, for instance, facilitated workshops utilising visual facilitation techniques. The attendees should possess practical understanding of the various activities managed by indirect procurement. The process starts with focusing the exercise on processes managed by the business function, after which the processes are decomposed in three stages; performing steps two and three provide descriptions of core processes, four and five descriptions of sub-processes performed within the core processes, and steps six and seven provide a detailed description of activities of the sub-processes and subsequently, of the core processes. Notice, however, that not all sub-processes can or need to be decomposed further into activities. Hence steps five and six may prove unnecessary to act upon, although necessary to consider.

After completing the third phase, indirect procurement should have strategy supporting performance drivers defined, together with an updated strategy map. The performance drivers should be clearly defined and accompanied by roles or teams responsible for said driver, or activity. Furthermore, the justification of choosing the exact performance drivers – namely the verification of contribution to organisation and objectives - should be available for all affected persons. If process decomposition is performed at this phase, the resulting documentation should be shared and presented appropriately.

6.2.4 Determine metrics

The next phase is to develop metrics to evaluate the performance drivers and to set targets for those metrics. The required input for the fourth phase are the previously defined objectives and their inherent performance drivers. The metrics can be determined in conjugation with the performance drivers in the same session, or in a separate session. A separate session is advisable when no metrics have been applied prior, as thence expansive development of metrics is required. This phase can be performed by the team responsible for performance measurement, or by indirect procurement management team. When the former approach is used, the performance measurement team will present the output to management team for approval. The expected outputs after completing this phase are performance metrics and targets, and a (updated) metrics library. The main guidelines of the fourth phase are presented in the table below.

Table 12. Phase 4: Determine metrics

Input	Objectives, Performance Drivers
Method	Workshop
Participants	Metrics team OR Management team
Output	Performance metrics Performance targets
Document	Metrics library

The metrics library refers to a collection of validated metrics that can be used, but that are not necessarily currently utilised. The metrics library is a document which should be made available to the whole indirect procurement personnel. The attributes that should be used to describe a metric in the metrics library are; name, definition, targeted activity (performance driver) and objective, calculation formula or evaluation method, unit of measurement and update frequency, data source, and the metric owner, i.e. the role responsible for measurement (Lohman et al. 2004, 283.). Furthermore, the metrics should be categorised under appropriate performance perspectives, e.g. financial, customer, internal processes, and learning and growth.

In table 14, some supporting questions for validating proposed metrics and targets are presented. The main considerations are whether or not the proposed metrics support and represent strategy, objectives and performance drivers. The usability of the metric must also be evaluated. Once all the implementable metrics have been defined, the set of metrics needs to be evaluated in terms of variety; are all relevant dimensions covered, and are both activities and outcomes targeted?

Table 13. Phase 4: Supporting questions

Question	Condition
Does the metric support strategy and objectives?	The measurement should be aligned with indirect procurement and organisational strategy and objectives, both long and short-term (Kaplan & Norton 1996; Melnyk et al. 2004, 213.)
Does the metric represent the intended objective?	The measurement should accurately indicate progress of the objective.
Does the measurement target the intended performance driver?	The measurement should accurately evaluate the performance of the element, process, or activity.
Is required data available at a reasonable cost and effort?	The cost of measuring should not exceed the benefit of measuring (Lohman et al. 2004.).
What is the possible benefit of using the metric?	The metric should produce more value than it requires effort (Neely et al. 2005.).
Are all the metrics compatible and non-conflicting?	The metrics should be coordinated and non-conflicting (Melnyk et al. 2004, 213.).
Do the metrics cover all performance perspectives?	The PMS should be balanced and consist of multi-dimensional metrics (Neely et al. 2000 119; Tung et al. 2011, 1300.).
What target levels are reasonable?	The targets should be attainable, yet challenging.

An important part of developing the metrics is validating them against actual data. This enables testing and fine tuning of the metrics, and is imperative for determining the current and target performance levels. Testing the metric may also reveal it to be unsuitable for its

intended purpose, and it is a prerequisite to determine whether the required data is available.

6.2.5 Determine PMS attributes

The fifth phase requires decisions regarding reporting practicalities and can be combined with the previous phase if the fourth phase is performed by the team responsible for performance measurement. The previous phases provide the PMS contents, while the structure and reporting features of the PMS are defined by user requirements. User requirements can be collected as the first activity of this phase. Designing the PMS to correspond with user requirements positively impacts the success of the system (Lohman et al. 2004, 283.).

Table 14. Phase 5: Determine PMS attributes

Input	Metrics collection, User requirements
Method	Workshop
Participants	Metrics team
Output	PMS proposal

The factors to be determined in the fifth phase concern the visual delivery and communication of the results especially. The tool, or tools, to be used for delivering results needs to be chosen. Also the format of the result report and types of indicators to be used. The need for different reports and reporting levels needs to be decided as well; do senior management, indirect procurement, and teams require separate reports? What is the appropriate level of detail and frequency of reporting? The place to store the reports, documentation, and data also needs to be decided. The location should be accessible by all indirect procurement personnel, for example cloud storage.

6.2.6 Review PMS proposal

Once all the appropriate preceding phases have been completed, the PMS proposal needs to be reviewed. The audience depends on the organisation; in low-hierarchy organisations an open discussion event participated by all personnel may be organised, and in a high-hierarchy organisation the PMS proposal can be sent on a management review round, for example. After the review, the metrics team finalises the PMS according to the feedback received. It is recommendable to request CPO's or management team approval before implementing the finalised PMS, once the adjustments have been made.

Table 15. Phase 6: Review PMS proposal

Input	PMS proposal, User feedback
Method	Open discussion event OR Review round
Participants	Indirect Procurement OR Management team
Output	Finalised PMS

Factors to be assessed when reviewing the proposal are presented in the table 16. The presented considerations are based on the characteristics of an effective PMS as identified in the literature review.

Table 16. Phase 6: Supporting questions

Question	Condition
Are the objectives and metrics aligned with strategy?	PMS should reflect and support strategy (Kaplan & Norton 1996.).
Are the cause-effect relationships between objectives and metrics clear and plausible?	PMS should reflect cause-effect relationships (Lebas 1995, 35; Kaplan & Norton 1996.).
Are the objectives and measurements non-conflicting?	PMS should consist of non-conflicting objectives and metrics (Melnyk et al. 2004, 213.).
Are all performance perspectives and dimensions covered by the PMS?	PMS should cover the four perspectives of performance (financial, customer, internal processes, and learning and growth) and consist of multidimensional measurements (time, quality, quantitative, qualitative...) (Kaplan & Norton 1996; Tung et al. 2011, 1300.).
Are the evaluation methods, calculation formulas, and data sources disclosed?	The formation of the result should be known by users (Braz et al. 2011, 753.).
Does the system respond to user requirements?	The system should be user friendly and correspond with their requirements.

After the reviews and final approval, the PMS is implementable. However, it should not be considered as a static system that will be modified only when new objectives or new strategy is deployed. Rather, it should be highly responsive and adjustable to various changes.

6.3 Indirect procurement PMS implementation process

Once the design process has been finalised and the PMS has been approved by all applicable persons, the PMS implementation begins. Before implementation, the following factors should be defined; the people responsible for objectives, the people responsible for updating metrics, the medias, audience, and frequency for presenting results. The implementation process is described in figure 9. The process emphasises responsiveness, and aims to make the PMS dynamic instead of static.

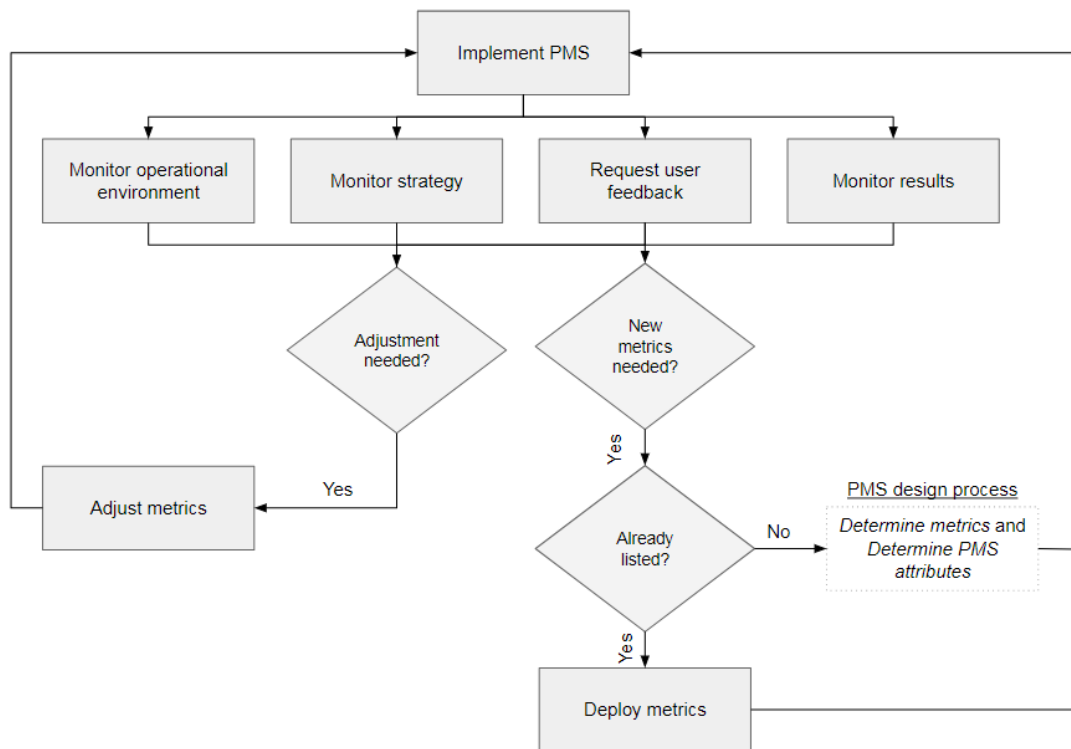


Figure 8. PMS implementation process

While implementing the PMS, operational environment must be monitored to prepare for changes such as new IT systems or disturbance in markets that significantly impacts prices. Changes in operational environment entail in this context any changes that may require changes to how data is collected and analysed, or that require targets to be readjusted. Organisational strategy also needs to be monitored so that any changes made to it will be immediately transmitted to procurement strategy and the PMS. To ensure the system abides to user requirements as well, it is advisable to request users to provide feedback in connection with performance status presentation. Giving immediate feedback should be promoted also.

Monitoring the results entails more than just following-up on the status of reaching targets and objectives. If results are continuously staying on a low level or decreasing, the reason may be in the metric or in the objective. The target levels may be too high, the objective or metric may contradict with another one, or the metric is defective. It may also indicate that the way of working or amount of resources should to be readjusted. If none of the above apply, and performance is still lacking, the capabilities of indirect procurement may need reforming, either by offering trainings or recruiting new resources.

When changes or deviations are noticed in operational environment, strategy, user requirements, or measurement results, and the causes and effects have been analysed, the PMS needs to be readjusted accordingly. Main considerations are; are adjustments needed to current metrics, and are new metrics needed? If adjustments are needed, the metric should again be validated against actual data before implementation, and the metric information in the metric library needs to be updated. In case new metrics are needed, the metrics library should be consulted to see if appropriate metrics have already been developed. If yes, then depending on how long ago the metrics have been developed, they can either be immediately utilised, or be validated against recent actual data before implementation. If appropriate metrics have not yet been developed, phases four and five of the PMS design process should be performed and the changes be subjected for CPO or management team approval.

7 RECOMMENDATIONS

The recommendations regarding PMS structure are meant to support the PMS design process to produce a system beneficial for different indirect procurement categories. The suggested metrics are generic, but may not be appropriate for all organisations.

7.1 PMS structure

The diversity of categories within indirect spend create the main challenges for measuring its performance. The purchasing and managing of routine maintenance items differs greatly from acquisition of fixed assets, and the characteristics of service purchasing and management are even more disparate, while IT&S procurement contains contract types not used in other categories. Some of the categories are easier to measure than others, and few measurements can be applied to each category without adjustment. Nevertheless, the measurement system should be generic enough to evaluate the business functions as a whole, yet diverse enough to sufficiently account for the different characteristics and requirements across the categories.

The PMS should be comprised of two layers; procurement, and category. The procurement layer contains procurement KPI's and generic measurements, and high-level joint measurements, which are applicable for measuring the success of Procurement Strategy and procurement's impact on its stakeholders. The category layer may consist of the general measurements adjusted to the category's characteristics, of measurements specific for the category, or of both. And while the high-level organisational metrics are not used to evaluate indirect procurement performance directly, they should be periodically communicated alongside the business function specific metric results.

7.2 Metrics

The metrics listed in tables 17 to 20 have been identified as potential indicators of indirect procurement performance within manufacturing industry. The proposed metrics cannot be expected to be readily implementable, however, as the usability of a metric is impacted by the IT systems and personnel's capabilities, among other things. Organisations operating

in several geographical regions or industries may benefit from segmenting indirect procurement performance measurement according to geographical regions or business units. Financial perspective metrics, presented in table 17, can be somewhat easily implemented in any organization. The abbreviations used in the formulas are: evaluation period (EP) and previous evaluation period (PEP).

Table 17. Suggested financial perspective metrics

Financial		
Indirect Spend	The total monetary value of indirect spend over a period	<i>Indirect spend YTD</i>
Indirect Spend Development	Development of indirect spend compared to e.g. comparable five year average or previous comparable evaluation period.	$\frac{Spend\ EP - Spend\ AVG}{Spend\ AVG} * 100\ %$
Category Spend	The monetary value of each indirect procurement category, e.g. MRO, utilities, logistics services	<i>Category spend</i>
Category Spend Development	Development of category spend compared to average spend over similar evaluation period (EP) or previous comparable evaluation period.	$\frac{Spend\ EP - Spend\ AVG}{Spend\ AVG} * 100\ %$
Cost of procurement operation	The annual cost of procurement operations including, for example, systems, personnel and equipment.	<i>Cost of operations</i>
Cost of Procurement Operation Development	Development of cost of operations compared to previous EP (PEP)	$\frac{Cost\ EP - Cost\ PEP}{Cost\ PEP} * 100\ %$
Cost / Spend	The cost of operations over EP in relation to indirect spend over EP.	$\frac{Cost\ EP}{Spend\ EP} * 100\ %$
Cost / Spend Development	Periodical development of cost of operations in relation to indirect spend	$\frac{Cost\ EP}{Spend\ EP} * 100\ % - \frac{Cost\ PEP}{Spend\ PEP} * 100\ %$

The procurement stakeholder, i.e. customer, perspective metrics suggested in table 18 are highly case specific. The potential metrics depend on core processes, how they are organised, and on the stakeholders of indirect procurement in each organisation. Abbreviations used in the formulas are: evaluation period (EP), previous evaluation period (PEP), actual dates (AD), required dates (RD), response date (ReD), and query date (QD).

Table 18. Suggested procurement stakeholder perspective metrics

Procurement Stakeholder		
Number of Reclamations	The number of reclamations regarding procurement performance submitted by internal stakeholders and/or suppliers.	$Reclamations_{EP} - Reclamations_{PEP}$
Stakeholder Satisfaction	The level of internal stakeholder satisfaction regarding especially the value creating activities/processes.	<i>Survey</i>
Supplier Satisfaction	Supplier satisfaction in regards of aspects identified as critical.	<i>Survey</i>
Schedule Compliance	Procurement activities performed in compliance with stakeholder schedule requirements. Timeliness evaluated by comparing actual dates (AD) to required dates (RD) and the result is reported as the average of the differences.	$\frac{(AD - RD)_1 + \dots + (AD - RD)_n}{No\ of\ activities\ (n)}$
Response Time	The average time it takes to provide internal stakeholders and/or suppliers with enquired information.	$\frac{(ReD - QD)_1 + \dots + (ReD - QD)_n}{No\ of\ queries\ (n)}$

As with the previous metrics, the metrics intended to evaluate internal processes are highly dependent on context. The metrics presented in table 19 are as generic as possible, but some metrics may not be relevant due to operational differences. For example, monitoring the automation rate is not relevant if a company is not yet utilising e-procurement solutions, or vice versa, if their usage level has already been optimised. Abbreviations used in the formulas are: purchase order date (POD) and purchase requisition date (PRD).

Table 19. Suggested internal process perspective metrics

Internal Processes		
Event invitee average	The average number of suppliers invited to an RFP, competitive tender or other event subject to minimum requirement of invitees	$\frac{\text{Supplier count}_1 + \dots + \text{Supplier count}_n}{\text{No of events } (n)}$
Contract Coverage	The share of spend and/or transactions governed by a contract or agreement.	$\frac{\text{Contracted Spend EP}}{\text{Spend EP}} * 100 \%$
eSourcing Index	Utilisation rate of digital procurement tools, e.g. e-auction tools.	$\frac{\text{No of digital events/transactions}}{\text{No of all events/transactions}}$
Automatisation Rate	Share of automated orders.	$\frac{\text{No of automated orders}}{\text{No of all orders}}$
PR-to-PO Lead-time	The average time elapsed from purchase requisition (PR) being issued to purchase order (PO) being created.	$\frac{(\text{POD} - \text{PRD})_1 + \dots + (\text{POD} - \text{PRD})_n}{\text{No of PO's } (n)}$
Supplier Base	Number of employable suppliers (per category).	$\frac{\text{Approved suppliers}}{\text{Category}}$
R2P Workload	Number of purchase orders in proportion to personnel performing R2P.	$\frac{\text{Purchase orders}}{\text{No of people}}$
RFx Workload	Number of RFx's in proportion to personnel managing RFx events.	$\frac{\text{RFx events}}{\text{No of people}}$
Maverick Buying	The share of purchases not submitted through the appropriate systems and/or processes.	$\frac{\text{Unauthorised transactions YTD}}{\text{Transactions YTD}}$

Proposed metrics for learning and growth perspective are presented in table 20 below. The first metric, Innovation Index, is generic and implementable in any business function or organisational level, but I decided to include nonetheless as promoting innovativeness internally is recommendable. Evaluating supplier innovativeness is, however, a procurement specific metric. The abbreviations used in the formulas are: improvement initiative (II), evaluation period (EP), previous evaluation period (PEP), and supplier initiative (SI).

Table 20. Suggested learning and growth perspective metrics

Learning and Growth		
Innovation Index	<p>Development of innovativeness level and improvement capacity within the organization.</p> <p>The quality of improvement initiatives (II) submitted by personnel.</p> <p>The expected benefits versus expected costs of implemented improvement activities.</p>	$\frac{\text{No of II EP} - \text{No of II PEP}}{\text{No of II PEP}}$ $\frac{\text{No of implemented II EP}}{\text{No of II EP}}$ $\frac{\text{Sum of expected benefits EP}}{\text{Sum of expected costs EP}}$
Supplier Innovation Index	<p>Utilization rate of supplier innovation capacity.</p> <p>The expected benefits versus expected costs of implemented supplier initiatives (SI).</p>	$\frac{\text{Sum of expected benefits EP}}{\text{No of SI EP}}$

8 CONCLUSIONS

In this section, I reflect on the theoretical and empirical findings to answer the research questions I intended to answer when starting the thesis. Furthermore, I assess the proposed PMS design and implementation processes in light of the findings.

The main research question of the thesis is:

How should indirect procurement performance measurement system be constructed for it to capture the total value produced by the function?

The existing theory provided several properties of an optimal PMS that can be expected to capture produced value most holistically. The foundation on which truly beneficial PMS's are constructed is the organisational and business function specific strategy (Kaplan & Norton 1996; Melnyk et al. 2004, 213.). This allows the PMS to be used as a strategy management tool, to direct behaviour to produce most value in view of the strategy, and to assess the success of implemented strategies. Strategy is the starting point of the proposed PMS design process, and the importance of deriving indirect procurement strategy from organisational strategy is also accounted for. The second phase of the process focuses on defining objectives to support strategy. When utilising the strategy map method to support the process as suggested, the strategy should follow through the entire process, being the foundation for each decision.

Another crucial property is deriving metrics from processes and activities creating the most value or contributing most to the objectives – i.e. performance drivers (Kaplan & Norton 2005). Hence, for the PMS to monitor and communicate the total value produced by procurement, the performance drivers need to be identified by utilising appropriate methods. I have suggested one method to support the identification of performance drivers, process decomposition by Chan and Qi (2002). However, value is a subjective concept, and thus the identification process should be implemented with people representing different procurement categories. Identification of performance drivers is handled in the third phase of the proposed PMS design process; identify performance drivers. However, the suggested approach focuses on identifying the performance drivers contributing to current long and short-term strategic objectives to ensure its relevance to implemented strategy, and does not account for general value. Nonetheless, the long-term objectives should be focused on

sustainable value creation, decreasing the potential problems related to emphasising current objectives.

An equally important property for a PMS to capture the total value produced by indirect procurement is the use of multidimensional metrics and different performance perspectives (Tung et al. 2011, 1300.). using multidimensional metrics in a balanced PMS can be expected to be more effective, support continuous improvement, and to emphasise various stakeholders equally (Neely et al. 2000, 1119; Quagini & Tonchia 2011, 1-2; Chan & Qi 2002, 182.). The latter is especially beneficial when wanting to capture the total value produced by indirect procurement. Moreover, metrics that monitor both activities and outcomes need to be utilized. Activity metrics indicate how efficiently outcomes are created, and outcome metrics can be used to evaluate the impact of indirect procurement performance on core outcomes such as EBITDA (Chan & Qi 2002, 182; Kaplan & Norton 1996, 66.). The notion to use multidimensional metrics and to target both activities and outcomes is presented in the fourth phase of the design process; determine metrics.

The main research question is supported by several sub questions, some of which can be answered satisfactorily, and to some of which a sufficient answer cannot be provided.

a. What is the perceived value of indirect procurement in different business functions (procurement, internal stakeholders)?

To answer the first sub-question from procurement perspective, the interviewed indirect procurement managers were asked to name describe what value the core processes produce to internal stakeholders. According to the answers, the core value produced by indirect procurement is availability, quality, safety, timeliness and cost efficiency of procured services and materials. Ensuring the listed properties of acquisitions contributes to efficient and safe operability of processing plant. An important notion is also that value is created in every step of acquisition processes, starting from market research and RFX's, to negotiations and supplier and contract management. During the interviews the significance of supplier management as a value-adding process was emphasised, for it is vital for controlling supplier performance and for fostering collaborative relationships. Brandmeier and Rupp (2010) identified efficient supplier management to be indicator of strong procurement performance, which supports the finding.

The stakeholder's perspective on indirect procurement value elements are somewhat in line with procurement managers perceptions. The most valued elements are flexibility, efficiency, schedule compliance, transparency, communicativeness, and understanding or experience of stakeholders' business function and industry. The respondents value communication and collaboration more than other aspects, and it is seen the most significant factor in ensuring high performance of most of the value elements, e.g. flexibility, efficiency, schedule compliance. The finding too supports the findings by Bradnmeier and Rupp (2010), who state that collaboration between indirect procurement and other business function as a property of high performing procurement.

b. What processes exist within indirect procurement?

Due to the variance in organising indirect procurement and categorising spend to direct and indirect, satisfactory answer describing indirect procurement processes in detail cannot be provided even within the thesis context. Still, several main processes can be expected to be implemented in most organisations. These processes are request-to-pay, supplier relationship management, supplier performance management, RFx events and negotiations, and contract management, the delivery method and responsibilities may vary greatly.

c. How is value created within these processes?

The aim of this question was to describe and simulate the value creation mechanisms. Unfortunately the study was not comprehensive enough to offer concrete or practical suggestions or evidence of how exactly is value created within the processes. An additional objective related to the question was to quantify the value in order to better represent indirect procurement's effect on 'the bottom-line'. The objective was not reached, but pursuing the objective is recommendable as it would produce relevant information regarding the impact of indirect procurement decisions to the balance sheet. Exploring the topic is also a prerequisite to creating joint financial metrics and could potentially increase the profile of indirect procurement. I would recommend utilising single case studies first to test different methods, for example the value-tree method (see, for example, Brandenburg (2013): *Quantitative models for value-based supply chain management* and Copeland, Koller & Murrin (1994): *Valuation: Measuring and managing the value of companies.*).

d. What factors impact the formation of indirect procurement performance measurement system?

Several general factors impacting the formation of performance measurement systems were identified in existing literature. As can be expected, industry, operating environment, company size, and organisational culture are the authoritative factors and a PMS must always be designed to complement these factors (Evans 2004, 220.). These should be considered when implementing the proposed design and implementation processes, as the practicalities related to the processes may not be relevant for small companies, or if authoritarian management philosophy is preferred. The number and complexity of information systems enable or limit the possibilities of performance measurement (Lohman et al. 2005; Bourne et al. 2000, 694.). The impacts of information systems will be accounted for if the recommendations and considerations presented in the fourth phase of the design process (determine metrics) are observed, e.g. the cost and effort of retrieving data, and testing metrics against actual data to reveal challenges. The capabilities and resources of indirect procurement have significant impact on the PMS formation, too, and the system should not include methods that procurement lacks the required skills or resources to implement (Kennerley & Neely 2002, 1227.). I would recommend assigning a team dedicated to performance measurement, consisting of people with appropriate skill portfolios.

A less evident impacting factor is the subjective perception of value and where it is created (Kaplan & Norton 2005.). This factor is prominent in indirect value, as different categories service different needs, leading to a multitude of perceptions of value. However, the challenges related to this issue can be avoided if the procurement value perceptions are known, which is stated as a prerequisite in the description of design process phase three, identify performance drivers. Furthermore, involving the whole procurement management team and/or category teams when identifying performance drivers further ensures that the variety of value is captured by the PMS.

e. What qualities are required to make the system dynamic, i.e. to ensure the system can be easily updated according to strategy/organisational changes?

As discussed earlier, theory implicates that for a PMS to be dynamic, it needs to respond to changes in strategy, operating environment, and user requirements (Lohman et al. 2004, 227; Kennerley & Neely 2002, 1241; Lohman et al. 2004, 283.). Subsequently, the strategy and operating environment must be understood and monitored in order to detect and

properly respond to possible changes. As for detecting changes in user requirements, Kennerley and Neely (2002) suggest to share detailed descriptions and to promote understanding of the metrics enables dynamism as users are able to evaluate whether or not the metric is appropriate at any point-in-time, and to communicate their remarks to the responsible person. Collecting user feedback frequently is also recommendable (Lohman et al. 2004, 283.).

In the proposed PMS implementation process, four areas are monitored to detect requirements to adjust the PMS. Operational environment and strategy are monitored to identify external change drivers. Collecting user feedback and critically assessing the reliability and relevancy of the metrics reveals internal change drivers. Depending on the changes, metrics are either adjusted, replaced, or removed. Using a metrics library to maintain past, present and potential implementable metrics is recommended to hasten the process.

In addition to quantification of indirect procurement value, other implications for future research were identified during the thesis process. An interesting topic is contract portfolio approach to indirect procurement value; evaluating procurement value in terms of the contracts it governs. There is also a need to include indirect procurement into supply chain research more, and to identify appropriate joint supply chain metrics. And of course I would hope to later read results of implementing the PMS design and implementation processes suggested in this thesis in different organisations.

Due to the limited amount of existing findings, and because single case study method was utilised, the findings cannot be reliably generalised. The empirical findings of the thesis may still apply to several organizations, and can be interesting to managers. The proposed processes, however, should be implementable in other companies within manufacturing industry, but this argument requires future action research to be confirmed.

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