MASTER THESIS



KEEPING TRACK OF THE PERFORMANCE OF THE PURCHASE-TO-PAY PROCESS OF PHILIPS LIGHTING

Public version

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Title

Keeping track of the performance of the Purchase-to-Pay process of Philips Lighting

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Management summary

Royal Philips N.V., also known as Philips, is a Dutch diversified technology company that serves both professional and consumer markets. In February 2016, the company will split into two companies: Royal Philips and Philips Lighting. This research is performed at the Procurement Department for the new Philips Lighting, and focuses on the buying of Indirect Materials & Services (IMS). The transactional purchasing process is called the Purchase-to-pay (P2P) process, which covers the process from the need for a product or service until the delivery and payment. Currently, the overview on the performance of the P2P process is incomplete and inadequate. Therefore, the objective of this research is: *develop a performance measurement system that the IMS Procurement Department of Philips Lighting can use to continuously control and improve the performance of the P2P process*. A performance measurement system (PMS) is a system that measures performance using performance indicators in a consistent and complete way (Lohman, Fortuin, & Wouters, 2004). Andersen and Fagerhaug (2002) created an eight-step methodology to guide the creation of a PMS, and their method is used to structure this research. The eight steps of their design process are:

- 1. Understand and map business structures and processes;
- 2. Develop business performance priorities;
- 3. Understand the current PMS;
- 4. Develop performance indicators;
- 5. Decide how to collect the required data;
- 6. Design reporting and performance data presentation formats;
- 7. Test and adjust the PMS;
- 8. Implement the PMS (the implementation is not part of this research due to time constraints).

Performance indicators should be derived from the strategy of the company (Azzone, Masella, & Bertelè, 1991; Dixon, Nanni, & Vollmann, 1990; Fortuin, 1988; Goold, 1991; Kaplan & Norton, 1992; Lynch & Cross, 1991; Maskell, 1991), however, since Philips Lighting does not exist formally, the strategy and strategic objectives are not entirely clear yet. Therefore, interviews are performed with several stakeholders of the P2P process, at all levels of the organization, and their needs and requirements (in combination with the current draft of the firm's mission) are the main input on which the selection of the key performance indicators (KPIs) for the PMS is based. From this input, three objectives for the PMS are drawn, and all KPIs are categorized according to these objectives: increase process efficiency, increase process effectiveness, and maintain compliance with internal controls. The following KPIs are selected for the PMS, and the final design of the dashboard can be seen in Figure 1:

- Cycle time
 - $\circ \quad \ \ {\rm Requisition-to-order\ time}$
 - Invoice-to-approval time
- Internal user satisfaction (SRM system usability)
- On-time payments
- Number of suppliers per 1 million euros spend
- Invoice matching rate



- Purchase Order (PO) compliance
- Contract coverage
- Preferred supplier usage



Figure 1 – Final design PMS dashboard

The model is verified by the commodity cluster leader of Industrial and Real Estate, who will use the PMS to see how the Organizational Reporting Units (ORUs) within Philips Lighting are performing on his clusters. The PMS could not be validated yet, as most data is still missing, and the model will not be implemented until next year.

To achieve a successful implementation of the PMS, three phases need to be passed according to the model of Lewin (1951), which are 'Unfreezing,' 'Changing' and 'Refreezing'. The first stage is the unfreezing stage, where the need for the PMS needs to be recognized, and where the organization needs to prepare for the change. Active participation of the employees is recommended, to reduce the likelihood of resistance. In the next stage, changing, the PMS will be actually implemented. The implementation can be divided into four phases: prepare & plan, design, validate, and deploy. In the prepare & plan phase, the project must be initiated, and a project team should be composed with people from different departments, including Finance, Procurement, and IT. Then, a good IT system needs to be chosen, which needs to fulfill the following criteria of Malik (2005): fast response, intuitive, web-based, secured, scalable, industry compliant, open technology, supportable, and cost effective. The next phase is the design of the PMS by IT experts in the selected system. In the following phase, the PMS needs to be validated. Several methods of validation should be performed by a process expert and an IT expert, including a user acceptance test, and a pilot at ORU level. In the last phase, the PMS goes live and the employees should be trained properly. The last stage of the model of Lewin (1951) is refreezing, where the company needs to start working with the PMS, and try to make it part of the regular work. Several aspects need to be taken into account, including the following:



- Check whether the targets are feasible for every ORU;
- Select KPIs that you want to improve first;
- Make sure that the management team stays committed to the PMS (during and after implementation);
- Organize review moments with the ORUs;
- Make performance visible at ORU level (print screens of the dashboard in the corridors).

When the PMS is successfully implemented, Philips Lighting IMS Procurement can start using it to continuously control and improve the performance of the P2P process, and start solving the challenges that exist within the current process.



Preface

This thesis is written in the last seven months, in order to finalize the master Industrial Engineering and Management at the University of Twente. I had the amazing opportunity to be part of the separation of one of the largest electronics companies in the world: Royal Philips. Philips is splitting the company into two companies, separating the lighting business from the healthcare and consumer lifestyle businesses. This research is executed for the new company: Philips Lighting.

I would not have been able to write this thesis without the support of many people, to whom I am very grateful.

First of all, I would like to thank Hein Rensma and Wicher Bos for their major support during the internship at Philips. Although the company was in a turbulent and very busy period, you always found time to discuss my thesis and many other things. Your expertise and useful suggestions really helped me to improve my thesis. I also want to thank my fellow intern colleagues, with whom I had a great time during the internship. In particular, my end-to-end partner, Nicko Imron, with whom I had many conversations, which really contributed to my thesis.

I would also like to thank my supervisors at the University of Twente, Petra Hoffmann and Leo van der Wegen. Your very detailed feedback and constructive criticism helped me to bring my thesis to a higher level.

I could not have written this thesis and finalize my study without the support of my family and Ali. The past years have not been easy, however I am very grateful to be part of this very strong family.

Unfortunately, my student time is over, but I am looking forward to the next step in my life. I am very happy that I was given the opportunity to join Philips Lighting from January 2016.

Iris Celeste Brem

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List of Abbreviations

AP	Accounts Payable
BOM	Bill of Materials
BPE	Business process expert
BSS	Business Strategic Services
CEO	Chief Executive Officer
CLOGS	Classification of Goods and Services
СРО	Chief Procurement Officer
CRG	Central Reporting Group
E2E	End-to-end
eCM	Electronic Contract Management
F&D	Freight & Distribution
FSSC	Financial Shared Service Center
FTE	Fulltime-equivalent
HR&M	Human Resources & Mobility
IMS	Indirect Materials & Services
IND	Industrial
IT	Information Technology
KPI	Key Performance Indicator
MME	Marketing, Media & Events
NPS	Net Promotor Score
ORU	Organizational Reporting Unit
P2P	Purchase-to-pay
PI	Performance indicator
PL	Philips Lighting
PMS	Performance measurement system
РО	Purchase order
PPG	Portal purchase guide
PSSC	Procurement Shared Service Center
RE	Real Estate
SRM	Supplier Relationship Management
TSSC	Transactional Shared Service Center
VGU	Vendor Global Ultimate



1. Introduction

This chapter gives an introduction to the problem setting at the Procurement Department of Philips. Sections 1.1 and 1.2 give an introduction to the company and the Philips procurement organization. Also, the importance of the procurement function in general is highlighted. Section 1.3 describes the research context, and Section 1.4 explains the actual problem. Section 1.5 explains the research objective, followed by the research scope in Section 1.6. Finally, the research questions and methodology of this research are explained in Section 1.7.

1.1 Introduction to Royal Philips

Royal Philips N.V., also known as Philips, is a Dutch diversified technology company that serves both professional and consumer markets. In 1891, Philips was founded in Eindhoven as a lighting company by Gerard Philips and his father Frederik. The company is one of the largest electronics companies in the world, and employs around 108,000 people over more than 100 countries. Philips is divided into three main branches: Healthcare, Consumer Lifestyle, and Lighting. In 2014, the CEO of the company announced the plan to split Philips into two stand-alone companies to sharpen its strategic focus. Philips will combine its health care and consumer lifestyle business into a company which continuous under the name Royal Philips, and the lighting business will become a company called Philips Lighting (PL). Both companies will continue to leverage the Philips brand. According to Philips, the separation would make it easier for the lighting business to enter new markets. The formal separation is planned to be accomplished by February 2016.

1.2 The Philips Procurement Organization

This research is conducted at the Procurement Department of Philips and is performed for PL. Within procurement, a division can be made between Bill of Materials (BOM) and Indirect Materials & Services (IMS) spend. This research is limited to the IMS Procurement of PL (Figure 2)¹, which will be accountable for approximately 1.6 billion euros spend (a forecast based on 2014 spend retrieved from SMART2²).



Figure 2 - The Philips procurement organization

¹ Officially, this section of PL will be called PL Indirect Material & Governance, but in this research it is still called PL IMS Procurement ² SMART2 is a reporting tool used by Philips Procurement



Within IMS Procurement, there are two different dimensions: commodity clusters and market groups. There are seven commodity clusters: Information Technology (IT), Business Strategic Services (BSS). Industrial (IND), Real Estate (RE). Forwarding & Distribution (F&D), Human Resources & Mobility (HR&M), and Marketing, Media & Events (MME). Basically, every commodity cluster has its own way of working, and uses its own processes and systems. In PL, there will be five commodity cluster leaders, who will be responsible for the seven commodity clusters. Next to the seven commodity clusters, there are four different market groups in which the approximately 200 Organizational Reporting Units (ORUs) of PL are located: Europe, Americas, Greater China, and Growth Markets³. An ORU is an organizational number of a Philips entity, and it is the lowest level on which (financial) reporting is done. The link between the two dimensions is visualized in Figure 3.



Figure 3 - Commodity Clusters and Market Groups

1.2.1 Importance of the procurement function

Procurement as a function is becoming more and more important, and it has been shown that purchasing activities critically influence the financial performance of a firm (Chen, Paulraj, & Lado, 2004; Ellram & Liu, 2002; Hendricks & Singhal, 2003). Despite the growing attention for purchasing, the procurement function within firms can still be at different stages of strategic development, ranging from more administrative to fully integrative (Cavinato, 1999; Reck & Long, 1988). Batenburg and Versendaal (2008) showed that an organizations' procurement maturity has a positive and significant effect on procurement performance. In addition, the more advanced and mature the procurement process is, the more time the company can spend on strategic activities, which are positively correlated with cost savings (Úbeda, Alsua, & Carrasco, 2015). Since purchasing can have a direct impact on the overall company results, the performance should be measured and monitored through an appropriate purchasing performance measurement system (PMS) (Monczka, Trent, & Handfield, 2004; Perkins & Gunasekaran, 1998; van Weele, 2004). A PMS is a system that measures performance using performance indicators in a consistent and complete way (Lohman et al.,

³ In total, Philips has around 800 ORUs.

2004). Performance indicators (PIs) are variables that express quantitatively the effectiveness and/or efficiency of a process or system against a given target (Fortuin, 1988). Previous research has revealed that the implementation of a mature purchasing PMS can be a means to attain even a higher level of functional strategic integration (Dumond, 1994; Mentzer & Konrad, 1991).

1.3 Research context

The IMS Procurement Department uses an End-to-End (E2E) process cycle to perform their procurement activities. The E2E process cycle consists of different stages, which can be seen in Figure 4. Stage one, two three and five cover the strategic purchasing part, whereas stage four covers the transactional purchasing part. In the first step of the cycle, the overall procurement strategy and stakeholders are defined. In this step, it is also decided that IMS Procurement is treated as a separate organization. During the second step,

the commodity cluster strategy is developed. Step one and two are focused on the long term. The third step concerns supplier management, where the relationship with the supplier, as well as the performance of the supplier are managed. The fourth step, the transactional purchasing, is called the Purchase-to-pay (P2P) process, which is also the focus of this research. The P2P process is explained in more detail in the next section. In the last step of the cycle, analyzes are done on the performance of the procurement process, for example a spend analysis, and performance reports are sent to the involved employees.



Figure 4 - The E2E process cycle for IMS Procurement

1.3.1 The P2P process

When there is a need for a product, the initiator goes to a requester, which is an employee who is allowed to create a shopping cart by using the system Supplier Relationship Management (SRM). SRM is a web-based requisitioning and spend approval tool for IMS Procurement. SRM is a SAP application, tightly integrated with all SAP R/3 systems used within Philips. Basically, a shopping cart is a request for a certain product or service in the SRM system. There are more than 25,000 employees who can create shopping carts, but most of the times, this is done by the secretary. How requesters create a shopping cart is described in more detail in Section 2.1.1. After the shopping cart is created, the system sends it to the Transactional Shared Service Center (TSSC), which is an external company called 'Infosys', located in Poland, which takes care of the transactional part of the P2P process. The TSSC checks if the shopping cart is correct and complete. After this process, the shopping cart is sent to the persons who need to approve it. These persons are specified persons within Philips, such as the project manager or the plant manager. The number of approvers depends on the total value of the shopping cart. After the shopping cart is approved, the system sends a purchase requisition to the TSSC, and the TSSC creates a purchase order (PO) and sends it to the selected

supplier. The supplier sends the invoice to the Financial Shared Service Center (FSSC), also part of Infosys, which registers the invoice in the SAP system. Afterwards, the FSSC matches the invoice with the PO, to check if the quantity and value are the same, and additionally, if there is a goods receipt in the SAP-system, they check if the ordered goods are really delivered. If there is a match, the invoice is approved and paid within 65 days. A simplified version of the P2P process is visualized in Figure 5.



Figure 5 - The P2P process

1.4 Problem statement

Currently, the overview on the performance of the P2P process is incomplete and inadequate. There are a lot of aspects of the P2P process that are already measured, for example PO compliance (an indicator of the spend that went via a PO) and SRM compliance (an indicator of the spend that went via the SRM system). The problem is that all different indicators are tracked by different persons, departments, and organizations, which makes the overview really fragmented. For example, Infosys creates a dashboard with more than 45 procurement PIs every month, but due to the large number of indicators, it does not become clear how a specific ORU is performing. Quite often, companies have a large number of performance measures to which they keep on adding based on suggestions of employees and consultants, and fail to realize that performance measurement can be better addressed using a few good metrics (Bhagwat & Sharma, 2007). On top of that, Infosys only sends this dashboard to the Finance Department and not to the Procurement Department.

Another problem within IMS Procurement is that the definitions of some PIs are not always clear. A small change or misinterpretation of the definition of a PI can have a large influence on the calculation of that indicator. The program manager of the commodity cluster Real Estate gave an example of ten years ago, where higher management was looking for ways to reduce the number of suppliers within IMS Procurement. At that moment, there were over 50,000 suppliers registered in the system. They started defining 'supplier' with criteria like 'total spend of 50,000 euros or more per year' and 'used in the last three

years'. With all these criteria, it turned out that they already reduced the number of suppliers to 15,000, which was an acceptable number. This example shows that the definition of a PI can have an influence on the result of that indicator. Within IMS Procurement, there are some PIs that do not have a very clear definition and are not calculated very accurate. These PIs give a distorted image of the actual performance. For example, the PO and SRM compliance rates for a specific ORU should have a value between 0 and 100%, but in reality the values can even be negative or above 100%, due to the inaccurate calculation. When you then look at the average percentage of all the ORUs, you get a wrong impression of reality.

Additionally, there are no clear targets for the majority of the current PIs, and also inadequate consequences when an ORU fails to reach a certain target or performance level. Currently, there is, for example, a PO compliance team that reaches out to the top 20 worst performing ORUs based on the PO compliance rate, which is only 2.5% of the total ORUs. Next to the fact that they only reach out to a very small number of ORUs, no real actions or improvements arise from these escalations. They only try to discover the cause of the top 10 non-compliant spend with the site, but most of the times it is concluded that it happened by accident, and therefore no actions are taken.

All these problems together, shown in Figure 6, result in an overall problem statement: *the current insight into the performance of the P2P process is inadequate*.



Figure 6 – An overview of the current problems

1.5 Research objective

The core problem that the company is facing is that there is no complete overview of the overall performance of the P2P process. The goal of this research is therefore to create a PMS that PL can use to continuously control and improve the performance of the P2P process. The main objective of a PMS is to provide comprehensive and timely information on the performance of business processes. This information can be used to communicate the performance and the goals of a process to the stakeholders, and to analyze the weaknesses of a business process and take some corrective actions accordingly (Kueng, 2000). In the new company, the commodity cluster leaders will be responsible for all the ORUs in their clusters, therefore PL should also be able to use the PMS to see how a single ORU is performing, and set consequences when the performance is below a certain threshold.

The research objective of this research is therefore: *develop a performance measurement system that the IMS Procurement Department of Philips Lighting can use to continuously control and improve the performance of the P2P process.*

1.6 Research scope

The research is conducted on the IMS Procurement Department and is done for the new PL. As stated before, all the ORUs of Philips are assigned to the four different market groups. In order to perform an internal benchmark to determine the targets of the Key Performance Indicators (KPIs) in the PMS, eight ORUs are selected: the two largest operational plants (with SRM) of PL per market group based on spend in 2014. The number of ORUs for this research is limited to eight, because it will take too much time to benchmark all the ORUs. Due to the different locations and spend of the ORUs, the selected ORUs give a good representation of all the ORUs. The list of the eight ORUs and their corresponding locations can be found in Appendix I.

As already mentioned, there are seven commodity clusters within IMS Procurement. This research is done looking from the view of the clusters Industrial, which includes the buying of products like dies, molds and other equipment for the production processes, and Real Estate, which includes the lease of real estate and the buying of facilities management. One of the reasons for this, is that the general purchasing process of PL IMS Procurement within these two clusters is represented best, and they also use the standard ordering system SRM, whereas F&D for example uses its own ordering system. Also, these clusters fit well with the scope of the eight operational plants, since they have the highest spend at these ORUs. However, this does not mean that the PMS is designed for these clusters only. All the clusters are taken into account when selecting the KPIs, but the clusters Industrial and Real Estate are the test ground for the PMS.

Because of time reasons, the actual implementation of the PMS is not part of this research.

1.7 Research questions

The research question of this research is: *How can insight be created into the overall performance of the P2P process of Philips Lighting IMS Procurement?*

To be able to develop a PMS, and to structure this research, four sub-questions are formulated, which are described below. Additionally, the methodology to obtain the necessary information is described per subquestion. In this research, both quantitative and qualitative research methods are used.

Sub-question 1

The first sub-question is discussed in Chapter 2, and describes and analyses the current P2P process and its performance measurement.

- 1. How are the current P2P process and its performance measurement organized?
 - 1.1. How is the current P2P process organized?
 - 1.2. How is the current performance of the P2P process measured?
 - 1.2.1. What PIs are used to measure the performance of the P2P process?
 - 1.2.2. Who is responsible for measuring the current performance of the P2P process?



1.3. What are the problems/bottlenecks in the current process and performance measurement?

Methodology Sub-question 1

Qualitative research in the form of semi-structured interviews is used to get insight into the current P2P process and performance measurement. It is used to map and explain the current P2P process in detail, to understand and explain the current PIs and to indicate who is responsible for measuring these indicators. Additionally, the interviews are used to understand and describe the experiences and problems that the employees encounter with the current process and performance measurement. The people that are being interviewed are the users of the process (e.g. the requesters) and several process experts. In addition, qualitative secondary data is retrieved from information sharing networks and databases, and used to explain the current PIs of the P2P process in more detail.

Sub-question 2

The second sub-question is addressed in Chapter 3, and performs a literature study to get more insight on PMSs and their applicability, and on criteria for good PIs.

- 2. How can a PMS be created for the P2P process according to the available academic literature?
 - 2.1. What methods can be used to design a PMS?
 - 2.1.1. What method is most suitable to design the PMS for PL IMS Procurement?
 - 2.2. What are criteria for good PIs?

2.2.1. What criteria should the KPIs of the PMS for PL IMS Procurement meet?

Methodology Sub-question 2

For the literature study of this research, websites like Google Scholar, Scopus and ScienceDirect are used to obtain articles about PMSs and criteria for PIs. A suitable design for the PMS is chosen based on the current situation as described in Chapter 2, as well as a suitable set of criteria for the KPIs in the PMS of PL IMS Procurement. It might be the case that the set of criteria for the KPIs is not the most optimal one, since not all the knowledge is available yet, as more information is retrieved in the interviews with the stakeholders in Chapter 4. A short reflection on this is given at the end of Section 4.4.

Sub-question 3

The third sub-question is discussed in Chapter 4, and concerns the design of the PMS using the input from stakeholders, and taking into account the literature from the second sub-question.

- 3. How should the PMS for the P2P process be designed?
 - 3.1. What are the needs and requirements of the stakeholders?
 - 3.2. What should the KPIs in the PMS be and how should they be measured?
 - 3.3. What design should be used for the PMS dashboard?
 - 3.4. How can the PMS be verified and validated?

Methodology Sub-question 3

Qualitative research in the form of semi-structured interviews is used to discover the needs and requirements of the stakeholders of the P2P process for the PMS. An interview guide is used for these

interviews, which can be found in Appendix VI. Stakeholders are selected in all the levels of the organization. The approach of the interviews and the selected stakeholders are discussed in more detail in Section 4.2. The KPIs for the PMS are then chosen and described based on the input from the stakeholders, taking into account the literature study from the second sub-question. An internal and external benchmark is performed to suggest a target for each KPI (discussed in more detail in Section 3.3.1). For the internal benchmark, data is obtained using data mining techniques and descriptive statistics methods, since the data needs to be retrieved from the different procurement databases, such as SMART2 and SRM. Microsoft Excel is used to analyze the data. After this, the PMS dashboard is designed with the selected KPIs using Tableau and Microsoft Excel. When there is no data available for a certain KPI, fictitious values will be used. To verify and test the PMS, the dashboard is shown to the commodity cluster leader of Industrial and Real Estate, as he is responsible for the performance of the ORUs in his clusters and will use the PMS in the future to monitor this. This is an important step that needs to be taken before actually implementing the PMS, because then it is still relatively easy to make small adjustments. A quantitative test/validation cannot be executed, since not all data is available yet, and there is no time available to get this data, due to the split of the company, with all employees having other priorities. After the split is realized in February 2016, the PMS can be implemented and tested by the company itself, an implementation plan for this can be found in Chapter 5.

Sub-question 4

The last sub-question is described in Chapter 5 and provides a guideline on how the PL IMS ProcurementDepartment should implement the PMS, and work with it, including a timeline and some points of attention.How should PL IMS Procurement implement the PMS, and work with it?

Methodology Sub-question 4

For the last sub-question, qualitative information is used, retrieved from the semi-structured interviews during this research, as well as from our own experience in the company. This last sub-question aims at providing the company with a guideline on how to implement and use the PMS. This is necessary, because the company is in the middle of a split and cannot implement the solution right away, therefore thoughts are given on the approach that should be used for the implementation and some important remarks are given on the use of the PMS in the new company. To obtain more information on the implementation of a system in general, a small literature study is performed, using websites like Google Scholar, Scopus and ScienceDirect.

This research is structured according to the questions discussed above, and ends with a chapter with a conclusion and recommendations for the company. The next chapter starts with answering the first subquestion, and describes the current P2P process and its performance measurement.

2. Current performance measurement of the P2P process

This chapter gives an answer to the first sub-question: '*How are the current P2P process and its performance measurement organized?*' The chapter starts with explaining the current P2P process in detail and continues to describe the current performance measurement of the process. Both sections end with an overview on the challenges and bottlenecks that arise from the way that the process and performance measurement are organized right now. The information to describe the challenges and bottlenecks is retrieved from semi-structured interviews with the requesters and from observations of the available data. The challenges and bottlenecks within the current P2P process are used to give insight into where the company stands concerning the P2P process and more importantly, to emphasize the importance of a PMS. Therefore, this research does not try to solve these challenges, but instead uses these challenges as input for the PMS to identify key points of attention.

2.1 The P2P process

In Section 1.3.1, the P2P process is already described briefly, but this section continues to explain the process in more detail. The P2P process can be divided into four sub-processes: requisitioning, purchasing,

invoice handling, and payment. The flowcharts of the sub-processes can be found in Appendix II. A production worker who works in the production facility in ORU D and needs a new, regular, hammer (Figure 7) is taken as an example to describe the sub-processes in detail.



It might be good to remark here, that besides the general purchasing process, the Industrial cluster has another way of purchasing their goods, which is replenishment. Replenishment orders are triggered automatically in the SAP system when the inventory hits a certain reorder point and therefore the requisitioning process is skipped. All variations of the purchasing process are taken into account in this research, but are not described any further in this chapter, since this chapter focuses on the more general process.

2.1.1 Requisitioning

The production worker who needs a new hammer goes to one of the requesters at his site, in this case it is a female requester, and explains her that he needs a new hammer. The requester then goes to the Portal Purchase Guide (PPG), which is an online guide on how to buy a certain product at a certain site on the Philips intranet, and selects her location and the CLOGS-code of the hammer. A CLOGS-code is a classification code for the products and services that are used within Philips Procurement⁴. The CLOGS-code of the hammer is 8HD100, which includes all hand- & machine tools. There is a site-specific guideline for every CLOGS-code in the PPG. The PPG is regularly updated by the Portal Team of the Procurement Shared Service Center (PSSC), which is part of Philips, and they receive the input from the sourcing specialists of the PSSC and the commodity clusters. In Figure 8, an overview on the input and usage of the PPG is given.

⁴ On May 2015, Philips IMS Procurement had 137 different CLOGS-codes



Figure 8 – The input and usage of the PPG

When the requester selects the right location and CLOGS-code, a specific guideline on how to order the hammer appears. The selection menu of the PPG can be seen in Figure 9. Next to the guideline on how to buy the product, the PPG shows the list of preferred suppliers for this product, as well as work instructions for the TSSC on how to order and approve a shopping cart for this specific site. Appendix III shows an example of the information of the CLOGS-code of hand- and machine tools that can be found in the PPG.

Please select your location					-
	Ca	onfidential			
Please select CLOGS					
70 INDUSTRIAL	140 INDUSTRIAL SERVICES & I	8HD100	•	Display Purchasing Guide	



In the guidelines of this particular CLOGS-code, the requester can read that it is obligatory to use a catalogue (if possible). There are five standard ordering channels that can be used to order a product, which are:

- Standard catalogue
- Punch-out catalogue (a vendor catalogue)
- Form catalogue (extension of a catalogue with possibility to add specific data)
- Free text (describe the product in a text box yourself)
- Third party ordering tool

After the requester has read the guidelines in the PPG, she goes to the SRM system where she starts to create a shopping cart. The requester should always use one of the preferred suppliers in the PPG. In the case of the hammer, the requester selects the product from one of the catalogue vendors and adds it to the shopping cart. In addition, the requester has to state where and when the product should be delivered. When all the fields in the SRM system are filled in, the requester can click on 'proceed', and the request is automatically sent to the TSSC. The TSSC checks if the shopping cart is correct and complete. If the shopping cart is incorrect or incomplete, the shopping cart is either sent back to the requester or sent to one of the sourcing specialists of the PSSC. The TSSC can send the shopping cart to the sourcing specialist of the PSSC for multiple reasons. The first reason can be that the requester used a non-preferred supplier, and the sourcing specialist needs to approve this supplier. The second reason can be that the requester did not assign a supplier at all. In this case, the sourcing specialist selects an appropriate supplier. Another reason can be



that the value of the shopping cart is above 50K euros, the shopping cart must then be approved by the sourcing specialist first.

After the shopping cart is approved by the TSSC, it is sent via an add-in tool of the SRM system to the persons within Philips for a monetary approval. The approvers are generally pre-specified and the number of approvers depends on the value of the shopping cart. In Tables 1 and 2, the approval levels and corresponding values of the shopping cart can be seen.

Value of the shopping cart	Approvers
< €2,000	No approval
< €25,000	Level 1
< €250,000	Level 1,2
<€5,000,000	Level 1,2,3 + level 3 peer
>€5,000,000	Level 1,2,3,4 + level 4 peer

Table 1 – Number of approvers for a shopping cart

Table 2 - Approval levels

Approval level	Approvers
No approval	Requester
Level 1	Cost Center owner or Project Manager
Level 2	Plant Manager (can differ per organization)
Level 3	Country Manager (can differ per
Level 3	organization)
	Executive committee or Group
Level 4	Management Council (highest consultative
	committee in Philips)

In addition to the monetary approval, there can also be additional approval steps where the commodity leader, a person from Finance & Accounting or someone from the PSSC wants to check and approve the shopping cart. There are no clear rules for these approvals, since it depends on a lot of different variables (value, uniqueness of the items etc.). When all the approvers have approved the shopping cart, it is sent back to the TSSC. In the case of the hammer, there is no approval needed, because the value of the hammer is lower than 2000 euros. Therefore, the shopping cart can be transformed directly into a PO after the approval of the TSSC. The creation of the PO is the next sub-process, and is explained in the next section.

2.1.2 Purchasing

The TSSC converts the shopping cart manually into a PO, after which it is sent to the supplier for confirmation. Most of the times, the supplier sends a confirmation to Philips. When the hammer arrives at the facility, a goods receipt must be booked into the SAP system, so that the FSSC eventually can check if the products really arrived. There are some exceptions for this, because there is not always a goods receipt for services or replenishment orders.

2.1.3 Invoice handling

After the hammer is delivered, the supplier sends the invoice to the FSSC. First, the FSSC checks the invoice visually, for example if there is a correct name and PO number on it. After this, the invoice is scanned, and it receives a Value Added Tax code. Then, the vendor data on the invoice is checked and compared with the data in the system. If everything is correct, the invoice is posted into the system. If there is no PO number on the invoice, the invoice is parked for coding and the FSSC has to get back to the site to ask where the invoice belongs to, and on which cost center it should be booked. A cost center is an organizational sub-unit to which costs may be charged for accounting purposes, but that not directly contributes to the profit of the company. When everything is clear, the invoice is posted into the system as well. After the posting, there is a two- or three-way matching process. Two-way matching means that the FSSC matches the invoice to the PO, and checks if the values and quantities are the same. In addition, an e-mail is sent to the approvers via an add-in tool of the SAP system, to check whether the goods or services have arrived or not. Three-way matching means that they match the invoice with the PO and the goods receipt (if there is one registered in the SAP system). Similar to the two-way matching, an e-mail is sent to the approvers to check if the goods or services have arrived or not. If there are no problems, the invoice is unblocked for payment.

2.1.4 Payment

After the invoice is unblocked for payment, it takes on average 65 days before Philips pays the invoice. This period is also called the payment term. Every day, the FSSC does a payment run, which means that they collect all the payment orders in the SAP system that are due and payable. Then, the banking team of the FSSC checks and approves the payment run. The FSSC sends a remittance advice to the supplier to inform the supplier that the money will be transferred within five days. After this, the payment instructions are sent to the internal Treasury Department of Philips (also known as the in-house bank). They perform a general vendor check, where they check for example if a vendor is not all of a sudden bankrupt. When the payment term has passed, the in-house bank sends the invoice instructions to a third party bank, and the bank pays the supplier. This payment date is called the clearing date.

2.1.5 Challenges and bottlenecks

From the semi-structured interviews with multiple requesters, it turned out that several issues arise related to the P2P process. A significant problem is that most of the requesters do not use the PPG when they order a product. Therefore, the requesters almost always choose for the free-text option, and do not check if there is a catalogue available at a certain supplier. In 2014, the percentage of spend that went via a catalogue was only 0.81%⁵. When looking only at the Industrial commodity Industrial Services & Parts, which includes products like safety products, dies and moulds (all very suitable to buy via a catalogue), the percentage in 2014 is only 9.1%⁶. An additional problem that arises when the requesters do not use the PPG, is that the preferred suppliers might not be used for a purchase. When a non-preferred supplier is used for a purchase, it costs a lot of extra time and money to register the supplier in the system. Besides that, PL IMS Procurement has a lot of preferred suppliers. When looking at the hand- and machine tools in Turnhout, there are already

⁵ Retrieved from SMART2, includes only PL IMS

⁶ Retrieved from SMART2, includes only the commodity Industrial Services & Parts of PL IMS

54 preferred suppliers for free-text and 3 preferred suppliers for catalogues, of which they used only 29 supplier in the last 12 months⁷ and additionally, they used more than 11 non-preferred suppliers in this period. All the preferred suppliers in the list have been registered in eCM⁸, which is a tool that is used for supplier contract management in IMS Procurement. However in the PPG, there is no contract identification number for most of the suppliers, which indicates that the systems are not linked very well. Another issue that arises, is the fact that there are a lot of CLOGS-codes. When the requester has to order something, she first has to find the right CLOGS-code, but because there are so many, she chooses the first one that seems appropriate. This problem causes that spend can easily be booked on the wrong CLOGS-code. Because of all these problems that arise when creating a shopping cart, a lot of the shopping carts are incomplete or wrong the first time when they are sent to the TSSC. According to the Operations Manager of the TSSC, the TSSC processes on average 7500 shopping carts per month, of which a maximum of 40% is complete and correct the first time⁹. The processing of a complete shopping cart takes on average 5 minutes, but when a shopping cart is not complete it takes them on average 30 minutes. This means that they spend on average 1,875 extra hours per month to complete and correct the wrongly filled in shopping carts. This is 22,500 hours per year, which is equal to at least 12 FTE¹⁰.

A different problem that some of the requesters brought up, is that it takes a long time before a shopping cart gets approved. This is due to the relatively large number of approvers. In Table 3, an overview of the average approval times is given based on the value of the shopping cart¹¹. It can be seen from the table that the higher the value of the shopping cart, the more approval steps, and the longer the approval time. On average, it takes more than a week to approve shopping carts with a value above 2000 euros.

Value of the shopping cart	Average approval time (in work days)	Average number of approval steps
<€2,000	2.52	3
<€25,000	4.84	4
<€250,000	6.34	5
>€250,000	9.00	6

Table 3 - Average approval time of a shopping cart

Another problem of the P2P process is that the overall compliance level to the processes is lower than 80%¹². When looking at the period of April 2015 until June 2015, the PO compliance rate for PL IMS was 76%, and the SRM compliance rate was 74%. This relatively low level of compliance costs the company a lot of time and money. When an employee does not create a PO, the invoice is often sent to the site and it needs to be forwarded to the FSSC first, however the FSSC cannot see to which department this invoice belongs to, because there is no PO number and they have to get back to the site again to find out. This costs a lot of extra time. The time between the invoice date and the date on which the invoice is registered in the

⁷ August 2014 – July 2015

⁸ Electronic Contract Management

⁹ Since May 2015

¹⁰ Assuming 1 FTE is 1840 hours a year

¹¹ Retrieved from SMART2, based on all the shopping carts created in the period April - July 2015 for PL

¹² Consisting of PO compliance and SRM compliance

system by the FSSC, takes on average 26 days. Next to that, spend cannot be controlled and authorized when people do not follow the right procedures. In addition, the Procurement Department can be completely bypassed, which means that IMS Procurement does not have an influence on what is bought, at what price, and from which supplier.

Another challenge of the P2P process is that the sub-processes belong to two different departments, the requisitioning and purchasing processes belong to the Procurement Department, and the invoice handling and payment processes belong to the Finance Department. Because there is no ownership for the entire process, no one feels really responsible for the overall performance of the process.

It can be concluded that there are some major challenges in the P2P process, which make it very important to measure and get insight into the overall performance of the process. The next section starts with describing the current performance measurement of the P2P process, and continues to describe some related challenges and bottlenecks.

2.2 Performance measurement of the P2P process

Within Philips Procurement, there are two main parties that measure PIs. First, there is the Central Reporting Group (CRG) which is responsible for a number of KPIs from the official KPI dashboard that Philips Procurement is using. CRG is a centralized reporting team of Philips Procurement, part of the PSSC, which makes reports about the purchasing KPIs and prepares other procurement analyzes on demand. Two of the official KPIs that CRG is measuring are important for the P2P process. These KPIs are 'Payment Terms' and 'Contract Coverage'. Payment terms is the three months weighted average Payment Terms against spend in the rolling quarter. Contract coverage is the percentage of net spend covered by formally signed contracts. In addition to the official KPIs, CRG also measures SRM and PO compliance. The PO compliance is measured by matching the incoming invoices to the created POs, and see how much spend went via a PO. The current formula to calculate the PO compliance rate is: $\frac{AP Spend with PO}{AP Spend} \times 100 \ [\%]^{13}$. The SRM compliance is measured by the amount of spend that went via a shopping cart in the SRM system. The current formula to calculate the SRM compliance rate is: $\frac{AP Spend with SRM}{AP Spend} \times 100$ [%]. All ORUs that do not have SRM are AP Spend excluded from the calculation, because they would always have a SRM compliance rate of 0%. Also, the replenishment orders that are triggered by the SAP system itself are excluded, because the SRM system is not used for these items.

The second party that measures PIs is Infosys. Infosys creates a dashboard every month with 45 PIs that is sent to the Finance Department (see Appendix IV). They have four different domains in their report of which P2P is one. Within the P2P domain, they measure 17 different PIs, which are all focused on the financial aspects of the P2P process. The dashboard is requested by the Accounting Operations Department of Finance, and this department determines the PIs that are in the dashboard and the corresponding targets.

¹³ AP = Accounts Payable

Besides the official KPIs, a lot of analysis is done by the commodity clusters for own purposes, based on the information that can be retrieved from the reporting tool SMART2. SMART2 can create reports on ORU-level about, among others, spend, savings, payment terms, shopping carts and PO creation times. In addition, a lot of milestones of the P2P process are registered in the system. Analysis based on these dates can be very useful to see which parts of the process take a long(er) time, since this can be an indicator of the low compliance rates.

2.2.1 Challenges and bottlenecks

Because the P2P process consists of two different parts that belong to two different departments, there is a lot of difference in performance measurement as well. The Finance Department has a lot of PIs, whereas the Procurement Department only measures a hand full of PIs. Overall, a lot of things are measured or can be measured, but it is not clear what is really important. Interviews with persons that measure PIs showed that they are just measuring these PIs because it is part of their job, and the reason behind it is already forgotten. This is partly due to the fact that a large part of the P2P process is outsourced. A related problem is the fact that sometimes exclusions have to be made for PIs, for example the exclusions of the SRM compliance that are described in Section 2.2. Some of the information to make the exclusions is determined a long time ago, and not updated anymore. This might be, because the people who decided on these exclusions switched to another job, and the people from the CRG, who make the reports, are not allowed to determine what should be the exclusions or calculations for PIs. If a PI contains wrong exclusions, it can give a wrong impression of the real values.

As already said, some PIs are measured incorrectly. The example of PO and SRM compliance, which can be a negative value or a value above 100% is already given in the Section 1.4. Another example of this, is the performance indicator Contract Coverage. The performance indictor is supposed to measure if the contracts that Procurement has with a certain supplier are really used when buying a product from this supplier. The current way of measuring is that the CRG checks if there is a contract for a certain supplier in a certain market when there is spend recorded for that supplier into the SMART2 system. This way of measuring does not give insight if the spend is really covered by a contract, it only shows if there is a contract with that supplier in that market, but this contract can be for totally different products. The problem here is that the eCM system has no option to show the contracts on ORU level, SMART2 on the other hand does not show the contract identification numbers corresponding to a certain amount of spend. In short, there is no alignment between the two systems.

The PIs in the KPI dashboard of Infosys, have targets that are determined by the Accounting Operations Department of Finance. However, the PIs of Procurement, for example SRM and PO compliance, do not have clear targets. Therefore, you cannot really say when an ORU is performing below level.

Finally, there are many different opinions about the definitions of some of the PIs. When looking at the definition of a preferred supplier, the PPG says that a preferred supplier is a supplier that has a contract with Philips. According to this definition, Philips IMS Procurement (across all sectors) has more than 16,000



(unique) preferred suppliers¹⁴. If you then ask the commodity clusters what they think a preferred supplier is, they will say that a preferred supplier is a supplier that has priority rights, and that the supplier is to be preferred over all other suppliers in terms of providing the products or services that they have been contracted for. Therefore, the term 'preferred supplier' should be well defined and accompanied with clear criteria.

2.3 Conclusion

This chapter answered Sub-question 1 '*How are the current P2P process and its performance measurement organized?*', and explained the current P2P process in detail as well as the current performance measurement of the process. Several challenges arose from the current process:

- No use of the PPG (by requesters)
- No use of preferred suppliers
- No link between systems
- A lot of CLOGS-codes
- A lot of time to correct the shopping carts (by TSSC)
- Long approval times
- Relatively low compliance level
- No process ownership

There are also several challenges that arose from the current performance measurement, which are the following:

- Unclear what is really important to measure; too many PIs
- A lot of not updated exclusions
- Inaccurate calculation of PIs
- Lack of clear targets for PIs
- Inaccurate definitions of PIs

This research aims at solving the challenges that arise from the current performance measurement, with the creation of a PMS. The challenges that arise from the current P2P process are used as an insight to see where to company stands, and they confirm the need to create insight into the overall performance of the P2P process. This research will therefore not solve these challenges, but rather uses them as input for the PIs. On the other hand, the PMS will provide the company with a better picture of the challenges that exist within the current process.

In the next chapter, a literature review is performed on design methods for a PMS, and on criteria for good PIs.

 $^{^{\}rm 14}$ The number of unique suppliers was 16,243 in June 2015

3. Literature review

In this chapter, an overview of the existing literature about PMSs and criteria for good PIs is given. At the same time, this chapter gives an answer to Sub-question 2: '*How can a PMS be created for the P2P process according to the available academic literature?*' In the first section, the idea of a PMS and methods to design a PMS are described, followed by the selection of a method to design the PMS for PL IMS Procurement. In Section 3.2, criteria for good PIs are described, and a selection is made of the criteria that the KPIs of PL IMS Procurement have to meet. Finally, Section 3.3 explains a method on how to describe the KPIs for the PMS.

3.1 Performance measurement system

This idea of a PMS is illustrated in Figure 10. There are two levels of control on an organization. At level 1, the operational level, the input and output is compared with the predefined goals. If there is a discrepancy between the actual value and the desired value, an appropriate action has to take place. Level 2 is the more strategic or tactical level, where the control loop is used to evaluate and adapt the operational level, by for example changing the goals (Lohman, 1999).



Figure 10 - Control loop (Lohman, 1999)

3.1.1 Designing a performance measurement system

The complex process of designing a PMS requires structure and methodology. There exist multiple generic methods to design a PMS, for example the model of Wisner and Fawcett (1991), Andersen and Fagerhaug (2002), and Cousins et al. (2008). All these design methods are quite similar and consist of a number of steps that should be executed in order to design an effective PMS. The steps should rather be seen as a guideline, since the number and interpretation of the steps can vary by company (Andersen & Fagerhaug, 2002). Wisner and Fawcett (1991) propose a nine-step process, which places great emphasis on the firm's mission and strategic objectives. They underline the need for a firm to re-evaluate the appropriateness of the established PMS in view of the current competitive environment. Andersen and Fagerhaug (2002) created an eight-step process based on their experiences with a number of organizations. The method of Cousins et al. (2008) consists of seven steps, and places great emphasis on feedback mechanisms of the system to undertake corrective actions when the performance is unfavorable. As already said, the model of Wisner and Fawcett (1991) strongly emphasizes on the firm's mission and strategic objectives, and since the company PL has yet to be established, the strategic objectives are not entirely clear yet. Therefore, we

prefer the other two models. Since the other two models are quite similar, the model of Andersen and Fagerhaug (2002) is maintained in this research. A description of the steps of the three different models can be found in Appendix V.

The method of Andersen and Fagerhaug (2002) consists of an eight step methodology to create a PMS, which are discussed in more detail below:

- 1. Understand and map business structures and processes: consider and reflect on the organization and its environment, its competitive position, and the existing business processes. This can even be a good opportunity to revisit some of the strategic issues of the company.
- 2. Develop business performance priorities: the PMS should support the requirements of the stakeholders from the organizational strategy to the business processes. It is important to have a clear view on the priorities before starting to design the PMS.
- 3. Understand the current PMS: a lot of companies have already some kind of measurement system in place, therefore you can either choose to introduce a new system to replace the old one, or to redesign the existing system.
- 4. Develop performance indicators: select the set of PIs that will be used to measure the performance of the organization and business processes by combining a top-down and a bottom-up approach.
- 5. Decide how to collect the required data: it is important to know if and how you can collect the data that is required to calculate the chosen PIs in order to prevent selecting indicators that can never actually be measured.
- 6. Design reporting and performance data presentation formats: decide how the PIs will be presented to the users, who will have access to the data, and how users can use the data for management, monitoring, and improvement.
- 7. Test and adjust the PMS: test the system extensively and adjust the elements that do not work as planned. It does not mean that the PMS is perfect after this step; the system should always be reviewed and updated to strive for perfection.
- 8. Implement the PMS: put the system to use, manage the user access, and provide training courses.

3.1.2 The PMS design method for PL IMS Procurement

The method of Andersen and Fagerhaug (2002) is used as a guideline for the design of the PMS for PL IMS Procurement. All the steps of the method can be linked to the sub-questions of this research and are shown in Figure 11. Additionally, the figure explains what steps are actually taken in this research.

Step three of the method is changed from 'Understand the current PMS' into 'Understand the current performance measurement', since there is currently no real system used to measure the overall performance of the P2P process (according to the definition in Section 1.5). The last step, where the PMS should be implemented, is not part of this research.

Understand and map business structures and processes

- Sub-question 1.1: How is the current P2P process organized?
- Describe and reflect on the current P2P process.

Develop business performance priorities

- Sub-question 3.1: What are the needs and requirements of the stakeholders?
- Describe the requirements of the stakeholders for the new PMS.

Understand the current performance measurement

- Sub-question 1.2: How is the current performance of the P2P process measured?
- Describe how the performance of the P2P process is currently measured.

Develop performance indicators

- Sub-question 3.2: What should the KPIs in the PMS be and how should they be measured?
- Select and describe the PIs for the PMS based on the requirements of the stakeholders, taking into account the literature in Chapter 3.

Decide how to collect the required data

- Sub-question 3.2: What should the KPIs in the PMS be and how should they be measured?
- Describe how the data for the PIs should be collected.

Design reporting and performance data presentation formats

- Sub-question 3.3: What design should be used for the PMS dashboard?
- Decide on how the PIs will be presented in the PMS. How the users should use the PMS is described in the step: 'Implement the PMS'.

Test and adjust the PMS

- Sub-question 3.4: How can the PMS be verified and validated?
- The PMS will not be tested extensively, but it will be examined if the PMS provides a
 good overview of the overall performance of an ORU on the P2P process. The dashboard
 will be shown to the commodity cluster leader of IND & RE, as he needs to use the PMS
 to see if the ORUs within his clusters are performing according to the standards.

Implement the PMS

Sub-question 4: How should PL IMS Procurement implement the PMS, and work with it?
The implementation of the PMS is not in the scope of this research. Therefore, a guideline is provided on how the company should implement the PMS and how the users should work with the system.

Figure 11 - Link between design steps and research questions

3.2 Criteria for effective performance indicators

This section provides a set of criteria for PIs, as well as elements to describe a good PI to be able to perform step four of the design method of Anderson and Fagerhaug (2002), where the PIs are developed.



One of the first articles about criteria for PIs is from George T. Doran (1981). Doran (1981) introduced S.M.A.R.T. goals in performance measurement, which was an acronym that stood for:

- Specific target a specific area for improvement and create specific goals that will tell you what is expected, why it is important, who is involved, where it is going to happen, and which attributes are important;
- Measurable formulate concrete criteria to measure the progress in achieving the target;
- Assignable specify who will do it, since it will not be measured otherwise;
- Realistic determine a state that can be achieved realistically, given the available resources;
- Time-related specify when the results can be achieved, mainly to establish a sense of urgency (Meyer, 2003).

Doran made two important notes: not all objectives must be measured across all levels of management, as in some instances the focus should rather be on the action plan for achieving the objective, and not every objective will meet all five criteria, but they should be rather seen as guidelines (Doran, 1981). The SMART acronym is one of the most used in businesses.

In the following years, a lot of literature was done on performance measures. Neely et al. (1997) created a list of 22 recommendations with regard to the design of performance measures based on an extensive literature review on ten different papers and books about performance measurement . The 22 recommendations are the following:

- Performance measures should be derived from strategy (Azzone et al., 1991; Dixon et al., 1990; Fortuin, 1988; Goold, 1991; Kaplan & Norton, 1992; Lynch & Cross, 1991; Maskell, 1991);
- Performance measures should be simple to understand (Azzone et al., 1991; Fortuin, 1988; Goold, 1991; Goold & Quinn, 1990; Lea & Parker, 1989; Lynch & Cross, 1991; Maskell, 1991);
- 3. Performance measures should provide timely and accurate feedback (Dixon et al., 1990; Fortuin, 1988; Globerson, 1985);
- 4. Performance measures should be based on quantities that can be influenced, or controlled, by the user alone or in co-operation with others (Fortuin, 1988; Globerson, 1985; Lynch & Cross, 1991);
- Performance measures should reflect the "business process" i.e. both the supplier and customer should be involved in the definition of the measure (Fortuin, 1988; Globerson, 1985; Lynch & Cross, 1991);
- Performance measures should relate to specific goals (targets) (Fortuin, 1988; Globerson, 1985;
 Goold & Quinn, 1990);
- 7. Performance measures should be relevant, i.e. referring to aspects that are controllable (Azzone et al., 1991; Fortuin, 1988; Lynch & Cross, 1991);
- Performance measures should be part of a closed management loop (Globerson, 1985; Kaplan & Norton, 1992);
- 9. Performance measures should be clearly defined (Fortuin, 1988; Globerson, 1985);
- 10. Performance measures should have visual impact (Fortuin, 1988; Lea & Parker, 1989);
- 11. Performance measures should focus on improvement (Lea & Parker, 1989; Lynch & Cross, 1991);



- 12. Performance measures should be consistent (in that they maintain their significance as time goes by) (Fortuin, 1988; Lynch & Cross, 1991);
- 13. Performance measures should provide fast feedback (Fortuin, 1988; Maskell, 1991);
- 14. Performance measures should have an explicit purpose (Globerson, 1985);
- 15. Performance measures should be based on an explicitly defined formula and source of data (Globerson, 1985);
- 16. Performance measures should employ ratios rather than absolute numbers (Globerson, 1985);
- 17. Performance measures should use data which are automatically collected as part of a process whenever possible (Globerson, 1985);
- 18. Performance measures should be reported in a simple consistent format (Lynch & Cross, 1991);
- 19. Performance measures should be based on trends rather than snapshots (Lynch & Cross, 1991);
- 20. Performance measures should provide information (Fortuin, 1988);
- 21. Performance measures should be precise be exact about what is being measured (Fortuin, 1988);
- 22. Performance measures should be objective not based on opinion (Fortuin, 1988).

We selected 18 out of the 22 recommendations for the KPIs in the PMS for the P2P process of PL IMS Procurement based on the current situation as described in Chapter 2. These 18 recommendations are in line with the strategy at PL IMS Procurement. The recommendations that are not taken into account are:

- Recommendation 5: this research focuses on an internal process of Philips, therefore, the view of the supplier is not taken into account, since it can be contradicting to the view of Philips.
- Recommendation 12: the recommendation states that the performance measures should maintain their significance as time goes by, however, because of the dynamic environment in which the company is currently operating, and the current underperformance of the P2P process, some of the selected KPIs for the PMS might be less relevant in the future, when the performance of these KPIs remains optimal, and is less important to monitor continuously.
- Recommendation 17: this is quite difficult for PL IMS Procurement, since they are using a lot of different systems, which makes it very hard to automatically collect data as part of the process. The data should probably be downloaded and uploaded to the system manually (which is currently also done for the Infosys KPI dashboard).
- Recommendation 19: this recommendation is not taken into account, because snapshots can also give insight in the current status of an ORU at a certain time. Although trends provide more information about the performance of an ORU, snapshots might be relevant and interesting as well.

These recommendations are excluded to make sure that PIs that might be relevant for the company, are not excluded beforehand. This does not imply that the final KPIs will fulfill all the excluded recommendations. Also, the recommendations that are excluded had only one source and did not support the performance measurement sheet, which is discussed in the next section.

3.3 Elements for a 'good' performance measure

In addition to the list of recommendations for performance measures, Neely et al. (1997) introduced a framework called 'the performance measure record sheet', which specifies what makes a good performance

measure. The article showed that the performance measure record sheet does lead to the design of 'good' performance measures, but that explicit guidelines on how to use the measures are still missing. In Table 4, the elements of which the framework consists can be seen. All the recommendations of the previous section can be linked to the elements of the record sheet, however some of them turned out to be not a characteristic of a well-designed performance measure. The design of the record sheet ensures that recommendations 1, 2, 3, 4, 6, 7, 8, 9, 13, 14, 15, 20 and 21 are satisfied (Neely et al., 1997). The remaining recommendations should only be considered as important process guidelines and supplements for the framework. The relation between the elements and the satisfied recommendations is shown in Table 4 as well¹⁵. Since all the elements of the record sheet are covered by the 18 selected recommendations in the previous section, the record sheet is used to describe the KPIs of the PMS of PL IMS Procurement. However, some necessary adjustments are done to the record sheet, to be able to use it in this research. This is described in the next section.

3.3.1 Applying the performance record sheet at PL IMS Procurement

Several adjustments need to be made to the performance record sheet to be able to apply it for IMS Procurement. First of all, to avoid confusion over the definition of a KPI, a definition of the indicator is added after the title of the KPI. Additionally, element 4 and 5 are reversed in order, since it makes more sense to discuss the way of calculating a KPI before discussing the target. Continuing on the target of the KPIs, there are three main approaches to establish standards for a target according to Cousins et al. (2008). The first approach is based on historical data, where the past data of an activity serves as a basis for the setting of a performance standard. Another option is to use planned performance, where the company can look to other internal divisions to identify company-wide best practice. The last approach is competitive benchmarking, where the targets are set based on an analysis of competitors or other firms with similar activities. In this research, two approaches are used, historical data and competitive benchmarking, to be able to make a suggestion for a target. The official targets should of course be established by the management team of PL IMS Procurement. For the historical data, from now on called internal benchmark, the performance of the eight selected ORUs is showed, including their average performance, and the highest and lowest scoring ORUs are highlighted. For the competitive or external benchmark, available information on the Internet is used from companies like Zycus and the Hackett Group, who provide benchmarking reports on the P2P process every year. If available, only the benchmarks of the best performing companies are taken into account, as Philips wants to be a world class provider of lighting solutions (Philips, 2015). An example of a benchmark study is the one of Zycus Inc. (Zycus, 2014), where they looked into KPIs relating to corporate processes and technologies for managing indirect spending. More than 450 procurement organizations worldwide took part in this study. With the internal and external benchmarks, a suggestion is made for the target of every KPI. A time scale for achieving the target will be different for every ORU, since there is a huge difference in performance between the ORUs, and is therefore left out of this research. However, an ambition for the first year in order to reach the target is suggested for all ORUs.

¹⁵ Only taking into account the selected recommendations for this research



Element		Description	Relates to recommendation(s)	
1.	Title	A self-explanatory title of the measure	2, 9, 21	
2.	Purpose	Purpose/underlying rationale of the measure	7, 14	
3.	Relates to	Corporate objective that the measure relates to	1, 6, 7	
4.	Target	An explicit performance target should be set (including a time scale for achieving it)	4, 6, 7, 8, 14, 20	
5.	Formula	Calculation of the performance measure	2, 4, 9, 15, 21	
6.	Frequency	Frequency of measurement and review	3, 13, 20	
7.	Who measures?	Identification of who is responsible for measuring performance	4, 17	
8.	Source of data	Source of the raw data	15, 21	
9.	Who acts on the data?	Allocation of responsibility for taking action on the measure	4, 6, 20	
10.	What do they do?	Specification of the types of action that can be taken to improve the performance	4, 6, 20	
Note	es and comments			

Table 4 - The performance measure record sheet of Neely et al. (1997)

3.3 Conclusion

This chapter answered Sub-question 2 'How can a PMS be created for the P2P process according to the available academic literature?' The eight-step method of Andersen and Fagerhaug (2002) is chosen to structure the design of the PMS for PL IMS Procurement. In addition, the KPIs in the PMS have to fulfill the S.M.A.R.T. criteria of Doran (1981), as well as the 18 selected recommendations of Neely et al. (1997). All the KPIs are described according to the adjusted performance measure record sheet of Neely et al. (1997), which ensures that the KPIs are described as good performance measures, and that they satisfy most of the recommendations. In the next chapter, the PMS is designed using the input of the stakeholders, which is retrieved from semi-structured interviews, taking into account the literature framework of this chapter.

4. Designing the PMS

This chapter gives an answer on Sub-question 3: *'How should the PMS for the P2P process be designed?'* First, the stakeholders are listed in Section 4.1. In Section 4.2, the approach for the interviews is discussed, after which in Section 4.3, the needs and requirements of the stakeholders resulting from the interviews, are described. After that, in Section 4.4, the KPIs for the PMS are chosen based on these requirements, taking into account the literature described in Chapter 3. The KPIs are described according to the performance measure record sheet of Neely et al. (1997), discussed in Section 3.3. Finally, the PMS dashboard is designed in Section 4.5, and verified by the commodity cluster leader of Industrial and Real Estate in Section 4.6.

4.1 Stakeholders

The first criterion that is selected in Section 3.3, is that the KPIs should be derived from the strategy of the company. Normally, the firm's mission statement is translated into strategic objectives, after which the different functions in the company have to decide how they can contribute to these strategic objectives. Subsequently, the PIs at operational level can be developed, in a way that they will reflect the firm's mission (Wisner & Fawcett, 1991). In the situation of PL IMS Procurement, there is only a first draft of the mission. The current draft of the mission is as follows: "we collaborate with our key stakeholders to provide commodity and domain expertise, creating a cost-out governance framework to exceed cost savings. We enable supply base optimization and world class Supplier Relationship & Performance Management that is fit-for-purpose using effective and efficient processes and systems. We will achieve this by empowering a winning team focused on creating sustainable value."¹⁶ The strategic objectives arising from this mission are not clear yet, which makes it hard to develop the KPIs for the PMS from the PL IMS Procurement strategy. Therefore, interviews are performed with several stakeholders of the P2P process, throughout all levels of the organization, and their needs and requirements (in combination with the current firm's mission) are the main input on which the selection of the KPIs for the PMS is based. Additionally, from this input, strategic objectives are drawn up to be able to link the KPIs to one of these objectives, which is necessary for the third element of the performance measure record sheet of Neely et al. (1997).

Freeman (1984) defined a stakeholder as: "*any group or individual who can affect or is affected by the achievement of the organization's objectives*". For the stakeholders of the P2P process, all groups or individuals who can affect or are affected by the achievement of the process objectives are taken into account. According to this definition, the following stakeholders can be identified:

- The initiator of the need;
- The requester who creates the SC;
- The PSSC;
- The business process owners/experts;
- The Commodity Clusters;
- The Management Team of PL IMS Procurement;
- The Finance Accounting Operations Department;

¹⁶ Retrieved at September 15th, 2015

- The internal Treasury Department;
- Infosys (TSSC/FSSC);
- The supplier.

There are several articles in the literature about stakeholder classification, where the stakeholders are classified based on their importance (Mitchell, Agle, & Wood, 1997). However, in this research, all stakeholders are seen as equally important, to give a complete picture of the view of the stakeholders on the P2P process. Also, all stakeholders are internal stakeholders, which means that they are working according to the same mission and strategic objectives, and therefore their opinions are not likely to differ, and probably will complement each other.

4.2 Approach

As already said, semi-structured interviews are performed to explore the view of the stakeholders on the P2P process. A semi-structured interview is an open and informal interview style, the interview is based on an interview guide, but it allows the respondent to take different paths and explore different thoughts. The interview guide that is used for the interviews, can be found in Appendix VI. The interviews are performed individually, so every respondent could explain his or her own view without any influence of the opinion of others. Since the respondents are located all over the world, the interviews are partly done in real life, and partly done via Skype or e-mail. The average duration of an interview is one hour.

The interviews are performed at different levels of the organization to combine all different viewpoints, covering all the stakeholders. First, three interviews are conducted within the management team of PL IMS Procurement, with inter alia the commodity cluster leader of Industrial and Real Estate (responsible for the two commodity clusters), the domain leader of Governance Excellence (responsible for the execution of the procurement processes), and the domain leader of Systems and Business Process Owner (BPO) of the P2P process (responsible for the procurement systems and owner of the procurement part of the P2P process). In addition, an interview is performed with a financial business process expert (BPE) to figure out how the Finance Accounting Operations Department is looking at the P2P process. The Internal Treasury department is not interviewed, since they only execute the payments of the invoices, and they do not face a lot of problems, as the input that they get is assumed to be correct already. Other interviews that are performed are more on the operational level, with inter alia an experienced requester, a local buyer (also a requester, but located at an operational ORU), the PSSC, and Infosys. The initiator of the need has usually the same needs as the requester, and is therefore not considered separately for an interview. The view of the supplier on the process is not taken into account while designing the PMS, because this is a third party and the PMS is focusing on the efficiency and effectiveness of an internal process of Philips. Also, the view of the supplier can be contradicting to the view of Philips, for example when looking at the payment term of a product, the supplier would like to have his money as soon as possible, whereas Philips wants to pay as late as possible, to use the money as working capital in the meantime. With all these interviews, the opinion of all the stakeholders (with the few exceptions) is heard. We choose not to perform any additional interviews, as all previously collected information (from Chapter 2), which came from different


stakeholders, confirms the information arising from the interviews. After the completion of the interviews, the interviews were summarized and the results are shown in the next section.

4.3 The needs and requirements of the stakeholders

From the interviews, it should become clear what parts of the P2P process are important for the stakeholders, and what they would like to see measured in the new PMS. The next sections provide small summaries of the interviews, starting with the commodity cluster leader of Industrial & Real Estate.

Commodity Cluster Leader Industrial & Real Estate

The main requirement of the commodity cluster leader for the P2P process is that the process is simple and easy to understand. In addition, he would like to see an improved connection between IMS Procurement and an ORU, since there is no alignment at the moment. The P2P process is too complicated, and the ORUs are not provided with the right information and training materials to execute it well. Therefore, he thinks it is important to measure the following aspects of the P2P process:

- Ease of use of the SRM system;
- Contract coverage (includes using the negotiated prices and payment terms);
- On-time payment;
- Number of new suppliers created in one month;
- PO compliance;
- Quality of a PO;
- Cycle time of the processes.

Additionally, the commodity cluster leader mentioned that he would like to see more early purchasing involvement, for example if a demand is already known a long time before it is needed, IMS Procurement can then already start looking for suppliers, and negotiate the prices a reasonable time in advance. This early involvement could be accomplished by for example having an IMS Procurement employee at an ORU or visit the ORU at least once week.

Domain Leader Governance Excellence

The domain leader of Governance Excellence believes that the P2P process is set up from a theoretical perspective, without taking into account the daily practice. This is one of the main reasons why the compliance rate is relatively low, because people like to take the path with the least resistance. According to the domain leader, the process should be intuitive and match the daily practice of the sites. Additionally, the process should be simple, and therefore fast. This resulted in the following measures for the P2P process:

- Cycle time of the processes;
- Ease of use of the SRM system;
- PO compliance.

The domain leader thinks it is important to show all the stakeholders how the entire process is working, and to let them realize that they are a part of a bigger picture. For example, people think that the ordering process takes a lot of time and money, and therefore they try to bypass it, however they do not know that



this costs even more time and money, and if they had known what kind of effect this would have on the rest of the process, they would probably think about it again.

Domain Leader Systems and BPO of the P2P process

The domain leader of Systems thinks that the current P2P process is way too complicated with too many options. His main requirement for the PMS is that it is easy to use, actionable (being able to be used as a basis for doing something) and that it provides a good overview of the performance of the P2P process. He mentioned different measures for the P2P process, which could be important for the new PMS:

- PO compliance;
- Catalogue percentage;
- Number of new suppliers created in one month;
- Total number of suppliers used in the last month;
- On-time payment;
- Cycle time of the processes;
- Channel compliance;
- Ease of use of the SRM system;
- Contract coverage (includes using the negotiated prices and payment terms).

In the new PL, the domain leader of Systems will be the BPO of the P2P process and will be responsible for the procurement part of the process. The Governance Excellence and IMS Excellence teams will help him execute all the improvement plans from strategic to operational level at all the ORUs of PL.

Financial BPE

The financial BPE thinks that the main focus in the P2P process should be on Procurement, since everything that goes wrong ends up in Finance. The financial BPE thinks that the invoice handling process could be automated very well, if only the input is correct. Therefore, his main criteria for the process is the quality: the content of the PO needs to be correct, the right prices and payment terms should be used (which will result in a first time match of an invoice with a PO), and on-time payment. Important PIs according to the financial BPE are therefore:

- On-time payment;
- AP overdue (the total spend of invoices that have not been paid before their due date);
- First-time match (invoices without waiting parking or exception handling);
- Quality of a PO;
- PO compliance.

Requester

From the interview with the requester, it became immediately clear that the system is too difficult, and that there are way too many options. Almost every shopping cart is sent back by the TSSC the first time, because something is wrong or information is missing. Therefore, the requester thinks that the system should be easy to use, and that the process should be fast. The process needs to be fast, because most of the times, requesters need the products or services as soon as possible, and now it takes so much time, that you are

easily inclined to buy it yourself at the supplier. Also, the input of IMS Procurement does not fit the business requirements (looking at for example the preferred suppliers or the PPG in general) and therefore, it is not used. The following PIs arise from the interview with the requester:

- Ease of use of the SRM system;
- Cycle time of the processes.

Local Buyer

The buyer had a lot of experience with maverick buying at his ORU, where people even created POs directly into the SAP system. According to him, the process needs to be simple and fast in order to ensure that people will use the right process. Important indicators for the P2P process according to the buyer are:

- On-time payment;
- Ease of use of the SRM system;
- Cycle time of the processes.

The relationship with the supplier is of great value, therefore it is really important to have good communication with the supplier, and to inform him about your terms and conditions. Therefore, on-time payment is an important PI, because when you regularly pay too late, there is a probability that the supplier does not want to cooperate anymore. In addition, when you tell the suppliers that you do not pay an invoice anymore when there is no PO number on it, the employees need to be compliant, since the supplier will not accept their orders anymore if they are not provided with a PO number. The buyer mentioned multiple times that it is really important that all employees will be informed about the whole process, because if they do not know the rationale, they will continue to use the way of the least resistance.

Sourcing Specialist of the PSSC

The sourcing specialist thinks that the most important thing of the P2P process is that there is a good starting point. At the moment, there is no alignment between Procurement and the business. Procurement should be able to understand what the business' needs are and reflect this in their strategy, since now the strategies neglect the business needs, and both parties are having their own reality. Additionally, they should provide the business with the right instructions and an up-to-date preferred suppliers list, taking into account the business' needs as well. It should also be the other way around, the business should be aware of the procurement processes and standards, since now the awareness of the procurement processes and standards is very low. The important things that should be measured in the P2P process according to the sourcing specialist of the PSSC are:

- Usage of the preferred suppliers;
- Approval time;
- Number of new suppliers created in one month.

Infosys

Infosys emphasizes the cooperation and engagement of all stakeholders of the P2P process, since you can only be efficient if the cooperation between all parties is good. At the moment, the cooperation is very poor, Infosys is working according to the requirements in the PPG, where the requesters are not aware of these requirements and do not want to cooperate. The quality of the shopping carts is often very poor and without



detailed information, Infosys cannot allocate the products/services properly. Because of all this, Infosys suggests the following PIs:

- Quality of a PO;
- Approval time;
- First time right shopping carts.

4.3.1 Conclusion

As can be concluded from the interviews, the alignment between Procurement and the business should be improved, which means that the effectiveness of the process would be improved as well. Most of the respondents also agreed that the process should be simplified and easier to understand/work with, to increase the efficiency and speed of the process. All the information emerging from the interviews supplemented each other very well. The respondents suggested a number of PIs to measure the performance of the P2P process, which are listed in Table 5.

Table 5 - Performance indicators recommended by the respondents

Performance indicator	Number of times mentioned	
Cycle time of the processes	5	
PO compliance	5	
Ease of use of the SRM system	5	
On-time payment	4	
Number of new suppliers created in one month	3	
Quality of a PO	3	
Approval time	2	
Contract coverage	2	
AP overdue	1	
Channel compliance	1	
First time right shopping carts	1	
First time match (invoice)	1	
Catalogue percentage	1	
Usage of the preferred suppliers	1	
Total number of suppliers used in the last month	1	

Some of the PIs that were suggested by the respondents were not really logical when looking at their functions. For example the commodity cluster leader of Industrial and Real Estate wanted to improve the easiness of creating a shopping cart in the SRM system, which is a performance indicator that you would expect from a requester or a process expert. This issue may be due to the fact that most of the respondents just started with their new function within PL, and most of them came from the business itself, so they had a lot of experience at the operational level as well. We consider this as an advantage, and therefore, all the mentioned PIs are taken into account when selecting the KPIs for the PMS.

4.4 The performance indicators of the PMS

In this section, the KPIs for the PMS are selected based on the input of the stakeholders, taking into account the literature described in Chapter 3.

Van Weele (2004) and Knudsen (1999) suggest in their articles to make a distinction between purchasing effectiveness and purchasing efficiency, when looking at purchasing performance. Purchasing efficiency and purchasing effectiveness represent different competencies and capabilities of the purchasing function. Drucker (1974) explained the difference between efficiency and effectiveness as follows: efficiency means that the organization is 'doing things right', whereas effectiveness relates to the organization 'doing the right things'. Efficiency is determined by the amount of time, money and energy that is necessary to obtain the output, whereas effectiveness is determined by comparing actual output to the targeted output. An organization can therefore be effective and fail to be efficient, the challenge is to find the right balance. In Figure 12, the relation between efficiency and effectiveness is shown.



Figure 12 – Relation between efficiency and effectiveness

It is part of the mission of PL IMS Procurement to create efficient and effective processes and systems. Also, the interviews confirmed these requirements. Therefore, the following three objectives are taken into account in the selection of the KPIs:

- Increase process efficiency (includes reducing the cycle time, simplifying the process etc.);
- Increase process effectiveness (includes alignment with business by providing the right information, such as contracts, preferred suppliers etc.);
- Maintain compliance with internal controls (PO compliance, contract compliance etc.).

Maintain compliance with internal controls is taken as a separate objective, as being compliant has to do with both efficiency and effectiveness. When you are non-compliant, you are not doing things right and you are also not doing the right things either. Hence, you have to be compliant in order to be efficient and effective. In Figure 13, the objectives are displayed in a triangle, and it can be seen that compliance serves as the foundation for process efficiency and process effectiveness.



Figure 13 - Objectives for the selection of the PIs

As already said in Chapter 3, the performance measure record sheet of Neely et al. (1997) is used to describe the KPIs for the PMS. The KPIs for the PMS are categorized in the following three categories: efficiency, effectiveness and compliance (relating to the objectives described above), and this is described in the 'relates to' element of the record sheet.

Starting the selection of KPIs for the PMS, the PIs mentioned in the interviews are discussed first (in the order of the number of times mentioned), and it will be argued whether they are taken as a KPI for the PMS or not.

Cycle time of the process was one of the PIs that was mentioned most by the respondents, which is remarkable, since this PI is not measured at all momentarily. The cycle time of the process can give good insights in how fast and efficient the process is. The PI 'Approval Time', that was mentioned twice during the interviews, is combined with this PI, since these two PIs have a lot of overlap.

Table 6 - Cycle time

Cycle time The cycle time is the average time from the beginning to the end of the P2P process, and includes process times and delay time. The purpose of this measure is to see the average cycle time of the P2P process. Long cycle times can have an influence on the level of maverick buying, since people will bypass the standard processes and systems, when it takes a long time to get the people will bypass the

	The purpose of this measure is to see the average cycle time of the P2P process. Long cycle
	times can have an influence on the level of maverick buying, since people will bypass the
Purpose	standard processes and systems, when it takes a long time to get the necessary products
	or services. Also, with a long cycle time, the risk of late payments is higher. Therefore, it is
	important to measure and reduce the cycle time.
Relates to	Relates to the objective: Increase process efficiency
Formula	The average cycle time of the process should be separated in two different KPIs: requisition-to-order cycle time and invoice-to-approval cycle time, otherwise you take the delivery time of the supplier into account, which is not part of your internal process. Also, the time of the actual payment is not taken into account in this PI, since Philips wants to have the longest possible payment term. This does not fit within this PI, which is focused on reducing the cycle time.

Formula requisition-to-order (KPI 1a):

Total number of days between shopping cart creation date and PO creation date per month Total number of shopping carts per month

Formula invoice-to-approval (KPI 1b):

 Total number of days between Document date and Unblock for payment date per month

 Total number of invoices per month

Period

For the calculation of this PI, the data from the last month should be taken into account, to be able to show clear improvements. For the requisition-to-order time, the creation dates of the shopping carts in this month should be leading, and for the invoice-to-approval time, the invoices within this clearing month (the month of the clearing date) should be taken into account.

Exceptions

Only invoices with a positive cycle time should be taken into account¹⁷.

Internal benchmark

For the invoice-to-approval data, SMART2 can only give the document and posting date, and does not yet report on the 'unblock for payment date'. Therefore, the internal benchmark is done with the available information, which is the time between the document date and the posting date.

	Requisition-to- order	Invoice-to-approval (Document date - Posting date only)	
А	2 days	29.9 days	
В	7.1 days	27.3 days	
С	4.6 days	26.5 days	
D	3.5 days	29.7 days	
E	4.2 days	17.2 days	
F	F 6 days 25.8 days		
G	3.8 days	30.8 days	
Н	4.5 days	28.4 days	
Average	4.5 days	27 days	

Target

*Data from September 2014 until August 2015, including all commodities.

External benchmark

- a. Best-in-class companies¹⁸ have a requisition-to-order cycle time of less than a day (Aberdeen Group, 2008).
- b. World class companies¹⁹ normally have a cycle time from invoice to approval of 5 days (and 7 days for non-PO invoices) (The Hackett Group, 2009).

Suggestion for the target

 The internal benchmark shows that A has the fastest requisition-to-order cycle time of two days. However, best-in-class companies have a cycle time that is less than a day. Therefore, the suggestion for the target is a requisition-to-order time of one day. The

¹⁷ Currently, there are a lot of negative cycle time registered in the SMART2 system

 $^{^{\}rm 18}$ Top 20% of aggregate performance scorers in their research

¹⁹ Top 25% organizations in both efficiency and effectiveness in their research



	ambition for the first year could be that every ORU needs to improve their score by 50%.			
	b. For the invoice-to-approval cycle time, world class companies achieve a cycle time of five days, whereas the fastest performing ORU of the eight ORUs already has a cycle time of 17 days (without the approval time). The suggested target is therefore five days, to keep up with the world class companies, which asks for an enormous improvement in all the ORUs. The ambition for the first year could be that every ORU needs to improve their score by 30%.			
Frequency	This indicator should be measured and reviewed every month.			
Who measures	Since the CRG is specialized in making reports about purchasing KPIs, they should be responsible for all the KPIs of this PMS.			
Source of data	The raw data should be retrieved from SMART2, however the Unblock for payment date should be added to the system.			
Who acts on the data?	The IMS Excellence team should act on the data if the performance is low. Every person within this team is assigned to a different market, to serve all the ORUs of PL. This could already increase the alignment between IMS Procurement and the business.			
	When the cycle times are decreasing, the team does nothing. When the cycle times are increasing, they have to find out the reasons for this, and try to resolve them. For the requisition-to-order cycle time, the IMS Excellence team should look at the			
	different approval times that every function needs (TSSC, PSSC, commodity, etc.), and the PO creation time. If they know which party caused the long cycle time, they can try to contact them, find out the reasons and try to solve the problem. Another idea is to provide the approvers with mobile devices from which they can do the approval, this can save a lot of time for them as well.			
What do they do?	For the invoice-to-approval cycle time, the team should check if the long time was caused by the invoice registration time or the invoice approval time. A reason for both can be an invoice mismatch. If invoices are not complete or contain incorrect information, they cannot be matched to a PO, which causes extra registration time and/or approval time (since an invoice only needs approval when there is a mismatch). In this case, make sure that the suppliers are using the right PO number, quantities and prices on the invoice. It can also be that the PO is not correct, then you need to make the requesters aware that they have to provide the right information on the PO, and it is also very important that requesters understand that wrong information can cause a very long invoice-to-approval time. It can also be that the certain approvers took a long time to approve the invoices, in this case the team should sit down with the approvers to train them or provide them with the option to do an approval via a mobile device.			
Notes and comments	Currently, you can only measure the time between the Document Date and the Posting date of the invoice. The Unblock for payment date is not registered in SMART2, so this additional data should be added to the SMART2 reporting. Another remark is that the invoice registration process should receive some more attention in terms of accuracy. Currently, from the invoices of the eight ORUs in the months			
	September 2014 until August 2015 more than 100 invoices had an invoice-to-approval time of more than a year. Without these invoices, the average approval time would have been 26 days, so it saves one day in the average invoice-to-approval time.			



Additionally, the FSSC should check the invoice on the correctness of the Document Date, because it can be that the supplier writes a date on the invoice, which is already in the future, so he will get paid earlier. However, this is fraud, and it should be prevented.

Another PI that was mentioned five times is PO compliance. PO compliance has always been a very important indicator within IMS Procurement, however there is still a lot of room for improvement. Therefore, PO compliance is chosen as the second KPI for the PMS.

Table 7 - PO compliance

PO complian	се				
PO compliance is the percentage of total AP spend that went via an official PO that is created					
before the invoice c	omes in and/or the supplier delivers the goods or services.				
Purpose	The purpose of this indicator is to see how much spend did go via an official PO, actually, the most important aspect of this measure is to see how much spend did not go via an official PO, and is therefore seen as non-compliant. It is important that spend goes via an official PO, otherwise you cannot control and approve it, and also the Procurement Department can be completely bypassed in the ordering process.				
Relates to	Relates to the objective: Increase compliance with internal controls				
	PO compliance means that the PO is created before the invoice comes in and/or the supplier delivers the goods or services (and preferably the PO-number is on the invoice). This means that when an invoice comes in and there is no PO, spend should be seen as non-compliant, so any PO created on or after that date can be seen as non-compliant spend. This indicator should be measured by dividing the AP spend that went via an official PO (compliant) by the total AP spend. The formula of PO compliance is therefore: $\frac{AP \ spend \ with \ PO \ per \ month}{Total \ AP \ spend \ ner \ month} \times 100 \ [\%]$				
	Period The data should be taken from the last month to be able to show clear improvements.				
Formula	Exceptions The negative spend numbers should be excluded from the calculation, since it is not a real purchase when you get money back and these numbers are influencing the outcome of this ratio.				
	 Additionally, there are some other exclusions that need to be made to calculate the correct PO compliance rate: 1. Forwarding & Distribution (Invoices are managed by service providers, no PO is created) 2. Travel (Travel spend is managed through the application BookClickGo, no PO is created) 3. MSP (Time hire spend is managed through the application Fieldglass, no PO is created) 4. Phigers (Non-SAP application, PO compliance cannot be measured) 				
Target	Internal benchmark IMS Procurement currently maintains a target of 95% for the PO compliance rate.				

	PO compliance
Α	90%
В	91%
С	74%
D	64%
E	75%
F	94%
G	91%
Н	88%
Average	83%

*Data from June 2015 until August 2015, including all commodities except for F&D.

External benchmark

Weighted average percentage of indirect spend flowing through compliant P2P processes of average-performing companies: 45% (Zycus, 2014). The Hackett Group shows on the other hand a percentage of 80% of spend that went on a PO for world class companies (The Hackett Group, 2009).

Suggestion for target

	The external benchmark of world class companies shows a percentage of 80% of spend that went on a PO, which is already lower than the average value of the internal benchmark. Also, the highest PO compliance rate of the eight ORUs is now 94%, but the current target is 95%, therefore the suggestion for the target is also 95%, because you do not want to lower the targets within the company. The ambition for the first year could be that every ORU needs to improve their score with 5 percentage points, if they did not reach the target yet.
Frequency	This indicator should be measured and reviewed every month, because it is a very important indicator that should be improved every month.
Who measures	Since the CRG is specialized in making reports about purchasing KPIs, they should be responsible for all the KPIs of this PMS.
Source of data	The raw data should be retrieved from SMART2 and analyzed in Microsoft Excel. To make all the exclusions, macros in Excel can be used.
Who acts on the data?	The IMS Excellence team should act on the data if the performance is low. Every person within this team is assigned to a different market, to serve all the ORUs of PL. This could already increase the alignment between IMS Procurement and the business.
What do they do?	To improve the PO compliance rate, the person assigned to a certain market should reach out to all ORUs that have a PO compliance rate below the target within that market. The ORU then has to explain the root causes of their non-compliance, and if they do not have good reasons, they will get an official warning and it should be reported to the management team of IMS Procurement. In addition, the site has to provide a list with corrective actions that they will take to increase their compliance level. Also, a report should be developed on these non-compliant issues per site to show recurring issues. Actually, the corrective action should not be taken if the PO compliance is low, but even before that. If there is no PO number on the invoice, the invoice should be sent back to the supplier and he does not get paid before he has a PO number on his invoice. This is called the 'No PO, No Pay' policy. This policy will put a lot of pressure on the requester, since the supplier will get back to him and require a PO number for every purchase. It might seem that you place the problem at the supplier, but a large company like Philips

can afford to do this, and the suppliers will learn not to accept orders without a PO. This
will also ensure that the payment of the invoice is not delayed anymore due to a missing
PO number.Notes and
commentsThe PO compliance rates for the commercial ORUs (ORUs that focus mainly on sales) are
often lower than the compliance rates of the operational ORUs. For these commercial
ORUs, the ambition should even be higher to reach the 95% target.Notes and
commentsTo show the people in the organization the importance of PO compliance, it might be
worth to calculate the extra costs that are made for every non-compliant PO, to see how

The next indicator that was mentioned five times, is the ease of use of the SRM system. Usability of a system cannot be measured directly. Therefore, a survey will be conducted among the users of the system to see how they score the usability of the system. This KPI is perfect to show the opinion of the business, which is something that is really desirable in the company according to the interviews. Also, Croom and Johnston (2003) and De Boer et al. (2002) argue that in order to achieve improvements in performance, the internal customer satisfaction should be a key concern. Since this KPI is mainly based on an opinion, it is called 'Internal User Satisfaction (SRM usability)', and it will be measured with a Net Promotor Score (NPS). A NPS is one of the most easy-to-use and intuitive metrics to measure customer satisfaction. A company can easily use it to compare its score with their competition or compare the scores between different departments within the company. The NPS can help drive business growth, as the company becomes more focused on improving the score (Satmetrix Systems Inc, 2015).

Table 8 – Internal user satisfaction about the SRM system

Internal user satisfaction (SRM usability)

large the possible savings are.

SRM usability is the extent to which the SRM system can be used to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.

Purpose	The purpose of this indicator is to measure how the user is experiencing the usability of the SRM system, and how satisfied they are with the system at the moment. It is very important to listen to the business/users, because in the end, they have to work with it. Additionally, if there are any problems causing a low perception of usability, the root causes need to be identified to be able to improve/solve them.			
Relates to	Relates to the objective: Increase process effectiveness			
Formula	 To measure the user satisfaction about the SRM system, an NPS is used. NPSs are calculated using the answer to a single question, using a scale from 0-10 (Reichheld, 2003; Satmetrix Systems Inc, 2015). The question to calculate the NPS is: <i>How likely is it that you would recommend the SRM system to another company?</i> The respondents can be grouped as follows: Promoters (score 9-10) are loyal enthusiasts. Passives (score 7-8) are satisfied but unenthusiastic customers. Detractors (score 0-6) are unhappy customers. 			



	The calculation of the NPS is: % Promoters – % Detractors. The NPS is not a percentage, but a value between -100 and 100.			
	All the requesters of the PL ORUs need to be asked to fill out the survey.			
	Internal benchmark			
	Not available.			
	External benchmark			
	A lot of factors can have an influence on the NPS of a company, which makes it hard to benchmark this score with other companies. Even the communication channel (phone, e-			
	mail) and the way in which the survey is constructed can have an influence on the			
-	outcome. However, an NPS of more than 50 is seen as excellent. However, the Hackett			
Target	Group showed that 82% of the top performers measured customer satisfaction (The			
	Hackett Group, 2011).			
	Suggestion for target			
	It would be most optimal, if the target is +50, however the target should depend on the			
	outcome of the first NPS. The ambition could be a 10 percentage point improvement every			
	year if the current NPS is positive, and if the NPS is negative, a more aggressive target is			
	needed of for example 25 points.			
Frequency	This indicator should be measured and reviewed every year to see if the score improved. If you measure it more often, the willingness of the users to fill out the survey will			
riequency	decrease.			
	Since the CRG is specialized in making reports about purchasing KPIs, they should be			
Who measures	responsible for all the KPIs of this PMS.			
Source of data	The Philips SharePoint can be used for the survey.			
	The IMS Excellence team should act on the data if the performance is low. Every person			
Who acts on the	within this team is assigned to a different market, to serve all the ORUs of PL. This could			
data?	already increase the alignment between IMS Procurement and the business. The IMS			
	Excellence team could reach out to the PSSC, to ask for help in optimizing the PPG, or reach out to other parties whenever other reasons turn out to be a problem.			
	If the NPS is very low, it would be useful to know the reasons behind this score. Therefore,			
	an additional question should be asked in the survey to the persons who gave a score			
	between 0 and 8. The additional question should be:			
	What are your main reasons for your NPS?			
	a. Overall usability (ease of use) of the system (data entry, intuitiveness)			
	b. Functionality of the system			
	c. Level of instructions clarity (in the PPG) d. Communication with Infosys (TSSC)			
	e. Clarity of roles and responsibilities			
What do they do?	f. Transparency of the process			
	g. Processing time			
	h. Level of available support			
	i. Other (specify)			
	Another question that needs to be asked is the country in which the user is working, since			
	the ways of working can differ strongly per country.			
	Depending on the reasons, different actions need to be taken to improve the score.			



Notes and comments

Another possibility to measure the user satisfaction of the SRM usability could be to ask a short question to a requester after she created a shopping cart S in the SRM system. The question could be: *How easy was it to create your shopping cart?* The requester needs to answer this question with a score between 1 and 10. This question should not be asked every time, but every once in a while. With this way of measuring, you can for example see if people who order more often have less difficulties with the system than people who barely use the system.

On-time payments is a PI that was mentioned four times during the interviews, and this PI is very important for Procurement to keep the relationships with their suppliers well. Although, the focus of a lot of companies shifted in the past few years more towards extending payment terms, when you always pay on-time, it can increase the willingness of your suppliers to agree on better payment terms and conditions for your company.

Table 9 - On-time payment

On-time payments

On-time payments is the number of payments that are made on (or in the two days before) the due date that is agreed with the supplier.

Formula	s a very import good and as op are working tog Finance must a Relates to the o The payments Number of on Total numbe	tant KPI, as you would otimal as possible. It is gether, since Procurem odhere to these terms. objective: Increase pro on time should be mean on time payments per per of payments per r	asured as follows: $month \times 100 [\%]$
Formula	The payments Number of or Total numbe Period Dnly the paym	on time should be mean time payments per er of payments per r	asured as follows: $month \times 100 [\%]$
Formula Pe	Number of or Total numbe Period Dnly the paym	n time payments per er of payments per r	$\frac{month}{100} \times 100$
In	nternal hench	ents in one clearing mo	onth should be taken into account.
Target	A B C D E F G H Average *Data from Augu	On-time payments 88% 83% 71% 91% 96% 80% 93% 66% 84% ust 2015 (clearing month, ark study of The Hack), including all commodities rett Group shows that world class organizations are de on time of 90% (The Hackett Group, 2009).



	Suggestion for target				
	As can be seen from the internal benchmark, three of the eight ORUs have a percentage				
	that is already higher than the percentage of the world class organizations. Therefore, the				
	suggestion for the target is done based on the highest scoring ORU, and is a percentage of				
	96%. The ambition for the first year could be that every ORU needs to improve their score				
	by 5 percentage points, if they did not reach the target yet.				
Frequency	This indicator should be measured and reviewed every month.				
Who measures	Since the CRG is specialized in making reports about purchasing KPIs, they should be responsible for all the KPIs of this PMS.				
Source of data	The raw data should be retrieved from SMART2. The manual adjustments to calculate the amount of on-time payments need to be done in Microsoft Excel.				
	The IMS Excellence team should act on the data if the performance is low. Every person				
Who acts on the data?	within this team is assigned to a different market, to serve all the ORUs of PL. This could				
	already increase the alignment between IMS Procurement and the business. The IMS				
Udldf	Excellence team could reach out to the Finance Accounting Operations Department for				
	help.				
	The early and late payments need to be reviewed to determine the causes. There can be				
	a lot of causes, for example short payment terms, long invoice approval process, or missing				
	invoice details. Therefore, the IMS Excellence team should meet with the commodities,				
What do they do?	and discuss the number of late payments and the cause of the delays.				
	The information on early and late payments should be shared with the Procurement, as				
	well as with the Finance Department to encourage people to improve the on-time				
	payments.				
Notes and					
comments					

The number of new suppliers is mentioned three times, and the rationale behind this PI, is that the number of suppliers that an ORU uses is often very high, and that they only keep adding new suppliers. It might therefore be more interesting to measure the total number of supplier per ORU, however, the indicator should employ a ratio rather than an absolute number (a criterion from Section 3.2), and is therefore changed into the total number of suppliers per 1 million euros spend. In this way, you can easily compare the number of suppliers per ORU, and see which ORU uses too many suppliers. In general, the smaller your supplier base, the better you can manage your suppliers and the less it costs, due to the fact that a lot of one time vendors are costly to manage.

Table 10 – Percentage of suppliers accounting for 80% or the spend

The number of suppliers per 1 million euros spendThe total number of suppliers that an ORU has for every 1 million euros spend.The purpose of this measure is to evaluate the current state of supplier consolidation. It shows how many suppliers an ORU uses to purchase their indirect materials and services.
Currently, Philips has a very long tail of suppliers, which they would like to reduce, since a lot of redundant suppliers can have a bad influence on the position of the company in contractual negotiations. Therefore, it is important to reduce the number of suppliers per 1 million euros spend for an ORU.Relates toRelates to the objective: increase of process effectivenessFormulaThe number of supplier per 1 million euros spend should be measured as follows:

	Total number of unique Vender Clobal Illtimates ²⁰ nor month			
	Total number of unique Vendor Global Ultimates ²⁰ per month Total AP spend per month in millions			
	-	Total AF spena per month in millions		
	Period			
	The invoices ir	the last clearing month	should be taken into account.	
	Internal bench	nmark		
	Number of suppliers			
		per 1 million euros spend		
	A	3.4		
	B	6.0		
	C	5.1		
	D	18.5		
	E	13.3		
	F	4.1		
	G	25.8		
Targot	Н	29.2		
Target	Average	13.2		
	 *Data from September 2014 until August 2015 (clearing months), including all commodities External benchmark An external benchmark will not add any value, as the number of suppliers heavily depends on the types of products and services that the company is buying, and the industry in which the company is operating. Suggestion for target As can be seen from the internal benchmark, the best scoring ORU has 3 suppliers per 1 million euros spend, which is the suggestion for the target as well. The ambition for the first year could be that every ORU needs to reduce their supply base with 10%.			
Frequency	This indicator should be measured and reviewed every month.			
	Since the CRG is specialized in making reports about purchasing KPIs, they should be			
Who measures	responsible for all the KPIs of this PMS.			
Source of data	The raw data should be retrieved from SMART2.			
	The IMS Excellence team should act on the data if the performance is low. Every person			
Who acts on the	within this team is assigned to a different market, to serve all the ORUs of PL. This could			
data?	already increa	se the alignment betw	een IMS Procurement and the business. The IMS	
			e commodity cluster leaders for help.	
			ir main suppliers, and try to consolidate the spend.	
	It is important to look at the tail (the 80% of the suppliers that represent 20% of spend),			
	and try to reduce the number of suppliers in there, since you can then access better			
	payments terms with your suppliers. Reducing the long tail of the spending is one of the			
What do they do?	most effective ways to reduce costs (Wyld, 2012). If an ORU has a very high amount of			
	suppliers, the commodity cluster leaders should try to reduce the number of suppliers in their clusters. This can be done with leveraging, where you can save costs by combining			
	products and services into one contract, or by outsourcing (for Industrial this could be			
	hiring an integrator or distributor who takes care of your stock). When spend is			
	fragmented, you should try to consolidate and source it centrally. If the tail is long because			

²⁰ A Vendor Global Ultimate (VGU) is a mother company name that Philips uses for a group of suppliers belonging to the same 'family'

	of maverick spend, you should try to ensure compliance. Additionally, the ORUs should be
	made aware of the preferred suppliers in the PPG, which are the only suppliers that should
	be used by the sites.
Notes and comments	The equipment type of the operational ORUs can have an influence on the number of
	suppliers. It is therefore necessary to investigate and check whether these ORUs can be
	compared or that every ORU needs a different target.

The quality of PO was also mentioned three times as a PI. This PI has much to do with the first time match (invoice), since an invoice will have a first match when the quality of the PO is high (all the information is correct and complete). Therefore, these PIs are combined into the following PI: invoice matching rate. The invoice matching rate is an important measure, since a high first-time match rate can have a lot of positive effects in other areas, for example a higher productivity, lower costs per invoice, and more invoices that can be paid on time, as no further approval is required. This PI is in nearly every KPI list for the P2P process that can be found on the Internet.

Table 11 - Invoice matching rate

Invoice matching rate

The invoice matching rate is the percentage of invoices that match a PO (two-way match), and pass straight through the P2P process without any delay or intervention.

Purpose	First time match of an invoice is an important measure, since a high first-time match rate can have a lot of positive effects in other areas, for example a higher productivity, lower costs per invoice, and more invoices that can be paid on time, since no further approval is required. This KPI is an essential indicator for the alignment between Procurement and Finance.		
Relates to	Relates to the objective: increase of process effectiveness		
	The formula should be as follows: <u>The number of invoices per month without waiting, parking or exception handling</u> <u>The total number of invoices per month</u> Note: if the PO is raised after the invoice arrival, it is not seen as a first time match.		
Formula	 Period The number of invoices in one clearing month should be taken into account. Exceptions For this measure, the matching process with the goods receipt notes should be excluded, because most of the products that IMS Procurement orders have a very long delivery time. This means that when the invoice comes in, the products are usually not yet been delivered. Also, replenishment orders and services do not have a goods receipt. Therefore, the invoice matching process should be done based on POs only (two-way match). 		
Target	Internal benchmark Not available. External benchmark World class organizations have an invoice matching rate of 94% (The Hackett Group, 2009). Suggestion for a target		



	Based on the external benchmark, the suggestion for a target is 94%. The ambition for the first year could be that every ORU needs to improve their score by 20%, however it is better to do an internal benchmark first, to see where the ORUs stand.	
Frequency	This indicator should be measured and reviewed every month.	
Who measures	Since the CRG is specialized in making reports about purchasing KPIs, they should be responsible for all the KPIs of this PMS.	
Source of data	The raw data should be retrieved from SMART2 (with the necessary adjustments).	
Who acts on the data?	The IMS Excellence team should act on the data if the performance is low. Every person within this team is assigned to a different market, to serve all the ORUs of PL. This could already increase the alignment between IMS Procurement and the business. The IMS Excellence team could reach out to the Finance Accounting Operations Department for help.	
What do they do?	 There can be multiple reasons for an invoice that does not match the first time. Ariba and SharedServicesLink performed an survey in which they identified the top causes of invoice exceptions: No PO (62%); Price Discrepancy (56%); Quantity discrepancy (42%); Wrong PO (28%) (Ariba & SharedServicesLink, 2014). A low invoice matching rate is mainly caused a low quality PO, therefore the requesters need to be approached on this issue and think of ways to improve the quality of the PO. However, it can also be that the quality of the invoice was low, then the team should reach out to the supplier and try to find the cause, so that it will not happen again. An important remark is that the requesters need to understand the impact of the quality of a PO (and also of not creating a PO) on the Finance Department, since it costs the Finance Department a huge amount of time to reconcile problems with invoices that 	
Notes and comments	should not have happened in the first place. For this PI, it needs to be registered in SMART whether an invoice matched a PO directly or not. This should only be a yes or no question that needs to be ticked in the SMART2 system by the FSSC.	

Contract coverage, also known as contract compliance, is a very important PI that is used in the procurement department of a lot of companies (Aberdeen Group, 2011a). It is another indicator of how well IMS Procurement is connected with the business. At the moment, contract coverage is one of the main KPIs of the Philips Procurement KPI dashboard, however it is measured in a way which does not really represent the amount of spend that is covered by a contract. Therefore, the KPI is calculated in a different way.

Table 12 - Contract coverage

Contract coverage	
Contract coverage is the amount of spend that is covered by a formally signed contract.	
Purpose	This KPI measures how much spend is actually covered by a formally signed contract. With this KPI, you want to make sure that the contracts that are negotiated with suppliers are actually used in the buying process, and that the spend is in line with the content of these contracts. If a lot of contracts (including the negotiated prices and payment terms) are not used, it is of course a waste of time and effort of the procurement employees, and it costs the company a lot of extra money.

Relates to	Relates to the objective: compliance to internal controls	
	The formula should be as follows: AP spend per month with a Contract ID $Total AP$ spend per month	
Formula	To measure this, all contracts need to be registered in eCM, even the contracts at ORU level. All contracts need to have an own contract identification number, and need to be accessible for everybody. When a shopping cart is created, the requester or the TSSC needs to insert the contract identification number (if there is one), and check if the spend really fulfills the content of the contract. Then, spend can be booked in the system with its own contract identification number. This will take some extra time for the requester and the TSSC, however since IMS Procurement is being remote, and not physically present at every ORU, it is worth to see if your negotiated terms and conditions are really used in practice. This process will be a learning process, and it will improve over time. Only in this way, you can calculate the spend that did not go via a contract.	
	Spend within one month should be taken into account.	
Target	Internal benchmark Not available, since the contracts are not registered at ORU level.	
	External benchmark Average contract compliance percentage of best-in-class companies: 78% (Aberdeen Group, 2011b).	
	Suggestion for target Since there is no internal benchmark available and the best-in-class companies have a percentage of 78%, this will be the suggestion for the target as well. The ambition for the first year could be that every ORU needs to improve their score by 20%, however it is better to do an internal benchmark first, to see where the ORUs stand.	
Frequency	This indicator should be measured and reviewed every month.	
Who measures	Since the CRG is specialized in making reports about purchasing KPIs, they should be responsible for all the KPIs of this PMS.	
Source of data	The raw data should be retrieved from SMART2 (with the necessary adjustments), whereas the contract identification numbers should be retrieved from the eCM system.	
Who acts on the data?	The IMS Excellence team should act on the data if the performance is low. Every person within this team is assigned to a different market, to serve all the ORUs of PL. This could already increase the alignment between IMS Procurement and the business.	
What do they do?	There need to be some strict rules on using the contracts, otherwise the Procurement Department spend a lot of time negotiating these contracts, while they are not even used. The first thing that needs to happen is to provide visibility to the contracts. In other words, make it easy for the employees to see and buy against the contracts through the normal buying process. Spend will always follow the path of the least resistance, and if this path does not expose the requesters to the contracts, they will not be used. When the contract coverage is low, it can have two reasons, it can be that the quality of the contract is very low, or that people just do not use the contracts. It is very hard to	
	measure if the quality of the contract fits the business requirements well, it can be a good solution to involve the business when negotiating a contract to make sure that the right	

things are being negotiated, and that it fits the business' needs. After this, it is important to get some visibility on the different areas of spend to see where the contract compliance level is the lowest. Within these areas, it might be the case that people think that they know best how to buy the products or services (for example with travel). It is then useful to sit together with these commodities, and make some clear agreements.

Notes and comments

As already said, the spend in SMART2 needs to be assigned to a contract identification number that all contracts get (also the contracts at ORU level) in eCM.

All the PIs that were mentioned multiple times during the interviews are now discussed. The remaining PIs are: AP overdue, channel compliance, first time right shopping carts, catalogue percentage, usage of preferred suppliers, and the total number of suppliers used in the last month. From these PIs, only the usage of preferred suppliers is taken as a KPI for the PMS. AP overdue is not taken as a KPI, since it is a clear Finance measure, and it has a lot of overlap with on-time payment. Channel compliance and catalogue percentage have a lot of overlap, and are not taken into account, since there are currently no clear channel strategies, and they are partly covered by contract coverage (when a contract contains for example catalogue items). Additionally, these two PIs are actually only important for the commodity cluster IND, as this cluster is the most suitable to buy goods via a catalogue. Also, catalogue percentage as a PI itself does not really give any information, since not all products can be bought via a catalogue, therefore, you should measure how much spend could have gone via a catalogue, which is very hard to measure. First time right shopping carts is already partly covered in the user satisfaction PI, since the shopping cart will not be right the first time if the users have a hard time understanding the SRM system correctly. The total number of suppliers used in the last month is already partly covered by the KPI 'the number of supplier per 1 million euros spend'.

The usage of preferred suppliers is supplementary to contract coverage, and also shows how well IMS Procurement is connected with the business, because a low percentage of preferred supplier usage can indicate that IMS Procurement is not providing the right preferred suppliers to the business. This disconnect is a result of working remotely as Procurement Department, and therefore the alignment between IMS Procurement and the business needs extra attention.

Preferred suppliers usage		
Preferred suppliers are suppliers that are marked as a 'preferred supplier' on their contract, and		
are listed in the PPG.		
Purpose	This measure has multiple purposes. The first purpose is to show how many of the preferred suppliers (in the PPG) are actually used when buying a product or service. The second purpose is that this measure can give an indication of how well the list of preferred suppliers in the PPG suits the business requirements.	
Relates to	Relates to the objective: compliance with internal controls	
Formula	The formula is:Number of unique VGUs (from the PPG) used in the last 12 monthsTotal number of unique VGUs in the PPG	

Table 13 - Preferred suppliers usage



Period

The data from the last twelve months should be taken into account for this PI, because of seasonality influences where some suppliers might be only used for some products in a specific period of time.

Internal benchmark	
	Preferred
	supplier usage
Α	20.6%
В	6.2%
С	7.3%
D	20.8%
E	16%
F	2.4%
G	12.9%
н	1.3%**
Average	10.9%

Target

*Data from September 2014 until August 2015, including all commodities **H does not have its own preferred suppliers list, however the preferred suppliers that are valid for the USA and for North-America are also valid for this ORU.

External benchmark

An external benchmark is quite hard for this PI, since most companies look at spend that went via the preferred suppliers and do measure the percentage of preferred suppliers used in the last year. However, this would be almost the same as the previous KPI, Contract Coverage, where you measure the spend that went via a contract, which PL has with every preferred supplier.

Suggestion for a target

Since the internal benchmark for this KPI shows very low percentages, and an external benchmark was not available, the suggestion for the target of this KPI is based on common sense, and is set at 50%

Frequency	This indicator should be measured and reviewed every month.	
Who measures	Since the CRG is specialized in making reports about purchasing KPIs, they should be responsible for all the KPIs of this PMS.	
Source of data	The raw data for the number of suppliers used in the last month should be retrieved from SMART2 and the preferred suppliers list can be retrieved from the PPG.	
Who acts on the data?	The IMS Excellence team should act on the data if the performance is low. Every person within this team is assigned to a different market, to serve all the ORUs of PL. This could already increase the alignment between IMS Procurement and the business. The IMS Excellence team should reach out to the PSSC for help, as they are the owners of the PPG.	
What do they do?	If this KPI shows a low value, it can have two reasons. It can be that the requesters are not aware of the preferred suppliers in the PPG, and just choose whatever supplier they think is suitable. In this case, the requesters need to be trained in using the PPG. It can also be that the preferred supplier list does not fit the business needs, in this case, the list needs to be adjusted and updated according to the needs of the business. Overall, the number of preferred suppliers in the PPG must be reduced tremendously.	

To guide the requesters automatically to the right preferred suppliers, a good channel strategy can be used as well (The Hackett Group, 2009).

Notes and comments

Now, all the PIs mentioned during the interviews are discussed. On the Internet, a lot of additional KPIs used by companies can be found. There are for example several top 10 KPI lists for Procurement, for example the list of Susie West, the CEO and founder of sharedserviceslink.com, who offered a list with the top 10 KPIs to measure the health of your purchase-to-pay organization (West, 2012). The list is as follows:

- 1. Cost-per-purchase invoice
- 2. First-time match rate
- 3. Payment on time
- 4. Productivity per FTE (full-time equivalent staff member)
- 5. Touchless invoices
- 6. Discounts captured
- 7. Number of suppliers per 1,000 invoices
- 8. Spend under purchase order
- 9. Days paid outstanding
- 10. Percentage of invoices in query

The Hackett Group showed in their studies that best-in-class companies measure at least four of these: Productivity per FTE, Cost-per-Purchase Invoice, First-time Match Rate and Payment on Time (The Hackett Group, 2009). As can be seen from the list, the KPIs 2, 3, 7, and 8 are already covered in the PMS for PL IMS Procurement. Cost-per-purchase invoice and Productivity per FTE are less relevant for this PMS, as PL outsourced the operational tasks of the P2P process, and only pay a fixed amount per shopping cart (and not per hour). Touchless invoices and percentage of invoice in query will not be added either, as these are overlapping with the KPI 'Invoice Matching Rate'. Discounts captured is basically the same as savings, which is very important for Procurement, however it is not a relevant KPI for the P2P process itself, as the savings are normally captured before the P2P process (see the E2E process cycle in Figure 4). Days paid outstanding is the same as Payment Terms, which is also very important for Procurement, however it is less relevant to measure and compare at ORU level, and should be done at a higher level. We decided to not add any other KPI from the literature and the Internet to the dashboard, as the current set of KPIs are already the most important ones and cover the overall performance of the P2P process well.

By filling in these record sheets for all the PIs, all the PIs fulfill the S.M.A.R.T. goals, which are discussed in Section 3.2. The record sheet is *specific* for every KPI and tells you what is expected, why it is important, who is involved, where it is going to happen, and which attributes are important. The 'formula' element shows that the KPI is *measurable*. The 'who measures' element makes sure that the KPI is *assignable*, and that it will be measured. The target element shows that the target is *realistic* to achieve and that it is *time-related*. Additionally, all the KPIs comply with the 18 other criteria that are selected in Section 3.2, these are discussed in more detail in Appendix VII. As can be seen, Recommendation 19 did not necessarily have to be excluded, as all KPIs fulfill this criteria.



4.4.1 Conclusion

In this section, the KPIs have been selected for the PMS based on the interviews with stakeholders at different levels of the organization. The KPIs that have been selected are shown in Table 14, where they are sorted based on their category, relating to one of the strategic objectives.

As can be seen, there are only two KPIs in the efficiency category, and four and three in respectively effectiveness and compliance. Efficiency indicators show how well the available resources (people, machines, and money) are used to realize the output, other possible PIs in this category were more about process costs and savings, which do not fit within this PMS. However, cycle time is the perfect indicator to show if the P2P process is efficient or not. Additionally, the compliance indicators are also about efficiency.

Efficiency	 Cycle time Requisition-to-order time Invoice-to-approval time
	2. Internal user satisfaction (SRM usability)
	3. On-time payments
Effectiveness	4. Number of suppliers per 1 million euros spend
	5. Invoice matching rate
	6. PO compliance
Compliance with internal controls	7. Contract coverage
	8. Preferred supplier usage

Table 14 - The selected KPIs

The targets for the KPIs are quite challenging, and the time-path to achieve them differs per ORU. We suggested an ambition for the first year for all ORUs, however, when the PMS is brought to practice, it should be checked per ORU whether these ambitions are feasible, and whether or not they should be adjusted.

It is quite hard to determine direct actions that should arise from the performance at the KPIs in the PMS, since a low score of a KPI can have multiple causes. Therefore, additional research is necessary to find out what causes the low score of a KPI. In Appendix VIII, an overview of the actions resulting from a low performance on a KPI is shown for multiple possible causes.

One thing that is really important for every KPI, is that it is very important to make all the people aware of them. All the people in the company, from strategic to operational level, need to know the effects and consequences of their actions. As Procurement, you cannot do something centrally and then just hope that everyone will comply. Also, the current performance should be shared throughout the whole organization, so everybody can see the current situation. This can have a positive effect on the compliance results.

In the next section, the design of the PMS dashboard with the selected KPIs is shown.

4.5 Design of the PMS dashboard

"A well-designed dashboard must have an aesthetic appeal and deploy powerful visualization to convey a wealth of information within a limited space" (Malik, 2005, p. 45). Malik (2005) mentioned several key elements, which are important for the design of a dashboard, including the following:

- Screen graphics and colors;
- Selection of appropriate chart types;
- Optimal content placement/lay-out.

These key elements are now discussed for the PMS of PL IMS Procurement that is designed using the program Tableau. Tableau is a data visualization software created by Tableau Software. Tableau connects easily to Microsoft Excel or other data sources, and transforms the data quickly into interactive visualizations/dashboards.

Screen graphics and colors

Screen graphics and colors are most important when designing a dashboard, as users expect a much greater visual appeal from dashboard than from reports. It is important to use relatively neutral colors, and only use color when it is needed to serve a particular communication goal. Different colors should only be used when they have a different meaning in the data (Few, 2008). Therefore, all the graphs in the dashboard have the same colors for the targets: red and green. The target is where the red area becomes green (or the other way around). These two colors are chosen, since there will not be much confusion about these colors as the meaning is very clear to people (red representing poor performance, and green representing good performance). We choose to display the targets in this way, since it enables you to see how far an ORU is from the target. The use of only red and green puts more emphasis on reaching the target, since ORUs that are performing 'on average' are not acknowledged.

Selection of appropriate chart types

We choose to display all figures with the same lay-out, horizontal bars, instead of using different figures and tables for every KPI, to make the dashboard visually attractive and consistent. The horizontal bars and dots represent the performance of the current month. A horizontal bar is used when the result of a KPI is displayed in percentages, and a dot is used when the result of a KPI displayed with a number. Additionally, the value is written above the horizontal bars and dots. The performance of last month is also added to the figures, and is represented by a thick black dotted line. This line is added as a reference line to see if the ORUs are performing better this month. We choose to not display the performance of multiple months, for example the performance of the whole year, since the graphs will become very big in this way, which causes that the dashboard cannot be displayed in one overview anymore. More on the limited content and the lay-out of the dashboard is discussed in the next section.

Optimal content placement/lay-out

It is very important that a dashboard contains limited content, as you do not want to overwhelm the user (Malik, 2005). Few (2006) recommends that the dashboard fits on a single page or screen. Taking this into account, we designed the dashboard with the eight selected KPIs and placed them on a single page, so you



can see an overview at a glance. The three different categories, efficiency, effectiveness and compliance, are central in the dashboard, and all the KPIs are categorized into one of these three categories. These three categories are symmetrical and displayed in equally sized boxes, to maintain an effective visual presentation.

In Figure 14, an example of the dashboard for the ORU A is shown. This is not the final design of the dashboard, as it still needs to be verified in Section 4.6. Since not all data is available yet, most of the numbers in the example dashboard are fictitious.



Figure 14 - PMS Dashboard

4.6 Verification and validation of the PMS

The next step is to check whether the PMS as a whole is correct. Model verification and validation can be used to increase the credibility of a model.

Verification of a model is about ensuring that the model does what it is intended to do. There are several techniques to check this, for example anti-bugging or structured walk-through (Obaidat & Papadimitriou, 2012). Anti-bugging means including additional checks and outputs in a model that may be used to capture possible bugs. Structured walk-through means that you explain the model to another person, and while doing that, you might focus on different aspects of the model and discover problems with its current implementation.

Validation is about determining if the model is a reasonable and accurate representation of the actual system/reality. However, in practice it can be difficult to achieve a full validation of a model, especially when the system does not yet exist. There are several approaches that can be applied to validate a model, including expert intuition, and real system measurements (Obaidat & Papadimitriou, 2012). Expert intuition is similar to the structured walk-through of model verification, however, ideally the examination should be led by an expert with respect to the system (rather than the modeler). Real system measurements

can be done by comparing if the input values, output values, and system behavior of the system match with the ones observed in the real world. This is the most reliable way to validate a model, however it is very time-consuming and expensive.

For the PMS of PL IMS Procurement, only an initial verification can be done based on the example PMS dashboard of Section 4.5, as the real PMS is not yet implemented. A validation of the whole PMS cannot be done, as most of the data is not available yet. Therefore, the PMS dashboard is verified by a structured walk-through with the Commodity Cluster Leader of Industrial and Real Estate. While explaining the dashboard to him, it turned out that the dashboard is not self-explanatory enough when you look at it for the first time and therefore, a legend is added to explain the targets, and the current and past performance. Overall, the dashboard contained the right KPIs to illustrate the overall performance of an ORU on the P2P process, and he thought that the dashboard was visually attractive. Something else that emerged was that besides showing the performance at ORU level, the model should also be able to show performance per commodity cluster. After this comment, a selection box is added at the top of the dashboard. After this verification, the dashboard was improved, and the final design can be seen in Figure 15 (a larger version of the dashboard can be found in Appendix IX).



Figure 15 - Final design PMS dashboard

4.7 Conclusion

This chapter provided an answer on Sub-question 3: '*How should the PMS for the P2P process be designed?*' The chapter started with a selection of the stakeholders of the P2P process. All stakeholders are valued as



equally important and therefore, the needs and requirements of all stakeholders are taken into account with the selection of the KPIs for the PMS. During the interviews, the stakeholders recommended several PIs to measure in the P2P process, which can be seen in Table 4. After the interviews, the KPIs for the PMS were selected, based on these interviews and taking into account the literature of Chapter 3. The eight selected KPIs are the following:

- 1. Cycle time
 - a. Requisition-to-order time
 - b. Invoice-to-approval time
- 2. Internal user satisfaction (SRM usability)
- 3. On-time payments
- 4. Number of suppliers per 1 million euros spend
- 5. Invoice matching rate
- 6. PO compliance
- 7. Contract coverage
- 8. Preferred supplier usage

All the KPIs were categorized according to one of the following strategic objectives, which is also incorporated in the PMS dashboard: increase process efficiency, increase process effectiveness, and maintain compliance with internal controls. If the ORUs are scoring below the target on certain KPIs, direct actions must be taken, which can be found in Appendix VIII. Thereafter, the PMS dashboard was designed with the selected KPIs, and the model is verified through a structured walk-through with the commodity cluster leader of Industrial and Real Estate, who will use the dashboard in the future to see how the ORUs are performing on his clusters. The validation of the model could not happen yet, as most of the data is still missing. The final design of the dashboard can be found in Figure 15.



5. Guideline on how to implement the PMS, and work with it

In this chapter, sub-question 4 '*How should PL IMS Procurement implement the PMS, and work with it?*' is answered. The model of change of Lewin (1951) is used to describe the stages that PL IMS Procurement need to follow in order to implement the PMS successfully. Additionally, some recommendations are made on how PL IMS Procurement should work with the PMS.

5.1 The implementation of the PMS

To implement the PMS and work with it, a change in the organization of PL IMS Procurement is required. The PMS needs to be incorporated into daily management of the organization, otherwise no follow up will take place when the PMS shows underperformance for an ORU. A classical approach for change management is the model of Lewin, which consists of three stages: 'unfreezing', 'changing', and 'refreezing' (Lewin, 1951). Lewin suggests that to in order to manage change processes, an organization must 'unfreeze' its current state into a neutral position, so that old behavior can be unlearned and new behavior can be adopted successfully (Lewin, 1947). Rather than describing in detail what the company needs to do to bring about change, the model explains the stages that the organization needs to follow to implement the PMS successfully, on a high level. The strength of the model of Lewin is its simplicity, and the fact that it is really easy-to-understand and use (Levasseur, 2001). For these reasons, we choose this model to describe the stages of the implementation of the PMS of PL IMS Procurement in the next sections.

Stage 1: Unfreezing

The first stage is the unfreezing stage, where the organization prepares for the change. In this stage, the need for the PMS within PL IMS Procurement needs to be recognized. This research already contributes to this, by showing the lack of insight into the current performance of the P2P process. The worrying performance results can be used to show everyone the need for improvement, and to explain them that a PMS can be a first step to achieve this. It is not enough to just tell people about the proposed change to ensure success. One of the fundamental principles of effective change management is that active participation by the affected parties in the change process is the most important element of change (Levasseur, 2001). This was also one of the reasons to include the opinion of all stakeholders in the design of the PMS. The main idea is that when the stakeholders know more about the change, and they also feel that it is necessary and urgent, the more motivated they are to accept the change. For the implementation of the PMS for PL IMS Procurement, there is no resistance expected, as it became clear from the interviews during this research that the employees are willing to change and improve the organization. This is mainly due to the fact that the existing challenges in the process ensure a lot of frustration among the employees, and since the PMS is a first step in solving these challenges, they will accept it (as long as they will remain involved). Moreover, the view of all stakeholders, at all levels of the organization, was taken into account when selecting the KPIs.



Stage 2: Changing

The second stage is where the PMS and related procedures are implemented. Despite the popularity of performance measurement tools, not all initiatives are successful. A lot of companies fail to implement and use their PMS (Bourne et al., 1999; Hudson, Smart, & Bourne, 2001; Lewy & Du Mee, 1998; McCunn, 1998; Neely & Bourne, 2000; Schneiderman, 1999). Multiple causes for this that can be found in the literature, including the following:

- The organization is in an unstable phase (Bulthuis, Mijland, & de Waal, 1998);
- Lack of management commitment (Brignall, 2002);
- The current IT system does not support the PMS adequately (Gates, 1999);
- There are insufficient resources and capacity available for the implementation (Bourne, 2001).

The first reason shows that when a company is in an unstable phase (such as a reorganization), it is not a good idea to implement the PMS. This is one of the main reasons for not implementing the PMS during this research, as Philips is in the middle of a split, and the management has no time to spend on the implementation of the PMS, which would immediately result in the second reason for failure, a lack of management commitment. The implementation of the PMS should therefore be postponed until the split is realized. The two other causes are insufficient resources and capacity, and an IT system that does not support the PMS adequately. How to deal with these problems during the implementation of the PMS for PL IMS Procurement is explained in more detail in the next sections.

We divide the actual implementation into four phases, prepare & plan, design, validate and deploy, based on the Signature Methodology of the business software company Epicor (2013), which can be seen in Figure 16. Many of these models can be found on the Internet, however, since they are all very similar, we simply choose the model of Epicor (2013).



Figure 16 - Signature Methodology (Epicor Software Corporation, 2013)

Prepare & plan

First, the project must be initiated, and a project team needs to be established that will be responsible for the full implementation of the PMS. This project team should be composed with people from different departments, including the Procurement, Finance and IT department. Employees from the Procurement and the Finance department should be part of the team, since these departments are both involved in the P2P process. The IT department needs to be involved to design the PMS in an IT system. Instead of using the internal IT department, PL IMS Procurement can also choose to hire external SAP consultants. All roles and responsibilities within the team need to be made clear, so people know what they can expect from each other. After this, the scope, objectives and requirements for the implementation of the PMS need to be set. The scope of the project should be IMS Procurement, including all the commodity clusters. The main objective of the implementation of the PMS is to create insight into the overall performance of the P2P process. The requirements for the IT system are discussed below. A time planning can help to manage the implementation. A proposal for a planning can be seen in Figure 17. We recommend to start the implementation of the PMS one month after the split is realized. It is very important to plan your resources (people, time, and money) carefully, since a lack of resources and capacity is one of the main causes for a failing implementation of a PMS.

Subsequently, a suitable IT system must be chosen that will support the PMS adequately. PL is reducing the number of systems that they bring to the new company, which is a good thing, since all information is currently being retrieved from different systems. According to Malik (2005), the system must meet the standards of any good software, which include the following:

- Fast response: the user should not experience any delay in retrieving their dashboards and reports;
- Intuitive: the user must understand the dashboard without a mandatory training;
- Web-based: the user should be able to access the dashboard via the Web (Philips Intranet), with the necessary access rights;
- Secured: the system must provide data encryption to secure sensitive data transmission across the Internet, also the system administrators may administer software security easily to track wrongful access;
- Scalable: the software must be able to access a large number of users without crashing or slowing down, this requires a reasonable hardware and network bandwidth;
- Industry compliant: the software should integrate with the standard databases of different vendors, and work with different server standards and operating systems;
- Open technology: the software should work well with prevailing protocols for information exchange, for example XML, ODBC, JDBC, OLE DB, JMS, and Web Services;
- Supportable: the software should simple enough to manage a large deployment within the existing IT staff with limited training on the software;
- Cost effective: the implementing and licensing costs of the software should be lower than the financial advantages of the PMS.

The system that will be chosen for the PMS should fulfill these standards as well. Additionally, the software should be able to show the graphs in the dashboard, and have the possibility to use filters on the data.

As already said, it is very important to keep the users informed about the implementation and to involve them as much as possible, since they have to work with the PMS.

The prepare & plan phase should last approximately two months, since it is very important to plan the project carefully and to select the right system.

Design

The design phase consists of the actual creation of the PMS in the selected IT system. This can be executed either by the internal IT Department of PL, or by external SAP consultants. Since the IT system is not selected yet, no recommendations can be done on how to design the PMS in the selected system. The design phase should not last more than two months.

Validate

Since the PMS is not yet validated, due to the lack of data and time, real system measurements need to be done in order to validate the system. This needs to be done by a process expert together with an IT expert. Additionally, the user acceptance needs to be tested. User acceptance testing involves stakeholders from outside the project team, and is a way of validating if the PMS meets the user requirements within the users' environments before the system is actually deployed (Atkins, 2009). A pilot can be done with the PMS at one specific ORU, to see how the users are experiencing the system, and to make some last improvements before continuing to the next phase. This phase may last approximately three months, as it is very important that the PMS is thoroughly validated.

Deploy

After the improvements resulting from the pilot, the PMS can go live. The next step is to train your endusers in how to use the PMS, as this is critical for the success of your implementation. It is also important to train the CRG in how to create the reports, as they are responsible for the creation of the dashboard every month. The deploy phase should last approximately one month, depending on the number of training sessions that are required. After the deploy phase, the refreezing stage of Lewin (1951) will start, where the PMS needs to be incorporated into the regular work.



Figure 17 – Planning for the implementation of the PMS

Stage 3: Refreezing

The last stage, refreezing, is where the recently implemented PMS needs to become part of the regular work. In this stage, the project team needs to work closely with the people in the organization to enhance the new system. Successful refreezing requires a commitment to remain actively involved until the new, required behaviors have replaced the old ones. In the refreezing phase, it is important to offer support and training,

and to celebrate success as well. Positive acknowledgements and rewards of individual efforts will reinforce the new state, as it is very likely that this behavior will be repeated.

5.2 The use of the PMS

After a successful implementation, the PMS can finally be used to continuously control and improve the overall performance of the P2P process. However, to actually use the PMS, several aspects need to be taken into account.

First, there are some general things that need to receive some attention. The first thing that needs to happen is to see whether the targets and ambitions are feasible for every ORU. In Chapter 4, we suggested an ambition to reach the target for the first year for all ORUs, however, it can be that these ambitions are not really feasible for a specific ORU, and that they need to be adjusted. It can also be that next year, it turns out that last years' ambition to reach a target was too ambitious, then, the target and ambition need to be revisited as well, as they should be achievable, but still remain challenging. It can be difficult for an ORU to focus on all eight KPIs at the same time. Therefore, it might be a good idea to focus on a selection of KPIs first, and try to improve them. As the compliance KPIs are the foundation of being efficient and effective, it might be a good idea to focus on these KPIs first. The P2P Key Issues Study of the Hackett Group confirms this, saying that compliance, both internal and external, is P2P's most critical priority (The Hackett Group, 2015).

Another important thing is that the management team is committed to the PMS during and after the implementation. If the management team does not intend to use the PMS, or is not committed to provide the necessary support during the implementation, the chances of success are limited. Also, when the management team has other priorities, and is not fully behind the PMS, other employees will also not continue to use the PMS, and the PMS will turn out to be a failure (Holloway, de Waal, & Counet, 2009). However, we do not expect that the management team will not be committed, considering that this research has been requested by the management team of PL IMS Procurement.

There are some other important aspects that need to be done more frequently. For example when the PMS is used in practice, it is important that when the performance of a KPI for a certain ORU is below target, the corresponding actions are taken by the IMS Excellence team. An overview of the direct actions can be seen in Appendix VIII. It is very important to follow up on the outcome of the PMS, to stimulate improvement. Also, when the results are above the pre-determined targets, a positive feedback needs to be given to the ORUs and the commodity clusters to acknowledge the good/improved performance, and to encourage them to continue in this way.

Another important thing is to organize (monthly) review moments where the results of the dashboard at ORU level are discussed with the ORU managers. It is important to involve the ORUs, as they are the ones who execute the P2P process. Make sure that the ORUs are aware of the goals and measures of the PMS. Shared objective and performance measures have led to more formalized ties between business units, resulting in increased compliance to policies and a reduced overall cost structure (Visa U.S.A. Inc., 2002).

Creating awareness at ORUs can be done by showing for example print screens of the dashboard with the monthly performance on visual boards in the corridors of the buildings of an ORU. In this way, people are directly confronted with the performance of their ORU, and this can result in a higher motivation to contribute to the performance of the ORU. Banker et al. (1993) argue that performance feedback is also necessary for employees to relate their behavior and decision to outcomes.

5.3 Conclusion

In this chapter, the sub-question '*How should PL IMS Procurement implement the PMS, and work with it?*' is answered. The approach of Lewin (1951) for change management is held in order to organize the stages that need to be followed in order to implement the PMS. The first stage is the unfreezing stage, where the need for the PMS needs to be recognized, and where the organization needs to prepare for the change. Active participation of the employees is recommended, to reduce the likelihood of resistance. In the next stage, changing, the PMS is actually implemented. A good IT system needs to be chosen, which needs to fulfill the criteria of Malik (2005). After designing the PMS in the selected IT system, the PMS needs to be validated. An implementation plan can be found in Figure 16. The last stage is refreezing, where the company needs to start working with the PMS, and try to make it part of the regular work. It is very important to guide and train the employees well, and to share the results of the dashboard with the ORUs, in order to create more acceptance and awareness for the PMS.

6. Conclusion and recommendations

This last chapter starts with the conclusion that can be drawn from this research, where all sub-questions are addressed. The chapter continues with describing the limitations of this research in Section 6.2, and ends with several recommendations for the company in Section 6.3.

6.1 Conclusion

The research question of this research is '*How can insight be created into the overall performance of the P2P process of Philips Lighting IMS Procurement?*' In order to answer the research question, a PMS is developed that gives insight into the overall performance of the P2P process of PL IMS Procurement, and that PL can use to continuously control and improve the performance of the P2P process. To design the PMS, and to answer the research question, four sub-questions have been developed, which are answered below.

The first sub-question of this research was '*How are the current P2P process and its performance measurement organized?*' The P2P process can be divided into four sub-processes: requisitioning, purchasing, invoice handling, and payment. Within the current process, a lot of things are already measured by different parties. Unfortunately, there exist a lot of challenges and bottlenecks as well. The challenges that arise from the current process are:

- No use of the PPG (by requesters)
- No use of preferred suppliers
- No link between systems
- A lot of CLOGS-codes
- A lot of time to correct the shopping carts (by TSSC)
- Long approval times
- Relatively low compliance level
- No process ownership

The challenges that exist in the current performance measurement are the following:

- Unclear what is really important to measure; too many PIs
- A lot of not updated exclusions
- Inaccurate calculation of PIs
- Lack of clear targets for PIs
- Inaccurate definitions of PIs

The creation of the PMS solves the challenges that exist in the current performance measurement, since the PMS focuses on eight KPIs, which are very important to measure, and have an accurate definition calculation, a clear target, and only a few exclusions. The challenges that exist in the current process on the other hand, make it even more necessary to have insight into the overall performance of the P2P process, and some recommendations on how to solve them are given in Section 6.3.

The second sub-question was '*How can a PMS be created for the P2P process according to the available academic literature?*' There is a lot of literature available about performance measurement and PMSs. The

method of Andersen and Fagerhaug (2002) was chosen as a guideline to design the PMS of PL IMS Procurement. However, the last step of their model, the implementation of the PMS, is not part of this research, due to time constraints. Several criteria for good PIs arose from the available academic literature, and all the KPIs of the PMS fulfill the S.M.A.R.T. criteria of Doran (1981), as well as the 18 selected recommendations of Neely et al. (1997). Also, all KPIs are described according to the adjusted performance measure record sheet of Neely et al. (1997) to ensure that the KPIs are good performance measures, and that they satisfy most of the recommendations of Neely et al. (1997).

The third sub-question of this research was '*How should the PMS for the P2P process be designed?*' The needs and requirements of the stakeholders of the P2P process were taken into account when selecting the following KPIs for the PMS:

- Cycle time
 - Requisition-to-order time
 - Invoice-to-approval time
- Internal user satisfaction (SRM usability)
- On-time payments
- Number of suppliers per 1 million euros spend
- Invoice matching rate
- PO compliance
- Contract coverage
- Preferred supplier usage



Select Month 🕞 Select ORU 🕞 Select Commodity Cluster 🕞



Figure 18 - Final design PMS dashboard

All the KPIs are categorized into the following categories: efficiency, effectiveness and compliance, and the final design of the dashboard can be seen in Figure 18. The efficiency KPIs make sure that the P2P process is performing fast, whereas the effectiveness and compliance KPIs are more focusing on the alignment of IMS Procurement and the ORUs. The model is verified by the commodity cluster leader of Industrial and Real Estate, who will use the PMS in the future to see how the ORUs are performing on his clusters. Unfortunately, the validation of the model could not happen yet, as most data is still missing and the implementation of the model will not happen until next year.

The last sub-question was 'How should PL IMS Procurement implement the PMS, and work with it?' The implementation of the PMS should be postponed to March, 2016, due to the split. To achieve a successful implementation, three phases need to be passed according to the change model of Lewin (1951): 'Unfreezing', 'Changing' and 'Refreezing'. The first stage is the unfreezing stage, where the need for the PMS needs to be recognized, and where the organization needs to prepare for the change. Active participation of the employees is recommended, to reduce the likelihood of resistance. In the next stage, changing, the PMS is actually implemented. An implementation plan can be found in Figure 17. The implementation can be divided into four phases: 'prepare & plan', 'design', 'validate', and 'deploy'. In the prepare & plan phase, the project must be initiated, and a project team should be composed with people from different departments, including Finance, Procurement, and IT. Subsequently, a good IT system needs to be chosen, which needs to fulfill the following criteria of Malik (2005): fast response, intuitive, web-based, secured, scalable, industry compliant, open technology, supportable, and cost effective. The next phase is to design the PMS in the selected IT system. In the following phase, the PMS needs to be validated. Several methods of validation should be performed, including a user acceptance test, and a pilot at ORU level. In the last phase, the PMS can be implemented and the employees should be trained. The last stage of the model of Lewin (1951) is refreezing, where the company needs to start working with the PMS, and try to make it part of the regular work. Several aspects need to be taken into account, which are the following:

- Check whether the targets are feasible for every ORU;
- Select KPIs that you want to improve first;
- Make sure that the management team stays committed to the PMS (during and after implementation);
- Organize review moments with ORUs;
- Make performance visible at ORU level (print screens of the dashboard in the corridors).

If it turns out that there exists some resistance among the employees to work with the PMS, then this means that not everybody is working towards a common goal, and the management team should really try to make the employees feel involved (by for example sharing and discussing the results with them, and asking them for improvement opportunities), and make sure that everybody is working towards the same goals, and that they also understand the rationale and the urgency of these goals.

When the implementation of the PMS next year is successful, PL IMS Procurement can start using the PMS to continuously control and improve the performance of the P2P process, and solve the challenges that exist within the current process. In the end, this will save PL IMS Procurement a lot of time and money. The more



mature the P2P process becomes, the more time can also be spent on strategic activities, witch positively correlates with cost savings (Úbeda et al., 2015).

6.2 Limitations

A limitation of this research is that the PMS is designed looking from the commodity clusters Industrial and Real Estate, however all commodities have different ways of working. This might cause that the PMS does not work properly for every commodity cluster. It can also be that some commodity clusters would like to see other or additional KPIs in the PMS. Additional research is needed to investigate this.

Another limitation of this research is the fact that the PMS could not be validated during this research, due to a lack of time and data. The validation of the PMS should therefore be done by the company itself, after the implementation of the PMS next year.

6.3 Recommendations

In this section, several recommendations that resulted from the observations during this research, are given. The first recommendation is stay focused to a few good metrics (like the ones selected for the PMS), and not to add a lot of other PIs. It is very important to remember why you are measuring what you are measuring, and to make sure that your employees are also aware of this.

Another recommendation is not to create a lot of loopholes in the process, meaning that you allow (a lot of) exceptions. This does not mean that you cannot have any exceptions, but we recommended to include these special circumstances in the process documentation. For example in case of an emergency, it can be recognized that the goods or services may need to be ordered without the delay of a formal process, but you need to insist that justification with appropriate approval is submitted after the emergency. In these cases, it is much easier to monitor the amount of maverick buying. It should never be easier to bypass the process than to follow it.

Several challenges that exist in the current process are identified during this research, and these challenges confirm the need for insight into the overall performance of the P2P process. As already said, this research did not aim at solving these challenges, however, these challenges should not be forgotten and require more attention. Therefore, we will give some recommendations on how to solve these challenges, but we advise to do additional research into them. The challenges in the current process were the following:

- 1. No use of the PPG (by requesters)
- 2. No use of preferred suppliers
- 3. No link between systems
- 4. A lot of CLOGS-codes
- 5. A lot of time to correct the shopping carts (by TSSC)
- 6. Long approval times
- 7. Relatively low compliance level
- 8. No process ownership

To solve the first challenge, the use of the PPG needs to be increased, as now a lot of requesters are not even aware of its existence. A way to achieve this, is to make the P2P process more intuitive and simplified, so that requesters will automatically be guided to the preferred sources of supply and buying channels. Not only will this increase the use of the PPG, it will also increase the use of preferred suppliers that are listed in the PPG, which also is the second challenge. Previously, we showed that the usage of preferred suppliers is currently only 10.9%²¹, and that a lot of additional suppliers are used. Additionally, a higher usage of the PPG will result in a higher channel compliance, and less time for the TSSC to correct shopping carts, which is currently taking more than 12 FTE (Challenge 5). A way to make the process simpler, is to reduce the number of CLOGS-codes (Challenge 4), and the number of options in the SRM system. It can also be that the requesters do not understand the purchasing process well enough. In this case they need a training, since no one in the organization should be able to order goods and services without a proper training. The third challenge is that the systems within Philips are not linked well. PL is already reducing the number of systems, therefore we recommend to not add a lot of systems over the years, and to link the systems as much as possible. Additionally, this can ensure that the data for the PMS does not have to be uploaded to the PMS manually anymore, which was the main reason why we excluded Recommendation 17 of Neely et al. (1997) in Section 3.2. To solve Challenge 6, the approval flow should be made as easy as possible, as it is now taking more than a week to approve a shopping cart with a value above 2000 euros. To make the approval as easy as possible for the approver, he should for example be able to use his mobile phone to approve a request. Additionally, the number of approvers per shopping cart could be reduced, as this will reduce the approval time a lot. However, it is very important that the controls of the approval process are not affected. In general, the more dynamic and flexible your approval process is, the better. Therefore, it is a good idea to re-evaluate the whole approval chain. The low compliance levels, which is Challenge 7, can be improved by re-evaluating the approval chain as well. When the process takes less time, people have less reason to bypass it, which will increase the PO compliance level. Another way to increase the compliance levels is to set consequences for the people who are being non-compliant. For the last challenge, we recommend that the P2P process has one owner that takes responsibility for the whole process, including the procurement and finance part. According to the P2P study of the Hackett Group, 61% of the top performing companies has a designated P2P owner that is accountable for the whole end-to-end process, or there is a very high level of coordination between Procurement and Accounts Payable (The Hackett Group, 2009). Since the first part of the process has the largest influence on the performance of the process as a whole, it would be logical that the responsibility lies within Procurement. Given all these challenges, it is very important to solve them, as they are causing a lot of frustration among the employees. Furthermore, a lot of (additional) savings can be secured for the company when these challenges are solved.

It can happen that the strategic objectives of PL change, as PL is currently in an unstable phase. This could lead to different KPIs for the PMS. It is therefore recommended to review the selected KPIs, once the company is in a stable phase. This was also the reason to exclude Recommendation 12 of Neely et al. (1997) for all KPIs. Also, when KPIs reach an acceptable level of performance and stay at this level for some time,

 $^{^{\}rm 21}$ The average of the internal benchmark with the eight selected ORUs

the KPIs of the dashboard need to be reviewed, to check whether there are other important aspects that need attention and therefore need to be included in the PMS.

The final recommendation for PL IMS Procurement is to show the importance of procurement to the entire company. Within Philips, there is currently a Chief Procurement Officer (CPO), however in PL, there will no longer be a CPO, and Procurement will be reporting into Operations again. To show the importance of Procurement, it might be a good idea to not only communicate the performance (of the PMS) to the operational level, but also to the strategic level. The performance needs to be integrated into the corporate reporting system, to make the executive committee aware of the contribution of Procurement is a central aspect in order to receive attention as a strategic function. Communication of the performance results throughout the company enables Procurement to participate in the strategic debate of the company (Carter & Narasimhan, 1996). Also, the perceived strategic importance of Procurement of the other internal functions can be crucial for the overall strategic integration (Paulraj, Chen, & Flynn, 2006; Tassabehji & Moorhouse, 2008). Concluding, the impact of Procurement has to be made known at all different levels within the organization in order to be acknowledged.



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Appendix I – IX

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