UNIVERSITY OF TWENTE.

Value Management governance & project selection at Philips Lighting

A purchasing perspective

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PHILIPS

sense and simplicity

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A purchasing perspective

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I have been working at the purchasing department of Philips Lighting, writing and investigating the way of working within the company. It has been a time full of learning and new experiences. The purchasing department is in the middle of a change towards a more empowered department within Philips Lighting. I remember Albie van Buel and Rene Reumkens as two inspiring leaders who motivate people and give, together with their colleagues, structure to the organisation. I would like to thank my colleagues at Philips for their support and interest in my project. I would like to give a special word of gratefulness to Rene Reumkens and Theo Rutjes for their help on value management, the interesting discussions and our work together on the implementation of value management within the organisation.

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Last but not least I have to thank my friends and family for their moral support. It has been a busy time for me, but all of them gave understanding and support. A special word of thanks goes to my girlfriend. I should apologize for the time I could not spend with her, even after finalising this report.

I hope you enjoy reading this report and find the subject as interesting as I do.

MANAGEMENT SUMMERY

This research has investigated the current value management practice of Philips Lighting. Value management at Philips, which is recently introduced at the sector Lighting, is a management program to increase the margin of Philips products by applying systematic tools and approaches to find solutions that increase value, reduce costs, or eliminate unnecessary value. It is expected that value management can help the organisation to perform better in terms of larger margins on its products. There is no clear structure in the value management process and its performance. This was the major reason to start this research.

The first step was to identify the major problems. Three problems were identified. Firstly, there is no sector wide uniform policy for value management and there is no clear strategy to achieve the cost saving targets that are set. Only one business group has a structured value management organisation, while ownership is not taken in the business groups. Secondly, value management control takes not place. There are no clear value management targets or performance measurement. Thirdly, there is no formalised project selection. Projects for value management workshops are chosen arbitrary by one or two managers. Project selection is important in order to make optimal use of scarce value management resources. Following research question is formulated based on the identified problems:

How should Philips Lighting design the governance and the project selection of its value management program in order to realise a value management organisation that is able to control and monitor performance and where project selection is structured and based on grounded criteria?

The current value management practice of Philips Lighting is compared with theories on the value management, value management governance and the project selection of value management. Value management consists of four steps: project selection, the workshop preparation, the workshop execution, and the implementation of improvement opportunities. Value management governance should consist of four layers of management and performance can be controlled by input, throughput and output control. Top-management sponsorship is seen as an important tool to enhance commitment and empower the teams that are working on value management. Furthermore it is shown that horizontal coordination mechanism can help to increase integration of the program in the organization. Especially the use of cross-functional teams that have mandate is important. Finally, it is showed that the project selection should be structured using criteria that are in line with the firms' objectives and strategy.

The analysis between the current situation and the theoretical framework has identified the most important discrepancies. Six conclusions are made on the practice of value management by Philips Lighting:

1. There is no formal and consistent project selection, the workshop preparation phase is not structure and the implementation of improvements is not monitored. Theory argues that these steps should all be part of the value management process;
2. Value management practice is not integrated in the purchasing strategy development;
3. There is no formal value management structure, that should consist of four layers, in five of the six business groups;
4. Value management teams lack mandate and autonomy and value management participation is not always rewarded by management;
5. The current used value management control system of Philip Lighting is solely based on output control and margin improvement is not measured while it is the goal of the management program;

6. The current project selection criteria are limited to product cost and quantities, the project selection is made by one or few arbitrary selected stakeholders and there no procedure for the project selection process that considers all possible projects.

Recommendations are made based on the theory, the current situation and the analysis described in this research. Recommendations are made in five fields: (1) the value management program, (2) the purchasing function, (3) organisational integration, (4) value management control, and (5) the value management project selection.

Philips Lighting needs to structure and formalise its workshop preparation. The project leader should be supported by a value management coordinator that is assigned for every business group. The project leader is responsible for assigning the team, preparing all relevant information and setting a clear objective for the value management workshop on forehand. The value management coordinator is responsible for monitoring the status of the implementation of improvement opportunities that are the outcome of a workshop. This information should be communicated with the value management steering committee that consists of managers from the purchasing, marketing, development and other relevant departments of the business group.

Purchasing should remain driving value management and it is recommended to consider supplier involvement for every value management workshop. Value management has important impact on the purchasing function since changes in a product design leads to a different internal demand which leads to other possibilities on the supplier market. Value management practice should therefore be integrated in the purchasing commodity strategy development by including commodity team members in value management workshops and host workshops dedicated to the commodity teams Buy for resell (BFR) Ballast, BFR Luminaires, BFR Light sources, and OEM-ODM/EMS.

A value management organisation that should be introduced in all business groups is suggested (see Appendix H). The value management organisation is a virtual organisation besides the current business group structure and the structure is based on three layers. A value management coach for the Philips Lighting sector at the first level, a value management steering committee and a value management coordinator at the second level and a third level where a project leader is leading a value management team. A steering committee should at least consist of managers from purchasing, marketing and development. The integration of the product development function is important to ensure value engineering practice during new product development which is argued to be beneficial due to higher pay-back rates.

Literature has also shown the importance of mandate within the project team. It is therefore necessary to include at least one decision maker from all the important functions for a specific project which are trained as “level 1 value management Experts”. Furthermore it is recommended to ensure top-down sponsorship by the total value manager because this is expected to be an important tool to make sure that participation of employees in value management workshops is rewarded by direct managers.

It is concluded that the current Philips Lighting purchasing performance measurement system is too much focused on the purchasing department. Superordinate goals like ‘product margin’, ‘time-to-market’, ‘achieving new product introduction schedules’, and ‘cost avoidance’ can help the organisation to increase performance of cross-functional teams. Mutual agreement and consistent measurements from all functional areas are a boundary condition. It is recommended to start with team performance measurements for value management that are supported by all functional areas that are involved. Input control and output control are two control mechanisms that can help improve value management practice at Philips Lighting. Following input control measures should be used:

- Percentage of value management workshops with a clear objective
- Completeness of information packages
- Degree of multi-disciplinarity of value management workshop teams

Output control should be measured by the margin improvement of products. Cost prices should be confirmed by a cost engineer. Following output control measures should be introduced:

- Availability of plans for implementation
- The number of value management experts trained across the organizations.
- The value outcome measured by product margin improvement:
    - The product price improvement
    - Product cost savings and cost avoidance

It is recommended to introduce a structured value management project selection method. Six criteria that are derived from literature and confirmed by the Philips management are input for the project selection: 'Product becoming non-competitive', sales volume, the difference between cost and value (product margin), market growth, return on investment, and market share. The project selection should be done at two levels. A yearly meeting between the Philips Lighting sector management and Philips Lighting sector value management coach is used to determine strategic importance and identify large volumes to focus on certain areas (segments or business groups). A quarterly meeting of the steering committee at business group level is hosted to do the actual project selection for the business group or business unit. It is important that this group of managers has an overview over all product development and product improvement projects in order to take all possible opportunities for value management into account. More emphasis should be given to value management practice during new product development (value engineering) because higher benefits can be achieved when value management is applied in an early stage of a product's lifecycle. The project selection should be executed by using the value opportunity potential method that incorporates cost, value, margin, volumes, market growth and competitive position.

The maturity of the purchasing function is identified as a boundary condition for successful value management practice. The recommendations have taken Philips' lower maturity score on planning, process organisation and organisation structure into account. The value management organisation should be a virtual organisation besides the currently developing purchasing structure with commodity teams. Value management can also improve the maturity level since it encourages functional integration and purchasing involvement in product development. The success of value management will increase when Philips keeps working on a world class (mature) purchasing function.

The current value management practice can be improved when these recommendations are implemented by Philips Lighting. Improved value management practice can lead to improved performance of Philips Lighting in general, better implementation of the value management program, and better awareness of value in daily practice.

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1. Introduction: Research background and a research framework for project selection and the governance of value management at Philips Lighting

Philips N.V. is a worldwide recognized brand (world top 50) and a leading company in health and well-being. Its aim is to develop meaningful innovations in order to respond to today's dramatic global trends. 188,000 employees spread over sales and service outlets in 100 countries realized sales of 33 billion dollar with 3.5 EBITA as a percentage of sales in 2009 (Annual Report, 2009). The current value of the Philips brand is 5.9 Billion Euro[1] (Annual Report, 2009). Philips N.V. has three individual sectors: Healthcare, Consumer lifestyle and Lighting. This research is conducted at Philips Lighting, where about 51,000 FTE generate 6.5 billion euro annual sales (Philips N.V., 2009). The report is focusing on value management initiated by the corporate purchasing department. This section describes the context of this research, a research description, the research (sub) questions and a plan of approach.

1.1. Research Context: Organising strategic purchasing in a changing market

The corporate purchasing department is one of the staff functions within the Philips Lighting sector. The central organized function is responsible for overall purchasing policy making, system and process optimization, procedure setting and legal compliance. The context of this department can be described by its position within the Philips Lighting group, its internal organisation, its strategy and the market and products.

1.1.1. Organisation of Purchasing at Philips Lighting: from decentralisation to commodity teams

The corporate purchasing department of Philips Lighting is one of the staff departments, next to departments like finance and IT. The purchasing department is supported by the global supply management department. The organisation chart of Philips Lighting is given in Figure 1.

[1] 8.1 Billion USD equals 5.9 Billion Euro at March 16, 2010 (source: http://www.fd.nl)

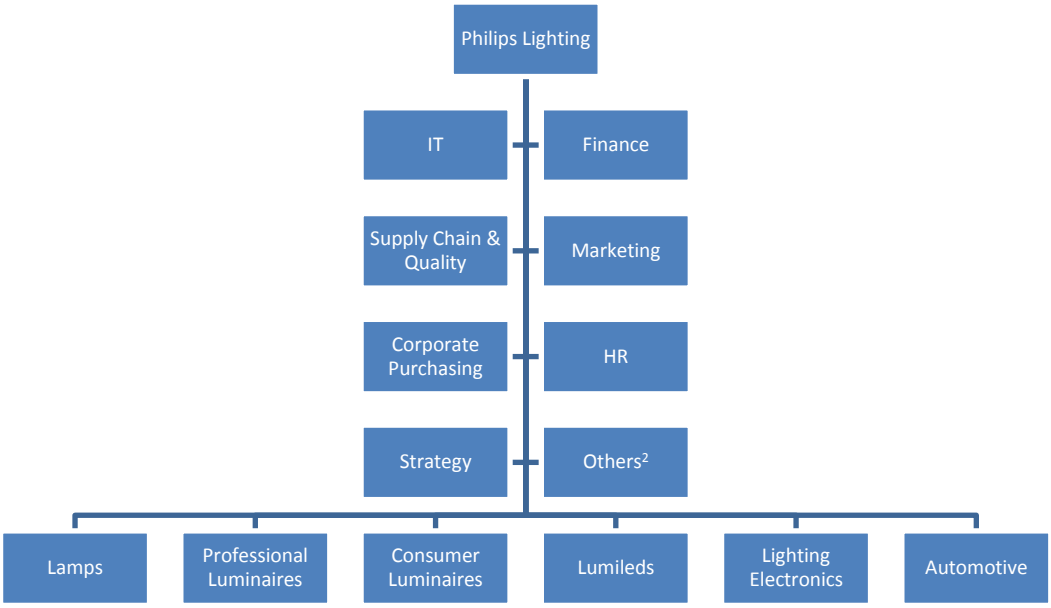


FIGURE 1: ORGANISATION CHART PHILIPS LIGHTING (SOURCE: PHILIPS LIGHTING, 2010)[2]

Since January 1st 2010 Philips Lighting's corporate purchasing department is officially reorganized. It is restructured from a decentralized structure where six business groups are responsible for their own purchases to a matrix structure with eleven commodity teams (Figure 2).

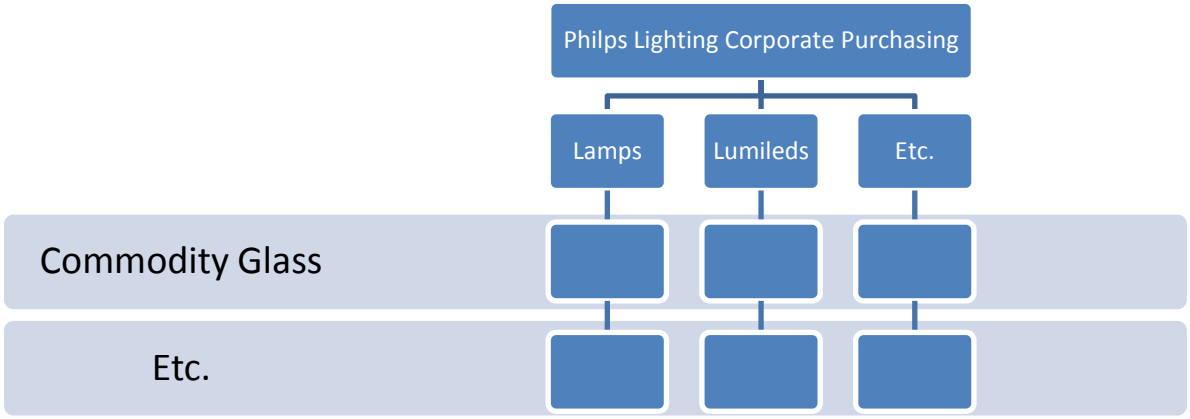


FIGURE 2: ORGANISATION CHART PHILIPS CORPORATE PURCHASING (OWN ILLUSTRATION)

The purchasing department is supported by a total value management, strategy and programs, supplier quality assurance, finance and HR function. Non-product related purchasing is completely centralised for the global Philips organisation. The non-product related purchasing department and non-product related activities are therefore not considered relevant in this research. The commodity teams in the product related purchasing organisation are: Buy for resell (BFR) Ballast, BFR Luminaires, BFR Light sources, LED components, Electronic components, Lamp components, OEM[3]-ODM[4]/EMS[5], Lumileds components, Metals, Plastics and Packaging. Commodity teams set a

[2] *Legal, Technology, Communication, Sustainability Intellectual property, and Commercial functions*
[3] *Original Equipment Manufacturer:* Purchasing of an "off-the-shelf" product
[4] *Original Development Manufacturer:* Outsourcing of design and manufacturing based on in-house commercial specification
[5] *Electronic Manufacturing Services:* Outsourcing manufacturing of modules/PCBA based on in-house design. Final assembly in-house

companywide purchasing strategy and business groups are responsible for day to day operational purchase activities. Most commodity teams (CTs) are virtual. CT lead buyers work from the business group they originate from. They are responsible for sourcing commodity goods for all business groups. Sourcing takes place at three levels. Strategic sourcing, which consists of long term contracting and supplier collaboration, is done by commodity teams. Ad hoc requests for quotation are done at the tactical sourcing level. This is mostly done by business groups. Occasionally commodity teams can be responsible as well. Call offs from existing contracts (straight rebuys) are done at the operational sourcing level by the business groups only.

1.1.2. WORLD EXCELLENCE STRATEGIC PURCHASING PROCESS: INTEGRATED, ALIGNED & GLOBAL

The mission of Philips Lighting Corporate Purchasing is, in line with the global supply management department, to create additional value for Philips by extracting the power of "One Philips" and contributing to the Philips Vision 2010 ('to improve the quality of people's lives through meaningful innovations'). Strategic focus is given on five areas: spend management, contracting & ordering, supplier quality & sustainability, supplier base & supplier development and people & competence. The model of Monczka (Figure 3) is used to develop the supply and purchasing function to world excellence. At this moment focus is given to supplier development, commodity strategy development and sourcing & contracting. The strategic development model and operational purchasing process is used cross sector at Philips (Philips N.V. Intranet, 2010).

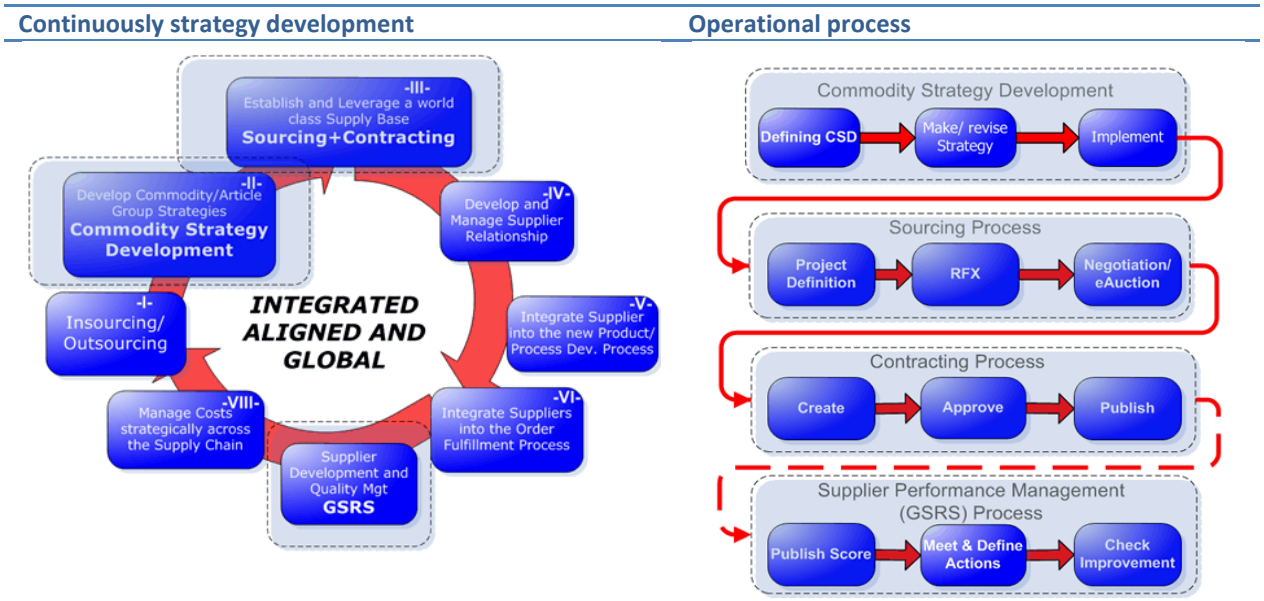


FIGURE 3: MONCZKA'S PURCHASING STRATEGY AND PURCHASING PROCESS MODEL AS USED AT PHILIPS (SOURCE: PHILIPS N.V. INTRANET, 2010)

This year (2010) is seen as a breakthrough year for Philips Lighting Purchasing. Key initiatives that are defined in the management agenda of this year (Philips Lighting, 2010) take place to realize ambitious targets.

1. Achieve a X% savings target on purchasing spending in 2010 in sector Lighting
2. Consolidate supplier base by 50% until 2012 and ensure 80% new sourcing to strategic and preferred suppliers
3. Create breakthroughs by cross-functional work in supplier involvement and value engineering
4. Implement a distinctive strategic purchasing organisation with commodity teams operational by January 2010
5. Improve efficiency of operational purchasing along procure-to-pay process

1.1.3. Products and market: from product to solution and technological innovation

Philips Lighting is active in a variety of markets. Besides the production of lighting for the automotive industry, both professionals and consumers are served with lamps and luminaires. Philips Lighting is no longer offering products only. Projects like the external lighting of buildings, stadium lighting and innovative streetlights take place and Philips Lighting offers a solution rather than a product.

Recent developments in electronic lighting technology, like LED, changed the lighting market. It created new design possibilities and a broader range of applications. Due to this, more new products are developed within a shorter time span which reduces the product life cycle of lighting products. The current developments are demanding for a change in the way of working at Philips Lighting. Development time becomes smaller and the company has to respond faster to trends in the market.

Also competition changed due to technological innovation and new product introduction. The traditional lighting market was dominated by a few large companies like Philips and Osram. Nowadays a lot of new entrants try to gain from the new electronic lighting market. Beside all kind of small companies also large semi-conductor companies like Samsung diversify their product range by offering electronic lighting products.

1.2. Research framework: Implement and improve value management practice at Philips Lighting

This section gives an overview of the most important problems that are identified. The problem identification leads to a research question and a research set up that gives structure to the research conducted in this report.

1.2.1. Problem identification: No clear value management process, poor governance and a lack of commitment

It is expected that the purchasing spend of Philips Lighting will increase the coming years for two reasons. Firstly, it is expected that turnover will rise, due to increased sales from 6 to 10 Billion euro in the coming 2-3 years. Secondly, Philips Lighting is reducing its supplier/industry base. This means that more production is outsourced and thus bought instead of produced. Philips Lighting's current purchase ratio (30% on 6 Billion euro sales) will rise to a ratio of 50 to 60% on the expected future sales of 10 Billion euro. Purchasing thus plays a more important role within the Philips Lighting sector. The restructuring of the corporate purchasing department is still developing and initiatives take place to achieve the objectives described in section 1.1.2.

One of these objectives is to create breakthroughs by cross-functional work in value management (or value engineering in Philips' terminology). Value management at Philips is a management program to increase the margin of Philips products by applying systematic tools and approaches to find solutions that increase value, reduce costs or eliminate unnecessary value. Value management is new to Philips Lighting, but not to Philips in general. It has been introduced successfully in the Healthcare and Consumer Lifestyle sectors. The implementation at Philips Lighting is coordinated by the total value manager who is working at the corporate purchasing department. His objective is to realize a total of 100 million euro in cost reductions in 2010. Currently about 50 million of opportunities are realized or addressed, mainly by negotiation and cost saving projects like supplier reduction and direct product changes (e.g. change of material). The main cost savings 'at the surface' are identified by now, but it will be a major challenge to identify the second 50 million savings. Cost engineering, value management, supplier involvement and sourcing in low costs countries should make up for the other half of the savings. Although it is expected that value management has a relative minor impact on cost savings in short term, it is expected that value management can lead to better performance in the medium term (1-2 years).

Furthermore, the implementation of value management in the Consumer Lifestyle sector led to significant savings as well.

The implementation of value management within Philips Lighting started in January 2010. There is no clear structure in the value management process, especially on long term. Ad hoc projects take place across the Philips Lighting organisation. Request for projects come from business groups. The purchasing department instructs a business group for gathering information and plans a value management workshop when they comply. Because of this bottom up approach, not all business groups participate in the value management program. Because of this, value management resources are not optimally allocated. There are no standardised criteria for value management project selection. The process of value management consists of instructional workshops with theory and a practical part to identify opportunities. It is copied from the other sectors (Healthcare and Consumer Lifestyle) and applied on projects within different business groups of Philips Lighting. The organisation is unknown about value management because it is just introduced and new for the business groups and commodity teams. Governance and commitment is lacking. Responsibilities are given to employees at different levels of the new commodity driven organisation structure. There is no system to keep track on the results or to control the performance of value management. Not everybody knows what value management is and why it might be a useful tool to improve performance. There is a need for theoretical background on value management best practices. The next section defines this research in terms of objectives and research questions.

1.2.2. Research definition: Improving project selection and governance of value management in order to create internal support and improved cost reductions

Value management, which is recently introduced at Philips Lighting, is expected to be an important tool to achieve better performance. The problems during the implementation are described in this section. From this, the research is defined.

It is difficult to ensure one way of working and a stable organisation for value management because the organisation is recently restructured and value management as a constructive program is recently introduced. Two problems are related to the governance of value management. Firstly, there is no sector wide uniform policy and there is no clear strategy to achieve the cost savings targets that are set. Responsibilities are divided among employees across the organisation (Value Management Business Experts). Value management is not a primary task for Value Management Business Experts and few people in the business groups take ownership. Only in the business group Lamps full ownership is taken by a program manager. Secondly, value management control takes not place. There is a need for structure in measuring performance and results of the program. It is thus unclear how the value management should be governed within Philips Lighting. This research investigates the governance aspects (organisation and control) of value management based on a literature review. The goal is to develop a control mechanism based on key performance measurements and a structured way to organise value management within Philips Lighting in order to increase the implementation speed and improve monitoring.

The current bottom up value management approach leads to segmentation of projects across the Lighting organisation simply because not every business group takes initiative. The main problem is that project selection decisions are made with ‘random’ arguments; it is not grounded or based on proven factors. There are only a limited number of value management experts in the organisation. Project selection criteria are important in order to make optimal use of scarce resources. Firstly, this research defines the success of value management. Secondly, criteria for project selection should be chosen in such a way that they contribute to the success of value management. This research should lead to a list of constraints and variables that help selecting successful projects for the value management process. The success of value management projects can then be measured by the control mechanism.

Four research objectives should be met: (1) find out how value management should be governed, (2) create internal support for value management, (3) structure the value management project selection, and (4) make the performance more visible by clear measurements. The main research question is:

How should Philips Lighting design the governance and the project selection of its value management program in order to realise a value management organisation that is able to control and monitor performance and where project selection is structured and based on grounded criteria?

Value management is a multi-functional program that includes all kind of disciplines like purchasing, development, marketing, supply chain management, etc. This research concentrates on value management in general as a cross-functional program and on purchasing in specific because this department coordinates the program. Marketing plays a supportive role by providing information about customers and the market. A structured research should answer the research question. First a theoretical model is presented based on a structured literature review. This model reflects the history of value concept and the process of value management, the way value management should be governed, and how the project selection process can be designed. The governance of value management incorporates the organisation and control system which includes the way performance can be measured. The model is compared with the current value management practice of Philips Lighting. Based on these results, a final recommendation can be made to Philips Lighting. The research model is given in Figure 4. Following sub questions should be answered in order to achieve the research objectives:

1. What is value management and how can it be practiced?
2. How can value management theoretically be governed?
3. In which way and based on what criteria, should projects for value management studies be selected according to literature?
4. How is value management practiced and governed by Philips Lighting?
5. How can the aspects of theory and practice be combined in order to create an integrated model for successful value management at Philips lighting?

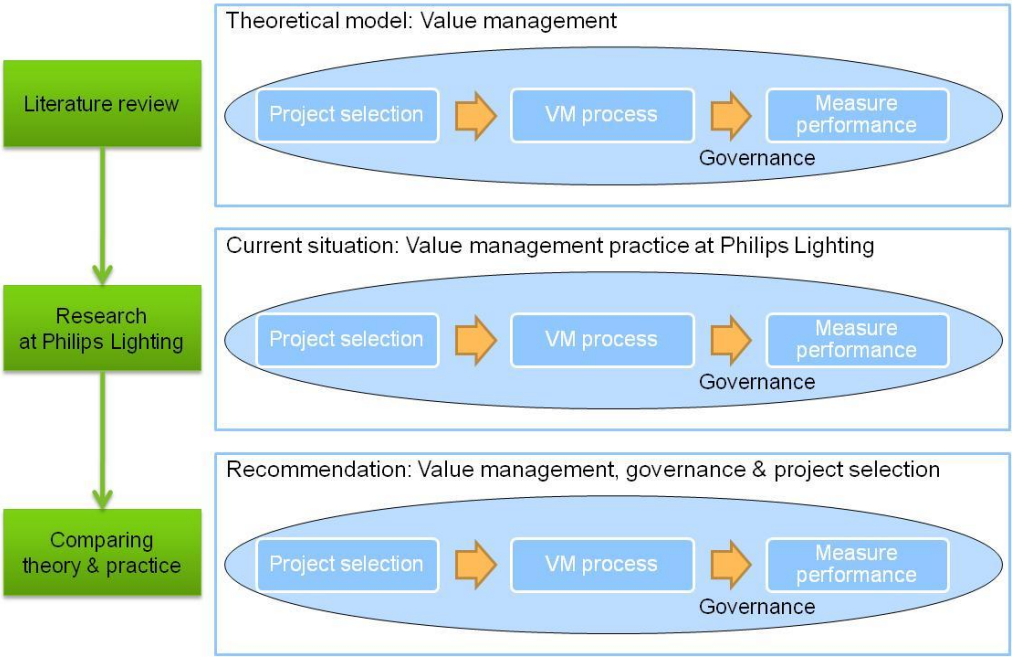


FIGURE 4: RESEARCH FRAMEWORK (OWN ILLUSTRATION)

Research can have different objectives or classifications. Kumar (1999) makes a distinction between four types. *Descriptive research* (1) describes a situation, problem, phenomenon, service or program systematically, and/or (2) provides information about conditions, and/or (3) describes attitudes towards an issue. *Correlational* research tries to discover or establish the existence of a relationship between two or more aspects. *Explanatory* research attempts to clarify why and how there is a relationship between two aspects of a situation. And *exploratory* research is carried out to investigate the possibilities of undertaking a particular research study. This research can be classified as descriptive. It attempts to describe and gain insight in the theoretical and practical organisation of successful value management.

1.3. PLAN OF APPROACH: LITERATURE REVIEW AND TEST AT PHILIPS LIGHTING

This section describes the step by step approach of this research and the methods that will be used.

The concepts of value, like value management and value engineering, are introduced by a literature review on its foundations and recent development. The goal is to create understanding of the concept and a clear definition for further research. Two steps are conducted:

1. Literature review on the historical development of value concepts, from value analysis to value management;
2. Defining the most important concepts: value, value analysis, value engineering, and value management.

A structured literature review on some specific aspects of value management should lead to a theoretical framework. Two steps are conducted:

3. Literature review on the governance of value management. Special attention is paid to the organisation and control;
4. Literature review on project selection criteria for the value management program and their relation to success of value management in industrial organisations.

The literature review should result in a theoretical model for the project selection and the governance of value management at Philips Lighting. The conceptual model which is derived from literature is compared with the current practice of Philips Lighting. The current organisation and strategy has influence on the design of value management. Following steps are conducted to investigate the value management practice and the organisation of Philips Lighting.

5. Document study on the current value management practice of Philips Lighting;
6. Document study and interviews to the organisational context of Philips Lighting in order to describe the purchasing function, coordination and integration, and the control mechanisms;
7. Investigation of the value management project selection of Philips Lighting in order to find out which process is used and based on what criteria value management projects are chosen;
8. Every aspect will be compared with the conceptual model in order to find discrepancies.

The last step finalizes the research. The gaps between the theoretical model and the current practice are subject to potential improvement. Ideas for improvement are tested on relevance and importance in order to make grounded final recommendations that fit the Philips Lighting organisation. This is tested by structured and standardised interviews with the most important stakeholders. This phase consists of following steps:

9. Standardised interviews with important stakeholders from the value management, purchasing and technology function;

10. Make conclusions and recommendation by a final model that takes interview results, current practice and theoretical model into account;
11. Derive implementation issues;
12. Discuss the results and conclusions.

The result is a scientific report on value management and practical recommendation to Philips Lighting.

1.4. METHODOLOGY: STRUCTURED LITERATURE REVIEW

Literature on the governance of value management and the project selection are gathered by a structured literature review. Combinations of primary search terms ('value management', 'value engineering', 'value analysis' and 'purchasing') with secondary search terms ('governance', 'organisation', 'control', 'performance', 'management', and 'success') are used in four academic search engines (*Wiley InterScience, Science Direct, Journal of Supply Management and IEEE*).

Search results are sorted on relevance by the engine. The hits are further selected based on title, abstract and full text. Both forward citation and backward reference search on selected articles should lead to high quality set of academic papers for the theoretical framework. Beside the papers, some specific academic books on value management and purchasing are used to complete the theoretical base for further research (Figure 5).

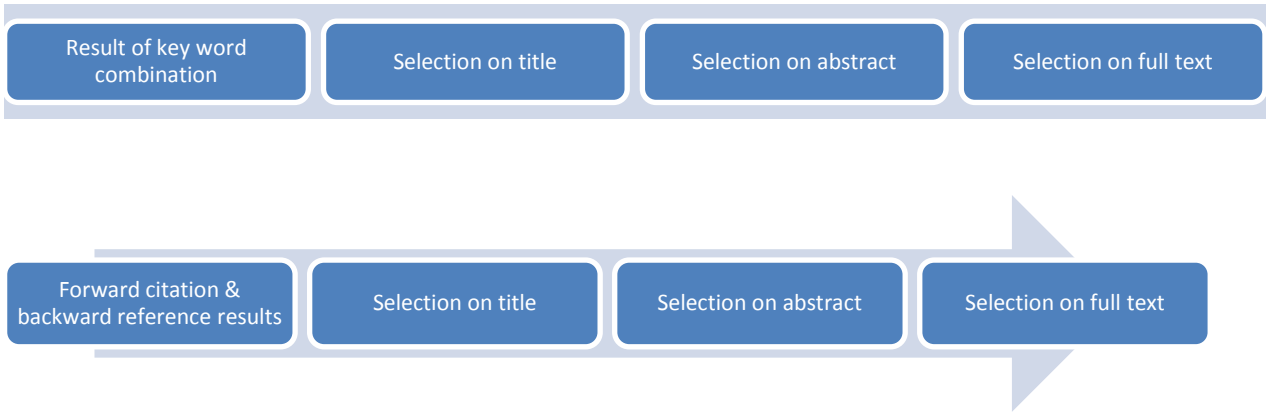


FIGURE 5: LITERATURE REVIEW PROCESS (OWN ILLUSTRATION)

A total of 53 sources, excluding internal documents, are used to build the literature review. This subset of the academic field is sufficient to cover most of the literature on value management because of four reasons. First, the review gives an overview of the history of value management from the beginning (Lawrance D. Miles) to the current practice (described by Chen, Chang & Huang, 2009). Secondly, the amount of sources used in this research is substantial looking at the total amount of literature on value management and value engineering[6][7]. Thirdly, forward and backward citations are used to cover a broader set of literature. Fourthly, additional literature on purchasing, working in teams and performance measurement is used since specific literature that combines these subjects and value management does not exist.

[6] Searching for "value management" and "value engineering" in paper titles with *Science Direct* led to 26 and 24 hits.
[7] Searching for "value management" and "value engineering" in paper titles with *Scopus* led to 149 and 322 hits.

2. LITERATURE REVIEW: VALUE CONCEPTS, VALUE MANAGEMENT GOVERNANCE & VALUE MANAGEMENT PROJECT SELECTION

An extensive literature search is the first step of this research. Literature is gathered through a structured literature review as described in the methodology section. This chapter gives an overview of the results in three fields: value concepts, value management governance and the value management project selection.

2.1. VALUE CONCEPTS: HISTORY, DEFINITIONS AND ITS APPLICATION

The previous chapter introduced value management as a management program that is used within Philips. Value management is part of a range of concepts and tools that are used in industrial, construction and service companies. This chapter starts with an overview of the historical development of value concepts. Besides that it defines the different concepts from the view of this report.

2.1.1. THE HISTORY OF VALUE CONCEPTS: FROM TOOL TO PHILOSOPHY

Value concepts started to gain increased attention after the introduction by Lawrence D. Miles. It developed itself from a tool to a management program that gained renewed attention in industrial environments. This section gives an overview of this development which started after the Second World War.

2.1.1.1. LAWRENCE D. MILES: THE FOUNDER OF VALUE ANALYSIS AND VALUE ENGINEERING

Value Analysis was developed by Lawrence D. Miles as a member of the General Electric (GE) engineering staff. Many industrial companies struggled with short supply of materials after World War II. Companies, like GE, were forced to look into the possibilities of substitute materials. These substitute materials often performed well, or even better than the original materials. From this observation, GE concluded that in some cases a change in material could actually improve a product or the processes. Lawrence D. Miles was asked to come up with the techniques and methodologies that would enable this type of changes in products. In 1946 he developed a systematic, orderly, and step-by-step process for finding substitute materials, products, components and services which came known as value analysis (Elias, 1998). Miles (1989) defines value analysis as: “a problem solving system implemented by the use of a specific set of techniques, a body of knowledge, and a group of learned skills”. It is an organized creative approach that has for its purpose the efficient identification of unnecessary costs. “A value analysed function must offer a better way of doing something” (Park, 1999). Miles came to two conclusions:

1. Creative thinking is constrained by the physical shape or concept of existing products or services.
2. Concentrating on the need or the requirement (function) helps to break down the constraints to visualization and offers outstanding opportunities for creativity.

GE had great successes with the technique developed by Miles. The success leaded to a quick spread of value analysis throughout the private industry (Elias, 1998). Also governmental organisations in the United States, like the U.S. Navy Bureau of Ship Building, the NASA and the U.S. Defence Department, adapted value analysis in their organisations. Value analysis was first used only in the manufacturing department, but soon people found out that this methodology was also applicable to the design and service process.

The Society of American Value Engineers (SAVE) describes the development of value analysis (SAVE International Value standard, 2007). Value analysis was mostly seen as cost reduction program, but it has an additional feature which distinguishes it from other cost reduction programs. In addition to common aspects like life cycle consideration, predictable cost reduction and organisational training, value analysis includes ‘functional analysis’ (Elias, 1998). Value analysis analyses the function as a means of understanding everything about the product. It

forces to think about a product in terms of its function rather than its parts. Within functional analysis, Miles used a combination of an active verb and a measurable noun in combination to characterise the benefit that a part's function provides (SAVE International Value standard, 2007).

The applications of value analysis expended, so did the context. Two factors marked the emergence of value engineering. Firstly, there was a desire by the U.S. Navy to use the value analysis techniques for project improvement in the early 1950s where it was for them not possible to hire "analysts". Therefore they decided to employ the new individuals as "value engineers". Secondly, there was a change in the context of value analysis. From reviewing existing parts, companies moved to an application of this methodology in order to improve conceptual designs (SAVE International Value standard, 2007). VE became a systematic method for establishing the design that gives the best value for a product (Webb, 1993). In this way, every object that is under design, development or production can be subject of value engineering and value analysis. It is argued that there is an optimum time to apply value engineering, which is early in the product life cycle as possible (Webb, 1993). An item that is designed for low-cost manufacturing shows an overall cost advantage over an item that is changed to reduce costs at some point during production.

2.1.1.2. VALUE MANAGEMENT FOR THE CONSTRUCTION INDUSTRY

Value engineering was introduced in the construction industry during the 1960s and has been employed worldwide for over 50 years. Since its introduction, this technique has been widely applied in building-construction projects (Chen, Chang, & Huang, 2009). Many clients are insisting on the application of value management to ensure value for money (Green, 2004).

Within its new context, value engineering developed itself more to a decision support system. Stuart Green (2004) developed a framework to describe this new way of thinking in terms of Value Management. He defines value management as "a structured process of dialogue and debate among a team of designers and decision makers during a short-term conference. The primary objective is to develop a common understanding of the design problem, identify explicitly the design objective, and synthesise a group consensus about the comparative merits of alternative courses of action". In contrast to value engineering and VA, VM is seen to be primary concerned with improving communication instead of hard concepts like value maximisation and design optimisation. The value engineer has a supportive function to facilitate these workshops.

2.1.1.3. RENEWED INTEREST FROM THE INDUSTRY: VALUE MANAGEMENT TO ACHIEVE BEST VALUE-FOR-MONEY

After its development in the U.S., value management gained popularity overseas. It became popular in industrial firms but interest has since been somewhat eclipsed after that. However, competitive pressure on producers means that industrial interest has been renewed in the early nineties (Webb, 1993). Besides that, in the late eighties and early nineties did the rise of new methods enable value practitioners to implement value analysis techniques at a much earlier stage and to integrate them into the project management process. By doing this, a true management tool was created (Thiry, 1997). Companies and scholars start to focus on the creation of customer value managed through a supply chain, value chain and/or customer chain (Dumond, 2000). According to SAVE international (2007), value management is defined as "the application of value methodology by an organisation to achieve strategic value improvement. Value management is used to achieve 'best value-for-money' and to increase achievement of stakeholder expectation (Thiry, 1997). Value management is thus not only used to decrease costs, but also to add value or get rid of unnecessary value. Together with other concepts like Activity-Based Costing (ABC), Target Costing, Quality-Function Deployment (QFD), Value Engineering and Value Analysis are

integrated into business practice in order to improve supply chain performance (Smith, Lewis, Churchwell, & Benjamin, 2002) (da Silva, Cavalca, & Dedini, 2004).

2.1.2. Defining value concepts: Value, value analysis, value engineering & value management

Value management, value engineering and value analysis are all terminologies that are used to describe initiatives, processes and programs that are concerned with value and how the value is managed within an organisation or team. There is no consensus among scientist what the right definitions for value management, value engineering and value analysis exactly are (Thiry, 1997) (Green, 2004). The terms are used in different ways and mixed up. This section elaborates the theoretical definitions of value, value engineering, value analysis, and value management.

2.1.2.1. Value: The lowest cost of a product to achieve its primary function

Depending on the context in which it is used, value can be defined in different ways. Within the context of this report we speak of value in term of the lowest total cost at which an item, product or service achieve its primary function while satisfying the time, place and quality requirements of the customer (Monczka, Handfield, Giunipero, & Patterson, 2009). Five types of value can be distinguished that all must be considered in a value study (Thiry, 1997). (1) *Use value* is the amount of resources used to realize a finished product that performs as it was intended, (2) *esteem value* is the amount of resources a user is willing to spend for the functions that please rather than perform and (3) *exchange value* is the amount of resources for which a product can be traded, thus what the product is worth on the market. The difference between the exchange value and the use value is thus equal to the esteem value. (4) C*ost value* is the amount of resources to achieve a function measured in a given currency and (5) *function value* is the relationship of function worth to function costs.

2.1.2.2. Value Analysis and Value Engineering: Existing vs. new products

Within this report I make a clear distinction between value analysis and value engineering.

Value analysis is: An initiative that is designed to continuously lower costs (and price) of the component, but which occurs *after a product is introduced* (Dyer, 1997). It involves examining all elements of a component, assembly and product to make sure it fulfils its function at the lowest total costs (Monczka, Handfield, Giunipero, & Patterson, 2009).

Value engineering is: A systematic procedure directed towards the achievement of the required functions at least cost. It is based on the assumption that all parties share the understanding of the function being provided and all feasible design alternative provide the same level of functional performance and can therefore be assessed on the basis of cost alone (Green, 2004). Value engineering is the application of value principles *during design* (Monczka, Handfield, Giunipero, & Patterson, 2009).

Value engineering is thus focused on *avoiding* costs and unnecessary value of *new products*, while value analysis is concerned with *reduction* of costs and unnecessary value of *existing products*. Product value can be increased both by reducing costs and improvement of the product's function.

2.1.2.3. Value Management: The application of value techniques on both new and existing products

Following Thiry (1997), in this research value management is defined as: "*the integral widespread application of value techniques which involves the skills and knowledge needed to manage the value process"*. The goal is to improve the margin of a product by either reduce cost or improve the product's value. Value management is a

continuous improvement process that needs governance and a clear way of working. Value management is thus defined as a combination of value engineering and value analysis where value techniques (or tools) are used to improve both existing and new products.

2.1.3. VALUE MANAGEMENT PRINCIPLES: FUNCTIONAL DEFINITION & THE JOB PLAN

The two basic principles in value management are the functional definition and the job plan (Park, 1999). The functional definition is determined by functional analysis, one of the phases in the value management job plan. The job plan is a formula for action that leads a team through the complete value management process from start to finish (Park, 1999). The job plan creates structure and at the same time, compensates for the peculiarities of the individual. There are a number of different job plans, or value management processes described in the literature. Appendix A gives an overview of a comparison between different job plans derived from literature. Seven different phases are regularly distinguished by scholars: (1) preparation phase, (2) information phase (3), (functional) analysis, (4) creativity phase, (5) evaluation phase, (6) development and recommendation phase, and (7) implementation phase. The seven phases are given in Figure 6 and further elaborated in this section.

FIGURE 6: VALUE MANAGEMENT GENERAL JOB PLAN/PROCESS BASED ON LITERATURE REVIEW (SEE APPENDIX A)

2.1.3.1. PHASE 1 & 2: PREPARATION & INFORMATION PHASE

The information phase is in the literature often mixed up with the preparation phase. Fong et al. (2001) and the Society of American Value Engineers (2007) make a clear distinction. According to this literature, the primary objectives and tasks for the preparation phase are to develop a supportive climate from top-management, select a project team, obtain the scope and objective of the study, form a timetable, and to set the budget. Park (1999) does not describe the preparation as a disjunctive phase. Nevertheless he states that "the selection of projects is a part of the entire value management preparation process". In line with the previous literature he confirms the importance of a team selection, setting the workshop time set, and ensuring full-time participation before a workshop is begun. The information phase is used to gather all relevant data that is necessary for the workshop and to perform the functional analysis. A responsible person must be assigned the task of organising the data package (Park, 1999). A typical list of information that should be included in the data package is given in appendix B.

2.1.3.2. PHASE 3: (FUNCTIONAL) ANALYSIS

Analysis on the data is performed in order to create better understanding of the project. All kind of analysis's can be useful, for example cost analysis and functional analysis. Functional analysis is what distinguishes value management from all other similar techniques (Thiry, 1997). Functional analysis abstracts technical solutions in order to concentrate on the actual needs and wants of the customer. Miles (1989) defined function as a want to satisfy a requirement. The function is a set of properties that make something work or sell and what it does to a customer. A properly defined function must satisfy three requirements (Park, 1999): (1) defined in two words: a verb and a noun; (2) measurable for evaluation; and (3) offer creative opportunities. The functional analysis is thus an important part of value management and can be found back in almost every value management job plan (Appendix A).

Functional analysis can performed in several ways and a broad set of methods and tools is developed to help teams in determining the functions of a product. The goal of functional analysis is to identify, compare, and classify the functions in order to build a virtual, function-oriented model of the project (Thiry, 1997). An example of such a method is the function analysis systems technique (FAST) that conducts a functional analysis in five steps (Thiry, 1997): (1) identification of the functions by listing all functions and define the interaction and adaption functions, (2) organise the functions by a function breakdown structure, (3) characterise function by defining measurement units, expected quality and flexibility, (4) rank the functions by relatively importance, and (5) rate the functions for example with a function cost distribution.

2.1.3.3. PHASE 4 &5: CREATIVITY AND EVALUATION

"The creativity phase should be approached with a completely open mind with the sky as the limit" (Park, 1999). The goal is to produce the greatest possible number of ideas in a short period of time and there is no room for judgement. Brainstorm sessions and other tools can help to generate the ideas and increase the team's creativity. The functions that are identified in the analysis phase can be used as targets for opportunities. A value management workshop can hand the tools and environment to be effective in the idea generation and prevent road blocks and 'idea killers'. The creativity phase can be found back in all job plans that are investigated (Appendix A).

2.1.3.4. PHASE 5, 6 & 7: EVALUATION, DEVELOPMENT, RECOMMENDATION AND IMPLEMENTATION

The last three phases are not strictly disjunctive in the literature. At least three different aspects can be found back: the evaluation of generated ideas of improvement, development of improvements to concrete recommendations, a planning, and the implementation phase where the improvements should be brought into practice. The purpose of the evaluation phase is to identify and select the best ideas for further development. The team should segregate ideas, identify priorities and separate those ideas to develop from those to be discarded (Thiry, 1997). The chosen improvement opportunities can be further developed to a plan of action. The typical outcome is a list of alternatives with low-, medium, and high-risk scenarios that can be offered to senior management as options that address the workshop's objectives (SAVE International Value standard, 2007). These recommendations should also include a planning (Park, 1999). Management can assign a champion for the project implementation and monitor the progress that is made (Fong, Shen, & Cheng, 2001).

2.1.4. CONCLUSION: VALUE MANAGEMENT AS A THREE STEP PROCESS

This section has described the development of value management from its introduction by Lawrence D. Miles in the 1980s as a primary cost saving tool towards a management program that is focused on both cost reduction and value creation. Value management in this research is seen as an creative approach in which value techniques are applied to improve margin of a product by either reduce cost of improve the products value. Value management consists of both value analysis on existing products and value engineering in new product development. The inclusion of functional analysis makes value management unique compare to other similar techniques.

Value management can be described as a process in different ways. The literature review showed that seven phases can be distinguished: (1) preparation phase, (2) information phase (3), (functional) analysis, (4) creativity phase, (5) evaluation phase, (6) development and recommendation phase, and (7) implementation phase. These seven phases can be reduced to three major steps that are taken (Figure 7). The first step is dealing with the preparation including the project selection, gathering information and forming a team. Phase 3 to 5 can be conducted in a workshop where functional analysis is performed (functional analysis phase), the products

improvement opportunities are identified (creativity phase) and improvement opportunities are evaluated (evaluation phase). The opportunities are developed, presented and implemented in the last step.

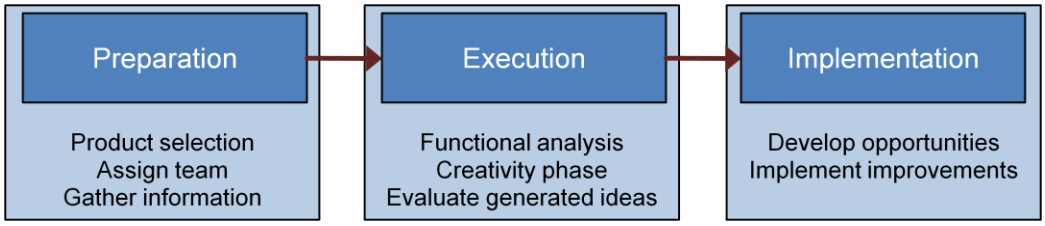


FIGURE 7: CONCEPTUAL MODEL OF THE PROCESS OF VALUE MANAGEMENT (OWN ILLUSTRATION)

2.2. GOVERNANCE OF VALUE MANAGEMENT: INTEGRATION AND CONTROL OF VALUE MANAGEMENT IN THE PURCHASING ORGANISATION

This section describes theories that give insight in the governance of value management. Value management is implemented and initiated by the purchasing department, but it involves and affects the purchasing functions as a whole. This chapter therefore starts with a literature review on organising the purchasing function. Secondly, the organisational integration that should coordinate and govern value management along the different business groups of an organisation is investigated. Extra attention is paid to the use of cross-functional teams during value management workshops. The last section describes the way in which value management can be controlled. This includes a performance measurement for value management and alignment with purchasing performance measuring.

2.2.1. THE PURCHASING FUNCTION AND VALUE MANAGEMENT: COORDINATION, THE STRATEGIC PURCHASING PROCESS AND THE EFFECT OF PURCHASING MATURITY

To describe the role of purchasing in value management it is important to make a distinction between the purchasing function and the purchasing department. The purchasing department is the bounded organisational structure (including formal reporting relationships and hierarchy), while the purchasing function is the broader definition of all activities in an organisation that have a relation with the external supplier market (Buter & Loa, 2008). For example an engineer that changes product specifications is part of the purchasing function, but not of the purchasing department.

This section deals with the role of the purchasing function in value management practice. First issues and reasons for value management coordination from the purchasing department are discussed. Second the impact of value management on the strategic purchasing process is elaborated. The last section describes the relation between purchasing maturity and the success of cost reduction initiatives.

2.2.1.1. VALUE MANAGEMENT COORDINATION FROM THE PURCHASING DEPARTMENT

Large firms often consist of multiple businesses. The firm is than divided in strategic business units (SBUs). Each business unit has freedom and responsibility to serve their own business area. Value management has to be implemented in the organisation as an operational program. The approach to structure a firm into multiple small businesses presents the managers with the issue of how to harmonize the business firm and give it uniform strategic direction. Multidivisional companies have the problem of realizing the extent of potential payout of free flow ideas, methods and division of resources among division. The differentiation that is created must be offset by a certain degree of integration to be able to address common issues and realize synergies (Lawrence & Lorsch,

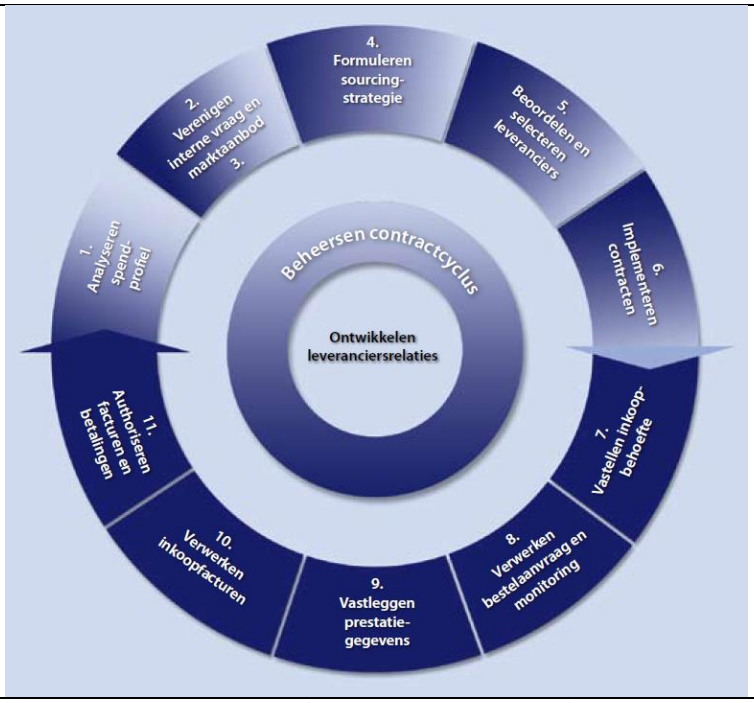
1967). Each unit tends to 'reinvent the wheel'. Three key integration mechanisms can be distinguished: centralisation, standardisation and coordination (Meyer & de Wit, 2004).

Centralisation means to bring resources and activities together into one organisation unit. Where labour is not divided between the business units, resources and activities will be kept together in one department. This department can be situated at the corporate centre, but can also be located at a business unit or at another function. *Standardisation* means to achieve such advantages as economies of scale and rapid competence development by having similar resources, standardized activities and common product features without the need to physically centralise or continuously coordinate. *Coordination* can be useful to achieve coordination in situations where resources and activities are split along business units. Value management is a cross-functional program where tools are applied ad-hoc during product development and product improvement. Formal centralisation of value management is not an option since the employees primary task remains within their current department. Standardisation as an integration mechanism may reduce creativity of the value management practice. Therefore it can be argued that coordination is the most suitable integration mechanism.

Value management can be coordinated by different departments in the organisation. The purchasing department can take the lead in an industrial firm because of three reasons. Firstly, most costs of industrial firms that are related to its product's are made by the purchase of components and parts. Secondly, because purchasing has an overview over all the elements of the supply chain that are involved (Monczka, Handfield, Giunipero, & Patterson, 2009). Thirdly, it is argued that value management is most powerful when suppliers are involved. Since purchasing is an inter-organisational process, value estimations and realizations must be based upon the interests of both exchange partners and not of the individual firm interests only (Zajac & Olsen, 1993).

2.2.1.2. VALUE MANAGEMENT INFLUENCES THE STRATEGIC PURCHASING PROCESS BY CHANGING THE INTERNAL DEMAND AND THE POSSIBILITIES ON THE SUPPLIER MARKET

Purchasing has evolved from a buying function into a strategic function due to the growing importance of supply chain management. It is now recognized as a strategic function in today's organisations (Paulraj, Chen, & Flynn, 2006). Purchasing departments in larger organisation usually structure themselves to support specialized purchasing activities in four major areas: (1) sourcing and negotiating; (2) purchasing research; (3) operational support and order follow-up; and (4) administration and support (Monczka, Handfield, Giunipero, & Patterson, 2009). Personnel in the field of purchasing research perform long-range material forecasts, conduct value analysis programs, assess supplier capabilities and analyse the cost structure of suppliers. According to Monczka et al, more and more organisations recognize the benefit of having specialized researchers because the development of products and material plans requires detailed and accurate research. Value management can thus be an activity in the field of purchasing research.



Translation:

1.	Analyse spend profile
2.	(+3) Unite internal demand and market offer
4.	Formulate sourcing strategy
5.	Select suppliers
6.	Implement contracts
7.	Determine purchasing demand
8.	Process orders and monitoring
9.	Document performance
10.	Process invoices
11.	Authorise invoices and payments
Middle:	Control contract cycle Develop supplier relations

FIGURE 8: PROCUREMENT WHEEL (SOURCE: BUTER & LOA, 2008)

The procurement wheel, as discussed by Buter and Loa (2008), can be used to describe the procurement activities in an organisation (Figure 8). It is based on an integral purchasing process approach where procurement is defined as all the activities that are related to the supplier market. The upper part of the procurement wheel (step 1 to 6) consist of strategic and tactical activities, while the activities in the bottom part (step 7 to 11) are operational. The middle, or axis, consist of supplier relation and contract management. Especially step 2 and 3 are important in the scope of this research. The two steps are related to eachother because of the iterative process. A change in a products or material specification (internal demand) results in a different target supplier market. Value management workshop are conducted in order to improve products by changing specification and therefore value management affects this step in the process. This two connected steps are crucial for the purchasing process because most of the integral cost are determined in these steps (Buter & Loa, 2008). Value management should thus be integrated in the development of sourcing strategies.

2.2.1.3. THE POSITIVE RELATION BETWEEN PURCHASING MATURITY AND THE SUCCESS OF VALUE MANAGEMENT

Extensive research showed that there is a significant relationship between the maturity level of the purchasing function and the success of purchasing cost reduction initiatives (Schiele, 2007). Maturity can be defined as 'the level of professionalism in the purchasing function' (Rozemeijer, van Weele, & Weggeman, 2003). A maturity model describes several stages an organisation is expected to go through in its quest for greater sophistication (Schiele, 2007). Mature purchasing organisations apply world-class best practices, while unsophisticated organisations fail to employ them (Ellram, Zsidisin, Siferd Perrot, & Stanley, 2002).

A comprehensive tool developed by Schiele (2007), which is based on five management functions (planning, organisation structure, process organisation, human resources and controlling), can be used to asses firms' maturity level. The model that is presented contains four stages of maturity for each topic of the five management functions. The stages are defined four each topic according to best practice, but they are structured to reflect guidelines adopted from process-organisation principles (Schiele, 2007):

- Stage 1: A particular best-practice activity/tool/method is known within the organisation;
- Stage 2: A position or person is assigned to perform the task;
- Stage 3: The process for completing the task is defined and documented as well as applied;
- Stage 4: Cross-functional integration in the company is assured while basic requirements are met.

The five dimensions can be assessed by 57 questions where four stages of maturity are fully formulated for each of the questions. The responded can indicate which of the four levels of maturity represent his firm's situation best. The eight page questionnaire can be found in the paper by Schiele (2007).

About 140 interviews within 14 firms were used to test the maturity. The research showed that a larger saving potential was identified in more developed firms, which can be explained by the purchasing absorptive capacity that states that purchasing functions would learn more from their environment of they have a higher maturity level (Schiele, 2007). The purchasing maturity assessment model is relevant for this research because it can help to identify potential threats and opportunities. The introduction of value management in a low maturity organisation is expected to be less successful. The model is used in this research to assess the organisation on the five management functions. Implications of maturity scores can be taken into account while developing recommendations and maturity scores can help to explain indentified problems.

2.2.2. Organisational integration: Horizontal coordination and the use of teams

This section describes the organisational integration that is necessary in order to coordinate the value management program. Horizontal coordination is presented as an important tool to enhance coordination. The use of teams is discussed because value management is practised by people from different backgrounds (cross-functional) in ad-hoc groups.

2.2.2.1. Horizontal coordination mechanisms to increase coordination

Coordination is, as discussed in section 2.2.1.1, an important integration mechanism for value management. Even where resources, activities and product offerings have been split up along business lines, integration can be achieved by ensuring that coordination is carried out between business units. This way of working should result in the ability to operate as if the various parts were actually one unit (Meyer & de Wit, 2004).

Value management is a cross-functional management program with participants from all functional parties (Thiry, 1997). Horizontal communication may overcome barriers between departments and improve coordination among employees to achieve unified objectives (Daft, 2004). *Horizontal linkage* refers to the amount of communication and coordination horizontally across organisational departments. Daft derives following structural alternatives that can improve horizontal coordination and information flow: information systems, direct contact, task forces, full time integrators and teams. Table 1 shows that information systems have the lowest horizontal coordination and costs for coordination contrary to full-time integrators and teams which have high horizontal coordination and cost for coordination.

Horizontal coordination Coordination costs	Horizontal coordination mechanisms	
Low	Information system	Cross-functional information systems enables information sharing about problems, opportunities, activities and decisions
	Direct contact	Creation of a liaison role usually between two departments. A person has located in department A has the responsibility to communicate and achieve coordination with department B.
	Task force	Direct contact linkage that involves several departments. A temporary committee is composed of representatives from each department.
	Full time integrator	Creation of a full-time position or department solely for the sake of coordination.
	Teams	Teams are permanent task forces and often led by a full time integrator. It is often a solution when long-term activities need strong coordination.
High		

TABLE 1: HORIZONTALE COORDINATION MECHANISMS (SOURCE: DAFT, 2004)

A company should have a mechanism in place to attain horizontal communication between the business units. Value management is practiced by temporary teams that come from different functional departments. This is actually a task force with representatives as described by Daft (2004) in table 1. Thiry (1997) argues that an in-house value management task team makes implementation easier because of buy-in of proposals, absence of confrontation with outside sources and reduced implementation time. This implicates that the value management team should be organised from the team that is already working on the project. Additionally other people can be involved. Creating successful teams requires careful consideration or a range of factors that enable and enhance effective teamwork (Driedonks, Gevers, & van Weele, 2010). The next section goes into this topic in more detail.

2.2.2.2. THE USE OF MULTI- FUNCTIONAL TEAMS: ADVANTAGES, CONTROL & COMPOSITION

Firms rely increasingly on project teams, also in the field of purchasing (Monczka, Handfield, Giunipero, & Patterson, 2009). In purchasing, teams are used to evaluate suppliers, develop commodity strategies, perform planning and carry out development programs. Project management and working in teams may be useful for several reasons. They minimizing the need for continuous reporting, increase communication, realise financial improvements, enhance process improvement, create higher learnings, and they increase effectiveness and early identification of problems (Patah & de Carvalho, 2007). Teams are thought to be the vehicle that enables more flexibility and horizontal- and cross-functional communication (Trent & Monczka, 1998). An important driver for moving to (sourcing) teams is the potential for combining knowledge and skills from different backgrounds more effectively (Rozemeijer & Weele, 1996).

From a sourcing team's perspective, Driedonks et al. (2010) suggest that autonomy provided to teams in general, and to cross-functional teams in particular, improves team effectiveness. Autonomy, defined here as the ability to control internal team processes and activities, can increase the flexibility of boundary-spanning teams. For example business managers tend to try to keep some level of control over team activities, since the team's (sourcing) decisions have a direct impact on many business aspects. Team members should have the power to make decisions in name of their function. Another important aspect is the level of effort that is brought to a team's. Gaining team member effort is a particular challenge for sourcing teams due to part-time assignment of members. There is a clear risk for value management teams that members may prioritize other responsibilities

outside the team and direct supervisors of these members do as well. It should be clear what the teams outcome is in order to justify the time spend on the team work. Maurer (1996) argues that in order to start and maintain a successful value program management, three levels of functions should be installed. First sponsors are used to oversee the program and increase the authority of a team. These can be individuals or groups which have business wide responsibility and authority and be genuinely committed to the program. The oversight body provides motivation and funding, evaluates improvement proposals and makes decisions on implementation. Secondly, a value manager receives direction and objectives from the management sponsor, organizes the workshops and administers the program. Properly trained, the value manager will take the lead in using business analysis techniques to identify projects for value analysis. The value manager tracks and reports the value improvement progress. Thirdly, a workshop facilitator instructs the team members in value management principles and techniques and leads the teams in applying them to their specific project. Although this way of organizing value management is an example, it shows that management sponsors can help teams to get authority. This way of control may break the cross-business hierarchy and improve value management efficiency.

Making teams a major part of the formal organisational structure is one, creating an environment where teams are successful is second. Two major hurdles should be taken. First, teams often consist of part-time members. It can be difficult for these members to obtain commitment while facing conflicts in demands on their time. Secondly, many organisational reward systems discourage people to participate in teams. The efforts they invest in project management are often not recognized and rewarded by performance indicators. The rewarding and evaluation should consider the use of teams. This issue is taken into consideration in the next section about value management control.

A good value management multidisciplinary team is composed of specialists who understand and accept the principles of team work. Team development involves four basic characteristics: (1) a common vision, (2) a viable structure, (3) a reward system, and (4) good team leadership (Thiry, 1997). A team with the proper balance of commitment, competence, and stimulation is the most critical factor for successful value management (Elias, 1998). Team effectiveness and the success factors for teams have been studied extensively in the context of manufacturing, new product development and purchasing organisations (Driedonks, Gevers, & van Weele, 2010) (Holland, Gaston, & Gomes, Critical success factors for cross-functional teamwork in new product development, 2000). Driedonks et al. (2010) have done empirical research to study the success factors for effective teams in a purchasing environment. Their research showed that teamwork training, autonomy, formalization, transformational leadership (charisma, individualised consideration and intellectual stimulation) and internal communication are very strong ($p=0.01$) correlated to the general overall team effectiveness. Their overall conclusion is that sourcing team's effectiveness depends strongly on the extent to which purchasing organisations have adopted a team management perspective. This perspective includes the delegation of responsibilities to teams, provide training in team working skills, and the facilitation of effective team processes. Instead of focusing on technology, information and measurements systems, managers should enhance collaboration, teamwork, and empowerment.

This section described the importance of cross-functional teams in value management that should be included in the theoretical framework for the governance of value management. Value management teams should consist of people from different functions that have the mandate to make decisions. The organisation of value management can be more effective when three levels of functions are installed: sponsors, a value manager and workshop facilitators. Finally it is important that teamwork is rewarded by the performance system.

2.2.3. VALUE MANAGEMENT CONTROL: STYLE & MEASUREMENTS

Management control systems are formal routines, reports and procedures that use information to maintain or alter patterns in organisation activities (Daft, 2004). It is the task of the corporate level strategist to determine the mix of control is needed to manage the corporation (Meyer & de Wit, 2004). Therefore this section starts with a description of management control styles and leadership. In order to let management control the organisation we need to establish measurements of performance. The development of an effective measurement system follows a general sequence of activities. These include determining which performance categories to measure, developing specific performance measurements, establishing performance standards for each measure, finalizing system details and implement and reviewing the system and each of the performance measurements. The first two steps are most important in the scope of this research. The last section therefore determines which performance categories can be measured and the third section gives an overview of requirements that are needed to develop specific performance measurements.

2.2.3.1. STYLE OF CONTROL: INPUT, THROUGHPUT & OUTPUT CONTROL

Effective control systems involve the use of feedback to determine whether organisational performance meets established standard to help the organisation attain its goals (Daft, 2004). A simplified feedback control model is given in Figure 9.

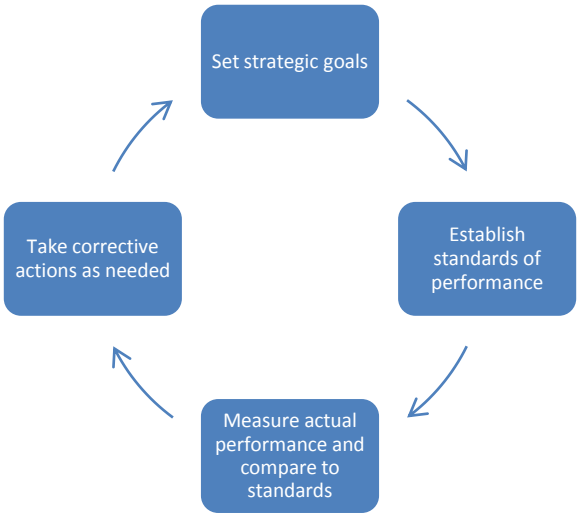


FIGURE 9: A SIMPLEFIED FEEDBACK CONTROL MODEL (SOURCE: DAFT, 2004)

Someone can be given the formal power to enforce centralization, coordination and standardization (control). This can be done by direct supervision or by giving objectives to business units that should be met.

Leaders can seek influence by control in three different ways. *Throughput control* is the most direct in its impact, but offers the lowest leverage. Leaders focus their attention directly at the actions being taken by others in the organisation. They lead by example and simply telling others what to do. *Input control* is least direct, but has the highest leverage. Leaders choose to influence the general conditions under which activities are carried out. The leader can influence who is assigned for the task, which teams are formed etcetera. In between we find *output control*. Instead of directly supervising how things should be done, leaders set objectives. The act of setting objectives can have an important influence on people in the organisation, but the ability to check ongoing performance and to link results with punishment and rewards can further improve a person's impact.

2.2.3.2. Measurement requirements: Developing specific measurements for value management performance evaluation

Measures track progress and direct behaviour (Monczka, Handfield, Giunipero, & Patterson, 2009) while they provide direction, consistency and enhance performance of individuals and teams (Cousins, Lemming, & Lawson, 2007). All locations should use the same system structure which can reduce duplication of effort and save development and training costs. At least the system basics should be the same (Monczka, Handfield, Giunipero, & Patterson, 2009). Involve stakeholders in the development of performance measurements is beneficial in order to get support for the measurement system (Monczka, Handfield, Giunipero, & Patterson, 2009). The measurement system can be reviewed periodically to determine whether existing measures still support the department's objectives. The system becomes dynamic. Specific performance measure should be developed to measure the chosen categories. Certain features characterize successful purchasing and supply management performance measurements. Requirements for performance measurements are derived from literature of Cousins et al. (2007) and Monczka et al (2009).

Each measure should be as objective as possible and use data that is available and accurate. Subjective evaluation can create discussion and disagreement among people. All parties must be clear about what each performance measure means, agree on performance objectives associated with the measure, and understand what it takes to accomplish the measure. In other terms, performance measurements should be clear and directly related to organisational objectives. The set of measures has to capture elements of both efficiency and effectiveness while balancing qualitative and quantitative measures. The last important requirement states that a measurement is not manipulable. This means that the personnel cannot inappropriately influence the result of measure. Ideally, the individual responsible for the measure should not be responsible for supplying the data for measuring. These aspects are taken into account by developing measurements for value management and the purchasing function.

2.2.3.3. Categories of measurements: Purchasing & the value management measurements

Traditional quantitative or financial objectives of output, department costs, productivity, efficiency, and profit are not sufficient within value management (Dumond, 2000). Additional objectives in integration, training and development, continuous improvement, flexibility, dependability, customer satisfaction, innovation, and long-term considerations over short-term profitability may be needed. Previously it is argued that value management as a management program can be coordinated by the purchasing department. The role of the purchasing department is important because product cost are influenced by the purchased parts and because the production of products can be completely outsourced. The performance control system of the purchasing department should also be in line with the value management program. Two types of measurements relevant: purchasing function measurements and value management measures.

Value management measurements

"If you want to know how successful a value management strategy is, you need to look beyond savings" (Arratia, 2007). While savings can tell us that there is value management activity, it does not tell the whole story. The project management success value could also be measured by the process (Patah & de Carvalho, 2007). The typical pattern of value management studies can be simplified as shown in Figure 10.

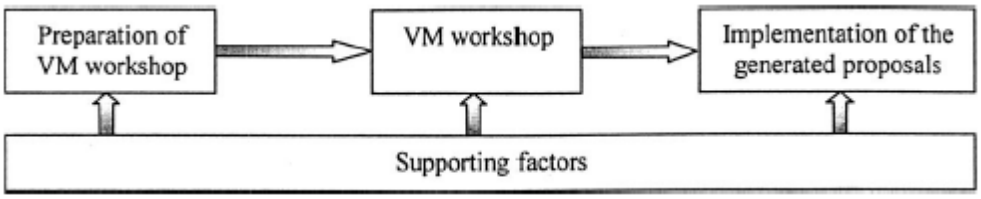


FIGURE 10: SIMPLEFIED PATTERN OF VM STUDIES (SOURCE: SHEN & LIU, 2003)

From a value management perspective it is important that the measurements track both the performance of processes and the quality of interactions (Dumond, 2000). Recent empirical research on the critical success factors (CSF) for value management studies have mainly been conducted in the construction industry (Chen, Paulraj, & Lado, 2004) (Lin, 2009). From this research and additional papers on value management success by Patah & de Carvalho (2007), and Arratia (2007), a list of CSFs for value management is derived (Table 2).

	P	W	I	S		P	W	I	S
Clear objective of VM study	X				**Qualified VM facilitators**		X		
Control of workshop		X			**Personalities of participants**		X		
Plan for implementation			X		**Tools used**		X		
Timing of study (planning)	X				**Interaction among participants**		X		
Experience and knowledge of participants in their own discipline				X	**Preparation and understanding of related information**	X			
Adequate time for VM study		X			**Coverage of VM trained people**			X	
Cooperation from related departments		X		X	**Enhancement of customer satisfaction**			X	
VM staff growth			X		**Enhancement of development**			X	
Sufficient number of VM studies conducted	X				**VM knowledge and experience of participants**		X		X
Providing information to organization				X	**Employees initiative to become VM expert**				X

TABLE 2: CRITICAL SUCCESS FACTORS FOR VALUE MANAGEMENT (SOURCE: CHEN, PAULRAY & LADO, 2004; LIN, 2009; PATAH & CARVALHO, 2007; ARRATIA, 2007; DUMOND, 2000)

From this table we see that, although most value management CSFs are related to the value management workshop itself, CSFs are dispersed among preparation (P), workshop (W), implementation (I) and supporting factors (S). Value management can be controlled by input, throughput, and output control as previous discussed. The factors in table 3 can be categorised according these three control styles. Preparation and supporting factors create the circumstances for good value management and belong to input control. The workshop is the actual execution of value management. The factors related to the workshop are thus intended to be throughput control. Output control can be derived from the implementation and thus outcome of the value management workshops. The critical success factors are the value management measurements as input for the theoretical framework that is developed in the next section.

PURCHASING PERFORMANCE MEASUREMENTS

Value management is regarded to be a tool and a way of working to generate savings related to purchasing (improved value, better price etc.). Beside savings, it may help purchasing to achieve other goals like increased quality or an improved purchasing supplier portfolio. The purchasing department defines the performance measurements to measure the performance of the purchasing function as a whole. Looking at purchasing performance measures literally hundreds different ways of measuring purchasing, or supply, performance can be distinguished (Cousins, Lemming, & Lawson, 2007). In order to capture a broad range of performance measures, two sets of purchasing performance measure categories by Monczka et al. (2009) and Cousins et al (2007) are combined. The goal of value management is to improve the margin of a product by reduce cost and/or improve the product value (see section 2.1.2.3). The performance measurements should be aligned with value

management practice. This means that the measurements should encourage people to make decisions during value management practice that improve cost and/or value of the product. Performance measurements that compare supplier performance, that are related to the internal organisation or practice in the purchasing department (for example legislation) are excluded. The broad set of purchasing performance measures derived from literature (Appendix C) are assessed to these two criteria.

Cost is the expenditure of money, time, labour etc., to obtain a requirement (Weele, 2008). Cost reductions, or savings, are an important indicator for measuring efficiency and effectiveness of the purchasing function. Definition is a problem. Practice shows that there is no true definition (Nollet, Calvi, Audet, & Cote, 2008). The purchasing function influences not only the product cost price by the purchase of material and components, but also other cost like distribution and inventory cost. For example making a product smaller may result in lower inventory and distribution cost. The total cost performance of the purchasing function is reflected in the deviation from actual and planned spending. Distribution, inventory, production and other related cost can be captured in a 'cost change' or 'cost saving' performance measurement that takes a total cost of ownership perspective. *Cost saving is thus defined as the difference between a prior and a new cost (price).* Looking at the cross-functional character of purchasing, savings are often related to a team effort. It may be clear that claiming all the savings to the purchasing function may lead to objection of other functions. It is therefore necessary to report savings on a corporate level (Weele, 2008). This should be done by using an integral cost evaluation of all cost that might be changed due to the decision. Only reporting price effects might lead to misjudgement of the real results. Literature makes a distinction between cost savings and cost avoidance. Cost avoidance is defined in different ways. Van Weele (2008) defines cost avoidance as the difference between historical and current price, which are expected not to be sustainable. For example when the purchasing budget for a certain product is set at 10 thousand euro but due to negotiations the purchaser is able to stay within its budget with a 7 thousand euro deal. In other words, cost avoidance is the difference between a price paid and a potentially higher price. The 'not sustainable' character is doubtful because a negotiation savings can last for a long term and create a new cost price for a product. It could thus be argued that it is a cost saving. A generalisation from a development perspective might be useful. *Cost avoidance is than defined as reduction or the elimination of future cost* (Dmytrenko, 1997). Cost changes that do not have a prior cost or price are categorised as cost avoidance. The cancellation of a product or a reduction in development time is also examples of cost avoidance. Price comparison (between operations in different plants, divisions, business units or suppliers) is more a method to achieve a better price for your products than a measurement in itself and is therefore excluded as measurement.

Value is ultimately reflected in the revenues of a company. The measurements that are derived from literature in the category 'revenues' are mainly concerned with value creation by the purchasing function. Royalty revenues, return on licensing, number of inventions and patents are all examples of value creation through suppliers or technology. These kinds of measurements can be captured in a single measure that would encourage purchasers to use their and their supplier's knowledge and technology in the creation of product value. The target price achieved (target price-profit target=allowable cost) is mentioned in the literature as a price-effectiveness measure. This measure is actually more important and suitable as a revenue measure because the target price achieved measure makes a direct link possible between cost and profit margin. Target pricing is the process of determining what the external customer is willing to pay for a product and then assigning specific cost targets to the components, assemblies, and systems that make up the product (Weele, 2008). Allowable costs are than calculated by the difference between target price and the profit target. Subsequently the allowable cost is allocated to the various elements that make up the final product. When a decision is made that increase the product value (price) more than the extra costs it occurs, a better margin is achieved. This performance measure is thus very important for value management.

Value is in product development a function of both the product recipe and the process that produces it (Browning, 2003). Processes provide benefits at some cost. A value measure should account for quality & performance, affordability and timeliness. Measures in the categories quality, time, customer satisfaction, and technology and innovation that are derived from literature (Appendix C) are thus relevant. Ignoring supplier performance aspects, quality in purchasing can according to the literature be measured by production quality, the maximum level of defects allowable in a product or process, and the customer returns or field failure rate. Time-to-market targets and achievement of introduction and ramp-up schedules is most important in the 'time' category. Customer responsiveness, on-time delivery and backorder/stock-out figures are less important because these criteria are difficult to be influenced by product design and value management. The same hold for the customer satisfaction. Although measuring satisfaction as an end goal might be helpful to make valuable decisions, it is difficult to bring this back to a single product and to the contribution of the purchasing function. The measurements on technology and innovation are partly related to the use of industry standards and achieving standardisation. Using industry standards is important because this will increase the value of a product because the market might require the use of industry standards. Standardisation can help to reduce cost of complexity and increase economies of scale. Having these performance measures in place can encourage a purchaser suggesting to use a certain standard in a product. The number of agreements with key suppliers for critical (new) technologies can be a method to improve the value, but it is not directly related to value management or a value mindset in way of working.

Using these arguments leads to a limited set of purchasing performance measurements and measures that encourage value management practice (Table 2).

Category	Measurement	Measure
Cost (price) performance	The deviation from actual and planned spending	% deviation, absolute savings (€)
	Cost change by (new cost-prior cost) x estimated volume (TCO)	Savings (€)
	Cost avoidance defined as reduction or elimination of future costs	Savings (€)
Revenue	Value creation through purchasing (e.g. patents and licensing)	Nr. patents, nr. license contracts
	Target price achieved (target price-profit target=allowable cost)	% deviation
Quality	Maximal level of defects allowable in a product, assembly, or service	% defects
	Field failure rates (failure after sales)	Rate of failure
Time	Time-to-marker targets	Deviation from target (days or % delayed)
	Achieving new-product introduction ramp-up schedules and introduction dates	Deviation of plan (days or % delayed)
Technology, innovation	Achieving standardisation (e.g. reduction of different components used)	Nr. of different components
	Using industry standards	% or nr. of exceptions

TABLE 3: PURCHASING PERFORMANCE MEASURES THAT ARE IMPORTANT FOR VALUE MANAGEMENT BASED ON LITERATURE REVIEW AND SELECTION (SOURCES: APPENDIX C)

A survey by Ellram and Pearson (1993) confirmed the changing transition of the purchasing function. The issues in which the purchasing function participates suggest a transition from individual purchasing responsibility to a team approach. Value management and the use of sourcing teams are examples within purchasing, but it is argued that firms in generally more on the use of teams for management in the future (Ellram & Pearson, 1993). This trend towards the use of team structures also requires new management practices (Driedonks, Gevers, & van Weele, 2010). Over the years, team performance and management have received a lot of interest from researchers, and for good reason. Creating successful teams requires careful consideration of a range of factors that enable and enhance effective teamwork. Functional management is argued to be the biggest obstacle to teamwork (Holland, Gaston, & Gomes, 2000). This means that department management is often demanding the use of team member's time for the achievement of functional sub goals at the expense of the team goals. Firms need to make teams accountable for performance and functional managers responsible for supplying functional excellence, through development and co-ordination of resources. Pinto et al. (1993) showed the importance of superordinate goals, which refer to 'goals that are urgent and compelling for all groups involved nut whose attainment requires the resources and efforts of more than one group or department. The use of superordinate goals is positively

related to cross-functional cooperation and task outcome in their empirical research. It is thus important to steer value management and the purchasing function from a project team perspective with team goals for all the different functions involved. The subset of superordinate goals from the previous purchasing performance criteria include: 'Target price achieved', 'time-to-marker targets', 'Achieving new-product introduction ramp-up schedules and introduction dates', 'cost changes', and cost avoidance'. The measurement 'customer satisfaction' can also be included using this argument. These performance measures should thus for example be given to value management teams, product development teams and sourcing teams.

2.2.4. Conclusion: Integrated value management and three step control

Integration and control issues are important when value management takes place in a multi-business organisation. This section described the governance of value management. Conclusions are made on the role of the purchasing function, organisational integration and value management control.

This chapter argued that value management can be coordinated from the purchasing department. Two important implications for the purchasing function are derived from literature. Value management has important influence on the strategic process because due to value management, specifications might change. A change in specifications will result in a different balance between internal demand and the external market. Value management should be part of the sourcing strategy making. Another important aspect derived from the literature is the influence of the purchasing maturity on its performance as a function. If an organization's maturity is too low, the introduction of value management may be less successful due to specific dimensions. The purchasing maturity assessment model can help to identify potential threats and opportunities.

Organisational integration is according to the literature important for successful value management practice. The organisation of value management should be installed on three levels. (1) Sponsors must oversee the program and increase the authority of teams, (2) a value manager organises workshops and administer the program, and (3) workshop facilitators leads the team during workshops. Multi-business organisations have to cope with integration issues since value management involves people cross-business and cross-functional. Coordination is argued to be an important integration mechanism. Horizontal coordination is an important tool to achieve integration by coordination. The literature review showed that horizontal coordination mechanisms can improve communication between business units and improve integration of the value management program. Information systems, direct contact, task force teams, full time integrators and full time teams are examples of horizontal coordination. A firm should make sure that a mechanism is in place to ensure horizontal coordination between business groups. In-house value management task force teams (that consist of people that are already working on the project) are expected to be very effective as coordination mechanism. The cross-functional teams are expected to minimize the need for continuous reporting, increase communications, realize financial improvements, improve processes, and increase effectiveness. Furthermore autonomy provided to teams in general, and to cross-functional teams in particular, improves team effectiveness. The level of autonomy of teams is important in order to deal with problems of ownership and gaining team effort due to their part-time assignment. Teams should thus be encouraged to participate in value management projects next to their regular assignments. Value management teams should consist of people from different functions that have mandate to make decisions.

The practice and performance of value management should be controlled in the organisation. Leaders seek influence by control in three ways: throughput control, input control and output control. These control types are in line with the three phases of value management (preparation, workshop execution, and implementation). The control system should use a feedback loop in order to steer on results and take corrective actions if needed. Preparation, workshop execution, and implementation performance criteria are compared with established standards. Corrective actions can be taken in the process (feedback arrow in the model of Figure 11).

Before a value management workshop or training starts, a clear objective must be determined, teams must be multidisciplinary and all important information on the product should be gathered. By doing this you ensure that all information that is needed during the workshop is available for the appropriate tools, creativity is enhanced and a broad scope is ensured by including all functional parties. Two previous named measures are excluded. The number of workshops is less relevant because this can be triggered by saving targets and targets for the number of trained employees, and 'timing' as performance measure is less important because the project selection considers this aspect.

Throughput control can help an organisation to get the best out of a workshop. A workshop should be structured (workshop control), led by a qualified value management facilitator that can ask the right questions to make people creative and think over decisions, departments have to cooperate to come to mutual decisions and the time available for a workshop should be sufficient in order to assess all important aspects and make decisions from ideas. Different projects, and different types of business, demand for different tools. Although suggested by literature, the 'tools used' is excluded from the control mechanism. Also aspects like personality, interactions and VM knowledge are not recommended as control measurements because they are difficult to measure and more likely to be assessed in a mature value management organisation that is used to the program and way of working.

Value management outcome is according to the literature most important. Output control has directly effect on the value management goal: creating value. Value management should become a way of working where employees consider value in their daily practice in a so called 'value management organisation'. It is therefore important to ensure the value management staff growth and their organisational coverage. Each workshop should end up in a plan for implementation to make sure that the opportunities that are generated can be considered in the products design, its process or the supply chain and finally lead to value improvement for the company. The last measurement is value outcome, as a result of cost reduction and value improvement, in terms of cost savings, cost avoidance and margin improvement. Control should both cover the initial potential value outcome and the implemented actual outcome over time. Other aspects like enhancement of customer satisfaction and providing information are indirect effects of value management and hard to measure. They are therefore excluded as output control measurements.

The different value management performance measures can be categorised as shown in the conceptual model (Figure 11). Value management can be coordinated from the purchasing department. The performance measurements for the purchasing function should be aligned with value management practice. Possible measures are derived from literature and arecompared with the currently used measurements. Literature has showed the importance of using superordinate goals for teams in order to make cross-functional working more effective. The emphasis of performance measuring should be on these high level mutual goals.

The most important aspects of the literature review described in this section can be summarised into a theoretical framework of value management (Figure 11).

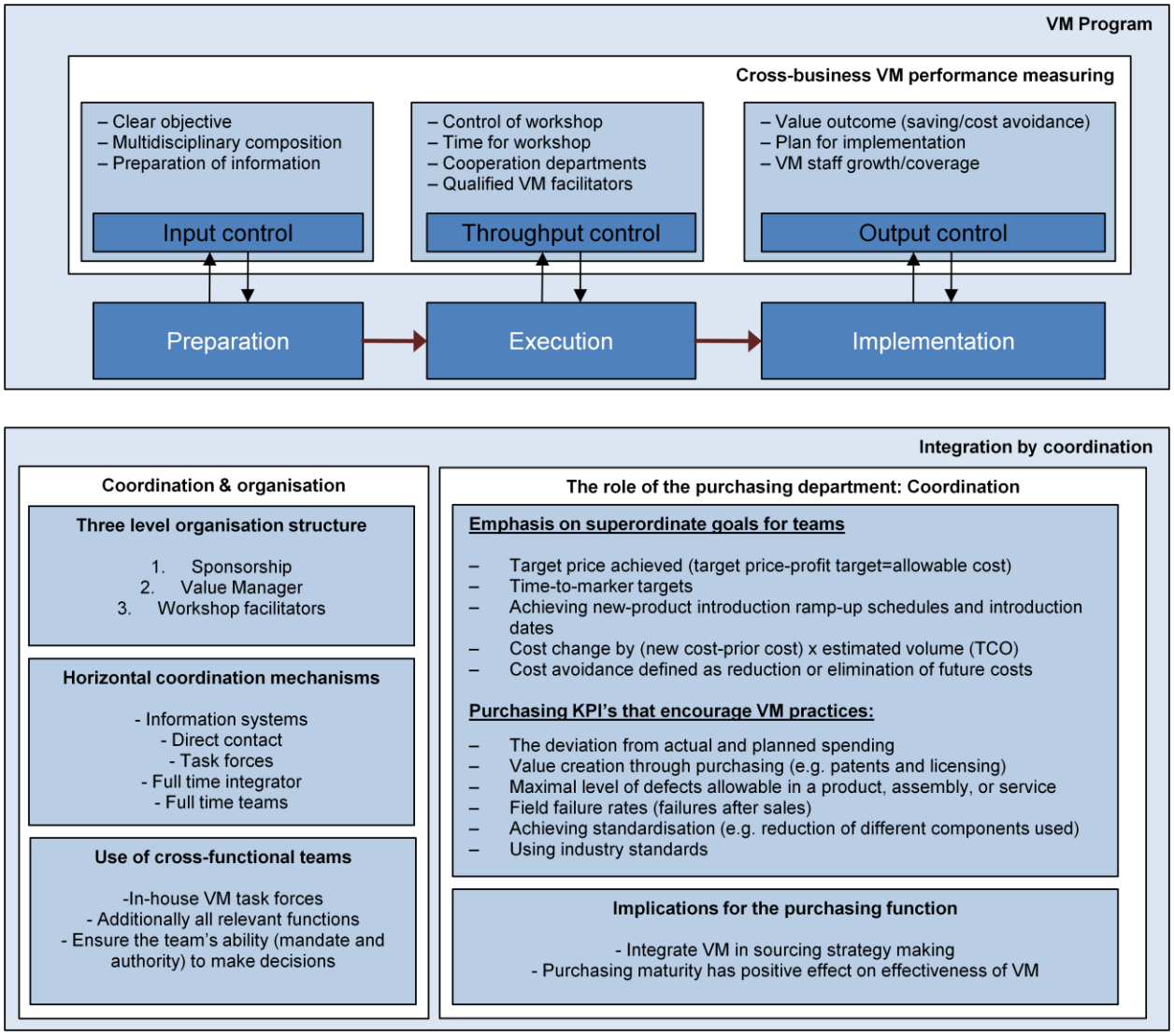


FIGURE 11: CONCEPTUAL MODEL OF VALUE MANAGEMENT PROCESS AND GOVERNANCE (OWN ILLUSTRATION)

2.3. PROJECT SELECTION: SELECTION CRITERIA & THE SELECTION PROCESS

The value management program consists of workshops where multi-functional teams seek opportunities for product improvement. Chapter 2 described the value management process. The time and resources that can be allocated to a value study are often limited (Shillito & De Marle, 1992). It is therefore wise to follow a formal selection process in order to allocate resources best. This section explores the academic theories about project selection criteria and the selection process. Selection criteria are the characteristic of projects and products which influence the success of the value management workshop on forehand. The project selection process should be a method or tool that support managers in the decision making process.

It is expected that by selecting a project based on the right criteria will lead to the best results of value management projects. The 'best' result depends on the goals that are set and which follow from a business' strategy. In the end, improvements of value studies should increase the organisational value (SAVE International Value standard, 2007). Three important overall goals for value management can be distinguished (Kaufman, 1993) (Maurer, 1996).

Firstly value management is used to reduce cost, add value without too much cost or cut unnecessary cost. A firm will for example seek to get return (better margin) on their investment (ROI) in value management. Secondly it is used to train people in the organisation to adapt their way of working and thinking in a more value driven instead of cost driven way. Thirdly, value management is used to support the corporate and business strategic goals on the mid-long term because solutions and opportunities can be applied cross-functional and cross-business.

2.3.1. PROJECT SELECTION CRITERIA: HIGH COST VALUE, MARKETING, DEVELOPMENT & PURCHASING CRITERIA

A structured literature review to project selection criteria resulted in an extended list of criteria (Table 4). This list is derived from literature that is mainly focused on value management practice and does not include empirical research on project selection criteria and value management success. From this table we see that a majority of published material is focusing on cost versus value selection criteria. Cost versus value is directly linked to a product's margin since this is the difference between price and cost. These criteria review a product's cost and price in order to determine the saving or value opportunities of a value study. It is clear that a firm has to invest resources (for example people and tools) into a value management project. A firm will seek to get return on their investment (ROI) in value management. ROI can be defined in many ways like in terms of lower acquisition costs, lower lifecycle costs, improved quality, more capabilities for the same dollar, economic feasibility, and an improved competitive position (Dlugatch, 1973). A case study by Hartley (2000) adds visibility of a project at top management as important selection criteria. Top-management visibility is partly reflected in other criteria (for example sales volume and cost price). It is additionally included as a project selection criterion because it can reflect emotional arguments and the strategic importance of a product or a technology.

Other criteria relate to the three important stakeholders in value management: marketing, development and purchasing. Marketing criteria include aspects like sales volume, market development and customer perception. Also inter-firm comparison can be a reason to perform a value study (Somkant & Padhye, 2000) for example when a firm finds out that a competitor's product is superior. In the field of development major issues on quality and functional performance can be assessed by a value study (Maurer, 1996).

From this research' perspective we are also very interested in criteria that are related to the purchasing function. The literature review didn't result in extensive research on value management project selection from a purchasing perspective. Somkant and Padhye (2000) name that value studies can be useful when a supplier has a monopoly position, but their paper lacks argumentation.

Criteria		(Shillito & De Marle, 1992)	(Kraljic, 1983)	(Kaufman, 1993)	(Maurer, 1996)	(Somkant & Padhye, 2000)	(Monroe & Cox, 2004)	(Dlugatch, 1973)	(Hartley, 2000)
Cost & value (margin)	High costs	X			X	X	X		X
	Resources consumed				X				
	Difference actual cost vs. value standard							X	
	Difference estimated cost vs. value standard							X	
	Most expensive item of a system		X						
	Current CPR vs. target CPR			X					
	Value opportunity potential			X			X		
	Waste				X	X			
	Enough resources available						X		
	Meets threshold for value creation						X		
	Return on investment						X	X	
Purchasing	Profit impact vs. supply risk		X						
	Monopoly of suppliers					X			
Marketing	Market growth			X					
	Market share			X					
	Sales volume	X		X					
	Improved value in the market	X							
	Customer complaints					X			
	Inter-firm comparison					X			
	Product becoming non-competitive					X			
	Customer find critical						X		
Development	Functions (needs) are not being properly accomplished				X				
	Repetitive problems				X				
	Production bottlenecks, breakdowns					X			
	Time constraints					X			
Other	Energy problem					X			
	Can be completed in given time frame						X		
	Top management visibility								X

TABLE 4: PROJECT SELECTION CRITERIA DERIVED FROM THE LITERATURE

The set of criteria that is derived can be used as input to the project selection process. Depending on its strategy, a company can decide which subset of criteria is used in practice.

2.3.2. PROJECT SELECTION PROCESS: A STRUCTURED WAY TO ALLOCATE RESOURCES

Time and resources for value management projects are scarce and it is therefore needed to follow a formal and well structured selection process to allocate resources to projects based on the selection criteria. The project selection process can be seen as a set of iterative steps taken to determine which project should be conducted. After gathering information on projects that possibly can be used for value studies, a certain number of projects can be picked due to scarcity of resources. This is especially an issue when value management is not yet fully integrated in the organisation because not many value experts are available. This section gives an overview of four selection methods derived from literature.

2.3.2.1. PROJECT SELECTION BY COMPARING COST WITH VALUE STANDARDS

A very general project selection method is described by Irving Dlugatch (1973). This method is general because it builds on comparing actual or estimated cost with value standards which is a very common criteria for value management projects as we saw in the previous section.

According to this methodology, three steps for project selection should be taken. (1) Comparing actual or estimated cost with value standards. The standards can be theoretical, stemming from a mathematical expression of the product's function, or historical, based on the assumption that existing products, if competitive, have high cost value. (2) Ranking components according to their approximate percentage of the total cost of the system. The most expensive item is the one most likely to yield high returns for VE. (3) Attacking subsystems with which the VE engineer has had the most experience. He thus suggests selecting project based on three criteria, namely high cost value, high cost and experience.

2.3.2.2. PROJECT SELECTION USING ANALYTICAL HIERARCHY PROCESS

This section describes a project selection method developed by Mahmoodzadeh, Shahrabi, Pariazar & Zaeri (2007) to gain better understanding of the project selection process. This method is useful because it is designed for project selection and combines common methods of combining alternative investments (net present value, rate of return, benefit cost analysis and payback period). It is a very quantitative and financial driven method for project selection that might be useful in addition to soft decision making criteria. Briefly, the step by step procedure using AHP is:

1. Define decision criteria in the form of a hierarchy of objectives. The hierarchy is structured on different levels: from top (goal) through intermediate levels (criteria on which subsequent levels depend) to the lowest level (alternatives);
2. Weight the criteria, sub-criteria and alternatives as a function of theory importance for the corresponding element. Use pair wise comparison to determine weights and ratings. A judgement matrix is developed;
3. Calculate the priority vector to weight the elements of the matrix.

The analytical Hierarchy Process (AHP) is an approach that is suitable for dealing with complex systems related to making choice out of several alternatives and which provides a comparison of the considered options. AHP has several advantages like: (1) both quantitative and qualitative criteria can be included in decision making, (2) a large quantity of criteria can be considered and (3) a flexible hierarchy can be constructed.

2.3.2.3. PROJECT SELECTION BY COMPARING RETURN ON INVESTMENT AND IMPACT ON RESOURCES

Monroe and Cox (2004) developed a methodology for the selection of Six Sigma projects. They define a Six Sigma initiative as the methodology for an organisation to address problems without known solutions that affect the organisation's financial and customer satisfaction success. Because solutions during value management studies are also unknown, this methodology might be useful for project selection of value management studies as well.

This project selection process is based on the comparison of return on investment (ROI) of a project and the effort that is needed to perform the study. ROI can be defined based on the goals and outcome of a value management workshop, for example in terms of customer value or cost reductions. Effort is defined as the resources, time and cost that are involved in organising a study. The five-step project selection process is as follows:

1. Identify the opportunities to create value. Usually the management team has a list of these issues they wish pursued. They tend to fall into categories of strategic, financial, operational and customer issues. These issues are the beginning of the potential project inventory, identify and prioritize these issues.
2. Analyse the value opportunities and rank them. Related opportunities can be grouped together to create the nucleus of a project. Value can be estimated in terms of leveraging revenue, cost reductions or improving customer's critical to quality issues. Some organisations adopt a minimum threshold NPV for a project. In cases where a project falls below the minimum NPV, the project will only be approved if it is an enabling project that must be done to enable a really big money-maker of money-saving project.
3. Screen the initial list of opportunities for projects against a criterion of the effort to implement a project and the impact based on the ROI of the completed project.
4. Scope and define the project based on a common project and the impact based on ROI of the completed project.
5. Prioritize the projects based on their positive benefit relative to effort (ROI), the project's ability to have its learnings transferred to follow-on projects, and the risk of the project not succeeding (Figure 12).

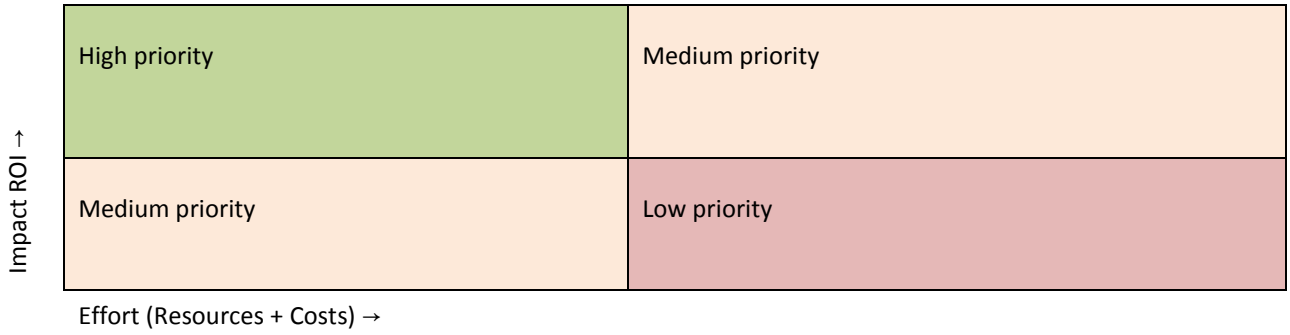


FIGURE 12: PRIORITY MATRIX FOR PROJECT SELECTION (SOURCE: MONROE & COX, 2004)

Projects are picked using the priority matrix. When many project opportunities exist, management should first allocate resources to projects with high impact on ROI and low effort. Secondly the management should leverage between the medium priority areas. It is not preferable to conduct studies that have low impact on ROI and require a lot of effort. This method may be used for selection of opportunities after a value study as well.

2.3.2.4. PROJECT SELECTION BASED ON THE VALUE OPPORTUNITY POTENTIAL

Jerry Kaufman (1993) describes a value management planning process based on the concept of product portfolio management. This method, called value opportunity potential (VOP), supports senior management's goals by planning cost effective projects that complement the company's business plan and expands value management into other fruitful areas. The value management planning process focuses on the industrial sector and offers cost reduction as one of many effective VM resolutions to solve business problems.

The VOP process is based on comparing cost-to-price (CPR) product performance against a given target, then analyzing the difference (delta) to market growth, to identify potential value management projects. The selection of VM projects involves identifying products that have a high potential for reducing the projected CPR considering such factors as sales forecasts, anticipated market growth, and market share held by the company's product line. This data should be available in the profit and marketing planning section of the business plan.

The CPR of a product is determined by dividing the product cost by its sales price. The costs is the standard, or inventory cost consisting of direct labour, burden on direct labour and direct material. For example, if a product is

sold for 100 euro, and its standard cost was 80 euro, the product CPR would be 80/100 or .80. Note that the inverse is the gross margin (0.2), but not profit because it does not separate other cost like cost of sales.

In the industrial products market, a CPR of .69 or higher will leave little if any profit. It may also indicate a loss position if the company has high overhead expenses. Target CPRs, used to track product performance, could be selected from government agencies that collects such statistics by industrial segment, or established internally as a company's business performance goal. To calculate the VOP following formula can be used:

VOP = planned sales overturn * (current CPR-Target CPR)

With a planned sales of 10,000 pieces, we get a VOP that is equal to 10,000*100*(0.80-0.69) = 110,000 euro. If a planned CPR is greater that the target CPR a cost reduction opportunity exists. The example shows that if the CPR is not improved (lowered) the company will miss its planned earnings by 110,000 euro. Since we are working with cost to price ratios, the potential loss can be recovered by reducing cost, raising price, or a combination of both. A planned value management cost reduction effort seems obvious, but it may not represent the best solution. To determine a value management support strategy we need more information about the product and the market in which the product is sold.

In order to gain insight in the marketing data and compare projects, Kaufman suggests using a project selection grid which is a modified version of the well known product portfolio management grid developed by the Boston Consultancy Group. The project selection grid (Figure 13) is used to display the products and the conditions governing their behaviour. The 'X axis' shows the company's relative market share. The break between high and low market share is the point where the company's share is equal to its highest competitor. The 'Y axis' shows the market growth. Market growth may vary from a rapid growing market to a mature or no growth market. The line separating the two segments can be established by using the projected Gross National Product (GNP), global market trends, company growth strategy, or other strategic factors. More than one product can be displayed in this way and the product's VOP can be included in the figure to make one overview for decision making.

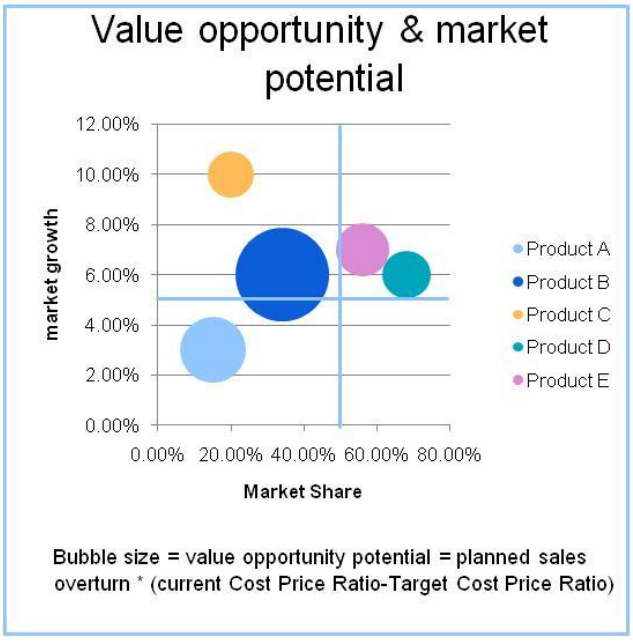


FIGURE 13: VALUE OPPORTUNITY POTENTIAL PROJECT SELECTION GRID (SOURCE: KAUFMAN, 1993)

The project selection grid is now divided into four quadrants: Wildcat, Star, Cash Cow and Dog. Products in every quadrant have a different degree of value management need. From Table 5 we see that wildcat projects have the highest priority after a firm has committed to the project. The risk and innovativeness for the project demands for value management to reduce time to market and to make sure the project becomes a 'star'. Second priority is given to 'stars' to make sure that their market share will be protected in the growing market. 'Cash cows' have low priority and value management projects with 'Dogs' should be avoided.

	Characteristics	VM goal	Priority
Wildcat	Innovative, risky, large fund after commitment,	Reduce time to market	High
Star	Protect or enlarge market	Cost reduction, quality improvement, model extension	Medium
Cash cow	Production oriented	No design change, better process	Low
Dog	Minimum investment, sustain or stop	No value management	Very Low

TABLE 5: VM GOALS AND PRIORITY BASED ON PROJECT SELECTION GRID (SOURCE: KAUFMAN, 1993)

2.3.3. Conclusion: Multi-function selection criteria as input for different selection processes

Organisations have to select value management projects due to constraints in resources. The literature review in this section made a distinction between the project selection process and the selection criteria that are input for this process.

Value management selection criteria should cover the company's value management goals. In general three different goals can be distinguished: improve margin, train people and support corporate and business strategy. A structured literature review led to an extended list of project selection criteria in five areas: cost & value, purchasing, development, marketing and others. The project selection criteria derived from the literature (table 4) can be captured in a limited set of criteria. From this, a company should select a subset that reflects the company's goals and strategy. The difference between cost and value can replace related criteria (like meeting threshold for value creation, current versus target cost price ration, and value opportunity potential), product bottlenecks and repetitive problems are captured by 'functions are not properly accomplished', 'enough resources available' is a resource capacity criterion that is included in 'resources consumed' and 'production bottlenecks', energy problem is excluded because this criteria is too specific for Philips, and finally the 'completion in given time frame' is related to the criteria 'time constraints' and therefore also excluded. The selected criteria are given in the framework.

Four different project selection methods are derived from literature, namely project selection by comparing cost with value standards, using an analytical hierarchy process, by comparing return on investment and impact on resources, and based on value opportunity potential. Based on the results of the criteria evaluation, a project selection method can be chosen. Four possible project selection methods are derived from literature (Table 6). The methods should reflect the company goal and all information that is used as input should be available. This should lead to a structured process that can support multi-functional decision making. The project selection process is thus a well defined method where all possible opportunities are considered in a structured way.

Method	Suitable for:
Cost vs. Value standards	Comparing actual or estimated cost with value standards, improve subsystems of a product on a component level.
Analytical Hierarchy Process (AHP)	Complex systems, both quantitative and qualitative criteria, a large quantity of criteria.
ROI vs. Impact on resources	Budget driven organisations, situations where resources are scarce.
Value Opportunity Potential (VOP)	Market and price driven organisations, for focusing on the outcome of the value management project (add value).

TABLE 6: PROJECT SELECTION METHODS (OWN ILLUSTRATION)

The project selection criteria are thus input for the project selection process. The theoretical review showed that this step should be added to the value management process. Figure 14 shows the conceptual framework of the project selection.

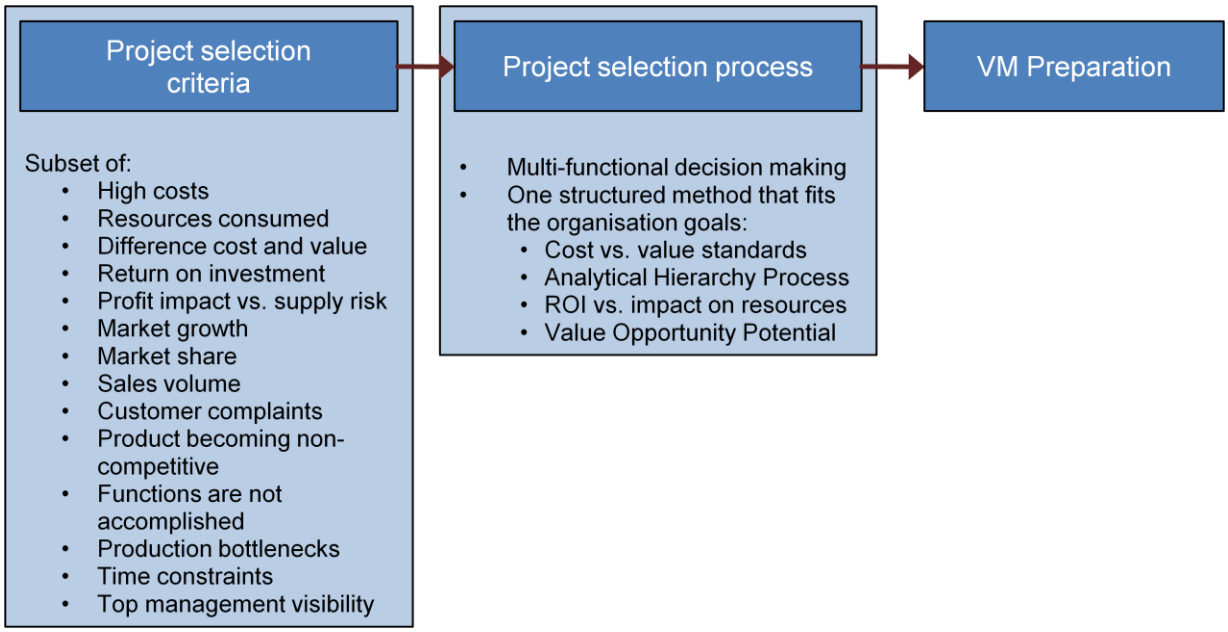


FIGURE 14: CONCEPTUAL MODEL OF THE PROJECT SELECTION PROCESS (OWN ILLUSTRATION)

2.4. THEORETICAL FRAMEWORK: VALUE MANAGEMENT PROCESS, CONTROL & INTEGRATION IN THE ORGANISATION

The literature on value concepts, value management, the governance of value management and the project selection is reviewed in this chapter. The most important aspects of the different sections lead to a theoretical framework (Figure 15). This framework is compared with the current practice at Philips Lighting in the next chapter.

Value management is a management program consisting of four basic steps. The project is chosen and prepared, a workshop where the tools are applied is executed and the opportunities for improvement are implemented in the organisation. Value management is a cross-functional program that involves different disciplines like marketing, development and purchasing. It can be controlled based on input, throughput and output control. An organisation can emphasise one of these mechanisms depending on the leadership style. The literature review derived a broad range of value management control measurements, from which ten performance measurements are derived in

section 2.2.4. These measures should, in line with the research objective, help the organisation to make performance of value management visible. The measures are based on input (preparation), throughput (workshop execution) and output (implementation) control. Each measurement category has a feedback loop to the related process step. An additional feedback loop is added in the theoretical framework that represents the total set of measurements. The project selection can use the outcome and performance of the value management program as input to the project selection. According to the literature the project selection, which is part of the value management process, should be based on grounded criteria and be done in a structured way. Multiple-functional decision makers that have an overview of all possible projects in a business can make a selection of projects that need to be optimised or improved by using value management

The topic of integration is also assessed in this literature review. The role of the purchasing function is important because value management has influence on the internal demand and subsequently on market possibilities. Value management practice should therefore be considered in strategic sourcing decision making. The maturity of the purchasing function also affect the effectiveness of value management. The purchasing maturity assessment model is used to assess different aspects of the purchasing function. Possible threats and opportunities can be identified with this tool and recommendations are validated by the maturity of the purchasing function. Alignment of the purchasing performance measurement with value management is important because of the supportive and coordinated character of the purchasing function. The general key performance indicators should encourage value management practice and also be focused on value and cross-functional integration. The performance indicators are derived from the literature in section 2.2.3.3. The measurements are assessed against the goal of value management (improve the product's margin), and the way it may influence people to make decisions that are in line to achieve this goal. The eleven performance measurements are also given in the theoretical framework. These measurements are compared with the current key performance indicators in order to find out if the current measurement system is supporting value management practice. Emphasis should be given to performance measures for teams as a whole because multiple functional measures for everybody separately lead to sub-optimisation.

Organisational integration is important because it can lead to better cooperation and resources can be shared. Two topics of interest are assessed: the value management organisation and integration mechanisms. The organisation of value management should be installed on three levels: sponsorship, a value manager and workshop facilitators. This way of control breaks the cross-business hierarchy and improves value management efficiency. Horizontal coordination is argued to be an important mechanism for increasing coordination in multi-business organisations and between different functions. Horizontal coordination can be achieved by the use of information systems, direct contact, task force teams, full time integrators and full time dedicated teams. A firm that consist of multiple businesses or functions should thus ensure that horizontal coordination mechanisms are in place. Literature argued that the use of empowered task force teams, consisting of people that are already working on the project, is very powerful for effective value management. These people are already committed to the project and able to come up with the information and can make decisions. The task force team can be extended by other specialist from different functional backgrounds (like marketing, purchasing, supply chain management, and development engineers). It is important that these people have commitment from their management to spend time on the project. The same holds for value management moderators or experts who have the ability and knowledge to lead a value management workshop.

The current value management practice at Philips Lighting is described in chapter 3 by using the key subjects of the theoretical framework. The current value management process, the governance and the project selection process are described.

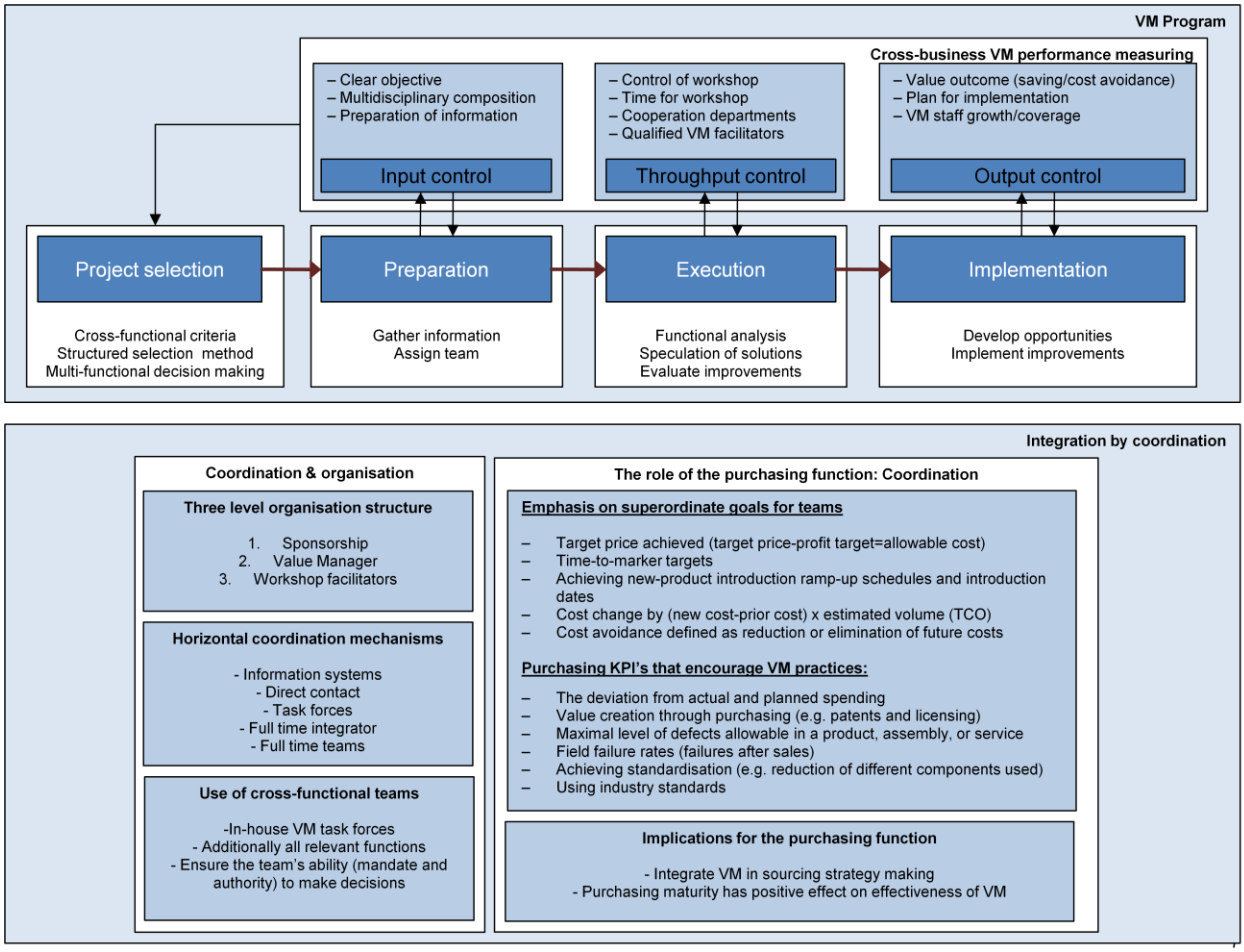


FIGURE 15: THEORETICAL FRAMEWORK OF A VALUE MANAGEMENT PROGRAM (OWN ILLUSTRATION)

3. VALUE MANAGEMENT PRACTICE AT PHILIPS LIGHTING: THE VALUE MANAGEMENT PROGRAM, GOVERNANCE AND PROJECT SELECTION

This section describes the current value management practice at Philips Lighting. The investigation of the current situation incorporates the aspects that are derived from theory in the previous section. First the value management program is described in detail. After that the organisation and control of the purchasing department in general and value management in specific is elaborated. The last section describes the project selection process.

3.1. VALUE MANAGEMENT PROGRAM: WORKSHOPS TO IMPROVE PRODUCT'S MARGIN AND TO TRAIN EMPLOYEES

The implementation of value management at Philips Lighting is still running. The program is adopted from the corporate supply management department. This section describes the current value management program where workshops take place to improve the margin of products and to train employees to a more value minded spirit. This section starts with a description of the implementation and it defines the program. This section ends up with a description of the value management process.

3.1.1. IMPLEMENTATION: CROSS SECTOR VALUE ENGINEERING PROGRAM ONLY FOCUSING ON ONE BUSINESS GROUP

Philips started with value engineering as constructive program in 2008 at the Consumer Lifestyle sector. Up to 2009 about 32 Million euro savings opportunities were identified. After the great successes in this sector, the management board of Philips decided to implement value engineering in the two other sectors, Healthcare and Lighting. Philips hired a cross sector vice president value engineering which goal is to increase knowledge and practice of value engineering in all three sectors. Value engineering is introduced in the sector Philips Lighting at the end of 2009. Workshops in the business group Lamps were conducted in order to train employees and improve products.

The implementation of value engineering at Philips Lighting follows four phases (Philips Lighting, 2010). Each phase consists of two steps that are captured in a value engineering progress tracking criteria sheet. The introduction phase starts to establish local leadership for value engineering with a committed sponsor, fully cross functional representation. The second step is to kick off a value engineering program with 'level 1' training in order to create understanding of the value engineering program and to establish expert teams. The second phase is planning. First step is the staffing of experts to ensure that experts are really working on value engineering. Furthermore it is encouraged to mix people across teams, functions and projects. The second step of the planning is called project coverage. This is established by systematic planning and execution of projects with value engineering and to make sure that all kinds of projects are covered. Execution is the third phase. Proven value engineering change agents (level 2 experts) are developed to increase value engineering capability and secondly a reporting system on value engineering related savings is implemented. The last phase is dealing with the institutionalisation that tailors value engineering to the business needs and makes the value engineering mindset as part of the culture. This phase is also focused on improving the competitiveness of products by adopting fundamentally lower cost and higher value product architecture, the final goal of value management.

The first phase of implementation is executed since the start of the implementation of value engineering at Philips Lighting. The chief purchasing officer and the chief technology officer of Philips Lighting are sponsors (Philips Lighting, 2010). A total value manager is assigned as a cross business leader of the program. The value engineering program is kicked off with two workshops in the business group Lamps. After this training, 17 active value

engineering experts are identified in the business group Lamps. Currently the value management steering group of Philips Lighting is preparing workshops in other business groups. The next implementation phase is not yet started.

3.1.2. PHILIPS' VALUE ENGINEERING DEFINITION: A VALUE MANAGEMENT APPROACH

Philips defines value engineering as follows (Philips Lighting, 2010):

Value engineering is a management program to increase the margin of Philips products by technical design actions. Systematic tools and approaches are applied to find solutions for increasing customer value, reducing costs and eliminating features that contribute little to customer value. Value engineering supports our brand mission of 'simplicity' by preferring the most elegant set of features that will excite each product's target customer.

From this definition we see that Philips value engineering is not only applied to new products, but also existing products. The definition and practice is thus rather a value management approach than a purely value engineering program. This report therefore uses the term value management. In line with theory, benefits can be achieved in three ways:

- Eliminating unnecessary costs: Which aspects create costs, but don't add value or add little value?
- Eliminating unnecessary value: Which aspects create value that is not wanted by the customer?
- Create added-value: What can we do to generate more value that is recognized by our customer, against costs that are lower than the resources we need to add that value?

3.1.3. VALUE MANAGEMENT PROGRAM: GOVERNANCE, VALUE MANAGEMENT EXPERTS, PROJECTS & TOOLS

The Philips value management program is built on four pillars: governance, value engineering experts, projects and tools (Philips Lighting, 2010). The value management governance is discussed in section 3.2 of this report and the value management projects are discussed in section 3.3. This section briefly elaborates the pillars of value management experts and the tools that are used at Philips.

3.1.3.1. A FORMAL DEVELOPMENT PATH TO DEVELOP VM EXPERTS

The philosophy of training value management experts is based on the principle of 'leading by example' (Philips Lighting, 2010). Change agents in the organisation build value management skills and they transfer them to the entire organisation. The general aim is to install about 100 value management experts per sector. It is preferable that these people have a technical or marketing background.

A formal development path is defined for value management experts. The development of value experts is tracked by using a system of three levels: expert level 1, expert level 2, and expert level 3. The development path consists of four phases (Figure 16).

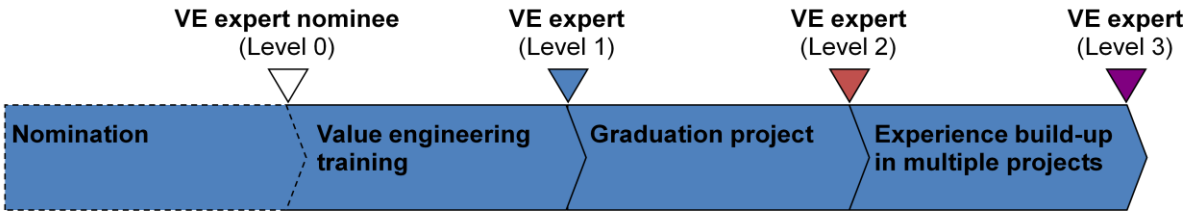


FIGURE 16: VALUE MANAGEMENT EXPERT DEVELPMENT PATH (SOURCE: PHILIPS LIGHTING, 2010)

First, the expert candidates are nominated by value management business leaders. The candidates are entered on a waitlist for value management training. The value management team will advise on a minimum level of balance of candidates between functions. Value management training takes place in the second phase. A three days training will cover value management analytical tools and at least three tools are practiced on real-life projects. In order to graduate as a level 1 expert full participation is needed and the participant should understand the value management formats and language used in Philips which is confirmed by the trainer. The third phase consists of a level two graduation project. The value management expert is expected to coach projects of colleagues in other business groups or developments teams. Besides that, the expert will use its knowledge and skills in its own projects. In order to graduate as a level two expert he or she has to submit a short summery of a project, including illustration of technical impact and a savings estimation. This will be reviewed by a Philips value management coach that decides whether it is sufficient to be called a level 2 expert. Level 2 is the generally desired target status of experts. For those people that are interested in a career as (full time) value management coach a fourth development phase can take place. In this process a value management expert has to build up experience in many projects and coach other level 1 experts in the organisation in the last phase. The entire value management tool set should be applied in many and/or large projects. The impact and result of value management workshops and case stories should be tracked. The level 2 value management experts are coached personally by a Philips value management coach. An in depth individual review will be conducted by a Philips value management coach to become a level 3 value management expert.

At the beginning of 2010 more than 200 value management experts have been trained Philips-wide (Philips N.V., 2010). Only a small share of these experts (about 7%) is working in the Lighting sector (Figure 17). This is mainly due to the fact that the introduction of value management in the sector Lighting has been taken place later than the other sectors.

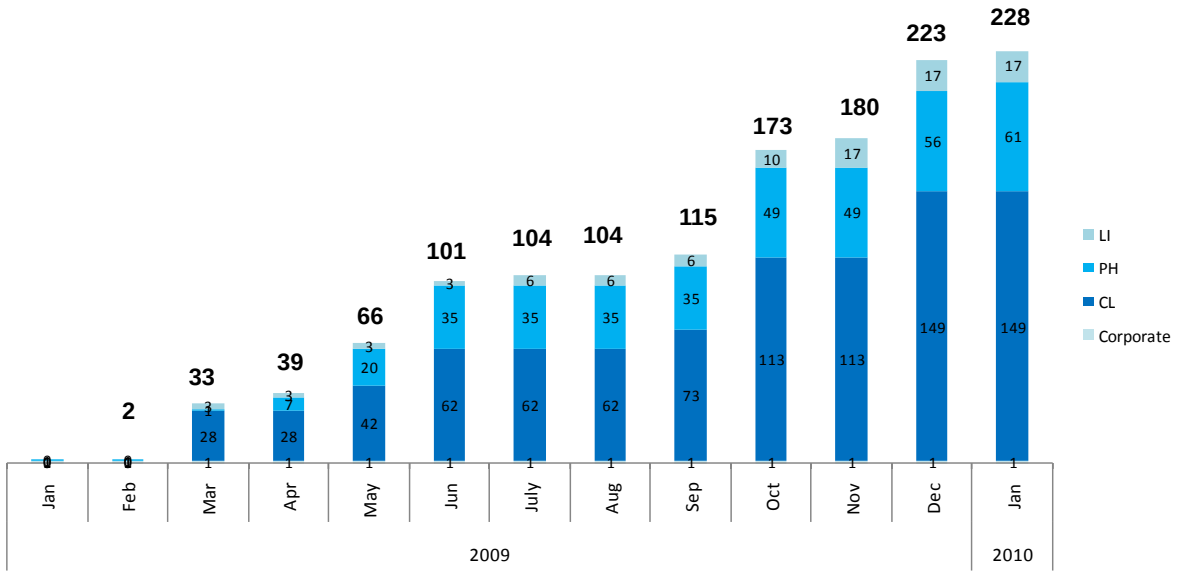


FIGURE 17: NUMBER OF VALUE MANAGEMENT EXPERTS BY SECTOR AT THE END OF THE MONTH (SOURCE: PHILIPS N.V., 2010)

3.1.3.2. VALUE MANAGEMENT TOOLS FOR BASIC COST REDUCTION, FUNCTIONAL SPECIFICATION & PERFORMANCE SPECIFICATION

Philips uses a set of eight systematic tools and approaches that structure idea generation, or that may help uncover savings or assist communication and decision making (Philips N.V., 2010). Three types of tools are

distinguished: tools for cost reduction, functional specification and performance specification (Table 7). Additional approaches will be developed over time and made available among value management experts and can be used in future trainings.

Category	Tool	Description
Cost reduction	Design for manufacturing and assembly	Systematic product optimization working line by line in the BOM. Useful in all situations, including supplier workshops
	Cost models	Simple cost estimation tools used to understand cost drivers, make good concept choices, or set tight procurement targets
	Product teardown (reverse engineering)	The systematic disassembly, comparison and analysis of own and competitor products
	Value chain mapping	A powerful visualization of an entire value chain at a single glance that allows to optimize entire product families
Functional specification	Value analysis	An industry standard method to analyze and compare product cost by function, rather than per part
	Concept scoping	A systematic matching of product features, architecture and cost to maximize margin, done by R&D and marketing
	Voice of customer tree	A scheme that logically links a product's discriminator to its specifications, enabling strong and targeted positioning
Performance specification	Spider map	A comparison of product performance specification to competitors, used to reduce over specification
	System parameter optimization	System optimization with a particular focus on cost driving parameters and the questioning of long-standing assumptions

TABLE 7: VALUE MANAGEMENT TOOLS (SOURCE: PHILIPS N.V., 2010)

Concept scoping and system parameter optimization are regarded to be important tools for Philips Lighting because the first one combines the marketing and R&D point of view and the second one is powerful in comparing different system parameters like power supply and light output. These methods has led to the most significant saving opportunities for the Lighting sector in value management workshops according to the Philips value engineering Coach (Seiler, 2010).

3.1.4. VALUE MANAGEMENT PROCESS AT PHILIPS: PREPARATION, WORKSHOP & FOLLOW-UP

The set up of the value management process is generic Philips wide. In general, three steps are conducted: the preparation, a three-day workshop and the follow up. This section is based on the preparation and execution of a value management workshop in May 2010 where a product from the business group Lighting Electronics was used to find opportunities for margin improvements (Philips Lighting, 2010).

Workshops are prepared by a program manager or a product development team leader. The preparation consists of three aspects. Firstly, the project is selected. The project selection, which is discussed in section 3.3, is not structured. Value management is applied on random projects that are brought to the table by business groups that are interested in participation. Even some of the projects that were selected were cancelled shortly before the workshop (Philips Lighting, 2010) for two reasons. The development teams felt that the preparation time was too short and there was a disagreement on the project choice. The workshop participants are selected and invited after the project selection. Preferably people from different functions (purchasing, development and marketing) are invited. Finally, the project information is gathered. The project information consists of (1) the product specification, (2) product and component drawings, (3) the cost structure, (4) the market expectation/expected sales quantities, (5) the value proposition house or other descriptions of the customer expectations, and (6) the goal of the workshop. This information should be gathered before the workshop.

The previously discussed tools are applied during a value management workshop. A workshop generally takes three full days and preferably multiple projects from different business groups join. A Philips value management coach is in charge of the day and he will present all theories. Moderators that are at least level 1 value management experts may assist teams during the application of tools. The first day starts with an introduction to value management. The most useful tools, as decided by the value management coach, are shortly introduced and then applied on the products. A joint diner at the end of day 1 gives people the chance to communicate in a more informal way. Two or three other tools are used during day two. This day is also very suitable to invite a supplier of the product to be involved in the product improvement program. The last day is more focused on the marketing aspects. The ideas that are generated are reviewed from a marketing point of view in order to find out what ideas can be useful to develop further and in which way it will influence the customers' product experience. The results of the workshop are summarised at the end of day 3 by a management presentation. This presentation can be used to present the outcome of the value management workshop to the management in the business group.

The follow up of projects should be done by the development teams. Excel documents with the product improvement opportunities can be used to support decision making. Tracking this follow up should be done by a value management steering team at a business group level. A steering group consist of managers from different functions that coordinate the value management program and make decisions on resources. In Philips Lighting there is only a steering team for the business group Lamps. The follow up of value management workshops that are conducted in the past are not documented. This is mainly due to changes in responsibilities and positions. The saving possibilities that were identified are reported as a rough, but plausible indication of savings possible in an area, backed with good reasoning (Philips Lighting, 2010).

3.1.5. Conclusion: Value management as a three step process is just implemented at Philips Lighting

The management program introduced at Philips is rather a value management program than a value engineering program because it emphases on both existing and new products. The first phase of the program's implementation phase is currently executed. There are some value management experts in the organisation and a steering committee is guiding value management in the business group Lamps, while central sponsors and leaders are assigned. Value management is coordinated from the Philips Supply Management department at the corporate

level and by the purchasing department of Philips Lighting at the sector level. Coordination from the purchasing (of supply management) department is in line with the theory.

Value management at Philips lighting consists of three phases (Figure 19). This process structure is comparable with the three step model (preparation, execution & implementation) derived from the theory. Two important conclusions can be made on the value management process. Firstly, little emphasis is put on the project selection as part of the preparation phase which led to late time cancellation of project participation. Secondly, there is no clear picture on the implementation phase (follow up of opportunities and the tracking of results).

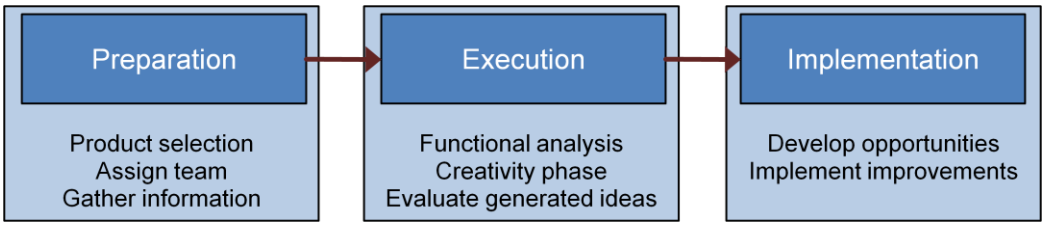


FIGURE 18: CONCEPTUAL MODEL OF THE PROCESS OF VALUE MANAGEMENT (OWN ILLUSTRATION)

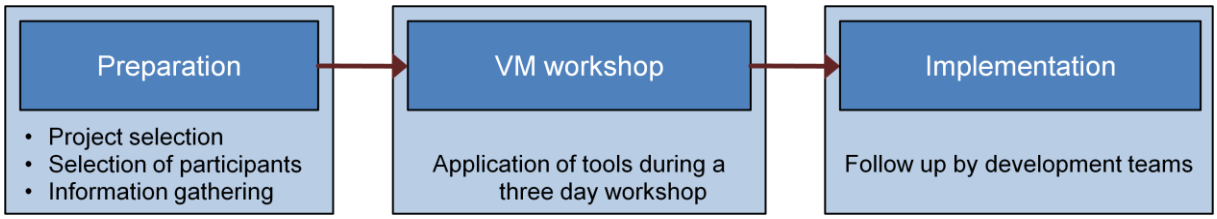


FIGURE 19: VALUE MANAGEMENT PROCESS AT PHILIPS LIGHTING (OWN ILLUSTRATION)

The project preparation of value management workshops and the product selection in particular, should be formalised and the implementation of improvement opportunities should be structured and monitored in order to improve the value management practice at Philips Lighting.

3.2. GOVERNANCE OF VALUE MANAGEMENT AT PHILIPS LIGHTING: ORGANISED FROM THE PURCHASING DEPARTMENT, BUT LITTLE CONTROL IN PLACE

This section describes the governance of value management at Philips Lighting. It starts with an introduction to the organisation and strategy of the purchasing department because value management is initiated and organised from this department. Beside that this section looks into the value management organisation and its control. The last section describes the measurement systems.

3.2.1. THE PHILIPS LIGHTING PURCHASING DEPARTMENT: COMMODITY TEAM STRUCTURE AND ITS STRATEGY

Value management is coordinated from the purchasing department. The purchasing department is recently restructured to a more centralised structured with commodity teams. Besides the structure of the purchasing organisation, this section briefly describes the purchasing strategic process.

3.2.1.1. THE INTRODUCTION OF CENTRALISED COMMODITY TEAMS

The structure of the purchasing department of Philips Lighting consists of four groups of functions (Appendix D). Business groups are represented by a Chief Purchasing Officers (CPOs), three regional strategic sourcing groups

(SSG), ten commodity teams and five support functions (strategic quality assurance, total value management, strategy and programs, finance and human resources). The commodity structure is introduced at January 1st 2010 to be able to leverage volume and combine forces across businesses and across regions and ensure savings year by year (Philips Intranet, 2009). Commodity teams are led by a commodity manager. Due to implementation convenience, some commodity managers are also chief purchasing officers of a business group. The commodity teams are responsible for the functional deliverables: spend management, contracting, supply base development, supplier development, supplier quality and sustainability, and people management. Figure 20 shows that the commodity teams control all the strategic parts of the purchasing process and work through the initial buyers in the development centres and the strategic (lead) buyers in the sites to deploy the commodity strategy that has been aligned with the businesses (Philips Intranet, 2009). Buyers work from the production sites are responsible for the operational purchasing. The purchasing authority has moved up centrally after the implementation of commodity teams. These teams are responsible for long term contracts, supplier relations and projects to realise savings.

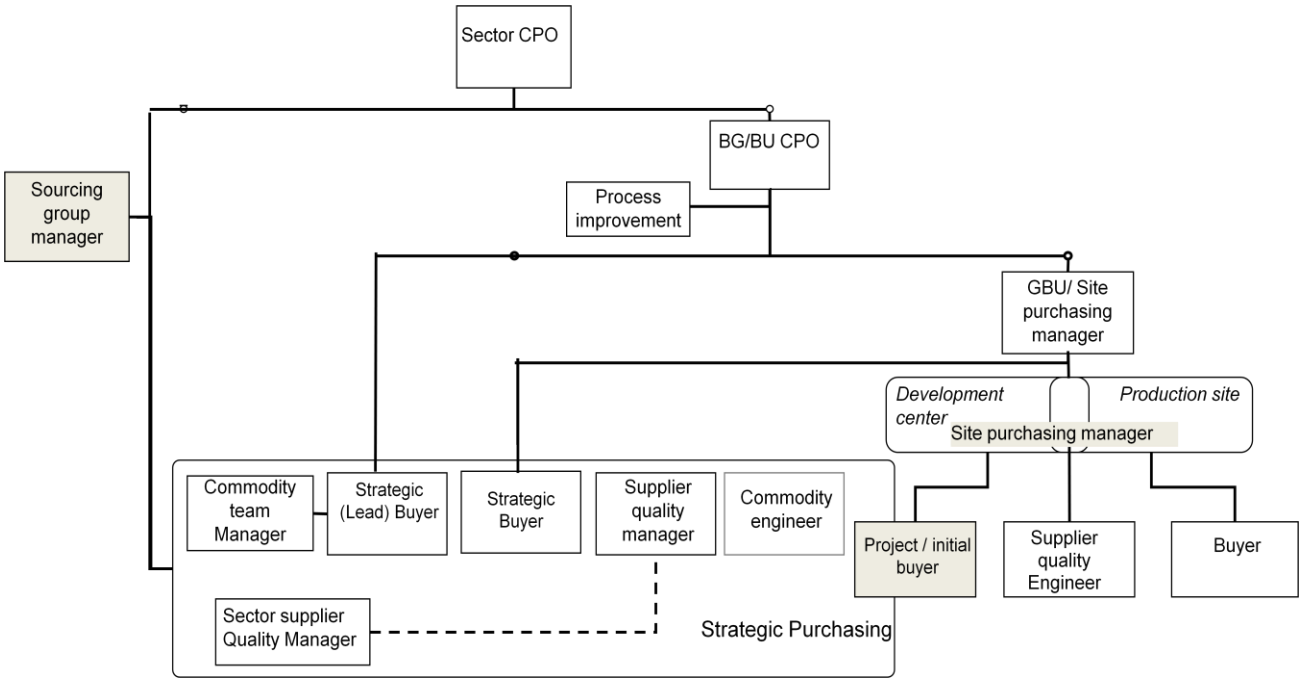


FIGURE 20: LIGHTING PURCHASING ROLES (SOURCE: PHILIPS LIGHTING, 2010)

3.2.1.2. THE STRATEGIC PURCHASING PROCESS BASED ON MSU PURCHASING AND SUPPLY MODEL

In the development of the strategic purchasing process, Philips adopted an approach developed by Dr, Robert Monczka Ph.D. cross-sector (Philips N.V. Intranet, 2010). The model is used to develop the supply and purchasing function to world excellence. The model is based on strategic processes and enabling processes:

1. Eight strategic processes aimed at long-lasting improvements; structured, documented and reviewed with a 3 year focus.
2. Six enabling processes (mid/long term focus areas) that provide essential preconditions for the strategic process.

At this moment focus is given to supplier development, commodity strategy development and sourcing & contracting (Figure 21). The sourcing and contracting strategy is a plan for every commodity with the goals and long term strategy for that commodity (NEVI , 2002). Elements of a commodity strategy are the product and process characteristics (demand side), purchasing policy, supplier databases, investments in supplier development, contracting, and the logistic and transactional elements. Value management practice is not part of the strategic purchasing process.

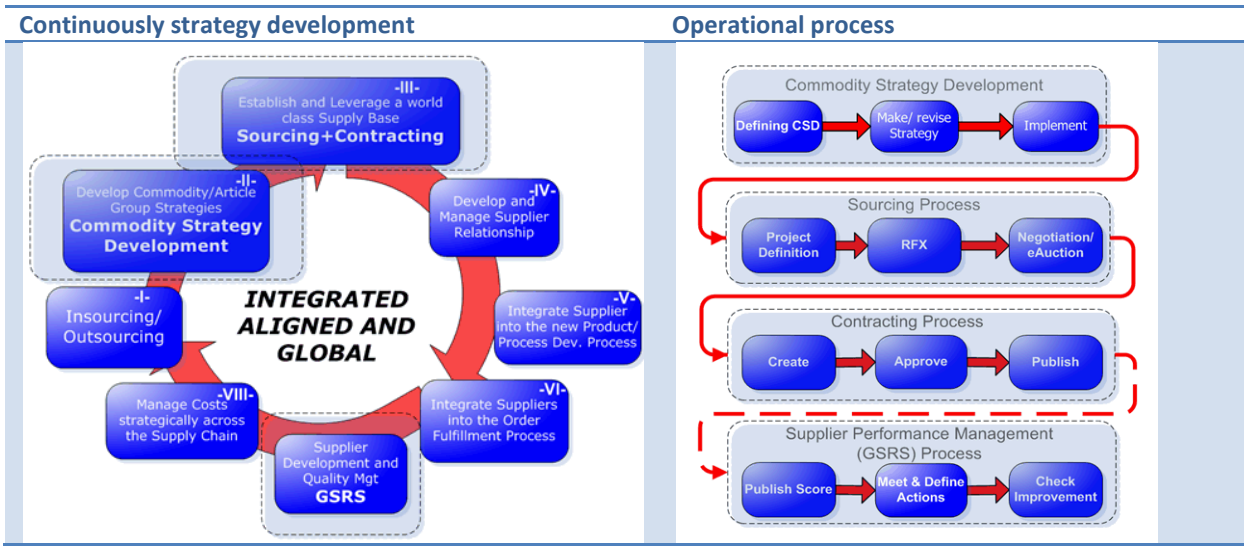


FIGURE 21: MONCZKA'S PURCHASING STRATEGY AND PURCHASING PROCESS MODEL AS USED AT PHILIPS (SOURCE: PHILIPS SUPPLY MANAGEMENT, 2010)

A simplified purchasing process at Philips Lighting consists of six steps (Figure 22). These steps are comparable to the eleven step model described in section 2.2.1.2. Opportunities for new products or product improvements are identified and a purchasing strategy for the product and the correlating commodities is developed or adjusted. The parts and resources are sourced and negotiations with suppliers take place. The contract is implemented and executed after an agreement. The final steps consist of payments of invoices and monitoring and managing the purchasing process. Monitoring is done both on business group and commodity level.

FIGURE 22: PURCHASING PROCESS (SOURCE: PHILIPS SUPPLY MANAGEMENT, 2010)

3.2.1.3. PHILIPS LIGHTING PURCHASING MATURITY: RELATIVELY LOW MATURITY IN PLANNING, ORGANISATION STRUCTURE AND PROCESS ORGANISATION

The maturity of a purchasing function affects the success of value management. The maturity of the Philips Lighting sector is assessed by the questionnaire described in the theoretical section. The detailed results can be found in Appendix E. The outcome of the assessment shows that the general maturity is 2.8 on a 4 point scale (Table 8).

	Score (1-4)
Planning	2.00
Organisation structure	2.88
Process organisation	2.55
Human resources and leading	3.39
Controlling	3.36
Total average maturity:	2.83

TABLE 8: MATURITY ASSESSMENT SCORES (OWN ILLUSTRATION)

The planning, organisation structure and process organisation have a relatively low maturity level. This observation might explain the current difficulties for value management in organising and structuring the value management process. Higher maturity levels are found in the human resource function of purchasing. The current skills and people's development is well structured. Developing value management expertise can be complementary to current employee development and can be integrated in the current systems. Detail results show that a low maturity score is found in following aspects: demand planning, environment scan, innovation scan, cross-functional integration, supplier development and early involvement of purchasing in the development process. Findings on maturity levels are taken into account while developing conclusions and recommendations. For example a low level maturity on process organisation can cause difficulties in integrating value management processes with current processes, since these are not (yet) formalised.

3.2.2. VALUE MANAGEMENT ORGANISATION AND INTEGRATION AT PHILIPS LIGHTING: STRUCTURAL ORGANISATION, HORIZONTAL COORDINATION AND THE USE OF TEAMS

This section describes the organisation of value management at Philips Lighting based on internal information sources and the way people work at this moment. Special attention is given to the organisation structure, horizontal coordination as integration mechanism, and the use of teams.

3.2.2.1. VALUE MANAGEMENT ORGANISATION: ONE OUT OF THE SIX BUSINESS GROUPS HAS A FORMAL, BUT DEVELOPING, VALUE MANAGEMENT STRUCTURE IN PLACE

As described before, governance is one of the pillars of the strategic value management plan (Philips Lighting, 2010). The value management organisation should, according to the strategic value management plan, consist of committed decision makers from the supply, marketing and technical function. They should provide support, remove roadblocks and get 'difficult' decisions implemented.

The value management program at Philips Lighting is led by a total value manager that is located in the purchasing department and supported by the Philips Corporate value management coach in the Philips Supply Management department. The value management organisation at Philips Lighting is concentrated in the business group Lamps (Appendix F). The business group Lamps has a dedicated value management program manager, while the other business groups are coordinated by a part-time program manager. The value management implementation started with workshops in the business group Lamps. The program organisation of value management in the business group lamps consist of four layers. Global leadership, resourcing and sponsors are ensured at a steering group level with involvement of the technology, purchasing and R&D function. The program is supported both cross business, by a total value manager and a value management coach, and locally (inside the business group) by a program manager. They ensure expert training and coaching, planning and effect tracking. The third level is filled with R&D managers on a business unit level for local leadership, resourcing, obstacle removal and decision making. The value management experts are inside the businesses and are shown by a fourth layer. These people conduct workshops and are in charge of the follow up. There is no clear governance structure in other business groups.

3.2.2.2. ORGANISATIONAL INTEGRATION BY INTEGRATORS

The Philips Lighting organisation is divided into business groups. The business groups are single entities that have the freedom and responsibility to serve their own business area. The fact that some business groups supply other business groups, while competing with other suppliers, makes the business groups internal focused.

Philips started its 'One Philips' program in 2008. This program is intended to increase the organisational integration by aligning strategies and ways of working across business groups and cross sector. The One Philips program's main goal is to create standardisation that supports integration. One of the initiatives that are part of this program is the development of a cross sector business intelligence and IT system (Philips N.V., 2010). Also the business process of the sector Lighting is standardised. There is a global Lighting business process management system (Figure 23) that describes the processes and ways of working across functions and businesses. This can be seen as the backbone of the organisation (Philips Lighting, 2010). The core business processes of Philips Lighting can be found back in this model. Two main processes take place: business creation and market realisation. This system creates standardisation across the Philips Lighting business groups. As described before, the Lighting purchasing department transformed recently to a more centralised organisation by the implementation of commodity teams that are responsible for the strategic sourcing aspects.

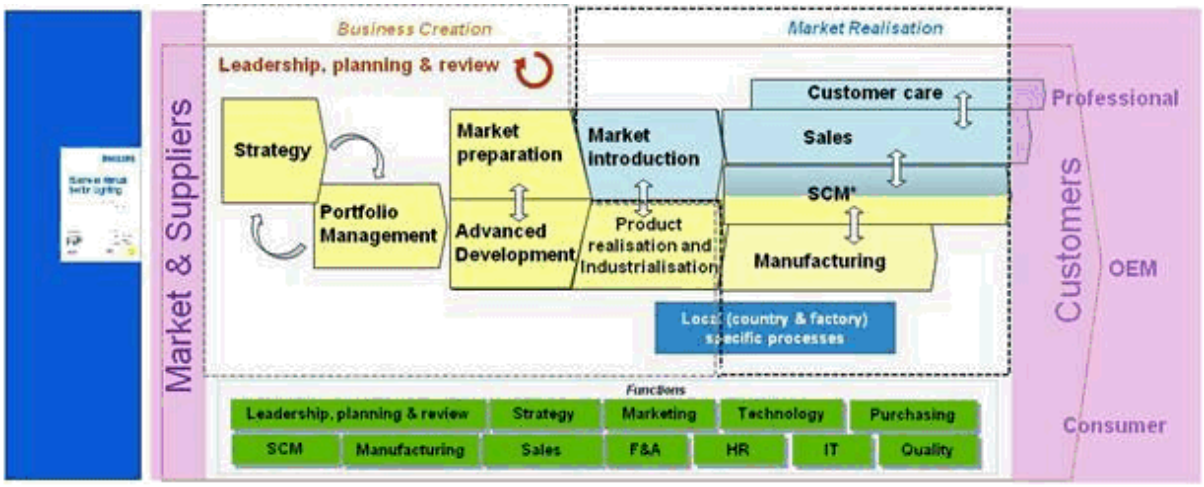


FIGURE 23: GLOBAL LIGHTING BUSINESS PROCESS MANAGEMENT SYSTEM (SOURCE: PHILIPS LIGHTING, 2010)

Horizontal coordination is an important integration mechanism, as discussed in the literature. Looking at the value management program, horizontal integration is achieved by a full time integrator that is supported by two part-time integrators. The full time integrator is assigned at the Philips global level and is responsible for the implementation of value management Philips wide. Besides that he takes the lead during value management training. Within Philips Lighting, a total value manager is installed to coordinate the implementation at sector level. Two program managers coordinate value management project planning and workshop preparation.

3.2.2.3. VALUE MANAGEMENT WORKSHOPS BY AD-HOC TEAMS

Value management teams are formed ad hoc when a workshop takes place. These teams are multifunctional and consist of people for example from purchasing, marketing, development and supply chain. Even suppliers are sometimes involved. Most of the members are also members of the actual product development team as well. They are part time involved in the value management team. Experience shows that often a value management teams does not have the authority to make decisions on the development of the product directly. The team is primary focused on the generation of opportunities for product improvements. The opportunities generated have

to be approved by the project team (leader) or management teams. Currently it is unclear to the superiors of team members why they should allow employees to participate in a value management workshop. It is sometimes regarded to be a possible 'waste of time'. This is especially the case when employees are not directly involved in the development of the product during their normal job. This problem is mainly caused by a lack of internal support or sponsorship by business group leaders like chief purchasing and chief technology officers.

3.2.3. VALUE MANAGEMENT COORDINATION FROM THE PURCHASING DEPARTMENT: OUTPUT CONTROL AND PURCHASING PERFORMANCE MEASUREMENTS

An effective control system involves the use of feedback to determine whether organisation performance meets the established standards. This section describes value management control and reporting and the measurement systems of the purchasing department of Philips Lighting.

3.2.3.1. VALUE MANAGEMENT CONTROL: OUTPUT FOCUSED

Value management is controlled at different levels with Philips Lighting. There is a centralised owner, the value management coach, of the value management program at the Philips corporate level (cross-sector) and total value manager at Philips Lighting sector level (cross-business) who is responsible for the implementation in the sector Lighting. Because the implementation of value management started in the business group Lamps, relatively more authority is given to this business group. The program manager of the business group Lamps makes its own decisions and has a direct report link to the corporate level value engineering coach. He is employed in a development role within the business group Lamps and only part-time (10-20%) involved in value engineering. The total value manager is responsible for coordinating, guiding and structuring the value management program for the other business groups. The corporate and sector level value management function, driven by the purchasing department, is heavily involved in securing cross business coordination.

Value management is controlled by two measurements: the amount of identified savings and the number of value management Experts. These measurements are described in the next section. Value management control is not directly related to the functions (purchasing, development or marketing), and reported to a sector wide value management program function. The control system can be characterised as an output control mechanism since the leaders try to influence people in the organisation by setting objectives. The formal control mechanism can be called loose because the targets are only set at a sector wide level, but not for the program managers at the business group level or for participants of the workshops.

3.2.3.2. FORMAL REPORTING: VALUE MANAGEMENT CONTROL AT THE TOP-LEVEL BASED ON SAVINGS AND THE NUMBER OF VALUE MANAGEMENT EXPERTS

Formal control only exists at the top-level of the value management organisation. This control is based on the output of the value management program as a whole. The total value manager, program managers and value management teams do not have value management targets. The value engineering coach at the corporate level has two cross-sector targets for 2010. By the end of this year he should have (1) achieved more than 60 Million euro effective savings and (2) trained more than 40 level 2 VE experts (Philips Supply Management, 2010). He translated the savings target into a specific target for Philips Lighting, namely a total of 10 Million euro effective savings that are planned to be realised before the end of 2011.

Value management savings are scaled at five levels to create transparency on what are rough ideas and what are proven savings (Philips Lighting, 2010).

- Level 1 savings are potential savings and rough but plausible indications of savings possible in an area and backed with 'good' reasoning;

- Level 2 savings refer to savings with a specific action and change where a project is explained with full backing defined in the business case.
- Level 3 savings are saving opportunities that are committed by the owner and tests have been successful or successful testing is anticipated based on past experience.
- Level 4 savings consist of savings where the technical implementation has taken place and there is proof of an effect
- Level 5 savings are savings where the economic benefit has been traced and proven.

Effective cost savings, as defined in the previous discussed targets, are savings that are at level 3 or 4 and thus have a high potential to be realised. The savings are focused on costs and do not include the possibility to include value that can be add to a product in a value management workshop. A margin improvement is realised if a cost reduction is achieved while remaining the customer value level.

The value management savings are reported to the value management coach at the corporate level of the organisation and are not part of purchasing savings in general. The savings are tracked immediately after a value management workshop. The value management coach and the program managers have difficulties with the follow up of value management savings. Most of the registered savings are level 1 savings and it is unknown what the current stage of implementation is. Also the terminology and the need for reporting is not always understand by development teams and purchasers in the business groups. The purchasing department of Philips Lighting is using a 'value based management' reporting system, documented in guidelines and approved by the sector purchasing controller. The system is based on the Philips Corporate guideline. The instruction is applicable on all bills of material (BOM) purchases and is defined in order to create a Philips-wide common reporting process and related definitions for the measurement, tracking and reporting of value creation related to BOM spend. Two categories of purchasing savings are distinguished.

Cost savings via *purchasing price changes* is captured in the first category. Results are calculated by comparing the current price (actual year-to-date average price) with the previous year price (average price of previous year). Reported price savings are corrected to possible currency impacts. The second category is *project savings* (or *concept savings*). The value creation, driven by the purchasing function and which are not reflected in price savings, is reported in this category. Examples of projects savings are supply chain improvements, process improvements that lead to reduced cost of production, make/buy decisions, product elimination, supplier changes and specification changes that lead to a new product code. The saving figures should be based on a total cost of ownership view where all the relevant cost down in the value chain should be taken into account and quantified. The savings can only be reported for a period of four consecutive quarters starting in the quarter in which the savings were realized for the first time.

Brand new products cannot and may not be taken into account for the first category. Price changes cannot be taken into account because a historical price reference does not exist. An important note is that savings during new product creation are not covered in the current system. For example savings that are realised by the value management program during product development cannot be reported.

3.2.3.3. PURCHASING PERFORMANCE MEASUREMENTS BY A BALANCED SCORE CARD

Value management is organised and embedded in the purchasing department. The Philips Lighting purchasing department uses a balanced score card to measure the function's performance. The key performance indicators (KPI's) are annually determined by the management of the Philips Lighting purchasing department. The measurement system of Philips Lighting is solely for members of the purchasing department and superordinate measures are not used. The key performance indicators are translated to more specific measurements for each

commodity team and business group's purchasing function and subsequently into individual targets for each role (commodity team manager, strategic buyer, initial buyer etcetera). KPI's differ through the organisation because of different strategic goals for every commodity team and business group. This year's KPI's are focused on five strategic areas: spend management, contract management, supplier quality & sustainability, supply base management and people (Philips Lighting, 2010). Table 9 shows the key performance indicators that are currently used. These performance indicators are verified with the current practice in the business group Automotive, the business group Lamps and the commodity team ODM/EMS. The centrally set annual targets for the purchasing department dominate the actual targets of business groups and commodity teams.

Strategic area	KPI
Spend Management	Price savings
	Project savings
	Payment terms
Contract Management	Most important contracts correctly in the system
Supplier quality & sustainability	Percentage of non-compliance processed on time
	Percentage of non quality charged to the supplier
Supply base management	Percentage of sufficient scores on supplier performance
	Percentage of BOM spend with strategic and preferred suppliers
	Risk management control
People	Employee engagement survey score
	Reduction of organisational costs

TABLE 9: KPI'S PHILIPS LIGHTING PURCHASING FUNCTION 2010 (SOURCE: PHILIPS LIGHTING, 2010)

The most important performance measures for the purchasing function are price and project savings. This is confirmed at the strategic buyer, the commodity manager and the business group CPO level. Price savings and project savings targets (or forecasts) are set by each commodity team and business groups are responsible for actual savings in the operational buying. Strategic buyers do not have specific product development targets. Supplier involvement targets are not set at the balanced scorecard level, but often translated to specific objectives for supplier account managers. It is more a plan than a performance target.

3.2.4. CONCLUSION: VALUE MANAGEMENT ORGANISATION EMBEDDED IN THE PURCHASING DEPARTMENT WITH ONLY VALUE MANAGEMENT OUTPUT CONTROL

The current governance and control of value management at Philips Lighting is discussed in this section. The most important aspects of the current value management governance can be captured in a model (Figure 24). This model is compared with the theoretical model which is developed by the literature review in section 2.2. Implications and possible improvements for Philips Lighting are generated by comparing the current situation with the conceptual model.

Value management at Philips Lighting is initiated by the purchasing department where a total value manager is responsible for the implementation. The purchasing department and subsequently the purchasing function have thus an important impact on the value management governance. The purchasing department at Philips Lighting is recently restructured to a centralised structure with commodity teams. The MSU purchasing and supply model is common to Philips Lighting in describing the strategic purchasing process. Value management practice is not part of the strategy development process at Philips Lighting. Value management should according to the literatre be integrated in the strategic purchasing process. The outcome of a value management workshop should thus be considered during the (commodity) strategy development. A purchasing maturity assessment test showed that the purchasing maturity of Philips Lighting is in general at a medium level (2.8 out of 4). The maturity is relatively low on the planning, organisation structure and process organisation aspects. This observation should be taken into

account while developing recommendations. Low maturity levels of the organisation structure and process organisation may influence the success of value management integration in a negative way. More specific it is shown that the maturity is low on supplier involvement, supplier development and early involvement of purchasing in the development process. These aspects can be improved by value management.

The value management organisation of Philips Lighting is concentrated in one of the business groups, namely the business group Lamps. The value management organisation structure is defined for this business group but still developing. The other business groups do not have a formal value management organisation structure and are mostly unfamiliar with value management. Value management in other business groups is coordinated by a part-time integrator. Value management is furthermore coordinated by an integrator at cross sector level. The value management resources, in terms of value management experts, are not shared at the lower level of the organisation. Cross-business activities are scarce. Only the use of the cross-sector value management Coach is 'shared' by all business groups. Besides the part-time integrators, the use of teams is important. Value management workshops are conducted by multi-functional teams. An important observation is a lack of mandate of the team members because the teams consist of part-time members, while participation is not awarded or acknowledged by their direct supervisors.

The performance of value management is only measured by output control on two aspects. The potential savings are tracked and the number of active VE experts is a key performance measure at a sector level. The outcome of value management workshop is tracked by a five level saving measurement system which is tracked by the value management program manager and reported to the value management coach at the sector level. Only value management savings on existing products can be used as purchasing saving in the current system. The reporting from a purchasing perspective is thus excluding new product savings and is only focused on cost reduction. Cost avoidance and increased value is not included in the current system.

This section also described the performance measurement of the purchasing department of Philips Lighting. The performance measures that are used at the higher levels of the organisation are collected and communicated by balanced score cards. The most important performance measures for the purchasing department are price and project savings. The purchasing department does not have specific measurements that are related to the product development. Also supplier involvement targets are not included on the balanced scorecard level. Philips Lighting does not use superordinate performance measures.

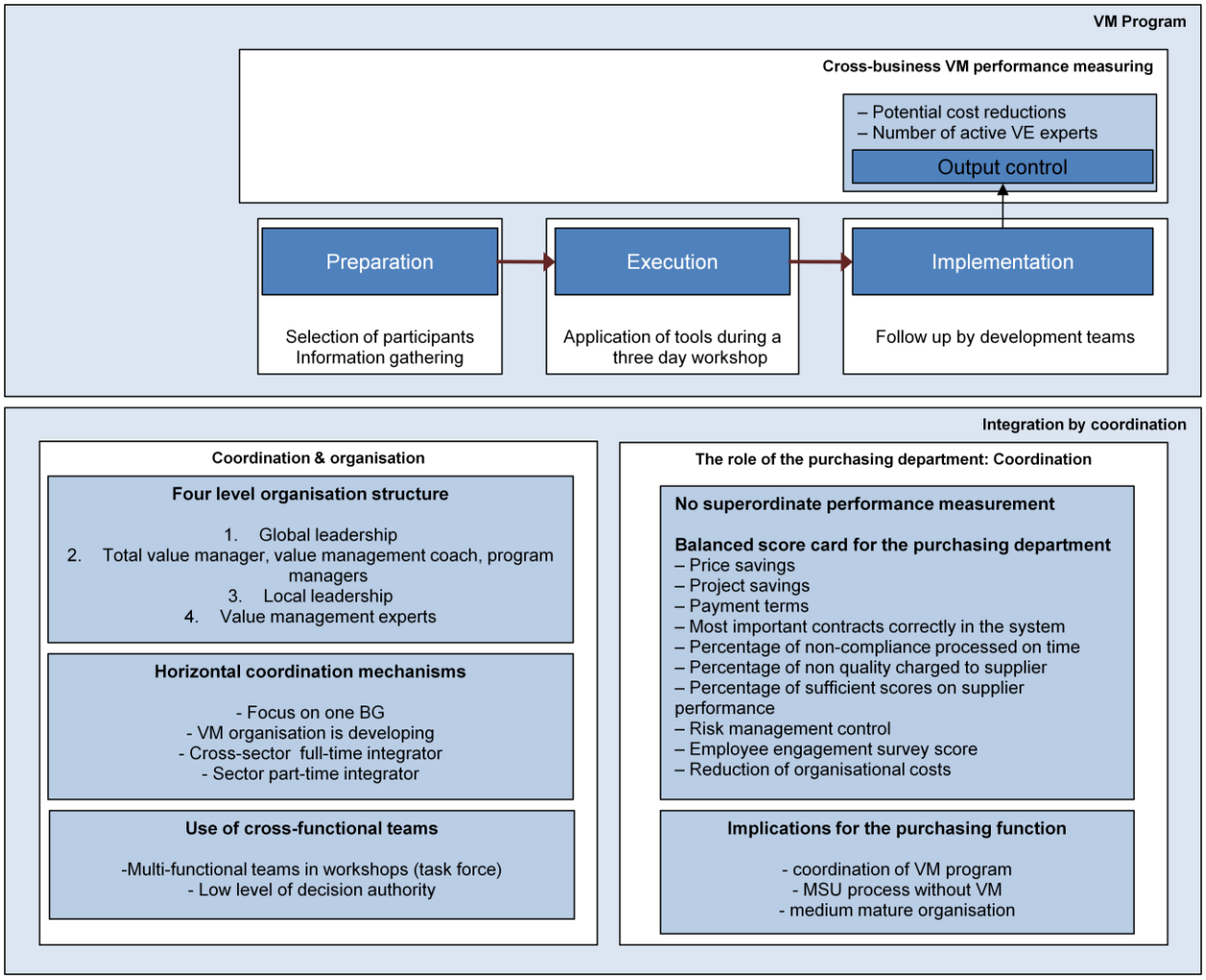


FIGURE 24: VALUE MANAGEMENT GOVERNANCE AT PHILIPS LIGHTING (OWN ILLUSTRATION)

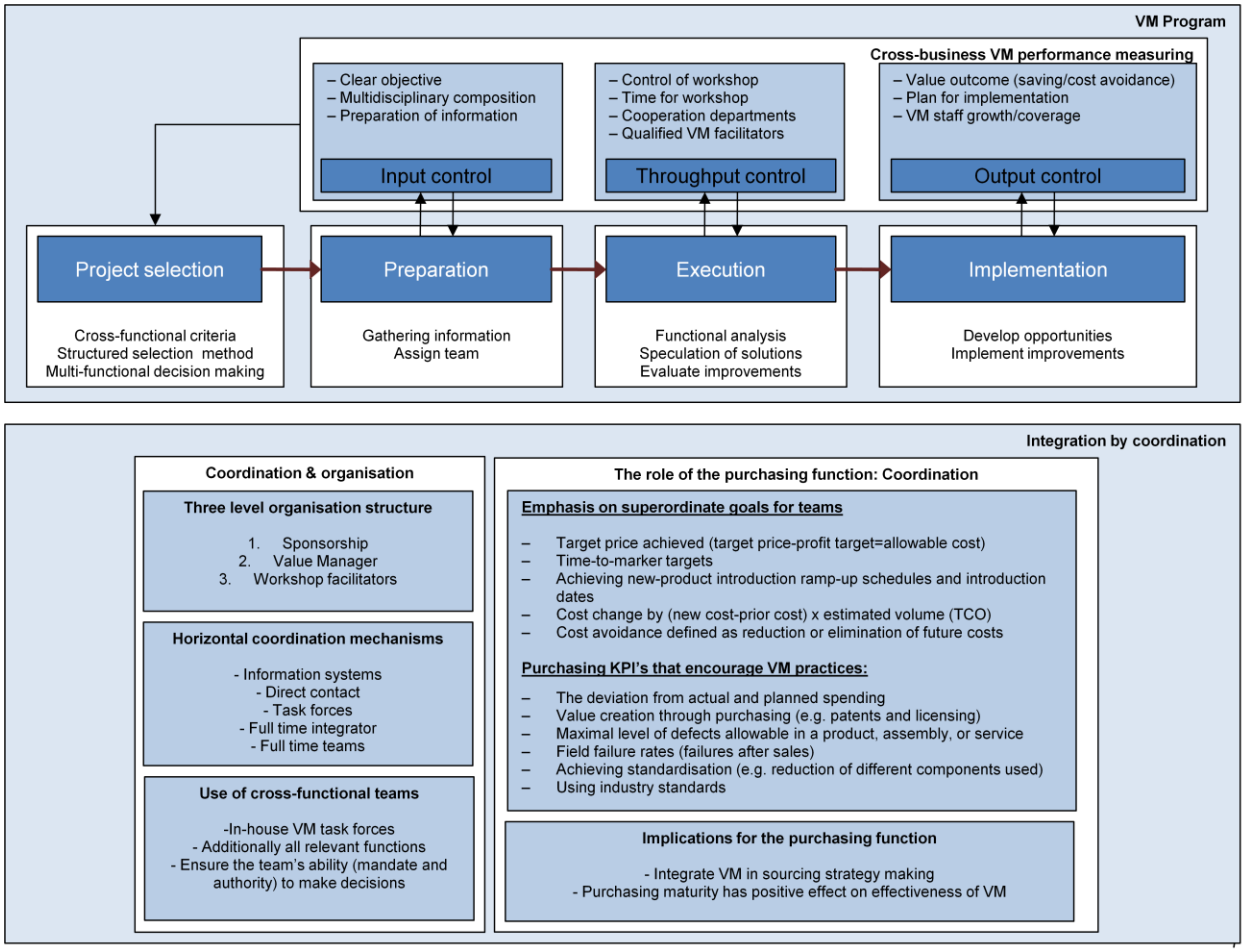


FIGURE 25: CONCEPTUAL MODEL OF VALUE MANAGEMENT GOVERNANCE (OWN ILLUSTRATION)

Comparing the current value management governance (Figure 24) at Philips Lighting with the theoretical best practice (Figure 25), conclusions can be made on the purchasing function and integration, value management control and alignment with performance measures.

PURCHASING FUNCTION AND EMPOWERED TEAMS

Value management is not integrated in the current strategic purchasing process. Theory described the influence of value management practice on the internal demand because if changes in product and material specifications. Value management practice should be incorporated into the commodity team strategy development which is part of the currently used MSU strategic purchasing model. Empowered teams should be involved in value management studies to increase the integration of value management into the different business groups. All involved functions (development, purchasing, marketing, supply chain etc.) should participate and be able (empowered) to make decisions. Teams with mandate and autonomy are according to theory more effective. Although most participants are directly involved in the product's development, participation in other projects should be rewarded as well. Moderators or specialist should be encouraged to join other workshops, also in other business groups.

VALUE MANAGEMENT ORGANISATION AND CONTROL

The current value management organisation is concentrated in one business group. A four level organisation is identified in the business group Lamps. These levels correspond with the theoretically recommended three level structure because sponsorships is defined at two levels instead of one. It is important to ensure that a formal value management organisation structure is also ensured in the other business groups.

The value management practice at Philips Lighting is only controlled by workshop output in terms of savings and the number of value management experts. Theory suggests an introduction of input and throughput control. Besides that, output control can be extended. Looking at the current value management practice of Philips and the recently implementation of the program, throughput control on the value management workshops is not necessary. This way of control is too direct to use when employees are not familiar with the program and do not know what to expect in a workshop. It is better to leave room for freedom and creativity. Most workshops are part of value management training and moderated by experienced value management Experts who can control the way of working in workshops. Input control during the preparation of workshops can be a powerful way to influence the conditions of workshops. This way of control is less direct but it has high leverage according to theory. All five measurements suggested by theory can help to increase the effectiveness of value management studies. The current output control can be improved and extended by setting objectives. The financial outcome should not only include savings (as currently used) but also cover cost avoidance and added value. The 'number of value management Experts' as an output measure is too limited. Clear objectives should be set on both the total number of active experts and the coverage/spread of experts. Every value management study should end with a clear and specific plan for implementation. It is easier to follow up on improvement opportunities and actual savings when a implementation plan is used and updated on a regular base. Other theoretically suggested output measurements are not needed. They describe possible positive effects, but are difficult to measure.

PERFORMANCE MEASURING SYSTEMS

The theoretical performance measures of the purchasing department are compared with the current practice in order to align the value management practice and improve performance of value management in general.

Philips Lightings performance measurement system of the purchasing function is only focused on the purchasing department. Superordinate goals are not set for the cross-functional teams, for example in product development, value management and commodity teams. In general we can conclude that several performance measurements are missing. Most measurements are related to the purchasing involvement during product development which is done by project and initial buyers. An important note is that savings during new product creation are not covered in the current system. For example savings that are realised by the value management program during product development cannot be reported. Literature suggests that cost avoidance, target price achieved and time-to-market targets should be included in the performance measurement system. The current Philips Lighting performance measurement system does not take these aspects into account. Target price can be based on expected cost or market. The market price is less reliable because it is based on (arbitrary) expectations towards the customer and heavily vulnerable for price erosion in time. Nevertheless, only market based target prices can include the effect of value management studies that increase the value of a product. The number of buyer-vendor saving initiatives is a measurement related to supplier involvement and the technology output of supplier is a measurement that is related to open innovation. These two fields are part of Philips Lighting's purchasing strategic agenda for the coming five years. Value management can be useful to help the organisation achieve the strategic objectives on longer term, but do not have priority for value management at this moment.

3.3. Project selection at Philips Lighting: Few criteria and no structured process

Value management studies take place in organisations that have different goals and contexts. Therefore optimal project selection criteria vary per organisation. It is important to make sure that project selection criteria and selection process are in line with your expectations (goals) and strategy (alignment). This section discusses the current value management project selection at Philips Lighting.

3.3.1. Selection criteria at Philips Lighting: product cost price and sales volume

The formal description of the value management project selection gives guidelines on project selection. It describes which kind of projects can be used for value management workshops (Philips Lighting, 2010). Typical projects are cost down projects on existing projects when the product lifecycle is very long and projects in an early stage of initial product development. Although not typical, it is stated that value management can also be useful for roadmap studies, platform studies, breakthrough product concepts and project cancellation. It is advised that value management should be mainly applied on important new product introduction projects (Philips Lighting, 2010). The formal criteria are thus: product lifecycle stage (new or existing product), product lifecycle length, cost price, and strategic importance based on roadmap studies.

Although these formal guidelines advise a focus on new product development, current practice is different. This year's (2010) value management workshops were conducted with more existing than new products, namely 3 new products and 7 existing products. Strategic importance as selection criteria, determined by an evaluation of product roadmaps, is neither used in practice.

3.3.2. The current project selection process at Philips Lighting

The project selection process at Philips Lighting is not standardised. Decision makers differ depending on the situation. Project development teams or strategic buyers are asked to join the value management program with one of their projects. An introduction to the program is given in a 30-60 minute meeting. One person, or a small group, chooses a product based on common sense. The program manager asks the decision maker(s) to consider cost price and (expected) sales quantities. This information is not always considered and there is no threshold for project turnover. The decision maker(s) are often unfamiliar with the value management program and working on a limited number of projects. Because of this, and because of the little amount of possible projects, a selection done by the program manager or at a higher level in the organisation with more overview of (all) available projects is not in place. It is expected that when the program size increases, more emphasis will be put on project selection. After the project is selected, one of the decision makers is asked to prepare the value management workshop by gathering information and select participants. One of the projects that were selected is cancelled shortly before the workshop. One of the reasons was a disagreement on the project choice between people that were not involved in the decision making.

3.3.3. Conclusion: Further research is necessary to derive the importance of new selection criteria

This section described the current project selection process at Philips Lighting. The project selection process at Philips lighting is not clear defined or well structured. The selection process is not based on a formal method, but depending on the situation done by one or more involved stakeholders. Only projects that decision makers are working on are considered. The selection criteria are formally described to some extent. The project selection criteria are primary focused on a products cost price and the (expected) quantities, but no threshold for value

opportunity is defined. The (strategic) importance is mainly based on 'gut feeling' and the opinion of the decision maker. Figure 26 shows the current project selection practice of Philips Lighting.

Comparing the current value management project selection of Philips Lighting to the previous defined theoretical framework (Figure 27) we see three important differences. Firstly, the project selection criteria are limited to cost and quantities. Although these aspects are considered to be important in the literature, several other criteria are neglect. Multi-functional criteria (cost and value, purchasing, development and marketing) are not incorporate in the decision making process. Secondly, decisions are made by one or few stakeholders that are chosen arbitrary. Thirdly, there is no structured method or procedure for the project selection process that looks into all possible projects based for example on a product roadmap of a business group. Further investigation to the selection criteria is needed in order to derive the best suitable selection criteria for Philips Lighting.

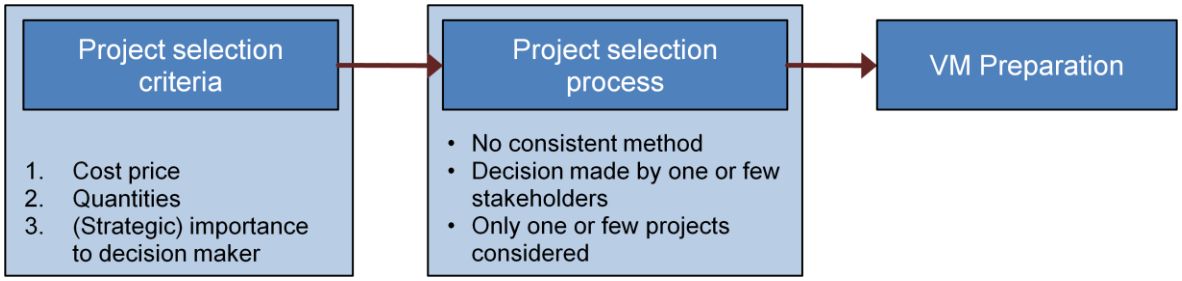


FIGURE 26: MODEL OF THE CURRENT PROJECT SELECTION PRACTICE AT PHILIPS LIGHTING (OWN ILLUSTRATION)

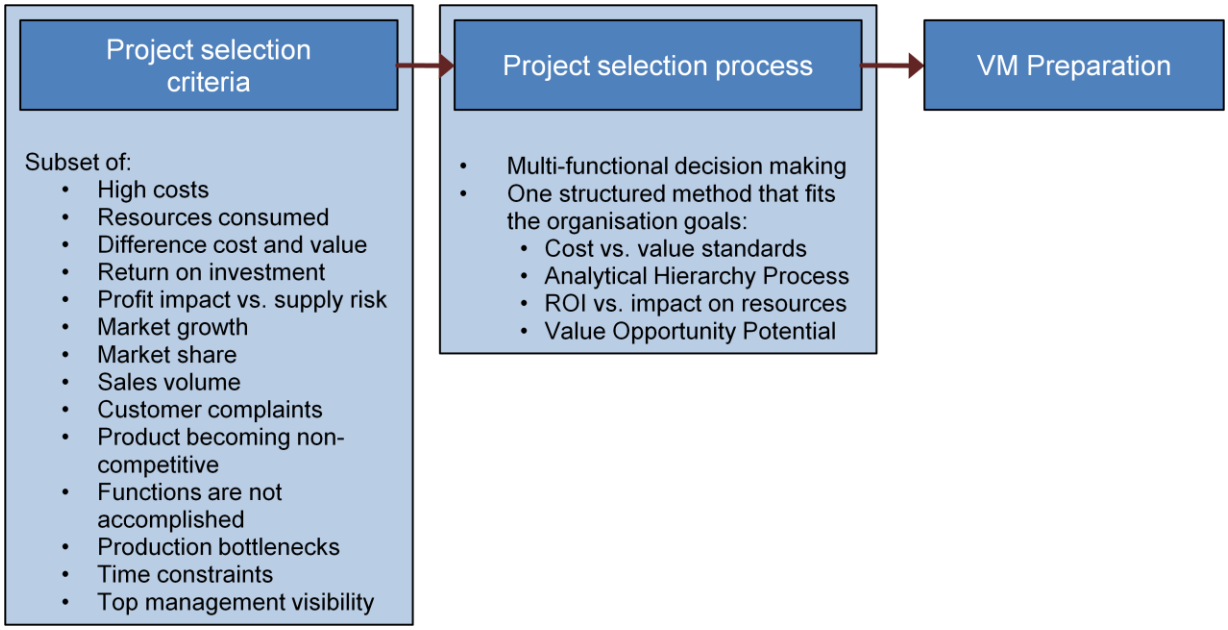


FIGURE 27: THEORETICAL MODEL OF THE PROJECT SELECTION PROCESS (OWN ILLUSTRATION)

3.4. CONCLUSION: UNSTRUCTURED VALUE MANAGEMENT PRACTICE WITH FEW CONTROL MECHANISMS

This chapter analysed the current value management practice of Philips Lighting. The value management program, the governance and the project selection that is used in the Philips organisation is described and the current system is compared with the theoretical framework from chapter 2. Combining the conclusions of each subsection

of this chapter leads to a model of the current situation (Figure 28). Comparing this model with the conceptual mode (Figure 29) results in following conclusions:

VALUE MANAGEMENT PROGRAM: LITTLE EMPHASIS ON PREPARATION AND NO VIEW ON IMPLEMENTATION

Literature describes value management as a management program with three process steps. These steps can be found back in the Philips Lighting practice. The preparation of workshops at Philips Lighting is not always smooth. Projects have been cancelled and not all the information is always available during a workshop. The project selection is important for value management success. A company wants to use its resources optimal and project selection can help to improve this. The need for project selection is extensively described in section 2.3 and 3.3 and is later assessed in this section. A last conclusion can be made on the implementation of improvement opportunities. Philips current practice is lacks tracking these results. The conclusions on the value management program can be summarised:

1. Only little emphasis is put on the project selection;
2. There is no formalised preparation and not all the relevant information is available during a workshop;
3. There is no clear picture on the implementation of opportunities and the results.

ORGANISATIONAL INTEGRATION: NO FORMAL VALUE MANAGEMENT ORGANISATION AND A LACK OF MANDATE

The organisation structure of value management should according to literature be available for every business group and at a sector level. The current practice is concentrated in one of the business groups. The value management organisation has the responsibility to support development teams in improving Philip's products and to encourage working in multi-disciplinary teams. One of the problems during workshops is a lack of mandate of participants in making decisions and commit to a workshop that might consume more time than people are willing to invest, while theory emphasise the importance of empowered teams. Three conclusions can be made on organisational integration

1. A formal value management organisation structure only exist in one of the six business groups;
2. Not all team members have mandate in a workshop and full commitment on participation from management;
3. A lack of commitment from management and the current reward system discourages employees to work on projects outside their own working environment, while literature suggests that value management experts must be shared across the organisation.

PURCHASING FUNCTION: NO INTEGRATION OF VALUE MANAGEMENT IN THE PURCHASING PROCESS

The MSU purchasing model that is used in Philips does not incorporate value management. Theory showed that value management has important impact on the internal demand because product specifications are changed. Secondly it is shown that the low maturity of the Philips Lighting purchasing function has impact on the success of value management. Two conclusions are made:

1. Value management is not integrated in the strategic purchasing process;
2. The maturity of the Philips Lighting purchasing function is relatively low, which impacts the introduction and success of value management.

VALUE MANAGEMENT CONTROL: CURRENT EMPHASIS ON OUTPUT CONTROL

Value management should be controlled on input and output control measures. Philips Lighting does not have any input control measures and value management output is only measured by the number of value management experts and the value outcome. Value outcome on existing products can be captured in the project savings of the current reporting system. Savings on new products cannot be reported because a reference price does not exist.

Cost avoidance can be measured by measuring the impact of each of the improvement opportunities. There are no measures that include margin improvements, sales or cost avoidance. Finally it can be concluded that the purchasing measurement system is only focused on the purchasing department, while cross-functional teams are working on several initiatives that are related to the purchasing function. Four conclusions on the value management control can be made:

1. Only a few value management performance measures are used and they are only focusing on output control and no clear goals are set for the organisation;
2. Superordinate goals for cross-functional working are not used;
3. Savings can only be reported for existing products in the current purchasing value based management reporting system;
4. Purchasing performance measurements are dealing with savings only, not with cost avoidance, margin or sales.

PROJECT SELECTION: NO FORMAL PROCESS OF THE PROJECT SELECTION

The current project selection at Philips Lighting is not structured. The criteria which are used should, according to the literature, be in line with the company's strategy and goals. The criteria that are derived from literature are therefore tested on importance. This question is included in the interviews that are described in the next chapter. The project selection is made by only a few stakeholders. Three conclusions are made:

1. Only a limited number of selection criteria is used;
2. The selection decision is made by only a few stakeholders;
3. There is no structure method or procedure for the project selection.

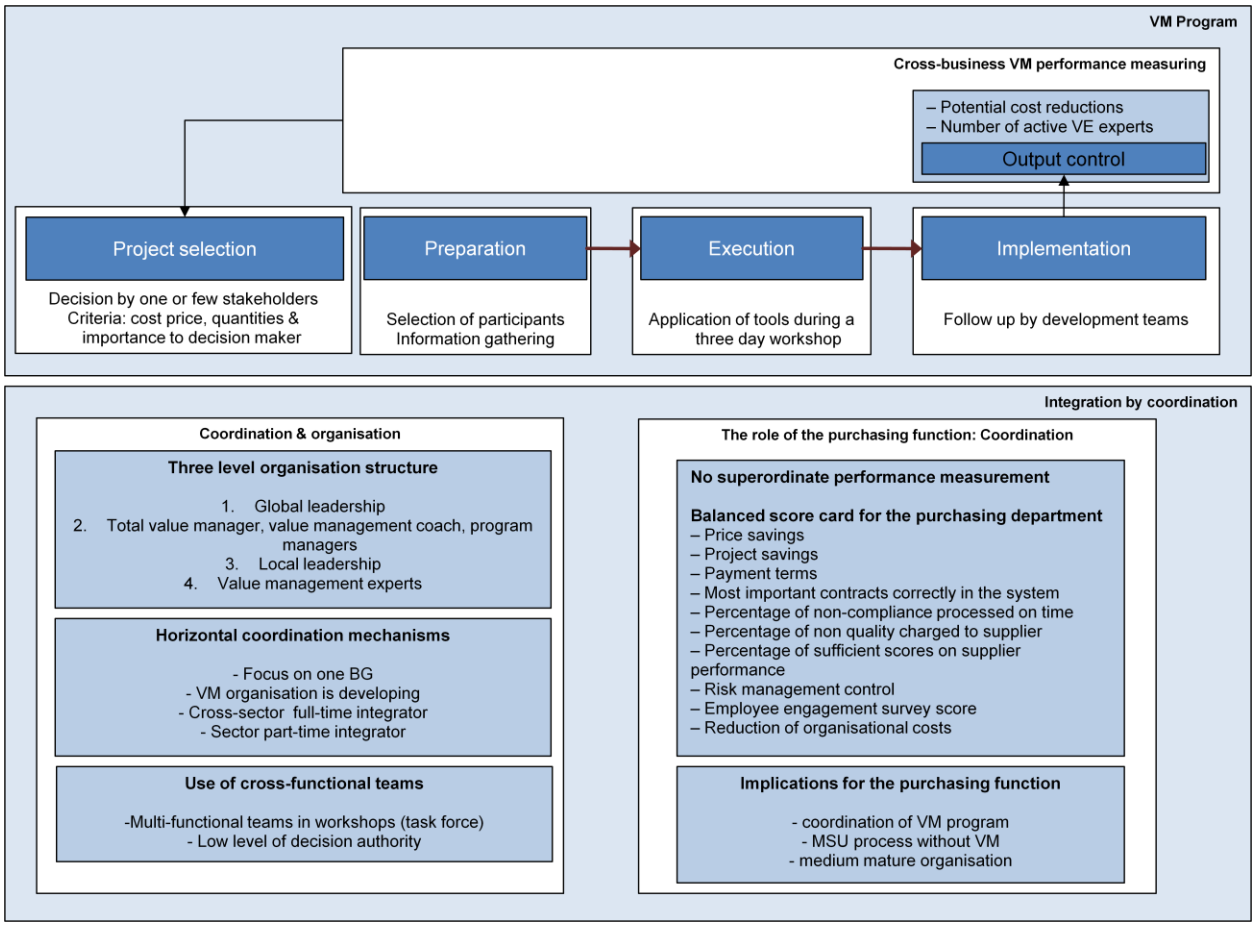


FIGURE 28: FRAMEWORK OF CURRENT VALUE MANAGEMENT PRACTICE AT PHILIPS LIGHTING (OWN ILLUSTRATION)

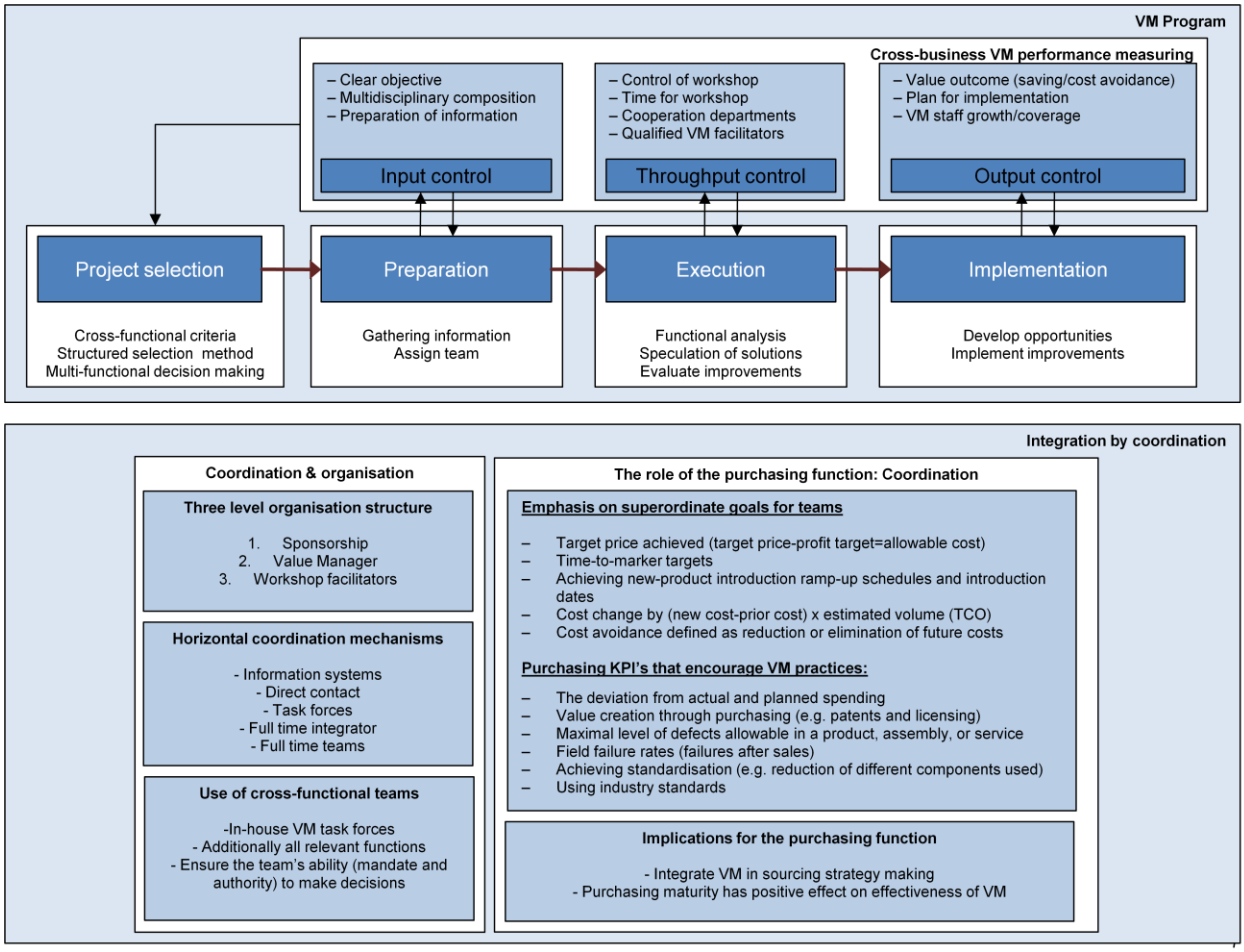


FIGURE 29: THEORETICAL FRAMEWORK OF A VALUE MANAGEMENT PROGRAM (OWN ILLUSTRATION)

4. INTERVIEWS TO TEST THE RELEVANCE AND IMPORTANCE OF IMPROVEMENT OPPORTUNITIES

The previous chapter has identified the major discrepancies on a range of topics related to value management and its governance between theory and practice at Philips Lighting. This chapter links discrepancies to possibilities for improvements based on the literature. Possibilities for improvements are tested on relevance and importance by interviews with internal stakeholders. The goal of this chapter is to improve the recommendations in such a way that they are in line with the Philips organisation and supported by the management. This section first describes the set up of the interview and secondly it elaborates the results.

4.1. INTERVIEW SET UP: QUESTIONNAIRE AND INTERVIEWEE

This section describes the set up that is used for the interviews. Chapter three gave input to the questionnaire. The interviewees are selected from different functions and businesses in order to test different points of view.

4.1.1. INTERVIEWEES: VALUE MANAGEMENT, PURCHASING AND TECHNOLOGY STAKEHOLDERS

A total number of eight managers participated in the interviews. The set of interviewees is limited because of two reasons. First, not all business group managers have experience with value management. Secondly, the set of interviewees consist only of top-management because of the importance of their support of the implementation of value management.

Three types of stakeholders are interviewed. Members of the value management team are directly involved in the value management program. Purchasing directors and technology directors are indirectly involved. They have knowledge about current practice in purchasing and development, and they are the owners of the resources that are involved in the workshops. Chief purchasing officers (CPO) and chief technology officers (CTO) from three different business groups are interviewed in order to cover different business groups within the Philips Lighting organisation. The three business groups are chosen because of their experience with value management. Employees from the marketing department are not included in the test because the technology and marketing department are working closely together. Every project is started with a mutual agreement on the project in terms of a formal business case. It is thus assumed that the technology officers can represent the marketing department in their criteria selection. The outcome of the interviews showed that all functions (purchasing, technology and value management) agree on the importance of 'marketing criteria'. This confirms the previous reasoning on excluding marketing from these interviews.

4.1.2. DEVELOPMENT OF THE STANDARDISED QUESTIONNAIRE COVERING FOUR SUBJECTS OF INTEREST

The previous chapter investigated the current value management practice at Philips Lighting. The conclusions from chapter 3 can be translated into opportunities for improvement. This section elaborates on the opportunities for improvement that are tested by interviews. Interview questions are defined on the value management program, governance of value management, and the value management project selection. The complete questionnaire is given in appendix G. The interviews consist of statements that are related to improvement aspects and possible measures, ideas or mechanisms. Every question should be answered with a number from 1 to 10, where a maximum score reflects a very important, very relevant or total agreement. Every question has room for comments of interviewee as well.

4.1.2.1. Interview questions about the value management program covered by the project selection and the value management process

Literature argued that the project selection should be formally part of the value management process. Philips Lighting does have a project selection, only it is not formalised and guidelines for the selection process do not exist. The fourth subject further elaborates on this issue. It is therefore not covered by the questions about the value management process. The second issue is related to the preparation of value management workshops. A structured and formalised preparation can help the organisation to make sure that every workshop has sufficient input and the execution goes smooth. A lack of information, as currently experienced, must be avoided. A list of documents that are important to prepare is derived from the literature (appendix B). This information should be gathered before a workshop starts. The value management organisation should ensure that someone is responsible for this activity. The third observation related to the value management process is concerned with the implementation of opportunities of improvements. Development teams are responsible for the implementation, but track and trace of results is not done. Because of this, there is no clear picture on the current status and outcome of value management. The control system, which is discussed later in this section, should make sure that the status of implementation is known at all times. This may encourage people to participate in the value management program. Because all the issues related to the value management process are later taken into account, no questions specifically related to this subject are asked during the interviews.

4.1.2.2. Interview questions about the governance of value management: the purchasing function, organisational integration and value management control

The governance of value management is the second issue assessed in this report. The analysis has derived conclusions about the governance of value management in three areas: the purchasing function, organisational integration and value management control. Conclusions and improvements are tested by interviews on these three topics.

Interview questions about the Purchasing function: the role of commodity teams

The current MSU purchasing model that is used by Philips does not take value management practice into account. Value management is important for the purchasing strategy development because changing product specification affects the internal demand and the subsequent possibility on the supplier market. Strategic purchasing at Philips Lighting is done by commodity teams. Value management practice should thus be part of the commodity team strategy development. Involvement in value management of commodity teams can be encouraged in different ways. Following interview questions are used to investigate the importance of commodity team involvement according to Philips employees and in which ways this can be achieved:

1. To what extend do you agree with this statement: “Value Engineering should be part of the commodity team strategy development because changing product specification leads to different internal demand”? (1-10)
2. To what extend are following ideas for improvement important for Philips Lighting? (1-10)
    a. Defining value management savings targets for each commodity team
    b. Involve members of a product’s most important commodity team in a workshop
    c. Organize value management workshops for product driven commodity team’s or for key suppliers
    d. Defining targets for the number of value management Experts in a commodity teams

Interview questions about organisational integration: supporting the value management organisation and create mandate

The analysis in the previous chapter showed that a formal value management organisation should be implemented in all the business groups. Currently only one business group has a value management structure in place. Theory suggests that the value management organisation structure must consist of three levels: sponsorship, a value manager and workshop facilitators. While taking the issues derived in the previous section into account, four activities should be supported by the value management organisation: (1) project selection, (2) workshop preparation, (3) workshop facilitation, and (4) monitoring implementation.

A value management coach at the sector level supports decision makers from three functions (purchasing, development and marketing) during the project selection and represent the value management function of the organisation. Besides that, he or she can train employees during workshops. The preparation of a workshop should be done by a member of the project team in order to be able to gather all the information. Nevertheless, it would be helpful to support this activity by a value management coordinator that is installed within a business group. This employee can be dedicated to one or more business groups or business group units (depending on its size) and in this position he or she is also able to monitor the implementation of the opportunities for improvement. These suggestions for improvement are tested in interviews by two statements:

3. To what extend do you agree with the statement: “Every BG/BGU should assign a coordinator which is together with the project leader responsible for the preparation of value management workshops” (1-10)
4. To what extend do you agree with the statement: “A value management coach at sector level and a steering committee, technology at the BG /BGU level should be responsible for the project selection and long term performance” (1-10)

The workshop facilitation is done by either the value management coordinator or the value management experts in the organisation. Literature acknowledged the importance of sharing resources and knowledge in value management practice. It is therefore important to use value management experts across the organisation and let them work on projects outside their own working environment. This can be encouraged by three mechanisms: communication of workshop outcome and implementation results to their management, top-down sponsorship, and the inclusion of participation as a personal key performance indicator for employees. One statement and one interview question are used to test these recommendations:

5. To what extend do you agree with the statement: “Value management participation outside your own working environment (other project) should be encouraged because this will increase cross-business integration, knowledge sharing and resource leveraging”? (1-10)
6. To what extend will following actions lead to encouraging participation outside own working environment? (1-10)
    a. Communication of workshop outcome and implementation
    b. Top-down sponsorship
    c. Include participation as a personal key performance indicator

Another important issue on value management governance is concerned with the mandate and commitment of team members of a workshop. In order to ensure empowerment of team members, decision makers should be included in a workshop. Therefore following statements are tested in the interviews:

7. To what extend do you agree with the statement: ”Value management teams in workshops should include all functions with at least one decision maker” (1-10)

Interview question about value management control: measuring value management performance

Value management practice should according to the literature be controlled by input, output and throughput control. Philips Lighting's current practice is only based on steering value management by sector level targets on the number of value management experts and the total savings by value management. The previous section concluded that throughput control is not necessary at this stage of implementation. The literature therefore suggests to use input (during the workshop preparation) and output (as result of workshops and implementation) control measurements. The workshop preparation should consist of determining a clear objective, compose a multi-disciplinary team and prepare all the important information. The output can be measured by the value outcome, the availability of a concrete plan for implementation and the number and organisational coverage of value management Experts. In line with the value management organisation structure discussed earlier in this section, input control measurements should exist for the value management coordinator and the project leader and the output control mechanism are important for the value management coach and the steering. Following questions are included in the interviews. Furthermore, interviewee are asked if any possible control measure is missing. Creativity and additional input is ensured by doing this.

8. How important/suitable do you find following control measures for the value management coordinator and project leaders of a value management workshops? (1-10)
    a. Clear objective of the value management workshop on forehand
    b. Preparation of the information
    c. Multi-discipline composition of the workshop team
    d. Plan of implementation
9. How important/suitable do you find following control measures for the value management sector coach and the steering committee? (1-10)
    a. Timing of workshops
    b. Number of planned workshops
    c. Value outcome
    d. Number of value management experts
    e. Organisational coverage of value management experts

The purchasing department performance measurements are compared with the literature in order to ensure that these measurements encourage value management participation and thinking in terms of value and costs. Superordinate performance measurements are argued to be important for increasing cross-functional team performance. Time-to market targets are not included in the current purchasing performance criteria, while this can be an important source for value creation. Savings on new products cannot be reported in the current system. It would therefore be useful to introduce cost avoidance measuring and margin improvement targets. Price target achievement is according to the literature a method to ensure a certain level of value during the purchasing and development process. This can be measured by two ways, namely improvements towards the expected market price (market target cost) or to the expected target cost of a product (determined by the bill of material). The first is more sensitive to price erosion and based on prediction, the second is more reliable but does not include added value. The interviews are used to test which of the two methods is most suitable. Besides that, the importance the suggested performance measures are assessed.

10. To what extend do you think following key performance indicators are important for project and initial buyers? (1-10)
    a. Time-to-market targets

b. Cost avoidance (=reduction of future costs in product development)
c. Price target achievement

11. If you use the price target as a performance indicator, to what extend are following aspects important? (1-10)
    a. Reliability of the target price target
    b. Measuring added value

4.1.2.3. Interview questions about value management project selection covering selection criteria and the selection method

The project selection can be improved by formalising the procedure. The lowest group of managers from different functions (purchasing, marketing and development) from a business group that have the overview of all product development and product improvement should make the project selection. To test this solution, following questions are asked to the interviewees:

12. To what extend do you agree with this statement:"The project selection of VE workshops should be made by the lowest group of managers in a BG/BGU that have an overview of all development and improvement projects"? (1-10)
13. To what extend do you agree with this statement: "project selection should be made by all the important product development/improvement functions (purchasing, marketing & technology)"? (1-10)

The criteria which are used should, according to the literature, be in line with the company's strategy and goals. The fifteen selection criteria derived from literature are tested on their importance. Following question are used:

14. To what extend are following criteria for project selection important for your business or Philips in general? (1-10)
    a. Costs
    b. Resources consumed
    c. Difference between cost and value/price
    d. Return on investment
    e. Supply risk/supplier issues
    f. Market growth
    g. Market share
    h. Expected/actual sales volume
    i. Customer complaints
    j. Product becoming non-competitive
    k. Functions are not properly accomplished
    l. Production bottlenecks/breakdown
    m. Time constraints
    n. Top management visibility

4.2. Interview results: Integration of value management and market based selection criteria

The interviewees regard themselves as value management experts as they argue to be very familiar with the value management program at Philips (8.7 on average) and all of them participated in a training session. This section elaborates on the most important results of the interviews for every subject.

4.2.1. Results on value management governance: the purchasing function, organisational integration and value management control

This section describes the results of interview questions on the three topics related to value management governance.

4.2.1.1. PURCHASING FUNCTION: 'VALUE MANAGEMENT SHOULD BE PART OF THE COMMODITY TEAM STRATEGY DEVELOPMENT'

Value management should be part of the commodity team strategy development according to employees of the value management organisation while purchasers are less convinced about the possible advantages this could have. This aspect is scored by a 6.0 on average. Value management is seen as an activity for the business group's development teams. Value management targets for commodity teams should not be set (relevance of 4.0), but involving commodity team members in workshop is a very good idea (9.0). There should be made a difference between material driven commodities (plastics, metals etc.) and product driven commodities (EMS/ODM, buy for resell). The last group of commodity teams do have the possibility to actively drive value management in terms of product. There is mutual agreement among the interviewees that value management should always be based on a product and not on a commodity.

Question/statement	Score
"Value management should be part of the CT strategy development"	6,0
Defining value management targets for each commodity team	4,0
Involve members of a product's most important commodity team in workshop	9,0
Organise VE workshop for product driven commodity teams or key suppliers	7,8
Defining targets for the number of value management experts in a commodity teams	6,0

TABLE 10: INTERVIEW RESULTS ON THE PURCHASING ORGANISATION

4.2.1.2. ORGANISATIONAL INTEGRATION: CREATING A FORMAL VALUE MANAGEMENT ORGANISATION

The organisational proposal (with a value management coach at a sector level and the three-unit of purchasing, marketing and development (top level) that are responsible for the project selection and a value management coordinator and project leaders that prepare workshops and track outcome) is seen as a very good idea (scored on average with 8.9). All participants agree that the value management teams should include all functions with at least one decision maker. Doing this ensures empowered teams that can make decisions right away instead of the current practice that is often limited to the generation of ideas only. Value management participation outside someone's own working environment should according to all stakeholders be encouraged (8.8). Top-management sponsorship is the most powerful tool to achieve this, although using key performance indicators and the communication of workshop outcome helps as well.

Question/statement	Score
"Coordinator per BG/BGU and project leader for preparation & implementation"	9,0
"value management sector coach and steering committee for project selection and long term performance"	8,8
"value management participation outside your own working environment should be encouraged"	8,8
by communication of workshop outcome and implementation	6,3
by top-down sponsorship	8,0
by including participation as a personal key performance indicator	6,3
"VE teams in workshops should include all functions with at least one decision maker"	9,3

TABLE 11: INTERVIEW RESULTS ON THE ORGANISATION OF VALUE MANAGEMENT

4.2.1.3. VALUE MANAGEMENT CONTROL: THE INTRODUCTION OF VALUE MANAGEMENT PERFORMANCE INDICATORS

The control measures for the VE coordinator, which are input control measurements according to the literature, are all evaluated positively (9.2 on average). This way of assuring good value management practice is thus evaluated as valuable. The suggested control measures for the value management sector coach and the steering committee (output control), are partly positively evaluated. 'Timing of workshops' and 'the number planned workshops' are not seen as good control measurements for the top level organisation. Value outcome and the number of value management experts are best according to the interviewees. These measures are also currently used by Philips Lighting.

The possible key performance indicators for purchasers that are involved in product development are in general positive evaluated. Time-to-market is seen as most important additional target followed by price target achievement and cost avoidance. There is no mutual agreement on the type of price target (market versus cost based), evaluated by respectively 7.5 and 8.3. A little preference is this given for cost based price targets because of their reliability.

The success of value management and product development in general would improve when Philips would work with joint targets, as one of the interviewees pointed out. This thus confirms that alignment of performance measures is important and superordinate measures are an optimal solution.

Question/statement	Score
Importance control measure for the value management coordinator/project leaders	
clear objective of the value management workshop	9,0
preparation of information	9,5
multi-discipline composition of workshop team	9,5
plan of implementation	8,8
Importance control measure for the value management sector coach and the steering committee	
Timing of workshops	4,0
number of planned workshops	4,2
value outcome	9,0
Number of value management experts	8,5
Importance of KPI for project and initial buyers	
Organisational coverage of value management experts	7,8
Time to market targets for project/initial buyers	8,5
Cost avoidance as KPI for project/initial buyers	7,0
Price target achievement as key performance indicator for project/initial buyers	7,8
Aspects of price target achieved as performance indicator	
Cost based price target (reliability)	8,3
Market based price target (measure value add)	7,5

TABLE 12: INTERVIEW RESULTS ON VALUE MANAGEMENT CONTROL

4.2.2. PROJECT SELECTION BASED ON MARKET ORIENTED CRITERIA

All respondents agree that the lowest group of multi-functional managers that have an overview of all product development and product improvement projects should make a project selection. This statement is evaluated with

a score of 9.0 on average. Also the recommendation to include a formal project selection by three functions (purchasing, marketing and technology) is seen as very important by the different interviewees.

The different possible criteria are also evaluated on a scale from 1 to 10. Following criteria are low (a score below 5.5) evaluated (Table 14): 'resources consumed', 'enough resources available', 'time constraints', and 'top management visibility'. The criteria 'cost versus value', 'sales volume' and 'product becoming non-competitive' are seen as most important. We also see that market aspects are in general higher evaluated than purchasing or development criteria. One of the members of the organisation of value management thinks that project selection should start one level higher. The Philips Lighting sector management gives strategic importance to certain segments or business groups. These business groups should be covered first by value management. One of the respondents pointed out that it would be interesting to look at the purchasing spend of each business group because it is expected that a business group with a large spend can be improved most in terms of absolute value.

Question/statement	Score
"project selection by lowest group managers with overview of projects"	9,0
"project selection by purchasing, marketing and technology"	8,8

TABLE 13: INTERVIEW RESULT ON PROJECT SELECTION

Criteria	Average score	Criteria	Average score
high costs	5.8	sales volume	8.7
resources consumed	4.7	customer complaints	6.0
difference cost and value	8.0	product becoming non-competitive	8.8
return on investment	7.5	functions are not properly accomplished	6.7
profit impact vs. supply risk	5.5	production bottlenecks	6.0
market growth	7.8	time constraints	5.3
market share	7.0	top management visibility	4.3

TABLE 14: MANAGEMENT'S AVERAGE SCORE ON PROJECT SELECTION CRITERIA

The results of these interviews are used as input for the recommendations made in the next chapter.

5. Conclusion and recommendations: creating a value management organisation

This last chapter answers the main research question that is defined in the first chapter. Besides that recommendations are given to the management of Philips Lighting in order to improve value management practice. The chapter ends with a critical evaluation of the results and implications for further research.

5.1. Conclusions on the value management program, value management governance and the project selection

This research has investigated the value management process and the value management organisation of Philips Lighting. The current practice is compared with the theoretical framework based on an extensive literature review. The main research question of this research was:

How should Philips Lighting design the governance and the project selection of its value management program in order to realise a value management organisation that is able to control and monitor performance and where project selection is structured and based on grounded criteria?

A value management organisation is characterised by a situation where people are aware of (product) value during all their decisions. Value management as a management program is introduced at Philips Lighting to change the way of working and thinking towards value. The analysis has shown that the current practice differs from theory. This research has investigated three topics of interest: value management as a management program, governance of value management and the value management project selection. Conclusions can be made on these three topics and form together an answer to the main research question.

5.1.1. Value management program: No project selection and unstructured preparation

Value management as a management program for product improvement should according to literature consist of four process steps: Project selection, workshop preparation, workshop execution, and the implementation of improvement opportunities. The investigation at Philips Lighting showed that there is no formal and consistent project selection, that the workshop preparation phase is not structured and that the implementation of improvements is not monitored.

5.1.2. Governance of value management: Increased organisational integration by the use of teams, purchasing strategy development and value management control

The governance of value management is investigated in three fields: the purchasing function, organisational integration, and value management control.

The purchasing function is important for value management because value management at Philips Lighting is coordinated from the purchasing department and because changes in product design affect the internal demand and subsequently the possibilities at the supplier market. Value management practice should be integrated in a company's strategic purchasing process in order to cope with the second argument. Philips Lighting, that is using the MSU strategic purchasing and supply model, does not include value management practice in their strategy development. The maturity of the purchasing function of Philips Lighting is relatively low. Low maturity scores are found on the planning, organisation structure and process organisation. The maturity of a function is important because it influence the success of value management practice and its introduction.

Value management practice needs to be integrated in the organisation. Value management can be coordinated from the purchasing department, but it involves multiple functional areas like development, marketing and supply chain management. A (virtual) three level value management organisation structure is recommended by literature. A formal structure that contains these elements (sponsorship, a value manager, and workshop facilitators) exists only in one business group at Philips Lighting. The use of multi-functional teams is important to improve organisational integration of value management. Philips Lighting does make use of teams, but, contrary to theory, they lack mandate and autonomy. Furthermore it is stated that participation in value management workshops is not always rewarded by management, especially when the workshop takes place outside someone's own working environment.

Value management control is needed to monitor performance and to improve value management practice. Value management control should according to literature be based on input and throughput control. The current control system that is used at Philips Lighting is solely based on output control and goals are only set at the highest level (at the sector level). Margin improvement is set as the major goal for value management at Philips Lighting, but in practice it is showed that only product savings are captured as a performance indicator. Cost avoidance and increased value is not measured, while this is argued to be important in the academic literature. Finally it can be concluded that the current performance measurement system of the purchasing function at Philips Lighting is mostly focused on the purchasing department. Theory and practice showed that performance measuring over the purchasing function is more powerful, because more functional areas affect the purchasing performance for example in saving projects and product development.

5.1.3. Value management project selection: Need for market based criteria and a structured method

The project selection is the first step of the value management process. A project selection should, according to the literature, be made by multi-functional stakeholders who use criteria that fit the company's strategy and by using a complementary method that is formally structured. The investigation at Philips Lighting has showed that the current project selection method is not structured. Decisions are made by one or two stakeholders and not all possible projects are considered. Interviews with the management of Philips Lighting have shown that market oriented criteria are seen as most important and reflect Philips Lighting's business strategy. The selection of criteria derived from literature and confirmed as being most important, are not all taken into account when selecting projects for value management.

5.2. Recommendations: Towards improved value management practice

The conclusions described in the previous section show that the current value management practice at Philips Lighting can be improved in order to achieve better performance. Recommendations can be made based on the conclusions. These recommendations give Philips Lighting guidelines to improve value management practice. Recommendations are given on three subjects.

5.2.1. Value management program: structure and formalisation

The value management program at Philips Lighting should consist of four steps: project selection, workshop preparation, workshop execution and the implementation phase. The project selection is discussed later. Here recommendations are be made on the preparation of workshops and the implementation phase where opportunities for improvement are brought into practice.

Structure and formalise the value management workshop preparation

- Involve the right people in a team: multiple functions
- Make all information available (Appendix B)
- Facilitate the workshop: agenda, location, etc.

Preparation is task for the project leader

- Support is given by a value management coordinator for every business group

The analysis has indicated that Philips Lighting needs to structure and formalise its value management workshop preparation. The project leader, assigned by Philips management, is responsible for the workshop preparation. The value management project leader is in general the project leader of the product development or product improvement project because this will enhance internal buy-in of the project team and he or she knows the project well. Because of the recent implementation and unawareness of value management it is recommended to assign a value management coordinator in every business group. This person can support the project leader with the preparation, monitor performance and support management in value management decision making and he or she is part of the value management organisation structure. The workshop must be supported by value management experts (those people that are trained in value management before). The value management coordinator can make use of value management experts across the organisation. Involving people from other business groups should enhanced to make knowledge sharing possible.

Introduce a track & trace system to monitor value management implementations

- Start with a plan of implementation from the workshop
- Monitoring the progress by the value management coordinator
- Implementation itself is done by the development teams

Philips Lighting has no clear picture over all business groups on the status of the implementation of improvement opportunities that are derived in workshops. It is therefore important to introduce a structured track and trace system, eventually supported by an information system. The plan of implementation that is made at the end of a value management workshop should be concrete and contain all opportunities for improvement, expected impact on the products margin, a list of decisions that have to be made and an action plan including a time planning. This plan is used during the implementation and can be used as communication tool for 'external' participants to make them able to show the workshop outcome and their contribution to their own management. The information on the implementation is useful for the value management organisation and possible problems or escalations can be discussed with the value management steering committee. The responsibility of the implementation itself lays in the business group, mostly at the development teams.

5.2.2. Governance of value management: focus on integration and control

The governance of value management is dealing with the coordination, organisation and control of value management within Philips Lighting. Recommendations are made in these three areas.

5.2.2.1. Purchasing function: drive and integrate value management

The purchasing function is argued to be important for value management practice. The purchasing department is coordinating value management. Purchasing should remain driving value management because of future opportunities in supplier involvement and the increased importance of the purchasing function in Philips.

Consider supplier involvement for every workshop

- The consideration to involve suppliers is part of the workshop preparation

Integrate value management in the commodity strategy development

- Value management workshops for 'product driven' commodity teams
- Always involve a representative of the most important commodity team for that project

Value management is a powerful tool to increase supplier involvement. This opportunity is not much used at Philips Lighting at the moment. This research' result suggest to considering supplier involvement for all workshops during the preparation. The analysis of the current situation at Philips Lighting showed that value management practice is not integrated in the strategic purchasing process while this is important because of its impact on the equilibrium of Philips Lighting and the supplier market. This research has identified several ways to integrate value management and strategic purchasing at Philips Lighting. Interviews with stakeholders have confirmed two important recommendations for improvement. Firstly, value management workshops can be conducted for 'product driven' commodity teams. The commodity team should be product driven because value management is primary used to improve product (design). The commodity teams at Philips Lighting that can initiate workshops for their team are Buy for resell (BFR) Ballast, BFR Luminaires, BFR Light sources, and OEM-ODM/EMS. Value management should be introduced to these teams by organising value management training and subsequently workshops in every team. Secondly, value management workshops should by definition invite a representative of the most important commodity team for that project. The commodity team brings product and price information to the table and is also able to steer decision making to make sure that these are in line with the commodity team strategy.

Philips Lighting should be aware of the maturity of the purchasing function

- Low maturity levels on organisation structure and process organisation
- Integrating value management in commodity team strategy development might be difficult
- Value management organisation should not be fomally integrated in the purchasing organisation
- Lower maturity levels on supplier involvement, supplier development, and early involvement of purchasing in development can be improved by value management practice

Integrating value management practice in the commodity team strategy development might be difficult because of the low maturity of these teams (commodity teams are recently introduced). Especially the first recommendation (value management workshops dedicated to commodity teams) can be difficult to introduce and might be reconsidered due to the maturity level. The next section, where recommendations are made on the value management organisation, should also take maturity of the purchasing function into account. It is recommended to develop a value management organisation that is primary supporting the organisation (including the purchasing function) and not formally integrated in the purchasing organisation. Finally it is recommended to assess the maturity of the development function of Philips Lighting. Value management practice involves the engineers and products of this department as well. A threshold for maturity might be considered to optimise the value management implementation.

5.2.2.2. Organisational integration: Create a formal value management structure with empowered teams in all business groups

A formal value management organisation is needed in all business groups, while Philips Lighting has a formal organisation in place in only one of the six business groups. A formal value management organisation structure is given in Appendix H. Value management practice takes place in the business group and is coordinated and

supported by the purchasing department. The value management organisation is thus a virtual organisation besides the current business group structure. The structure within the sector Lighting is based on three layers.

Layer 1: A value management coach for the Philips Lighting sector

- Responsible for mid-long term perfomance
- Setting up the oganisation and reporting structure
- Assign value management moderators
- Identify cross business opportunities

Layer 2: Value management program management (steering committee)

- Project selection
- Assign teams

Layer 3: Project teams

- Project leader takes the lead
- In charge of the workshop preparation and execution

The second layer is most important because this layer does not exist, while important decision making takes place. Value management program management (or so called steering committees) is a group of management from different backgrounds. This group should be installed in such a way that every steering committee has an overview of the product roadmap (all products that are developed or improved), the group has the power to make decisions on human resources, and all business units and business groups are covered. Depending on the sub-organisation size, the steering group can be installed at the top of the business group or in every business unit or regionally business unit. Representatives of the marketing, purchasing, development and, depending on the characteristics of a business, other functions have a meeting every quarter. Integration of value management with the product development function of Philips Lighting is important to ensure value management practice on new products. The project selection should be made and a project leader for the workshop and value management training team is assigned by the steering committee. Support to the steering committee is given by a value management coordinator. His/her responsibilities include (1) securing value management quality in the business group/unit and organise a value management training if necessary, (2) support the steering committee by defining projects and guide project selection, (3) support the project leader with the value management workshop preparation, and (4) monitor and support value management implementation by tracking margin improvements, the number of value management experts and identification of problems during implementation and communicate escalations to the steering committee. Value management coordinators are preferably trained as “value management Experts level 2” to ensure knowledge and experience with the tools and management program.

Ensure madate and empowerment in value management teams, by:

- Top-down sponsorship
- Invite at least one decision maker from every function a value management project team

It is important to ensure the ability of making decisions during a workshop in order to enhance mandate of the value management team. Top-down sponsorship is, according to literature and the Philips Lighting management, expected to be an important tool to make sure that participation of employees in value management workshops is rewarded. This means that the value management program management at Philips has a primary task in creating awareness and support for the value management practice in Philips Lighting among top-management in all business groups and in different functional areas. The total value manager should increase the commitment from multiple functions inside the different business to increase top-management sponsorship. A second method is to

ensure that every function (purchasing, development, etc.) is represented by at least one decision maker. This can speed up discussions in a project team and makes decision making on opportunities easier.

5.2.2.3. VALUE MANAGEMENT CONTROL: BY INPUT AND OUTPUT MEASUREMENTS

Input control and output control are two control mechanisms that can help improve value management practice at Philips Lighting. Output control is already used to some extent, while input control on value management does not exist at Philips Lighting.

The first recommendation on value management control is the introduction of input control. Leaders choose to influence the general conditions under which activities are carried out.

Input control measures

- Percentage of value management workshops for which a clear objective was defined before the workshop started;
- Completeness of information packages that are prepared before a value management workshop, measured by the percentage of available documents versus the necessary documents (see Appendix B);
- Degree of multi-disciplinarity of value management workshop teams measured by the number of different functional areas (development, marketing, purchasing, supply chain management etc.) involved in a workshop.

Secondly, findings revealed that extending and adjusting the current output control used by Philip Lighting would be beneficial for the value management practice. The outcome is a performance indicator that is not related to a specific function or department. The value management program is multi-functional and the outcome may therefore not be subjected to one or few departments as highlighted in the theory. Furthermore, steering on savings per function leads to sub optimalisation since every function has its own role and influences the margin of a product.

Output control measures

- Availability of plans for implementation measured by the percentage of workshops that have formulated a plan of implementation according to the standards described in the previous chapter;
- The number of value management experts trained across the organizations. Targets are set per business group for all three levels of value management experts;
- The value outcome measured by product margin improvement.

The product margin improvement can be measured by calculating the difference between two measures: (1) The product price improvement based on the difference between the current customer price and the market price target (*exchange value*); (2) Product cost savings and cost avoidance by differences in the bill of material or compared to the target cost price (*cost value*). Value outcome on existing products can be captured in the project savings of the current reporting system. It is important to note that a predecessor of a product may only be used as a reference of the product has exactly the same functionality and target market. If this is not the case, cost models confirmed by cost engineers should be used to calculate savings and cost avoidance. Savings on new products cannot be reported because a reference price does not exist. Therefore it would be necessary to introduce the cost avoidance as a saving measure for new products. Cost avoidance can be measured by measuring the impact of each of the improvement opportunities on the products cost price target. This cost price target should also be confirmed by a cost engineer. A disadvantage of the current system is that savings can only be reporting for the first year in which a product will be produced. It would therefore thus be more interesting to conduct workshops on existing products because these have already a more mature production volume level.

Results of this research suggest therefore steering value management on margin improvement that is realised in a workshop.

Theory recommends putting emphasis on superordinate goals for cross-functional teams. This implicates that not only the current measurement system of the purchasing department, but all measurement systems that are used by different functions should be changed. This might be one step ahead, since the Philips lighting organisation is still based on a hierarchical functional system. A first step towards a performance system that is based on team performance would be to introduce the previous recommendation on value management team performance measurement for the cross functional teams as a whole.

5.2.3. Structuring value management project selection

The project selection, which is the first phase in the value management process, is not done in a structured way by Philips Lighting. Literature demands for a structured selection method and criteria that meet the company's goals and strategy. This section describes recommendation on the project selection process.

5.2.3.1. Market based criteria for the project selection

The criteria that are derived from literature and which importance is confirmed by the Philips Lighting management should be used as input for the selection process. Six basic criteria are selected:

- Product becoming non-competitive
- Sales volume
- Difference between cost and value (product margin)
- Market growth
- Return on investment
- Market share

This information should be gathered upfront the project selection. Five out of six criteria are quantitative. The first criterion is qualitative and should be determined by the marketing or sales manager. Value management is a program that leaves room for creativity and flexibility. Other criteria that are argued to be relevant in the future or for a certain business group can be added in mutual agreement.

5.2.3.2. Project selection by value opportunity potential method

Literature has argued that the project selection must be performance by a multi-functional team, while this is currently done by one or two stakeholder. Results from the literature review recommend to introduce a two level project selection decision system.

Yearly meeting between Philips Lighting sector management and the value management coach

- Identify large volumes and strategy
- Determine focus for value management

Quarterly meeting of steering committee

- Overview of all possible projects
- Selection by 'value opportunity potential method'

A yearly meeting between the Philips Lighting sector management and Philips Lighting sector value management coach is used to determine strategic importance and identify large volumes to focus on certain areas (segments or business groups). Priority for the value management resources (experts and moderators) is given to these areas. A quarterly meeting of the steering committee at business group level (see Appendix H) is hosted to do the actual

project selection for the business group or business unit. It is important that this group of managers has an overview over all product development and product improvement projects in order to take all possible opportunities for value management into account. Doing this ensures the consideration of new products and thus more emphasis on value engineering compared to the current practice.

The project selection should be based on the value opportunity potential method (developed by Kaufman (1993) and described in section 2.3.2.4) because this method incorporates cost, value, margin, volumes, market growth and competitive position. This method compares the value opportunity potential with the market potential of a product. It should be noted that this method is a guideline for the project selection and especially useful to compare the different project in a first stage. Discussion within the steering group leads to a final selection based on grounded arguments.

5.3. DISCUSSION: REFLECTION AND VALUE MANAGEMENT IN A CHANGING ORGANISATION

The main findings of this research are discussed in the last section of this report. Possible weaknesses are described and some general notes give a reflection on the topic of value management and purchasing in general.

Value management gained recent renewed interest by the industrial world. This research is valuable for the scientific field for three reasons. First, it makes the relation between the purchasing function and value management clear. Second, it teaches us how to deal with the multi-functional character of value management and the control that is needed to improve performance. Thirdly, it describes a structured way to link the firm's goals to value management project selection. Although this research is conducted in a structured way, some weaknesses can be identified. The research is conducted at Philips Lighting as a single case. It would be interesting for further research to look into situations in companies that are comparable in terms of organisation structure, business environment and technology. The research is mainly based on internal documents and literature. Little quantitative information is used due to time constraints. Further (quantitative) research on the relation between selection criteria and the success of value management would be important to generalise the findings on value management project selection.

Philips Lighting is a changing organisation. The first chapter described a changing market, with more innovations and shorter product life cycles. Market responsiveness becomes more important for the organisation that is currently structured to support the current, long lifecycle, product portfolio. A critical problem for firms is to create and work within organizational structures that effectively coordinate the new product development process, facilitate the sharing of information and other scarce resources across functional areas, and provide mechanisms for decision making and conflict resolution. Project team structures, where responsibility for coordination and decision making are decentralized and shared among members of a development team has gained increased popularity (Olson, Walker Jr., & Ruekert, 1995). The Philips Lighting organisation structure is thus expected to move into a project organisation where multi-discipline teams work on new product development. The question rise whether value management is still needed when the organisation gets used to think in terms of value and where multi-functional teamwork is usual. I claim that value management is always valuable to an organisation when the program adapts to the needs of an organisation. Value management is an opportunity to enhance creativity and get teams out of their normal working conditions. Multiple functionalities are already brought together in a project organisation. Value management in a project organisation can bring project teams from different business groups or segments together, it can enhance supplier integration and it can be used to integrate open innovation (eventually from outside the firm) with internal product development.

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APPENDIX A: JOB PLANS DERIVED FROM LITERATURE

	Preparation	Information	Analysis	Creativity	Evaluation	Development & Recommendation		Implementation
Park (1999)		Information Phase		Creativity Phase	Evaluation Phase	Planning Phase	Reporting Phase	Implementation Phase
Thiry (1997)	Information Phase		Functional Analysis Stage	Speculation Phase	Evaluation Phase	Development Phase		
Elias (1998)		Information Phase		Speculation Phase	Analysis	Development	Presentation Phase	
Fong et al. (2001)	Orientation Phase	Information and Analysis stage		Speculation Phase	Evaluation Stage	Implementation		
Save (2007)	Pre-study Activities	Information Phase	Function Analysis Stage	Creative Phase	Evaluation Phase	Development Phase	Presentation Phase	Implementation Phase
Miles (1989)		Information Step	Analysis Step	Creativity Step	Judgement Step	Development Planning Step		
From Park (1999):								
Department of Defence	Orientation Phase	Information Phase		Speculation Phase	Analysis Phase	Development Phase	Presentation Phase	Follow-up Phase
Fallon	Preparation Phase	Information Phase	Analytical Phase	Creative Phase	Evaluation Phase	Presentation Phase		Implementation Phase
Mudge	General Phase	Information Phase	Function Phase	Creation Phase	Evaluation Phase	Investigation Phase	Recommendation Phase	
Value Analysis Inc		Information Phase		Speculation Phase	Analytical Phase	Planning Phase	Execution Phase	Recommendation Phase
Japan		Information collection Phase	Functional Evaluation Stage	Creation Stage	Schematic and detailed Evaluation Stage	Proposal Preperation Stage	Proposal Follow-up Stage	
From Thiry (1997):								
American Society for testing Materials		Information Phase	Functional Analysis	Creative Phase	Evaluation Phase	Development Phase	Presentation Phase	
AFNOR		Preperation	Needs Analysis	Solution Analysis				Results implementation
U.K. Her Majesty's Treasury	Orientation	Information		Speculation	Evaluation	Development	Recommendation	Implementation
Deutsche Industriell Normen Standard	Project Preperation		Analysis & Ideal situation	Develop Ideas	Determine solution	Implementation of solution		

APPENDIX B: REQUIRED PROJECT INFORMATION

The data package that is part of the workshop preparation should, according to Park (1999), include following information:

1. Assembly and parts drawings
2. Technical information
3. Quantity requirements, annual usage
4. Sample of assembly, breakdown showing parts
5. Cost data (material, labour, burden etc.)
6. Tooling costs
7. Manufacturing data (planning sheets, sequence of operations)
8. Company standards and government requirements
9. Market surveys
10. Operating service history
11. Special features or requirements
12. Future plans and objectives
13. Competitive situation (benchmarking information)
14. Other potentially useful information

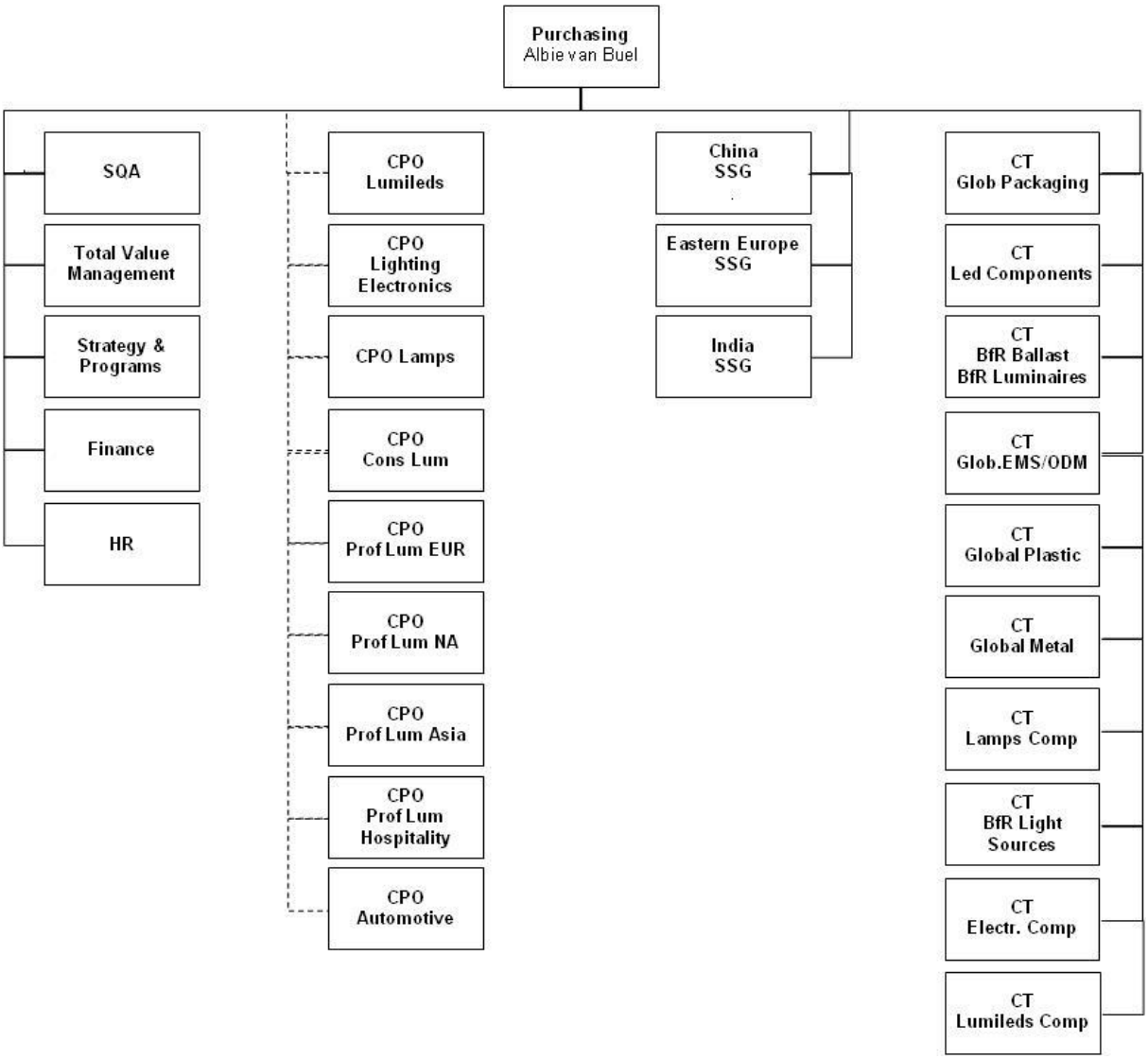
APPENDIX C: PURCHASING MEASUREMENTS

Category	Measurement	I/E/C [8]
Cost (price) performance	The deviation from actual and planned spending	I
	Actual versus market price index (for commodity products)	E
	Total distribution costs	I
	Total inventory costs	I
	Cost change by (new price-prior price) x estimated volume	C
	Actual purchase price compared to plan	I
	Cost avoidance defined as the difference between a price paid and a potentially higher price	C
	Price comparisons between operations in different plants, divisions, business units or suppliers	E
	Target price achieved (target price-profit target=allowable cost)	I
Revenue	Royalty revenues generated from supplier- or buyer-development technology and patents	C
	Supplier contribution as a reason for new business	C
	Return on licensing technology driven by purchasing	C
	Number of invention disclosure forms filed	C
	Number of patents granted	C
Quality	Production quality	I
	Defects per supplier	E
	Customer returns	I
	Maximal level of defects allowable in a product, assembly, or service	I
	Customer defects per supplier	E
	Field failure rates (failure after sales)	I
Time	On-time deliveries	E
	Customer response time (time lag between order and delivery)	E
	Backorder/stockout	E
	Time-to-marker targets	I
	On-time delivery	E
	Achieving new-product introduction ramp-up schedules and introduction dates	I
	Responsiveness to schedule changes, mix changes, and design changes of suppliers	E
Supplier performance	Level and degree of information sharing	E
	The number of buyer-vendor cost-saving initiatives	E
	Characteristics of the supplier base (number of suppliers per commodity, percentage of certified suppliers)	E
Customer satisfaction	Internal customer satisfaction	E
	Post-transaction customer service level	E
	Customer query time	E
Technology, innovation	Number of agreements with key suppliers for critical (new) technologies	E
	Achieving standardisation (e.g. reduction of different components used)	I
	Using industry standards	I
Physical environment, safety	Compliance of safety and environmental legislation and company goals	E

TABLE 15: PURCHASING PERFORMANCE MEASURES (SOURCE: COUSINS ET AL., 2007 & MONVZKA ET AL., 2009)

[8] I) included in selection of performance criteria, E) excluded in selection, C) changed

APPENDIX D: PURCHASING ORGANISATION



SOURCE: PHILIPS LIGHTING ORG CHARTS TIER 1,2,3 (2010)

APPENDIX E: PURCHASING ASSESSMENT SCORES

	Process organisation	Score (1-4)
PO1	**Sourcing strategy**	**2.33**
	Sourcing strategy	2
	Process supplier selection	2
	Responsibility	3
PO2	**Supplier selection**	**3.33**
	Process documentation	4
	Negotiation	3
	Contract management	3
PO3	**Supplier evaluation**	**2.33**
	Process	3
	Communication with supplier	2
	Responsibility	2
PO4	**Supplier development**	**1.75**
	Process	1
	Process	1
	Optimisation	3
	Phase out	2
PO5	**Purchasing early involvement in development process**	**2.75**
	Process	3
	Cross-functional integration	4
	Standardisation	2
	Material-/ functional release	2
PO6	**Early supplier involvement process**	**3**
	Early supplier involvement	3
	technology roadmaps	3
PO7	**Process involvement with other functions**	**2.33**
	Involvement marketing	1
	Involvement quality	4
	Involvement logistics and production	2
	Logistics targets	3
	Involvement operative procurement	1
	Involvement risk management	3
	PO maturity score:	2.55

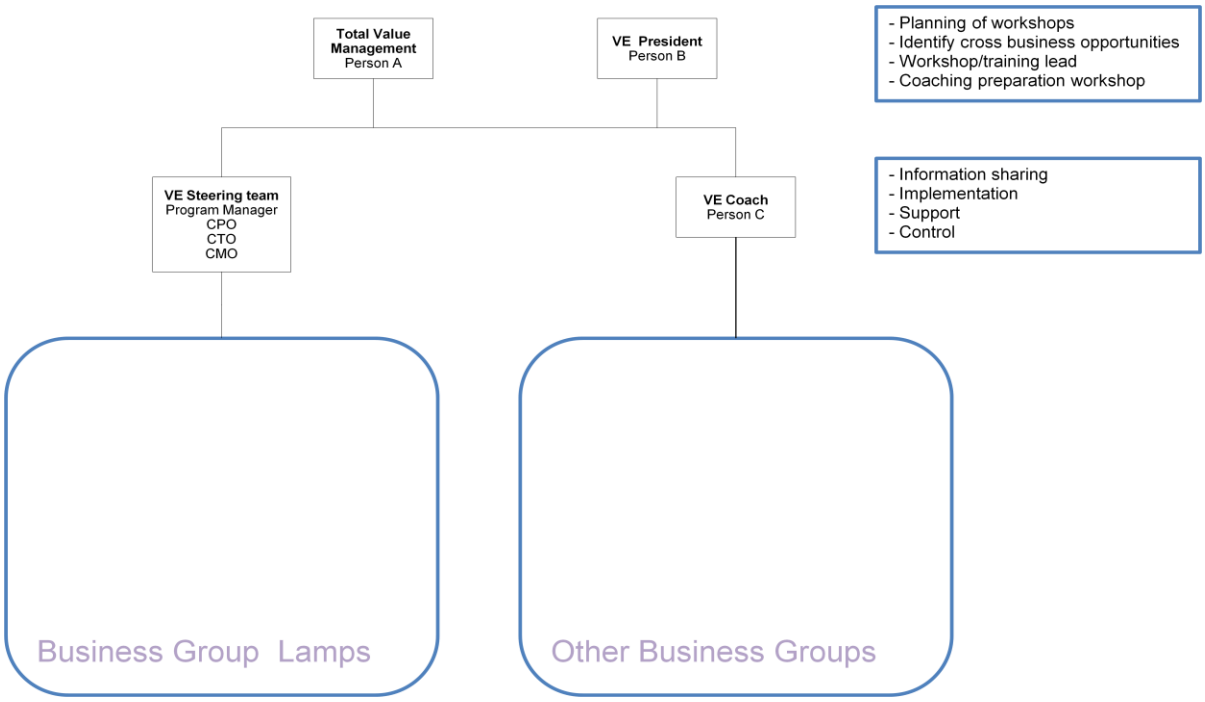
	Human resources	Score (1-4)
HR1	**Job descriptions and competences**	**3**
	Functions	2
	Technical competencies	4
HR2	**Personnel selection and integration**	**3.5**
	Selection	4
	Integration	3
HR3	**Performance appraisal & career development**	**3.67**
	Target agreements	3
	Career development	4
	Feedback process	4
	HR maturity score:	3.39

	Planning	Score (1-4)
PL1	**Demand Planning**	**1**
	Process	1
	Assesment of demand	1
PL2	**Pooling of demand**	**3**
	Planning	2
	Mandates	4
	IT support	3
PL3	**Environment Scan**	**2**
	Process	1
	Resources	2
	Crossfunctional integration	3
PL4	**Innovation Planning**	**2**
	Technological Identification	2
	Technology roadmaps	2
	PL maturity score:	**2**

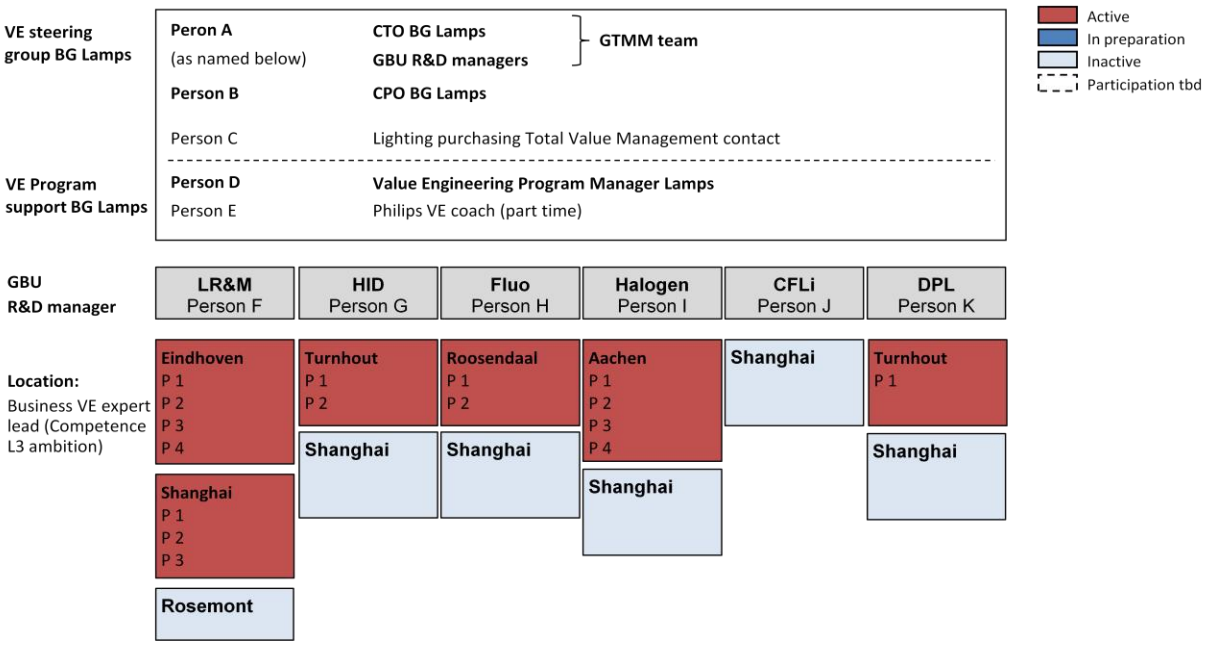
	Organisational strcuture	Score (1-4)
OS1	**Structure & Mandates**	**2.75**
	Organisational strcuture	4
	Mandates	3
	Cross-functional integration	2
	Integration into group	2
OS2	**Strategic integration**	**3**
	Board meetings	3
	Make-or buy decisions	3
	OS maturity score:	**2.88**

	Control	Score (1-4)
CO1	**Controlling system**	**3.33**
	Target results definition	3
	Target breakdown	3
	Measurement figures	4
CO2	**Controlling process & structure**	**3.25**
	Organisational strcuture	3
	Responsibility	3
	Target controlling process	4
	Measurement controlling process	3
CO3	**Controlling methods and tools**	**3.5**
	Commodity codes	3
	IT support	4
	CO maturity:	3.36

APPENDIX F: CURRENT VALUE MANAGEMENT ORGANISATION



VALUE MANAGEMENT ORGANISATION AT PHILIPS LIGHTING – AN OVERVIEW (OWN ILLUSTRATION)



VALUE MANAGEMENT ORGANISATION IN THE BUSINESS GROUP LAMPS (SOURCE: PHILIPS LIGHTING, 2010)

APPENDIX G: INTERVIEW QUESTIONS

Function:
BG:

Value management (VE in Philips terms)

1. How familiar are you with VE Program? (1-10)
2. Have you been participating in a VE training or workshop? (Y/N)
3. What are your responsibilities towards VE?

Purchasing function

4. To what extend do you agree with this statement: "Value Engineering should be part of the CT strategy development because changing product specification leads to different internal demand"? (1-10)
5. To what extend are following ideas for improvement important for Philips Lighting? (1-10)
    a. Defining VE savings targets for each CT
    b. Involve members of a product's most important CT in a workshop
    c. Organize VE workshops for product driven CT's or for key suppliers
    d. Defining targets for the number of VE Experts in a CT

Organisational integration

6. To what extend do you agree with the statements? (1-10)
    a. "VE teams in workshops should include all functions with at least one decision maker"
    b. "Every BG/BGU should assign a coordinator which is together with the project leader responsible for the preparation of VE workshops"
    c. "A VE coach at sector level and the steering committee at the BG /BGU level should be responsible for the project selection and long term performance"
7. To what extend do you agree with the statement: "VE participation outside your own working environment (other project) should be encouraged because this will increase cross-business integration, knowledge sharing and resource leveraging"? (1-10)
8. To what extend will following actions lead to encouraging participation outside own working environment? (1-10)
    a. Communication of workshop outcome and implementation
    b. Top-down sponsorship
    c. Include participation as a personal KPI

Value management control

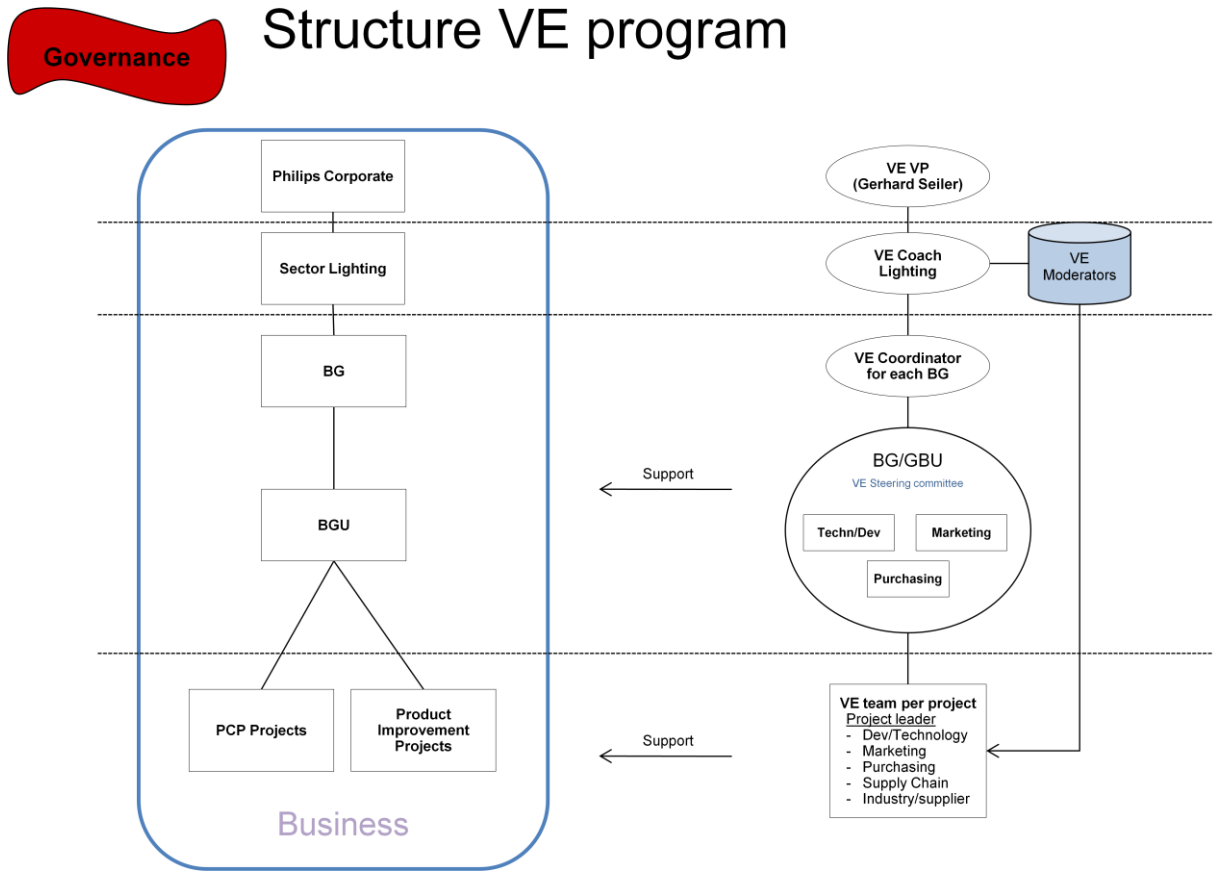
9. To what extend do you think following KPI's are important for project and initial buyers? (1-10)

   a. Time-to-market targets
   b. Cost avoidance (=reduction of future costs in product development)
   c. Price target achievement
10. If you use the price target as a performance indicator, to what extend are following aspects important? (1-10)
   a. Reliability of the target price target
   b. Measuring added value
11. How important/suitable do you find following control measures for the VE coordinator and project leaders of a VE workshops? (1-10)
   a. Clear objective of the VE workshop on forehand
   b. Preparation of the information
   c. Multi-discipline composition of the workshop team
   d. Plan of implementation
12. Do I miss any other possible control measures?
13. How important/suitable do you find following control measures for the VE sector coach and the steering committee? (1-10)
   a. Timing of workshops
   b. Number of planned workshops
   c. Value outcome
   d. No. of VE experts
   e. Organisational coverage of VE experts
14. Do I miss any other possible control measures?

Project selection

15. To what extend do you agree with this statement:"The project selection of VE workshops should be made by the lowest group of managers in a BG/BGU that have an overview of all development and improvement projects"? (1-10)
16. To what extend do you agree with this statement: "project selection should be made by all the important product development/improvement functions (purchasing, marketing & technology)"? (1-10)
17. To what extend are following criteria for project selection important for your business or Philips in general? (1-10)
   a. Costs
   b. Resources consumed
   c. Difference between cost and value/price
   d. Enough resources available
   e. Return on investment
   f. Supply risk/supplier issues
   g. Market growth
   h. Market share
   i. Expected/actual sales volume
   j. Customer complaints
   k. Product becoming non-competitive
   l. Functions are not properly accomplished
   m. Production bottlenecks/breakdown
   n. Time constraints
   o. Top management visibility

APPENDIX H: RECOMMENDED VALUE MANAGEMENT ORGANISATION STRUCTURE



SOURCE: OWN ILLUSTRATION

APPENDIX I: TABLE OF FIGURES