



Universiteit Leiden

ICT in Business

IT Value Management through the total
life cycle of investments at Dutch municipalities

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Foreword

Writing this thesis has been quite a ride. I'm quite sure that after some years I will look back at this period as the highlight of my academic career.

There are numerous people I would like to thank for helping me in, or supporting me while writing this thesis. In the first place I would like to thank my supervisors from Berenschot, Linda van Rens en Erik van der Meij, for their patient reminders to get working and critical sparring sessions. Hans le Fever for this academic view on the thesis. My parents I owe thanks for their patience during a long academic career.

I would also like to thank everyone at Berenschot, mainly the advisory group information management, that have made my internship at Berenschot an educational, interesting and fun experience. I would like to thank all my fellow students at ICT in Business for two interesting, eye opening years. Finally I would like to thank Leiden University, an impressive institute, which I'm grateful to be part of.

Enjoy the read,

Dick van Egmond

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1 Abstract

Dutch municipalities face an increasing reliance on IT to increase productivity or customer service. The organizations demand higher and more secure value from their IT investments. This study explores what IT value management activities Dutch municipalities perform in the various stages of the life cycle of an investment and who is involved in the process. By comparing theory and practice we create insight in possible improvements for municipalities.

IT value management is reasonably well defined in municipalities in the start of the life cycle in the stages of identifying, legitimizing and realizing investments. In the later stages of exploiting and evaluating activities are ad hoc or non existent. IT value management is an effort mainly executed by IT managers and other roles from the IT organization. Especially when investments are realized and start being exploited municipalities could increase their efforts to maximize IT value.

2 Introduction

This chapter gives an introduction to the research problem. It explains why this topic is worth researching. Next it explains what it is exactly that will be researched, including the research question and scope. The chapter ends with a general overview of the method of research and design of this thesis.

2.1 Problem Indication

2.1.1 IT Value is a challenge

"You can see the computer age everywhere but in the productivity statistics." said economist Robert Solow in 1987. This led to a series of papers researching the "IT Productivity Paradox". Central theme in these papers is demonstrating the added value of IT investments in organizations.

2.1.2 IT Value in government

The role IT is playing in government is growing. In May 2013 the Minister responsible for governmental services presented his vision for 2017: "Digital Government 2017". Most notable is the goal of 100% digital communications between government and citizens and organizations. This will create an increasing dependence on IT and on IT investments to deliver what they promised.

On the other hand the government doesn't have a good track record in delivering maximum value on their IT investments. The economic crisis increases pressure to deliver value from IT investments.

2.1.3 IT Value in municipalities

Dutch municipalities play an important role in the aforementioned "Digital Government 2017". They are the "first government" being the layer of government closest to the citizens. In delivering this increased service level municipalities turn to IT. By improving or creating digital service desks for citizens and organizations they increase service level and decrease costs.

Municipalities are experiencing an increase in responsibilities. Carrying out those tasks within budget will demand an increase in efficiency. Also for this increase municipalities are looking at IT. Examples of these tasks are the "three decentralizations" in youth care, unemployment and special care.

These two trends, increasing service and increasing process efficiency, will lead to an increased use of IT. Management of municipalities will demand more value from IT investments. To deal with this municipalities will need better IT value management.

2.1.4 Scientific relevancy

This research provides insight into the use of IT value management practices in the public sector. Most research in the IT value management domain has focused on the private sector. This research could generate new knowledge about the characteristics of IT value management in the public sector. Although not part of this research, a comparison of the findings in this research and the findings of research in the private sector, might provide a better understanding of the differences and similarities.

Most research has focused on the theory of IT value Management. In a recent literature review conducted by Maes, Haes, and van Grembergen (2011) the suggestion is offered that an exploration of what practices are actually being used in organizations could be very interesting: *“An exploration on what structures as well as processes and relational mechanisms are used in contemporary firms might be very interesting”* (Maes, Haes, & Grembergen, 2011, p. 5).

2.2 Problem statement

2.2.1 Research goal

This research will focus on discovering the application of IT Value Management practices in municipalities. IT Value Management can be summarized as practices that enable business and IT to maximize the business value derived from IT enabled investments. In other words: how can municipalities make sure that the investments they make with their (limited) IT budget are the investments that will deliver the best value. IT Value Management is explicitly focused on the total life cycle of investments. It covers the first steps of identifying opportunities to the steps of evaluating the delivered value and gathering lessons learned.

2.2.2 Research Question

<p style="text-align: center;">“How do Dutch municipalities manage the value of their IT enabled investments during the life cycle of these investments?”</p>
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2.2.3 Sub Questions

- Who is responsible for the IT enabled investment during the different steps of the life cycle?
- What activities are performed to manage the value of the IT enabled investments during the different steps of the life cycle??
- What correlations can be found between the role of IT in the municipality and the organization of the IT value management?

2.3 Scope Definition

2.3.1 IT value on the investments level

IT value can be defined on different levels. This research will look into IT value management based on the investment level. The investment level focuses on measuring and maximizing the value of individual investments in organizations. This is in contrast to measuring the value of IT on the firm level where value of IT is defined on the total organization. More about the different levels of IT value management in the chapter “theory”.

The choice for the investment level is made because organizations can control individual investments. Thus there are different management practices that can be researched.

2.3.2 Dutch municipalities of minimally 50.000 inhabitants

This research will look into IT value management in Dutch municipalities with 50.000 inhabitants or more.

The number of inhabitants is based on the latest numbers from the central bureau of statistics (CBS). This results in 73 municipalities that are being researched.

The choice for a minimum of 50.000 inhabitants is made for two reasons. First IT value management requires a certain maturity of the IT organization. The organizations need to have some form of formal or explicit activities regarding IT value management.

Secondly in order to compare the results the size of the organizations shouldn't differ too much. So a bottom-limit in size needs to be set.

2.4 Research method in brief

Figure 1 below describes the research method in brief.

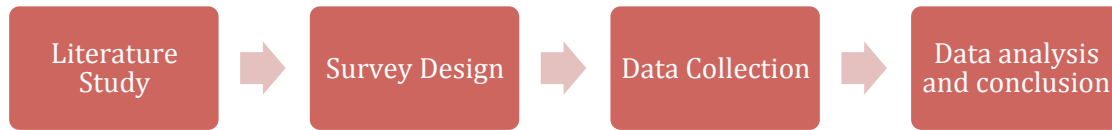


Figure 1 - Research method in brief

Step 1 is a literature study to gain insight in the domain of IT value management and the most important steps and activities.

Step 2 is a survey design. Based on the results of the literature study.

Step 3 is carrying out the survey to gather results.

Step 4 is analyzing the data to gather the information necessary to answer the research questions.

2.5 Thesis outline

This chapter gave a general outline of the goals and structure of this thesis. The next chapter (chapter 3) provides the theoretical background used in this study. Chapter 4 describes the method of research used to gather and analyze the data. Chapter 5 gives an overview of the data gathered. Chapter 6 is the conclusion and answers the research questions. Chapter 7, Discussion, describes potential improvements in the study and sources for further research.

3 Theoretical framework

3.1 Introduction

This chapter gives an overview of the theory used in this research.

This chapter begins by describing the concept of IT value. Two different definitions will be used to give an explanation of IT value in the context of this research.

The second paragraph describes the challenge of IT value. This will explain why IT value is elusive and why organizations need to put effort into achieving it. The “productivity paradox” is cited as historic theme describing the IT value challenge. The productivity paradox also shows the different levels IT value can be measured on. This is explained next. This paragraph ends with an explanation of the IT enabled investment, as this is the level of measuring value that will be used in this research.

The third paragraph explains the concept of IT value management. Using a definition IT value management will be explained. Next it will describe the IT value management activities different roles in an organization perform. This paragraph further describes the benefits for organizations when using IT value management. It ends with an explanation of Val IT, an important framework, and Benefits Management.

Fourth is the life cycle of IT enabled investments. This paragraph describes through what stages an IT enabled investment progresses and what activities are performed in managing the investments. This will be done using a model of G.J.P. Swinkels that will be slightly adjusted and used as central model in this research.

3.2 IT Value

3.2.1 Definitions of IT value

There are numerous definitions for IT value, often called IT business value or business value. Two definitions will be used to clarify the concept and come up with a working definition for this research.

3.2.2 IT value in relation to the organization

IT value (or business value) is defined as *“the organizational performance impacts of IT, including productivity enhancement, profitability improvement, cost reduction, competitive advantage, inventory reduction, and other measures of performance.”* (Melville, Kraemer, & Gurbaxani, 2004). This definition shows 2 things.

First it shows us that the value is not in the IT itself but in the effect IT has on the organization. An example is a new information system for an organization that speeds up a business process. It's not the system itself that has value but the enhanced speed of the process.

Second is the diversity of the different kinds of “performance impacts”. The definition names 5 but also says there are other measures of performances. Apparently there are different measures of performance and thus of value. Value comes in many forms.

3.2.3 IT value as the sum of costs and benefits

The Val It framework defines value as *“the total life-cycle benefits net of related costs, adjusted for risk and (in the case of financial value) for the time value of money”* (IT Governance Institute, 2008). This definition has 4 interesting components.

First is the “total life-cycle benefits”. Apparently value has a life-cycle and the corresponding benefits must be calculated over it's total life cycle. The life-cycle of investments will be discussed more deeply later on.

Second component is “net of related costs”. The costs of an investment must be deducted from the resulting benefits.

Third is the risk. When estimating value you must adjust for the risk in carrying out the investment.

Fourth is the “time value of money”. When estimating value in a financial scale you must adjust for the time value of money. Time value of money means that financial costs of benefits now have a different (often higher) value than in the future. This definition also shows that there are financial and non-financial ways of determining value.

3.2.4 IT value in this research

These two definitions, one from a business perspective, one from an economic point of view show three important elements:

- IT Value is about the impact of IT on the organization and its performance.
- IT Value is the sum of costs and benefits.
- IT value is diverse. It comes in many forms and can be measured in many ways.

For this thesis the following definition will be used: **“IT value is the sum of all types of costs and benefits concerned with the impact of IT on the organizations performance.”**

3.3 The challenge of value

3.3.1 The Productivity Paradox

But why is IT value a topic organizations should be concerned with? Why is it a topic of research? The answer to this question closely relates to a statement made by an economist some time ago: *“You can see the computer age everywhere but in the productivity statistics.”* (Solow, 1987). Demonstrating the added value of IT has been subject of research for quite some time. Articles that have been written on this topic include "The IT Productivity Paradox" (Brynjolfsson, 1993) and spinoffs like "Beyond the IT Productivity Paradox" (Willcocks & Lester, 1999) and "The IT Productivity Paradox revisited" (Lin & Shao, 2006). Challenge of this research has been to demonstrate that organizations that invest more in IT outperform their peers. The value of IT seems not be an obvious case.

Four main reasons have been stated for the lack of "productivity proof" by Brynjolfsson (1993). The first two reasons point to the methods of research. The first states that the research done up till now has used the wrong inputs and outputs to measure. The second states that there is lag between the time of investment and the resulting productivity increase (for instance due to learning and adjustment of the organization). The third and fourth reasons are harsher in that they say there is no productivity gain to be found. The third reason states that an investment somewhere leading to an increase in productivity must lead to a decrease in productivity somewhere else. The fourth reason is the most interesting one. It is called "mismanagement" and states that somehow organizations have been investing in the wrong projects or have been doing the right projects in a wrong way (Brynjolfsson, 1993). This last argument gives us reason to more closely look into the value of IT on an individual investment level. Apparently there is reason to believe not all investments lead to the same value.

3.3.2 IT value on different levels

The IT Productivity Paradox shows that there are different levels on which you can try to show IT value. Literature describes three levels: the market level, the firm level and the investment level (Chan, 2000).

The IT Productivity Paradox was first defined on the market level (or 'industry' or 'economy' level). On this level you look at industries or markets and try to see if the investments in IT increase have resulted in an increase in productivity.

Most research has been done on second level. On the firm level the research subjects are organizations. Research tries to show the value by correlating the money spent on IT against the effectiveness of the firm. The effectiveness is often defined as the stock market value of a firm.

The investment level focuses on individual investments. It tries to show value of these individual investments by linking the business outcome (benefits) to the costs of the investment. Research subjects now are different investments and the outcomes. Although a comparison of different organizations is still possible.

In this research we will use the investment level and look into how organizations can manage investments to achieve IT value.

3.3.3 Achieving IT value through IT enabled investments

IT Enabled Investments are defined as “*significant business investments in sustaining, growing or transforming the business with a critical IT component*” (IT Governance Institute, 2008).

Some aspects of this definition are worth explaining. First is the term "significant", specifying that it only includes investments of a certain size or budget. This will be the investments that organizations make a contemplated decision on. This will lead to a need for guidelines or practices on how to make the decision. The second term worth noting is "business investment". The investments are primarily business investments. Defining that it's not just an investment in IT but that the business plays a central role. The third term "sustaining, growing or transforming the business" relates to the same topic. IT Enabled investments change (or sustain, i.e. preventing (negative) change) the way the organizations operates. The last term is "a critical IT component". This states that the investment is not possible without the IT component. In other words: IT is enabling the investment.

This last statement is relevant for this research. The figure below shows that it's not directly the IT enabled investment but the business change resulting from the investment that creates the value.



Figure 2 - How IT enabled investments deliver value

3.3.4 The challenge of this research

Topic of this study will be to see how Dutch municipalities manage individual IT enabled investments to deliver value.

3.4 Managing for IT value

3.4.1 A definition of IT value management

IT Value Management will be defined as: “The organizational processes, structures and relational mechanisms that enable business and IT to understand, initiate, prioritize, execute, organize, manage and evaluate IT enabled investments and their outcomes, to secure optimal value in the entire IT enabled investment portfolio for the organization.”(Maes et al., 2011)

Maes et al. distinguish 3 types of IT value management practices: structures, processes and relational mechanisms.

Structures are methods of dividing labor and achieving coordination amongst them. This definition is based Mintzberg definition of an organizational structure: “*The structure of an organization can be defined simply as the sum total of the ways in which it divides its labor into distinct tasks and then achieves coordination among them*” (Mintzberg, 1979). Examples of organization structures in the context of IT value management are IT steering committees or business sponsors.

(Business) Processes are “*a set of logically related tasks performed to achieve a defined business outcome*” (Davenport & Short, 1990). Examples of processes in the context of IT value management are project management and portfolio management.

Relational mechanisms are defined as “*the people aspect within the structures and processes, and focuses on realizing various dimensions such as trust, respect and communication, amongst all involved*”

business and IT actors" (Maes et al., 2011). Examples of relational mechanisms in the context of IT value management are organizational leadership and personal development.

3.4.2 Roles involved in IT value management

As demonstrated by the definition of IT value management it is not a "one-man-job". IT value management is a task for an entire organization and responsibility is assigned throughout the organization. This chapter explains three distinct parts of an organization and their responsibility in IT value management.

Responsibilities of senior management

Senior management (or top management team) has many definitions. Studies have been done into this subject. An example is done by Carpenter et Al. (Carpenter, Geletkanycz, & Sanders, 2004). Two useful definitions from this study are: "*Top managers involved in strategic decision making identified by the CEO*" and "*All inside top-level executives, including CEO, COO, business unit heads, and vice presidents*". Activities they perform in IT value management include implementing an IT governance structure (roles & responsibilities) and controlling it. Often a senior manager (for instance the CIO) will be responsible for the IT investment committee, the structure making the major IT investment decisions.

Responsibilities of the IT organization

The IT organization is the department or function in an organization responsible for delivering IT solutions. Activities they commonly perform in IT Value management are delivering the IT enabled investments and managing the portfolio of existing investments.

Responsibilities of the business

The business is defined as the part of the organization outside the IT organization. They are concerned with the core business of the organization or are in other supporting processes like HR or finance. They are 'the customer' of the IT organization. Activities they commonly perform in IT value management are identifying investment opportunities and structuring these in business cases (often done together with the IT organization).

3.4.3 The benefits of IT value management

IT value management is about measuring and maximizing the value an organization generates from their IT enabled investments. The benefits of practicing IT value management for an organization are numerous according to the Val IT framework: *“Val IT [IT Value Management] helps enterprises increase the probability of selecting investments with the highest potential to create value. Val IT also increases the likelihood of success executing the selected investments, both when IT services are being created or enhanced, and during the subsequent delivery and use of those services. The framework reduces costs and value leakage by helping ensure that decision makers stay focused on what they should be doing and take early corrective action on investments that are not delivering value in accordance with their expected potential. At the same time, the framework reduces the risk of failure, especially high-impact and highly visible failure. The framework also reduces the surprises associated with IT costs and delivery, and, in so doing, increases business value, reduces unnecessary costs, and increases the overall level of confidence in IT on the part of the board, executive management and other organizational leaders.”* (IT Governance Institute, 2008).

3.4.4 Val IT

Val IT is a framework for IT value management. It is developed by ISACA. The same organisation that develops and maintains COBIT, the framework for IT Governance. Val IT is now in version 2 and was first presented in 2006. Frameworks in this context are a reference set of organized best practices (such as processes, structures and relational mechanisms). Organizations can use frameworks to design their own implementation based on the standard of the framework. Frameworks are used often in IT. For instance for describing an enterprise architecture (TOGAF) or for IT governance (COBIT).

Val IT consists of three domains:

Value governance: the implementation and constant improvement of the IT value management practices. Mostly a concern of senior management.

Portfolio management: the management of the portfolio of IT enabled investments in order to secure optimal value from the portfolio. Mostly a concern of senior management and the IT organization.

Investment management: the management of IT enabled investments in order to secure optimal value from these investments. Mostly a concern of the IT organization and the business.

Val IT emphasizes the use of business cases in order to secure the outcome of an investment. Val IT provides advice as to what should be described in a business case. In this research we will use the recommended contents and some other practices described in Val IT.

3.4.5 Benefits management

Benefits management is a concept laid down by John Ward and Elizabeth Daniel. It is defined as “*The process of organizing and managing such that the potential benefits arising from the use of IS/IT are actually realized*” (Ward & Daniel, 2006). As the title and definition show it is closely related to IT value management. If we look at value from the economic perspective benefits management focuses on the benefit side.

Benefits management distinguishes several stages. These are:

- Identifying and structuring the benefits
- Planning benefits realization
- Executing the benefits plan
- Reviewing and evaluating the results
- Establishing potential for further benefits.

From: (Ward & Daniel, 2006, p. 81)

Each stage has main activities. In this research we focus on the following activities from the first stage because these most closely relate to the frame of reference and expected maturity of the subject of this research, the municipalities. These activities are:

- Identify the benefits that will result by achieving the objectives and how they will be measured.
- Establish ownership of the benefits
- Identify the changes required and stakeholder implications

This research will test if municipalities practice these activities.

3.5 The life cycle of IT enabled investments

3.5.1 Introduction

As stated IT value management considers the full life cycle of IT enabled investments. During each stage of the life cycle there are different objectives to pursue and activities to perform. There are different models to describe the life cycle of an investment. For this thesis a model based on research by G.J.P. Swinkels (Swinkels, 2000) will be used to describe the different stages. G.J.P. Swinkels was manager of the department “Policy & Architectural processes” at the Rabobank and attached to the department accountancy and information management at the University of Amsterdam. The model was presented in 2000 and was used in other research by the University of Amsterdam to categorise IT evaluation methods (Waal & Aker, 2003).

The advantage of this model is that it’s very practical and looks at the different stage from the perspective of an investment. This makes it easy for IT managers without specific knowledge of IT value management to recognize the different stages and activities.

The model of Swinkels is a continuous process and is displayed in the figure below.

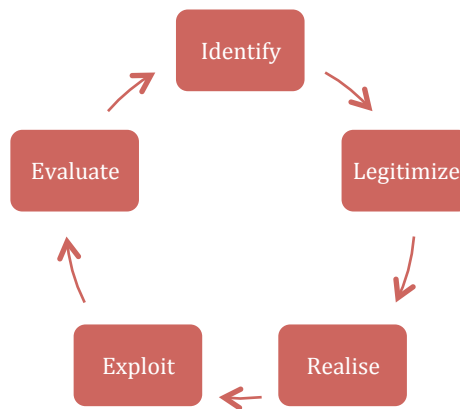


Figure 3 - Life cycle of IT investments according to Swinkels

3.5.2 Identify

The stage of identifying is concerned with finding IT enabled investment opportunities and structuring the relevant information about the investment.

Finding investments opportunities

“Management strategies for information technology” (Earl, 1989), describes three distinct ways an investment opportunity can originate. They are referred to as “Top-down”, “Bottom-up” and “Outside-in”.

“Top-down” is the process of finding investments based on strategy and goals. This approach is often structured and analytical, executed or coordinated on a certain interval (e.g. yearly) by senior management. An example could be the investment in a new CRM-system(customer relationship management) as part of the goal of increasing customer satisfaction.

“Bottom-up” is the process of finding investment opportunities by evaluating day-to-day activities. This approach is continuous and less structured. Investment opportunities from this approach often come from the “business”. An example could be an application that can speed up a business process for a certain department.

“Outside-in” is the process of finding new investment opportunities based on new technology. This approach can be structured or not. There could be a designated role in the organization that looks for new technology that could improve organizational performance. But if there is no one designated, people in the organization could still identify interesting new technology. Investment opportunities from this approach often come from the IT organization. An example could be the rise of smartphones that could make employees more mobile.

Which approaches are used in municipalities and who is involved in these approaches is topic of this study.

Structuring investment opportunities

Another goal in the stage of identifying investment opportunities is structuring them in a way that all relevant information about the investment is present and a comparison to other opportunities can be made. A document to structure relevant information about an investments is often called a business case. As described earlier in the paragraph of Val IT this framework suggests a list of aspects that should be described. These are as follows:

- The reason for the investment
- The recommended solution/approach
- The business benefits targeted
- The initial investment and ongoing costs
- The business changes
- The risks inherent in the approach
- The governance approach for the investment
- The detailed program plan
- The resourcing plan
- The financial plan

- The benefits realization plan
- The (organizational) change management plan
- The risk management plan (including the risk register)

(IT Governance Institute, 2010, p. 10)

Topic of this study will be whether and when business cases are used, who is responsible for creating them and what they contain

3.5.3 Legitimize

The stage of legitimizing is concerned with prioritizing the most promising investments and the criteria used to select them. It is also concerned with the management of different portfolios of investments.

Selection criteria

Evaluation criteria are an organizations measure of (expected) value. They are used to structure the definition of “good projects” and make a fair and objective comparison between projects.

According to Val IT, the following is bare minimum of selection criteria (Val IT uses the term ‘evaluation criteria’) to be used: *“alignment with the enterprise’s strategic objectives; business worth, both financial and non-financial; and risk, both delivery risk (the risk of not delivering a capability) and benefits risk (the risk of not realizing the expected benefit from the capability).”* (IT Governance Institute, 2008, p. 37)

There is a broad distinction between financial and non-financial criteria.

Financial criteria

As most costs are measured in financial metrics organizations try to measure the benefits in financial metrics as well. Multiple methods for measuring the financial returns of an investment have been created: *“..., several techniques have been created to properly measure the financial value of projects. Most importantly, however, one should choose a valuation methodology, be it return on investment (ROI), internal rate of return (IRR), net present value (NPV) or economic value added (EVA), and consistently apply it.”* (de Reyck et al., 2005)

In this research we will look into the following. The difference between and contents of the several methods is not topic of this study so they will be explained briefly.

- **Return on investment (ROI)**
The ROI measures the sum of all cash inflows divided by the sum of all cash outflows during the life of an investment. (Sanwal, 2007)
- **Net present value (NPV)**
NPV measures the sum of discounted cash inflows minus the sum of discounted investment costs. (Sanwal, 2007)
- **Payback period**
Payback period measures the time it takes for an investments to pay back it's initial costs.
- **Overview of costs and benefits grouped by initial and ongoing costs**
A more basic way of looking at financial metrics is by showing all costs and benefits broken down by initial (costs of realizing the investment) and ongoing (costs and benefits of keeping the investment running).
- **Overview of costs and benefits**
An even more basic method of measurement is just showing all costs and benefits.

Non-financial criteria

Non-financial criteria are more diverse in nature and often harder to quantify. In this research we will test for the following non-financial criteria:

- **Strategic fit**
Strategic fit is the contribution of an investment to the strategic goals of an organization.
- **Architectural fit**
Architectural fit is the degree to which an investment adheres to the principles laid down in the information or enterprise architecture.
- **Customer service**
Customer service is the contribution of an investment to customer service of an organization. This can be seen as a contribution to a strategic goal (if customer service is a strategic goal) but for the organizations in this research (Dutch municipalities) it seems IT plays a central role in customer service that makes it worth noting separately.
- **Flexibility of organization and infrastructure**
Sometimes new investments don't directly deliver value but generate opportunities for other investments or reduce risk (like vendor lock-in).
- **Innovation**
Organizations can purposefully make investments that don't have a quantified positive value. These investments could have an innovative character: new technologies will be introduced and it is yet to see what benefits they will deliver.

- **Technical reliability**

Investments can be made to increase technical reliability and reduce (technological) risks. These are often investments in IT infrastructure.

- **Intuition**

Not a selection criteria per definition but often the “gut feeling” of decision makers plays a role in prioritizing possible investments. So even though in quantified metrics one investments proofs to be more promising decisions makers choose otherwise. Whether intuition is used in deciding investment priority will be topic of this study.

There is no silver bullet-criterion

There is not one criterion that measures all diverse types of value. Hence organizations should use a mix of different criteria. Topic of this study will be to see which of these criteria are used in selecting the most promising investment.

Portfolio management

Portfolio management, often called project portfolio management (PPM) can be defined as: *“the organization of a series of projects into a portfolio consisting of reports that capture project objectives, costs, timelines, accomplishments, resources, risks and other critical factors. PPM enables regular review of entire portfolios, allocation of resources and adjustment of projects to assist in taking key financial and business decisions in order to produce the highest returns. In addition, PPM helps bridge the strategic and operational by enable the business’s ‘coal face’ to deliver on the project management process.”* (Rajegopal, 2007)

A “Centralized view of the project portfolio” is named as a central part of project portfolio management in in “The impact of project portfolio management on information technology projects”(de Reyck et al., 2005). Organizations should keep an inventory of current and proposed projects. Since this research considers the total life cycle of investments it will be extended to investments that are being exploited.

Topic of this study will be whether and in what manner municipalities keep an overview of (possible) investments, whether they distinguish different categories of investments and if so, what types they distinguish.

3.5.4 Realize

The stage of realization is concerned with putting the investment into effect. This covers building (or acquiring) software and hardware, developing software, changing processes and organizational structures and other change management activities. Main point in relation to IT value management is project management.

Project management

Project management is defined as “ the application of knowledge, skills and techniques to execute projects effectively and efficiently” (Project Management Institute, n.d.).

What is interesting in relation to IT value management is how well organizations control projects during realization. Who checks to see if the investments is still on track of supplying value and what actions can they take if this value is threatened.

Topic of this study will be to see whether municipalities use a project management methodology, if they control investments during realization, who is responsible for this and what actions can be taken.

3.5.5 Exploit

The stage of exploiting is concerned with valorizing the investment. The investment is in effect. In this stage the organization should be concerned if the investment is delivering the value it promised and if there are opportunities to increase it's value.

Value monitoring

Value monitoring is the process of checking to see if the investment is delivering the value and to see if there are options to increase this value.

Investments could generate less value because costs unexpectedly went up or because not all benefits are achieved. A process or structure should be in place to periodically check if the investment is delivering the value that was estimated. As stated in the chapter paragraph regarding the concept of IT value: it is not the IT enabled investment generating the value, it is the business change. If something is inhibiting the business change it is possible not all benefits are achieved. An intervention could be required to enable the business change.

During the life-cycle of the investments new opportunities could arise that allow the investment to generate more value. A process or structure should be in place to periodically check for these opportunities. New opportunities could arise from new ways of utilizing the technology offered by an IT enabled investments.

Topic of this study will be to see whether municipalities control value of investments during exploitations and if so what actions they take to control value.

3.5.6 Evaluate

The stage of evaluation is concerned with lessons learned. Organizations should measure if the investment delivered the value it promised over its total life cycle. If this is not the case they should look into how the process or selection criteria can be enhanced to give a better forecast next time around.

Lessons learned

Topic of this study will be to see if and how municipalities evaluate IT enabled investments after completion of their life cycle and what implications lessons from this evaluation can have.

3.5.7 Governance & Leadership

While identifying the different activities organizations execute to manage value some arise that are not allocated to a specific life cycle stage. This mostly concerns the activities regarding “relational mechanisms”. I.e. promoting value culture or the different forms of “leadership”. These closely relate to the linkage between business and IT, often called business alignment. Other activities are controlling governance activities like setting up processes and continuously improving the IT value management of the organization. To accommodate these activities an extra theme is introduced in the model.

Business alignment

Business alignment (also known as “IT business alignment”) can be defined as “*applying IT in an appropriate and timely way, in harmony with business strategies, goals and needs*” (Luftman, Papp, Brier, & Luftman, 1999). In his article Luftman et al. describe a set of enablers and inhibitors for good business alignment.

Enablers	Inhibitors
Senior executive support for IT	Senior executives do not support IT
IT involved in strategy development	IT fails to meet its commitments
IT understands the business	IT does not understand business
Business - IT partnership	IT/business lack close relationships
Well-prioritized IT projects	IT does not prioritize well
IT demonstrates leadership	IT management lacks leadership

As you can see there is close resemblances between the enablers and inhibitors. The inhibitors are not all negates of the enablers but for the sake of conciseness this study will only use the enablers. Topic of this study will be to check how CIO’s rate these enabling factors and if scoring high on these factors correlates with better IT value management.

3.5.8 Concluding model

Based on the 5 stages in the life-cycle and the extra theme of governance and leadership we will use the following model to describe IT value management activities of municipalities.

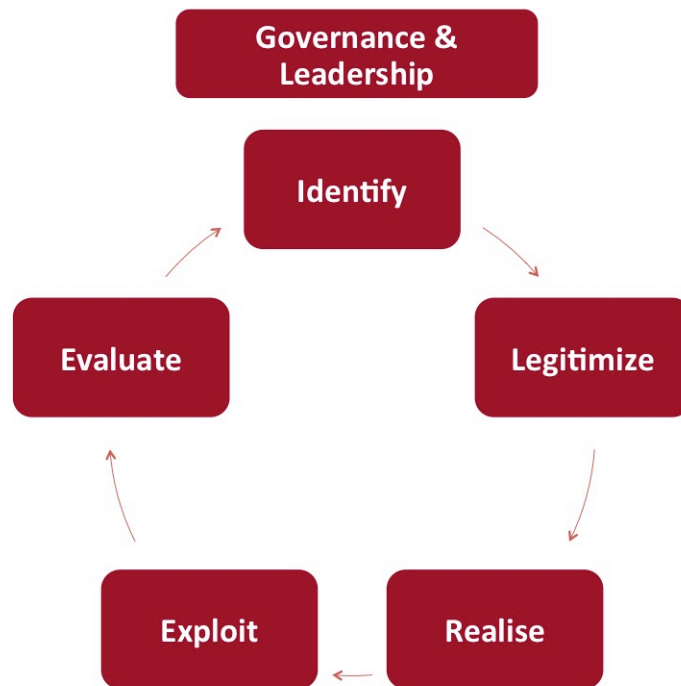


Figure 4 - IT Value Management throughout total life-cycle

4 Methodology

4.1 Introduction

This chapter will describe and argue how this research has been executed. Goal of this research is to describe what practices are used by who in the different stages of the life-cycle and if there is a correlation between this and (perceived) success of IT value management.

This research takes a quantitative approach. Using an online questionnaire data is gathered. A quantitative approach is chosen because this allows for a structured and practical way to survey a large number of municipalities.

This research consists of 4 steps. These steps are:

- **Literature review**
A literature review is conducted to index the main elements of IT value management.
- **Constructing questionnaire**
Based on the literature gathered an online questionnaire was constructed.
- **Data collection**
A survey group was selected and requested to fill out the survey.
- **Data analysis and concluding**
The data gathered from the respondents is analyzed and used to answer the research questions.



The next paragraphs will describe the steps of this research and the choices that were made during the steps.

4.2 Literature review

Goal of the literature review was threefold:

- Find a model to base research on
- Gain understanding of the main elements of IT value management
- Find best practices to test for in the survey.

The literature review was conducted via Google Scholar. The following keywords were used to search articles with titles that contain the following keywords:

- “Information Technology Value Management”
- “IT value management”

The results were listed and screened on the following criteria.

- Papers in other languages than Dutch or English were discarded.
- Papers from which you can positively state based on the title they don’t cover IT value management (e.g. “The process edge: creating value where it counts”) were discarded.
- Papers that don’t mention practices of IT value management in the summary were discarded.

This resulted in a list of 90 articles (see Appendix 1) that were analyzed for IT value management practices. In using these papers for building the theoretical framework other literature has been used. This resulted in a model and the theory that is tested in this study as described in the theory chapter.

4.3 From theory to questionnaire

Choosing the questions

To build the questionnaire, choices had to be made what would be included and what not. The questionnaire shouldn’t become too extensive. A long questionnaire will result in a lower response rate. Also only questions that help answer the main research questions should be asked. Three criteria were used to determine what would go into the questionnaire and what not:

- **Link to research question**
Do the elements of IT value management found link to the original research questions

focusing on the party responsible and the activities they perform during the life cycle of the investments.

– **Fits frame of reference of respondents**

The respondents need to understand the concepts laid down in the questionnaire. While the respondents are IT managers, they may not be familiar with the theory and research of IT value management. To verify this, a concept of the questionnaire was discussed with a respondent.

– **Fits the expected maturity of IT value management**

The questions asked should cover the spectrum of expected maturity of IT value management. Questions that all respondents will answer positively or negatively will not give a more precise view of the current state of maturity of IT value management.

The expected maturity of IT value management is estimated by discussing the questionnaire with a person from the respondents group and experts from Berenschot Advisory.

The choice was made to base the questionnaire around the model of Swinkels. This was done for reasons relating to the arguments described above. A) The model looks at IT value management from the perspective of the life cycle of an investment. Closely linking to the research questions of this research. B) The model uses terminology that fits the frame of reference of the respondents. This has been tested by discussing the questionnaire with a respondent.

The model lacks a broad theme covering activities that don't fit in a certain stage of the life cycle. As discussed in the theory chapter this is resolved by adding a new theme "Governance & Leadership".

Statements

Also added in the questionnaire were certain statements. These are used to test the perception of the respondent on the success of IT value management of the municipality. The statements were created in cooperation with consultants with knowledge of IT management in municipalities. These are as follows:

- The value (both financial and non-financial) of IT investments is decisive in the choice of our investments.
- In general our IT investments deliver the value we had predicted in advance.
- It is difficult to control the benefits, so we mainly control on costs.
- Innovation with the use of IT is a focus of our municipality.
- Making sure IT investments pay back is not just a responsibility of the IT organization but is also taken by other departments at our municipality.

- The board of our municipality has a good understanding of strategic IT issues.
- IT is a permanent topic at board meetings.
- The board of my municipality regularly discusses the chances IT could offer.
- With investments we mainly look at the value it could offer on the short term, the long term is less important.

These statements can be answered using a 5 point Likert scale. A 5 point scale allows for easy answering, increasing response rate but allows for a relatively precise scale.

4.3.1 Roles in the municipality

To see what roles are active in IT value management and what responsibilities they have a number of roles will be used in the questionnaire. The list of roles is constructed in collaboration with consultants from Berenschot Advisory that have knowledge of and experience in municipalities and is verified by a CIO of a large municipality. These are as follows:

- **Board of mayor and aldermen (College van burgemeester en wethouders)**
The senior management of the municipality. Responsible for governing the municipality. Often one alderman is responsible for IT in the municipality.
- **City manager (Gemeentesecretaris)**
The highest civil servant and responsible for day-to-day activities.
- **Department managers (Directieleden)**
Managers of the different departments such as “culture” or “economy and employment”.
- **Team managers (Afdelingshoofden)**
Managers of teams in the different departments.
- **IT manager / CIO (Hoofd IT / CIO)**
The manager responsible for IT
- **Functional application manager**
Someone responsible for managing the functional requirements of a information system.
- **End user (eindgebruiker)**
Users of an information system.
- **Special role**
In this study: a role designated for looking for technological developments that could be used by the municipality.

4.4 Gathering response

The next step was selecting a respondents group and gathering data.

Selecting respondents

As stated in the scope of this research in the chapter introduction this research will focus on municipalities with a population of 50.000 or more. This results in a list of 73 municipalities that are part of this research. Appendix 2 shows this list of municipalities.

The person that should fill out the questionnaire is the CIO of equivalent of the municipality. Persons in these functions are most likely to be able to answer the questions. They probably have a responsibility in deciding over the IT budget and thus which investments to pursue and which not.

Contact details were acquired via the personal contacts of consultants of Berenschot Advisory. The respondents were contacted via e-mail and asked to participate by filling out the questionnaire.

The survey opened on August 8th, 2013 and closed on September 10th. All respondents received an e-mail with a link to the website www.itvaluemanagement.nl where they could fill out the questionnaire.

4.5 Data analysis

The data has been analyzed using SPSS. The following data presentations were made:

- For each stage in the life cycle an overview of the different activities covered by the questionnaire shows how many municipalities perform these activities.
- A regression analysis is made on the combination of success of IT value management versus the use of business cases and selection criteria.

5 Results

5.1 Introduction

This chapter provides an overview of the results from the online questionnaire. First there is information about the respondent's population and their characteristics. Next the different stages of the life cycle are covered and the different elements that are studied will be described. After each stage a short summary of the results is given.

5.2 General

The questionnaire has been completely filled in by 21 respondents. The average number of inhabitants of the respondents is 135.635, compared to 121.500 for the total population. The role of the respondents is shown in Figure 5. The "team manager SSC" is the manager of a IT Shared Service Center for multiple municipalities.

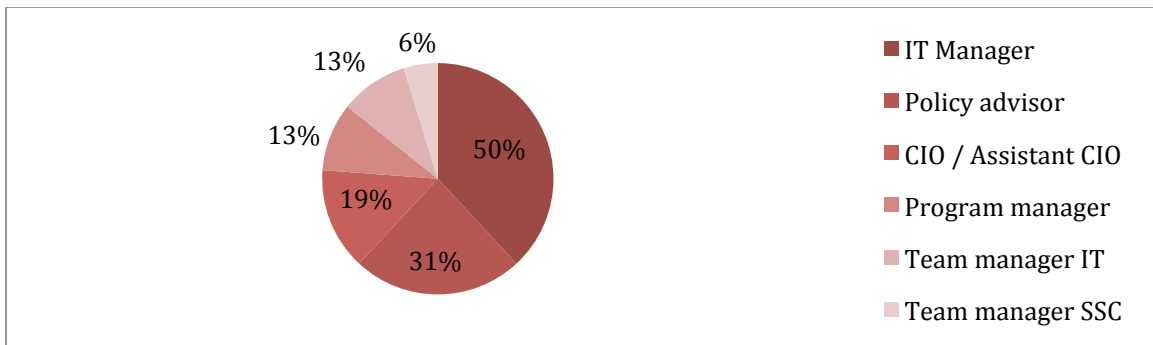


Figure 5 - Roles of the respondents

Figure 6 shows the number of FTE in the IT department of the different municipalities. Figure 7 shows the IT budget of the municipalities in million euros.

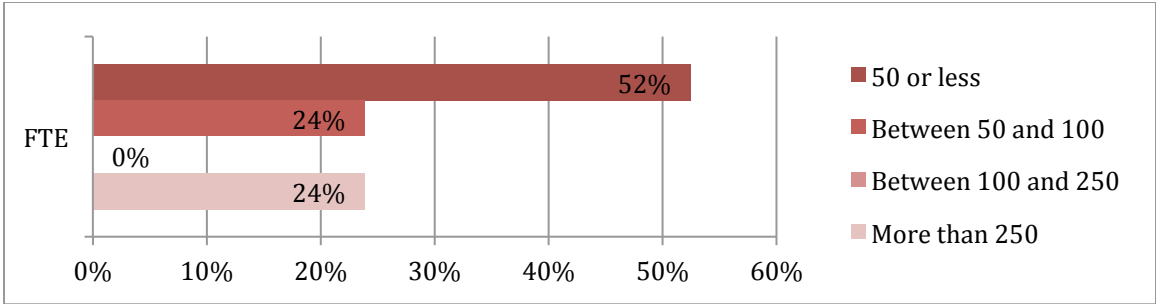


Figure 6 - Number of FTE in IT department

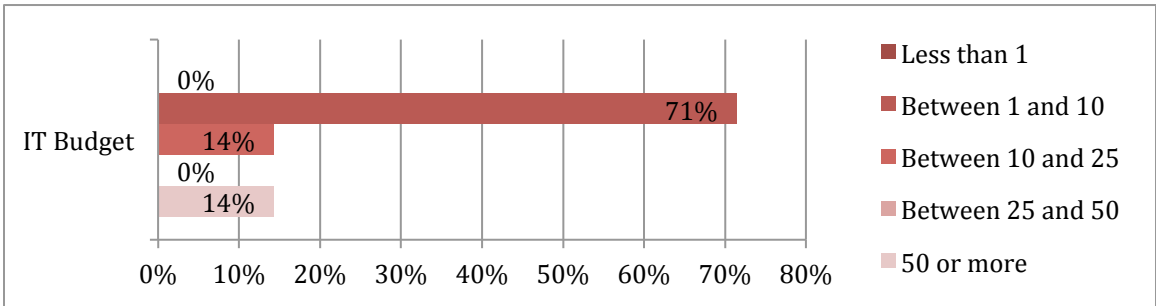


Figure 7 - IT budget in million Euros

Figure 8 shows the percentage of municipalities that have appointed CIO's or someone with equivalent responsibilities.

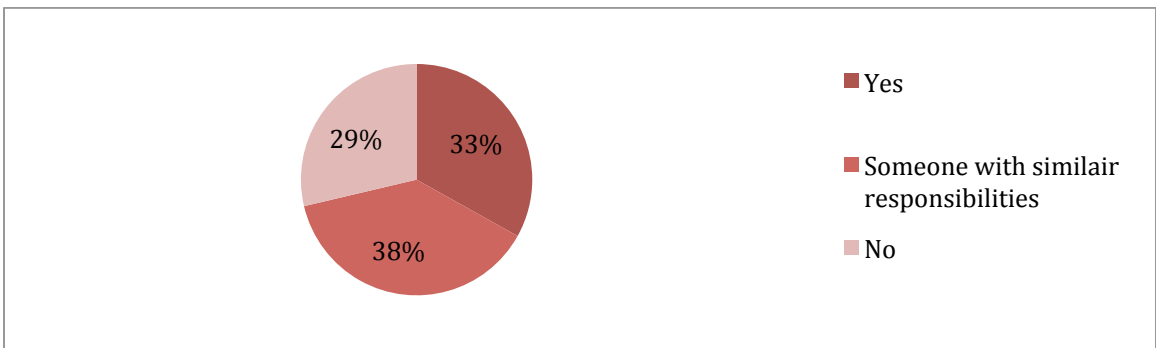


Figure 8 - Percentage of municipalities with a CIO or equivalent

5.3 Identify

Identification is the first stage in the life cycle. For this stage this study looks into sources of investments proposals and the use of business cases.

5.3.1 Finding investments opportunities

Finding investment opportunities is concerned with the sources of investment proposals used by municipalities and the roles in the organization that come up with proposals.

Figure 9 shows the different sources of investment proposals used by municipalities. Most municipalities use all three sources of investments proposals. Especially bottom-up (finding investment opportunities by evaluating day-to-day activities) is used by more than 90% of the municipalities.

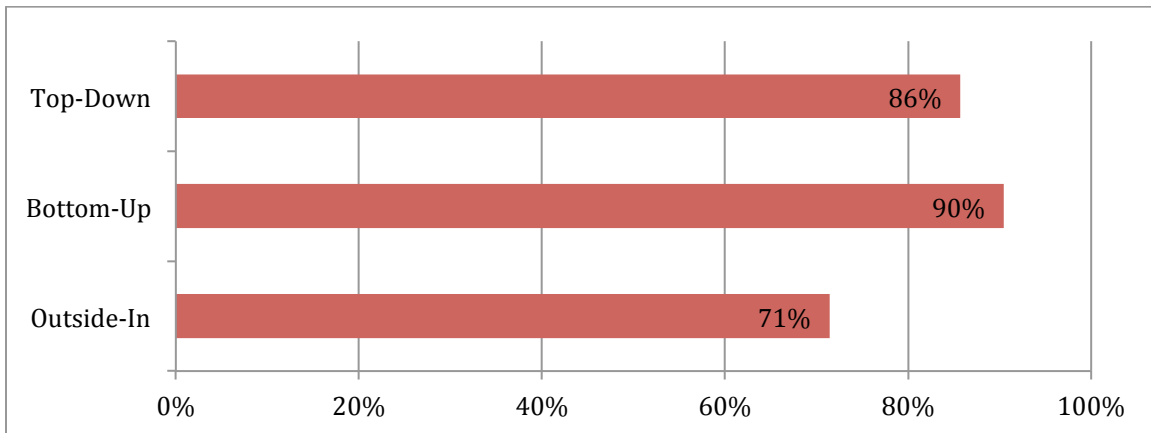


Figure 9 - Different sources of investment proposals used by municipalities

For each source we take a look at who is involved in process. Figure 10 shows the different roles concerned in the process as answered in the question: “Who can make investment proposals for this source of investment proposals?”.

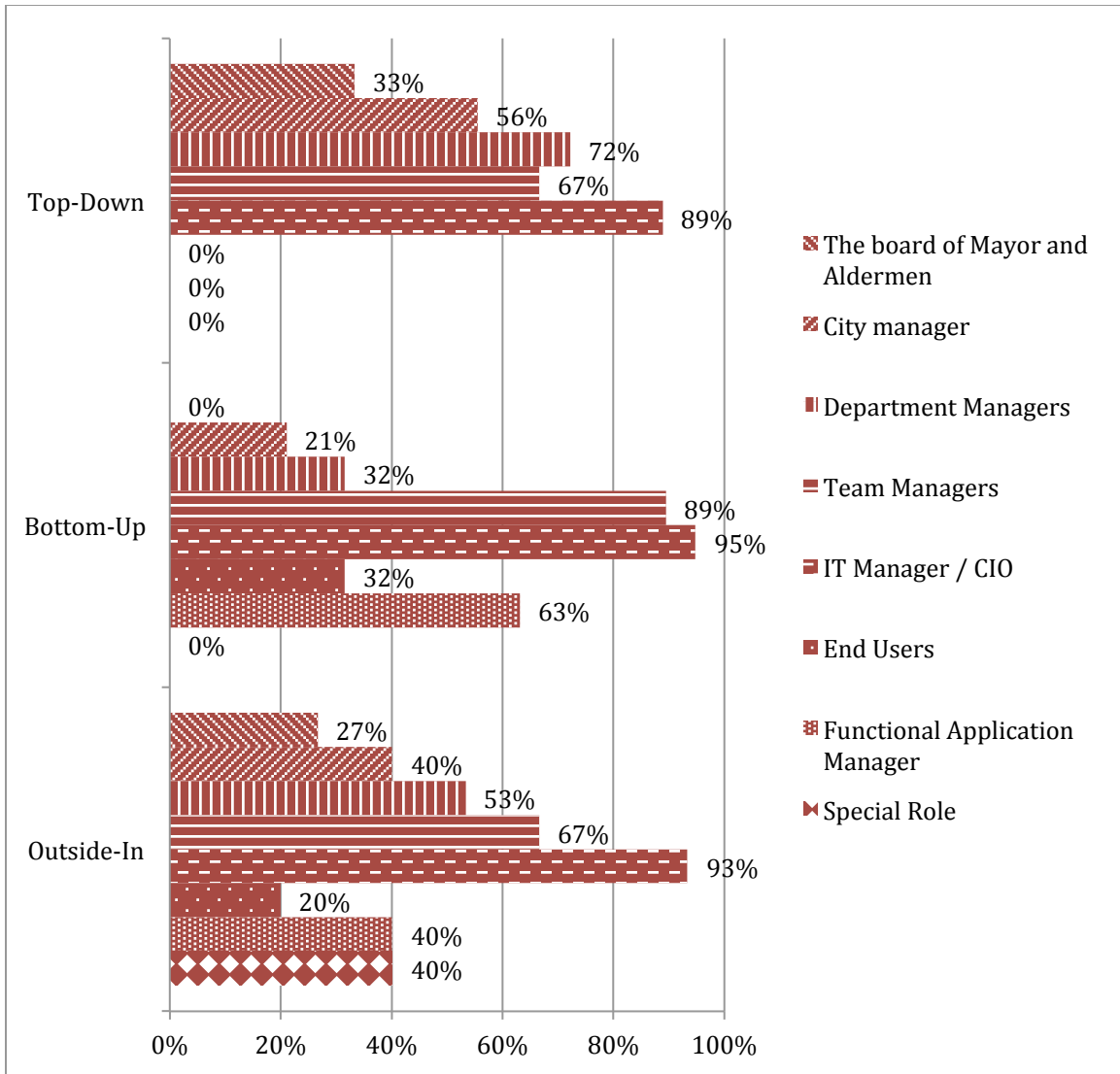


Figure 10 - Roles concerned in the different sources of investments

Looking at the “Top-down” perspective it shows that in most municipalities (89%) the IT manager or CIO is involved in coming up with investment proposals. Department and team managers are also involved in the majority of the municipalities. The end users, functional application managers and the special role were not an option in this question and are 0%.

For “Bottom-Up” it shows that again in most municipalities the IT manager is involved in coming up with investment proposals. This time the team manager is also often involved and the functional application manager is involved in the majority of municipalities. The board of mayor and aldermen and the special role were not an option in this question and are 0%.

For “Outside-In” it shows that again the IT manager is involved in the vast majority of municipalities. Also the team managers are often involved in these types of investment proposals. In fewer than 50% of the municipalities a special role for this kind of investment proposals is appointed. The board of mayor and alderman and the city manager come up with investments of this type in about a third of the municipalities.

Other sources

Some municipalities stated other sources of investment proposals. These responses were other formulations of sources already named above or just of different names for roles active in the process. A response of a source that has not been mentioned yet is that of legal compliance. The comment regarding this source is “*Legal requirements may be a reason to implement new technology or functionality*”.

5.3.2 Structuring investment proposals

To make a business case or not

Structuring investment proposals is concerned with the format (often called the “business case”) municipalities use to structure information regarding the investment. Figure 11 shows that 90.5% at least sometimes use business cases. This is the response on the question “*Does your municipality make use of business cases (a template for information about the investment proposal)?*”.

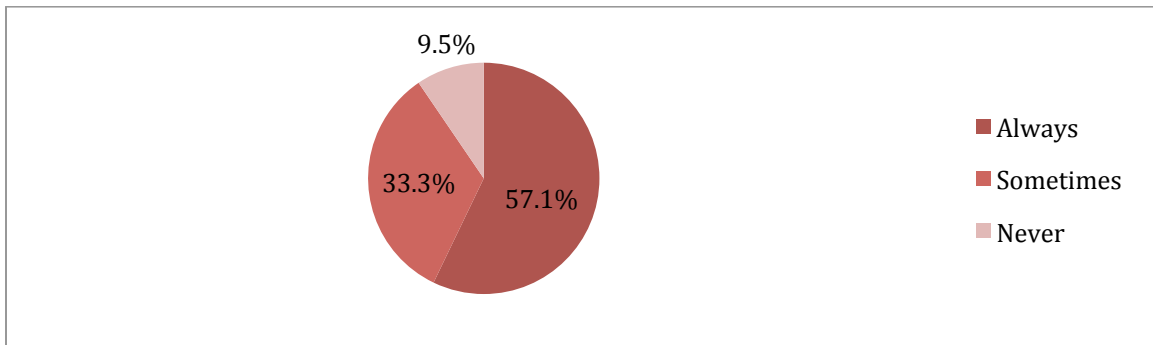


Figure 11 - Percentage of municipalities using business cases

For the municipalities that state they sometimes use business cases there could be criteria that designate whether a business case should be made or not. Figure 12 shows the different reasons municipalities that sometimes make business cases have to decide whether to make a business case or not. 43% state that there are no criteria. Some of the respondents with this answer also state some criteria. This suggests that there are some guidelines but no formal criteria.

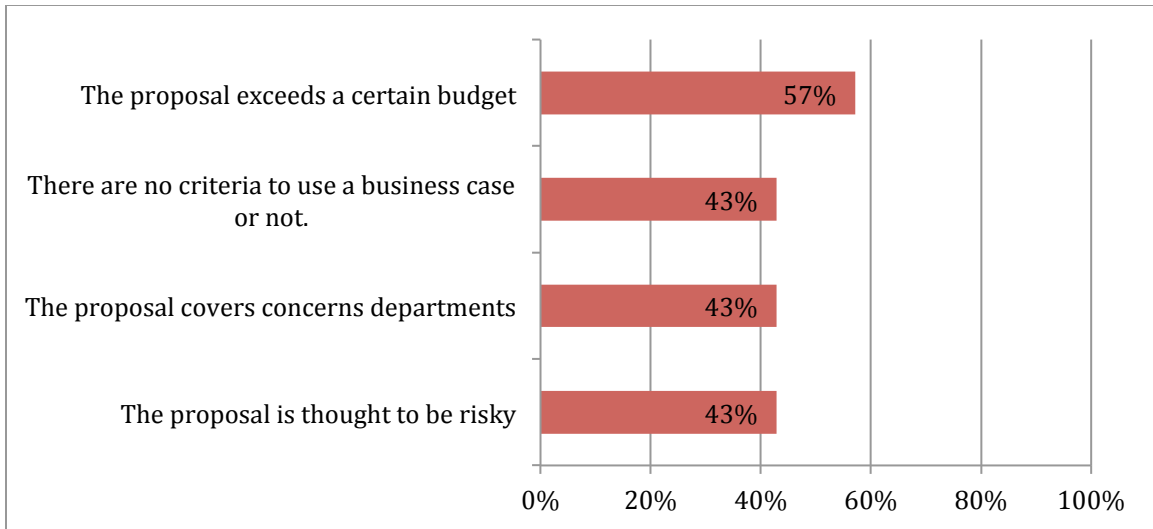


Figure 12 - Reasons for using a business case

The contents of the business case

If a municipality makes use of business cases (sometimes or always) the question “*What information should be recorded in an investment proposal?*” was asked. This list is based on suggested content of a business case by the Val IT framework. Response to this question is shown in Figure 13.

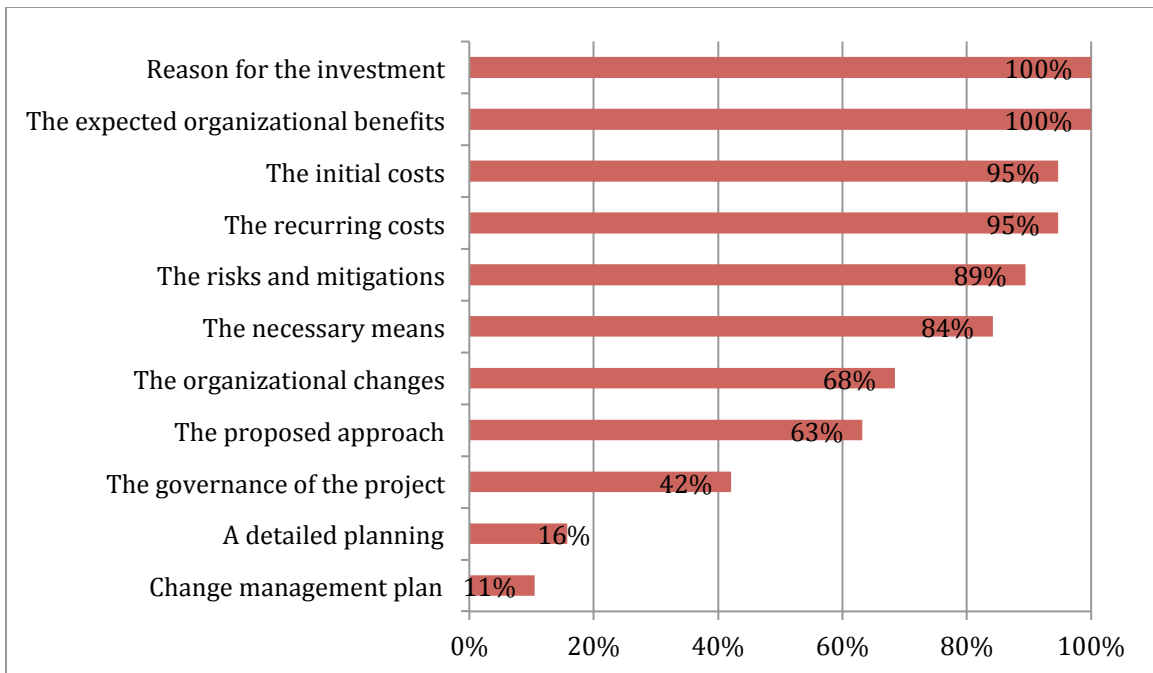


Figure 13 - Elements described in investment proposals

Many elements that Val IT suggests should be in a business case are part of the business case in all or most of the municipalities. On the bottom we see that very few municipalities describe a change management plan for the investment and that less than 4 in 10 municipalities describe the governance of the project.

Business case maturity

The data from the previous question is used to construct a new variable: the maturity of the business case. By counting the number of elements that a business case should contain actually are used by each respondents we can see measure how extensive and complete their business cases are. As the Val IT framework states: *“A business case must be: [...] Complete and comprehensive, including the full scope of change required in achieving the desired outcomes”* (IT Governance Institute, 2010). Completeness is an important factor in the quality of a business case according to the Val IT framework. That is why the number of present suggested parts of the business case will be used as the maturity of the business case. This leaves the quality of the different parts out of scope but gives a broad overview useful for this research.

The score is a number between 0 (no elements used) and 11 (all 11 elements are used). The lowest score for the respondents is 4 since all respondents use at least 4 elements. Figure 14 shows the different levels of maturity and the number of municipalities that have that maturity level. The average maturity is 7.6.

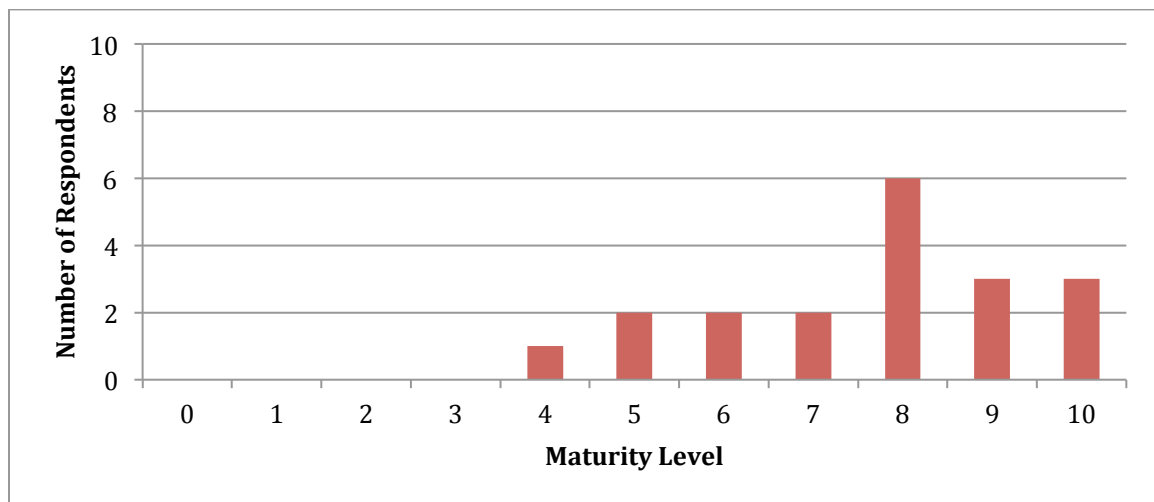


Figure 14 - Maturity level of the business case of the respondents

Benefits management

All municipalities were asked what activities they performed to track and measure the benefits of their investments. Response to the question “*How is the realization of the anticipated benefits described in an investment proposal?*” is shown in Figure 15.

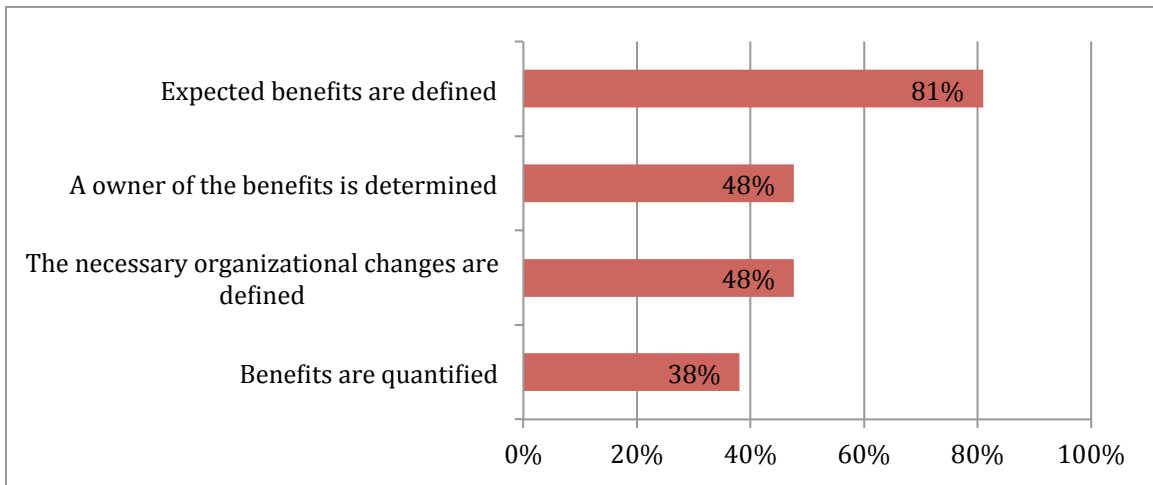


Figure 15 - Use of Benefit Management elements

All municipalities describe the expected benefits. Less than half of the municipalities choose and record an owner for the benefits (who is responsible for achieving the benefits?), what organizational change is necessary for achieving the benefits or how to quantify the benefits.

Responsibility for the business case

Someone in the municipality should be responsible for producing the business case. The response to the question “*In practice, who is responsible for composing the business case?*” is shown in Figure 16.

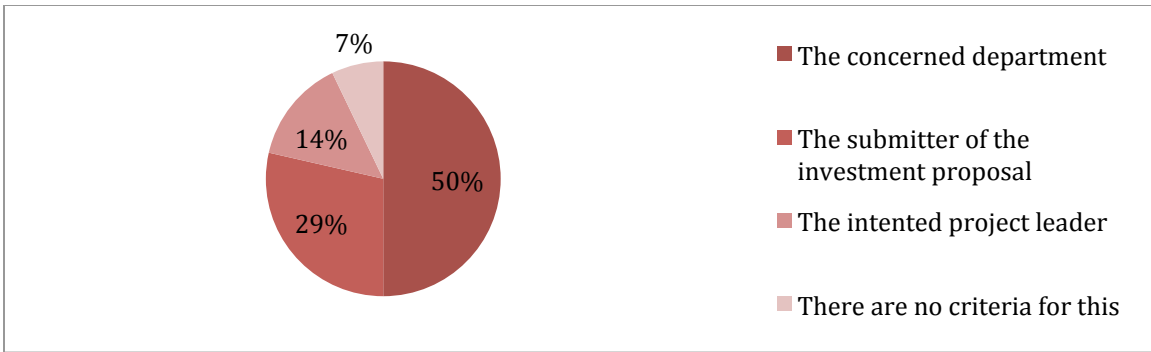


Figure 16 - Role responsible for developing the business case

In the majority of municipalities this is a responsibility of the business, the department concerned with the investment. A respondent noted: *“A business case is a living document, with an idea it is mostly the submitter of the idea. But as it turns into a PID [project initiation document] it is the project leader in collaboration with other”*.

5.4 Legitimize

Legitimizing is the second step in the life-cycle. For this stage the study looks into the use of portfolio’s and selection criteria.

5.4.1 Selection criteria

The first question regarding selection criteria asked whether municipalities actually use selection criteria and if these criteria are “formalized”. Figure 17 shows the response to the question *“On what grounds is the decision to make an investment based?”*.

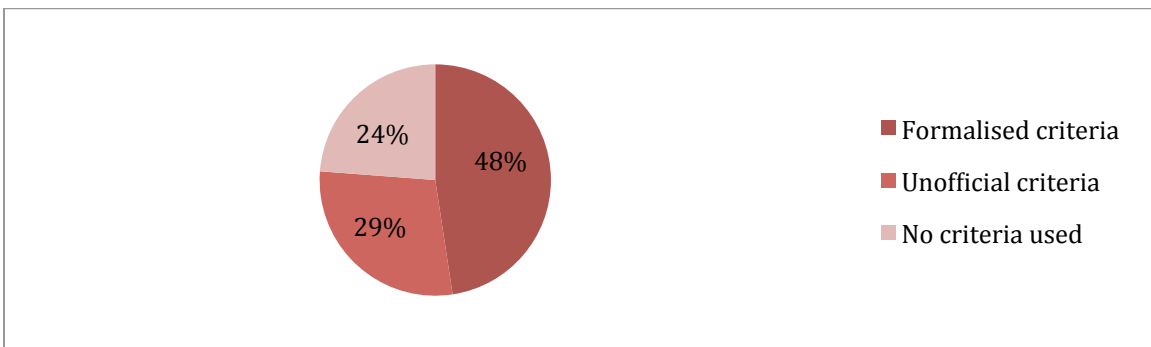


Figure 17 - The use of selection criteria

It shows that three quarters of the municipalities use criteria but almost half of them have not formalized these criteria.

Selection criteria can be roughly divided into financial and non-financial criteria. In Figure 18 the results to the question *“Which of these financial selection criteria are used in predicting the value of IT enabled investment proposals?”*.

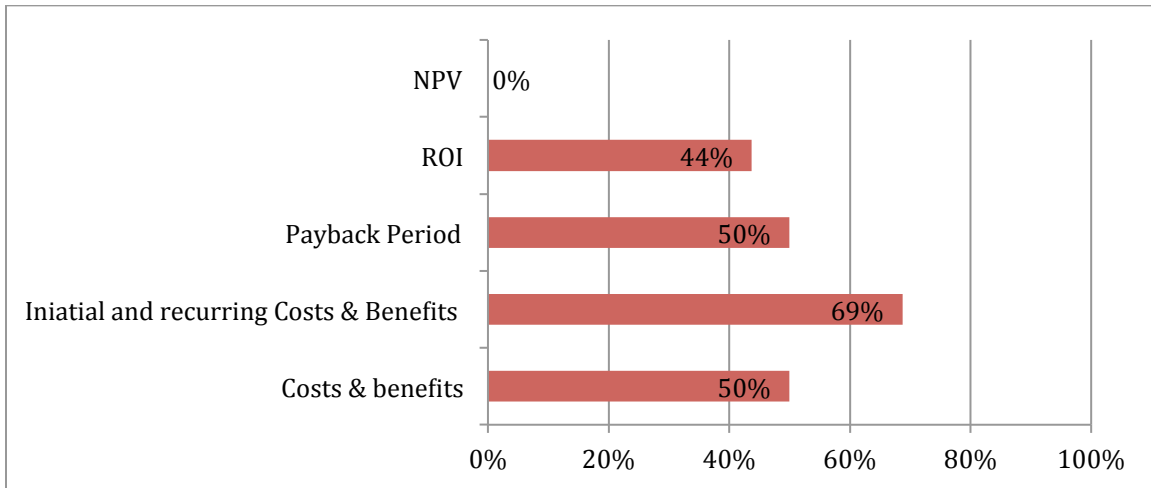


Figure 18 - The use of financial selection criteria

No municipality uses net present value as a predictor of value. Roughly half of the municipalities use other means of predicting financial value.

The other selection criteria are non-financial criteria. Figure 19 shows the results to the question *“Which of these non-financial selection criteria are used in judging IT enabled investment proposals?”*.

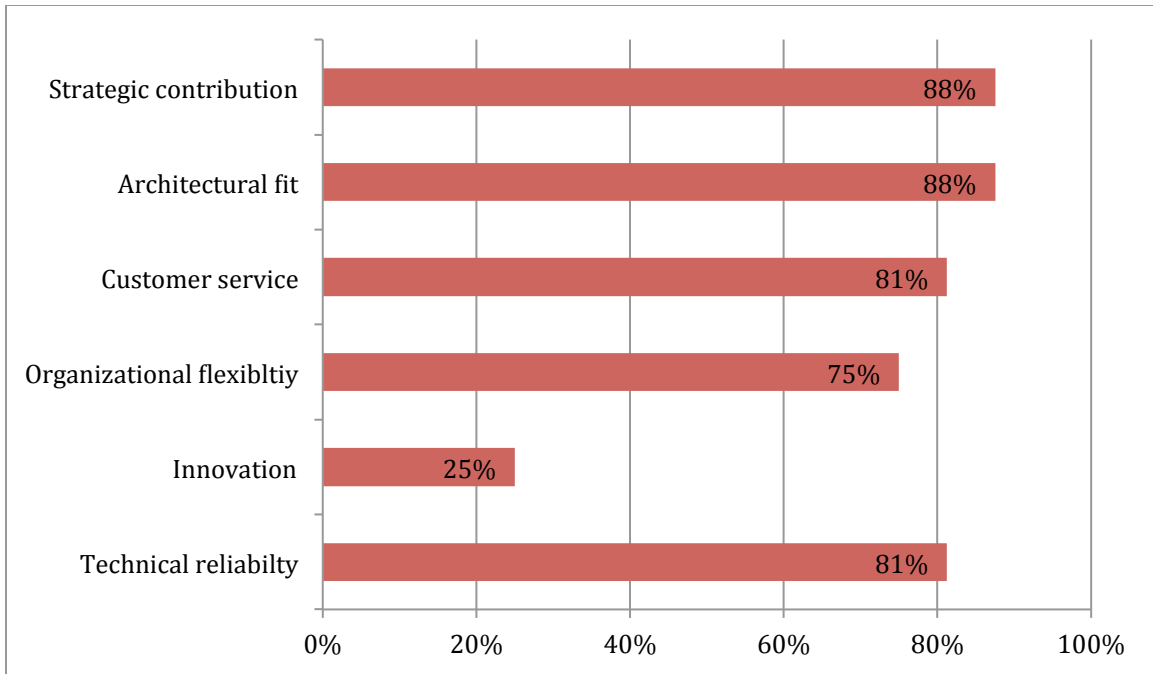


Figure 19 - The use of non-financial selection criteria

It shows that non-financial criteria are used more widely amongst municipalities than financial criteria. Except “innovation” as a criteria. That is used in a quarter of the municipalities.

Respondents could also add other criteria they used in judging investments. Criteria that don’t fit under the already mentioned categories are:

- Available capacity (“can we handle this?”)
- Legal compliance

Maturity of the selection criteria

The data of the questions above was used to construct a maturity level for the respondents on their use of financial and non-financial criteria.

The maturity of financial criteria was constructed by looking at the most advanced financial criteria that is used. The order used to do this is:

- Level 4: Net Present Value (NPV) or Return on Investment (ROI)
- Level 3: Payback period
- Level 2: Costs and benefits divided in initial and recurring
- Level 1: Costs and benefits

So if a respondent used ROI and payback period their maturity level is 4. If they only use cost and benefits their level is 1. The lowest maturity is a basic overview of costs and benefits. This gives a relatively basic overview of the expected added value of an investment. Next is the costs and benefits divided in initial and recurring stages. Most of the projects have high costs for realisation and start to create benefits when they are realised. So the initial stage is different from the recurring stage. Dividing the costs and benefits between these stages creates a better overview. After these factors the payback period gives the best overview of the added value by comparing the costs and benefits over time to show the break even point. Highest maturity level is considered NPV or ROI. It gives most insight in the total added value of an investment in relation to the other investments by using the factor of discounting in addition to all benefits of the payback period.

Using this formula the maturity of the use of financial selection criteria is shown in Figure 20. The average maturity is 2.75.

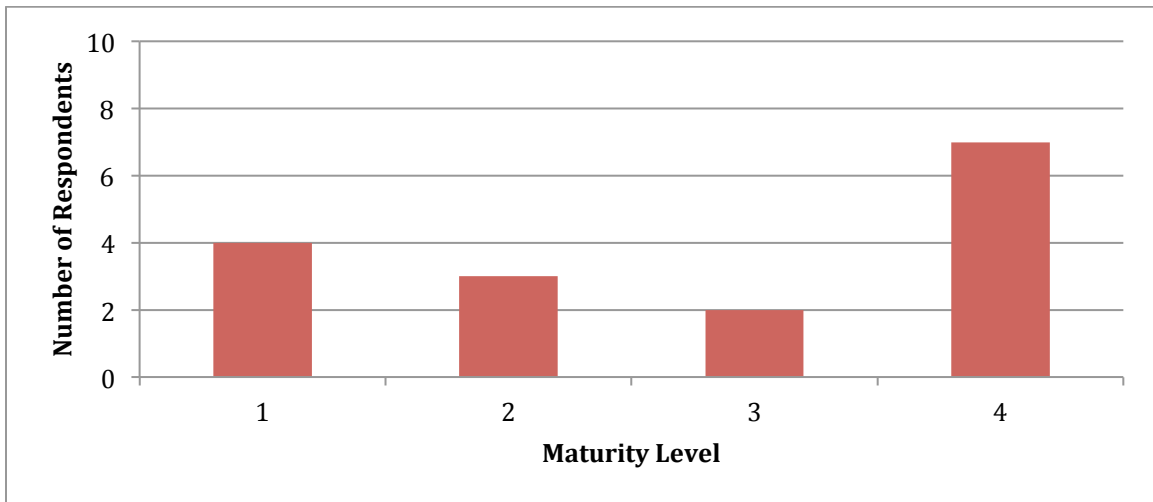


Figure 20 - Maturity level of the use of financial selection criteria

For the non-financial criteria the maturity level was constructed by counting the number of criteria that are used. For this maturity level a sum of the criteria is used because non-financial selection criteria need to give a more broad insight in the investment. It needs to highlight every aspect. So for this maturity level, using more selection criteria will be considered as a higher maturity. This gives a minimum level of 0 and a maximum of 6. The results are shown in Figure 21. The average maturity is 4.38.

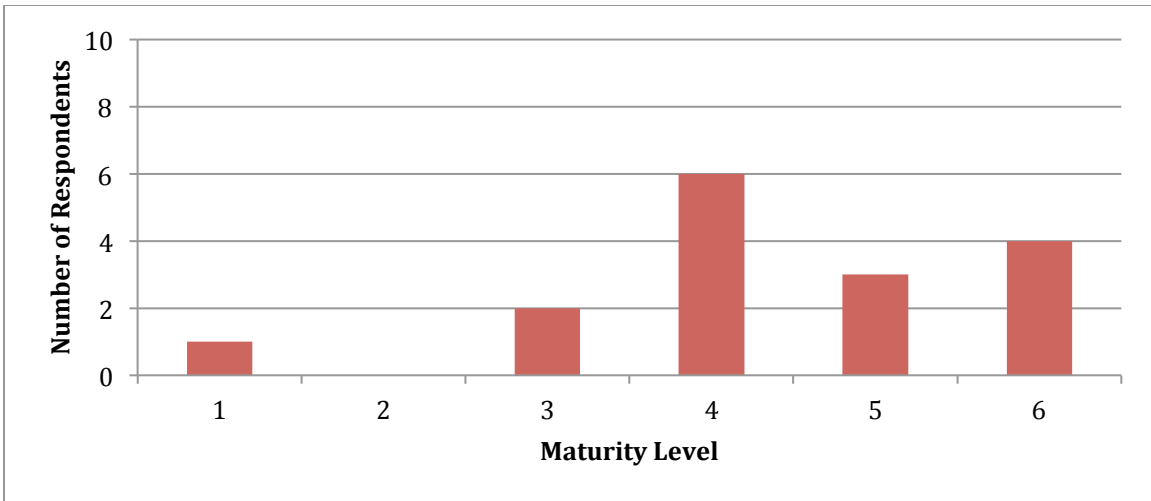


Figure 21 - Maturity of the use non-financial selection criteria

Weighing of selection criteria

For the municipalities that use the selection criteria in prioritizing investments the questionnaire also asked if these criteria have different weights. Figure 22 shows the results to the question “*Is there a different in weights for the different selection criteria?*”. It distinguishes between formalized and informal differentiation. Formalized means that the organization has described a weighting score for the different selection criteria. Informal means that in practice the weighting differs but this is not written down.

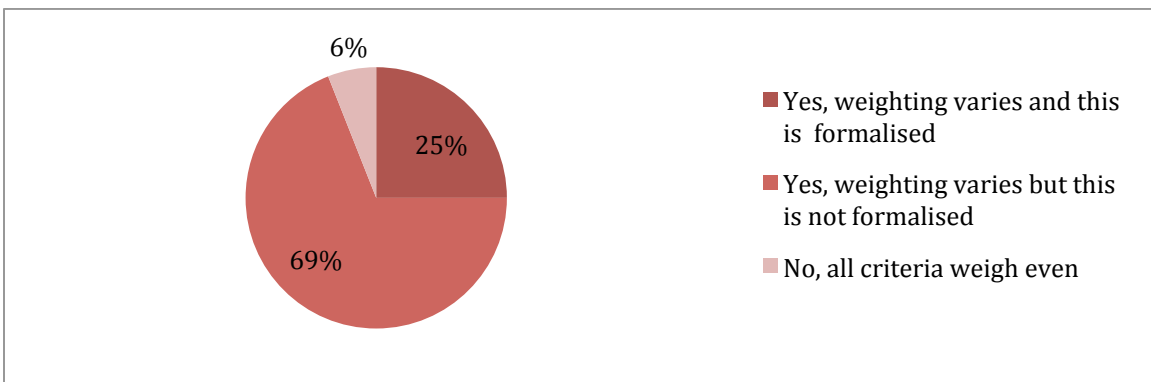


Figure 22 - Weighing of the criteria

If municipalities stated they have a different weighing for criteria (formal or not) they were asked if financial or non-financial weighs more heavily than the other. Figure 23 shows the results to the question “*What is – by approximation – the ratio of weighing between financial and non-financial criteria?*”.

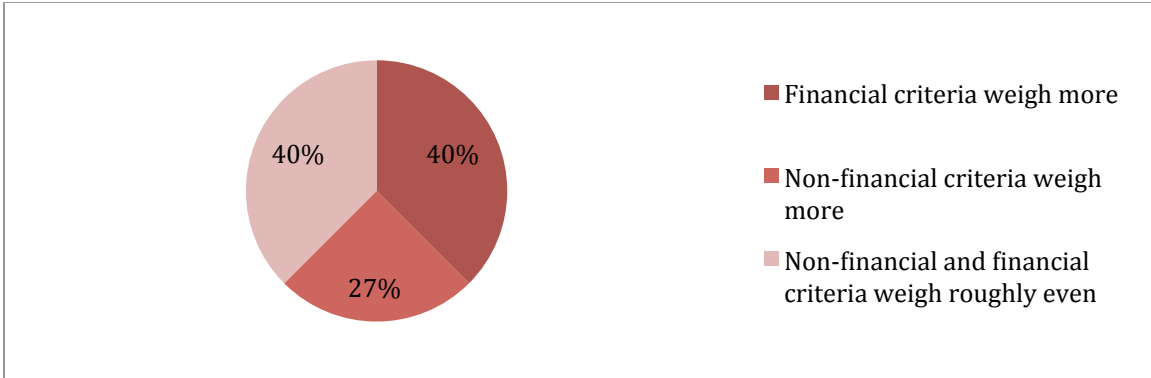


Figure 23 - Weighing of financial vs. non-financial criteria

There is no definite majority among the weighing of criteria. In 40% financial criteria weigh more, in 40% it's roughly even and in 27% the non-financial criteria weigh more.

The role that intuition of the deciding body plays ("gut feeling") is part of this study. All respondents were asked the question: "To what extent does intuition ("gut feeling") of the deciding party play a role in judging investments?". Figure 24 shows the results of this question.

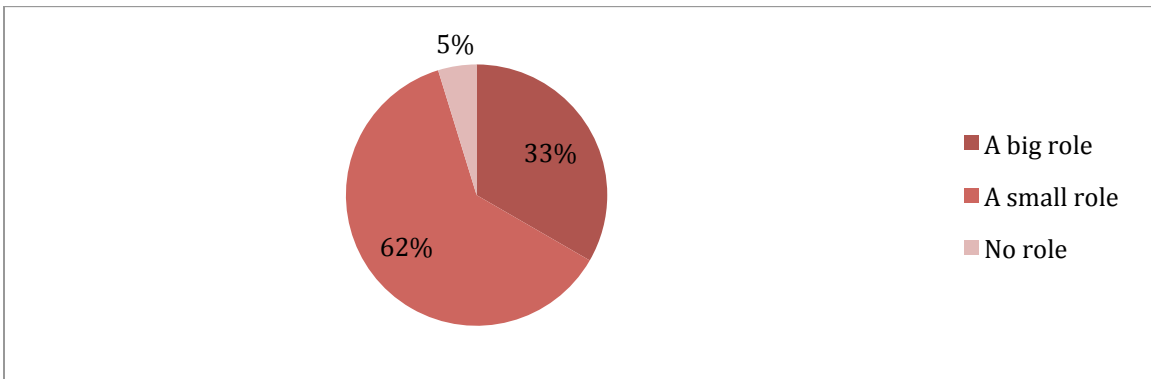


Figure 24 - The role of intuition in judging investments

In the vast majority of municipalities intuition plays a role in judging investments.

5.4.2 Portfolio management

The element of portfolio management was defined as keeping overview of investments (projects) and categorizing different investments.

Figure 25 shows the overviews municipalities have of their current investments. It is the answer to the question “Does your municipality have a centralized overview of all investments?”.

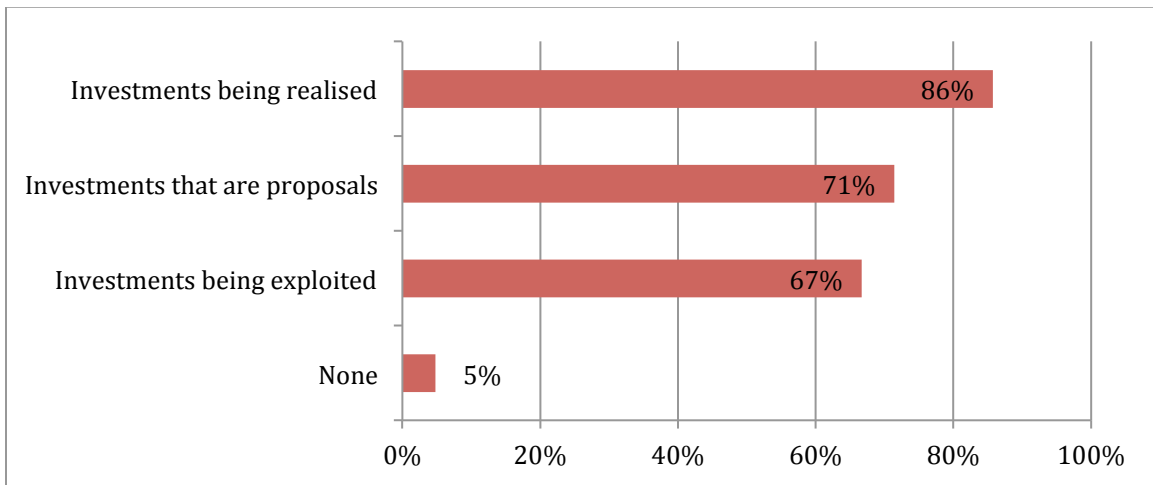


Figure 25 - Overview of investments

The majority of municipalities have overviews of investments in progress, proposal or exploiting. Some municipalities have no overview of these investments.

All respondents were asked if they differentiate between types of investments. The results to this question are shown in Figure 26.

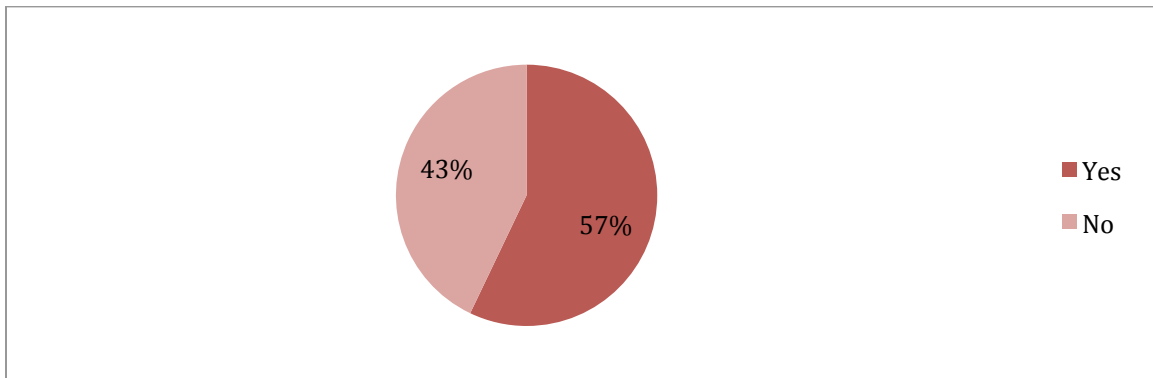


Figure 26 - Percentage of municipalities that differentiate in types of investments

The respondents that state that they use different categories of investments were asked what type of investments they differentiate in. Figure 27 shows the results of the question “What categories of investments are used to differentiate?”.

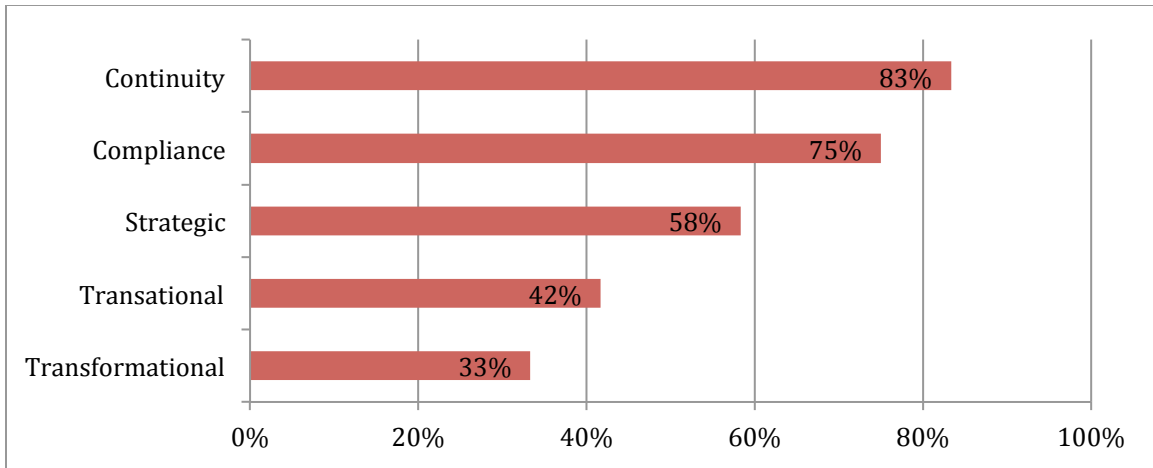


Figure 27 - Use of categories for different type of investments

It shows that the vast majority of municipalities that differentiate have categories for continuity and compliance. Other categories that were mentioned in the survey include:

- "Categorization according to municipality wide programs."
- "Distinction between projects in collaboration with other municipalities or solo"

5.5 Realize

Realization is the third step in the life cycle. For this stage this study looks into the use of project management methodologies.

5.5.1 Project management

Figure 28 shows what project management methodologies (if any) municipalities use.

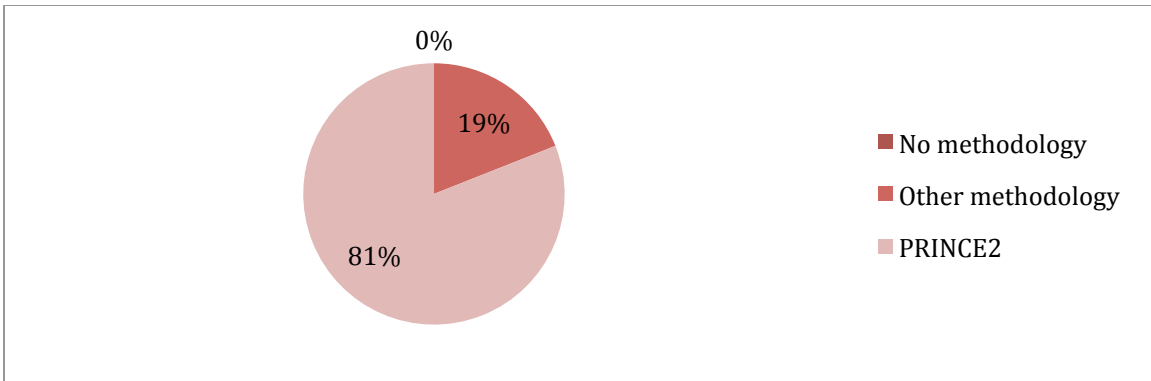


Figure 28 - Use of project management methodology

All municipalities use a methodology and the vast majority uses PRINCE2 as a methodology.

Second question that was asked regarding project management concerned the aspects of the projects that were controlled. Figure 29 shows the results to the question: “Which of the following aspects of a project are controlled during realization?”.

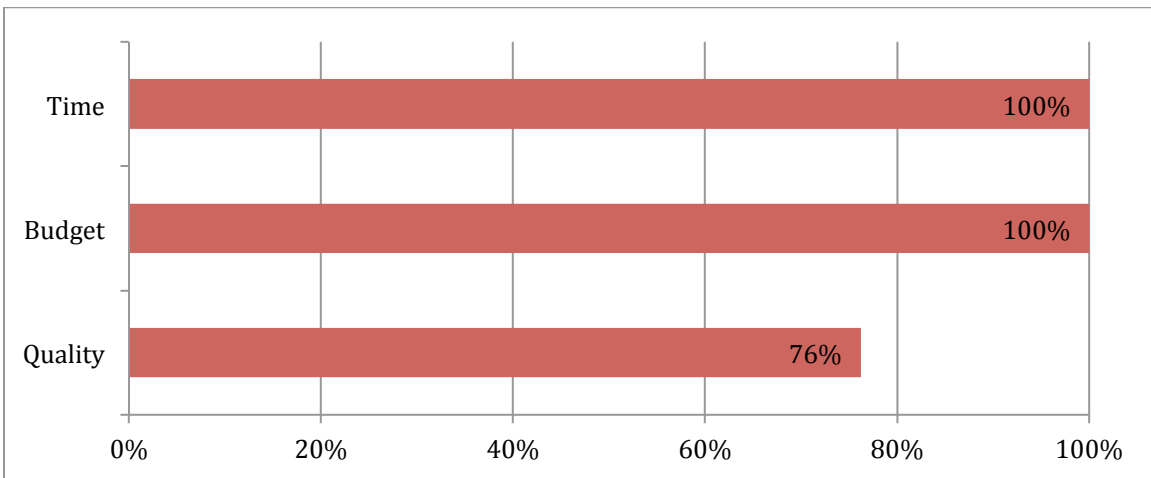


Figure 29 - Which aspects of a project are controlled during realization

All municipalities control projects on time and budget. Three quarters of the respondents control for quality.

The next question concerned the persons involved in controlling the projects. Figure 30 shows the results to the question: “Who is involved in controlling the projects?”.

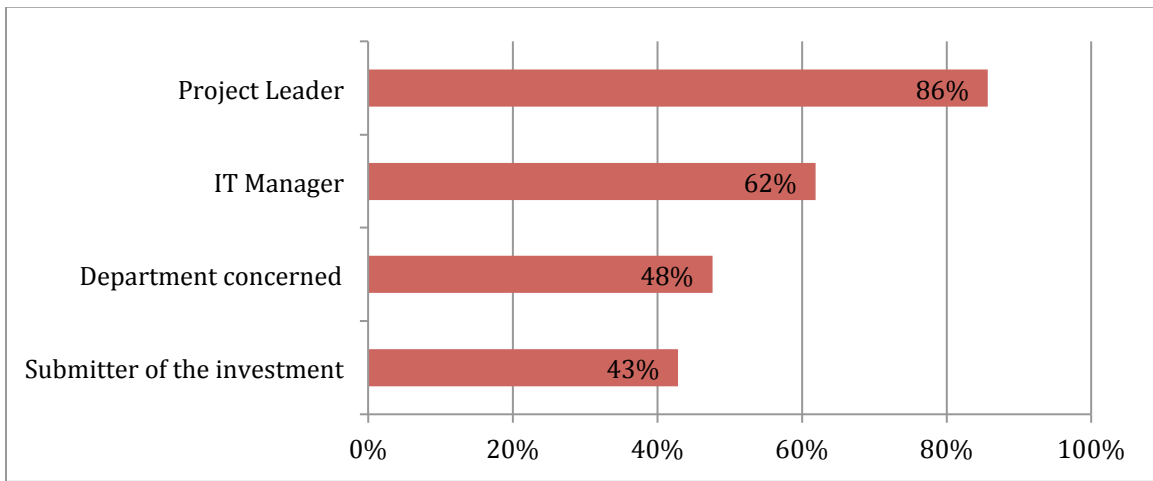


Figure 30 - Roles concerned with controlling investment realization

Other answers from respondents that are not part of the options above are:

- Financial controllers
- IT (Policy) advisors
- Sponsor of the project

The next questions regarded the measures municipalities take when projects are not running as expected. Figure 31 shows how many municipalities take pre-emptive measures when there is a risk of projects deviate from the planning.

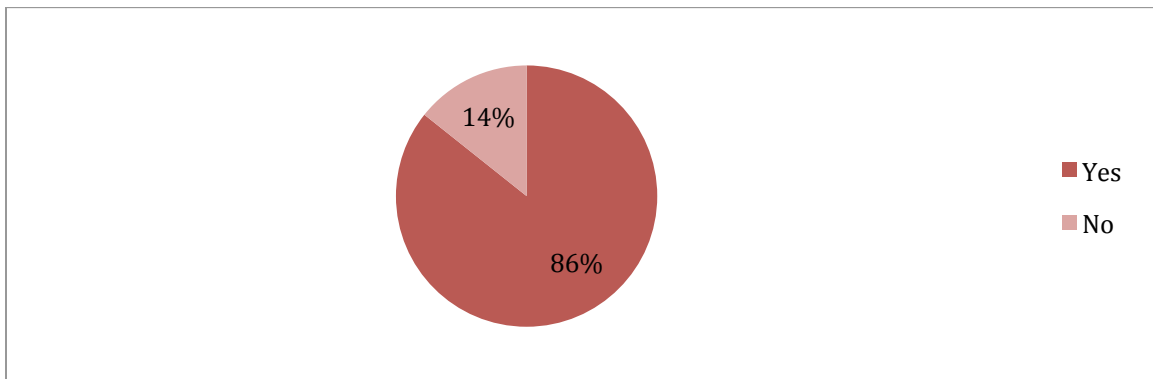


Figure 31 - Percentage of municipalities that take pre-emptive measures to control projects

A vast majority of the municipalities take measures when there is a chance of deviation. Figure 32 shows what measures municipalities can take when controlling projects.

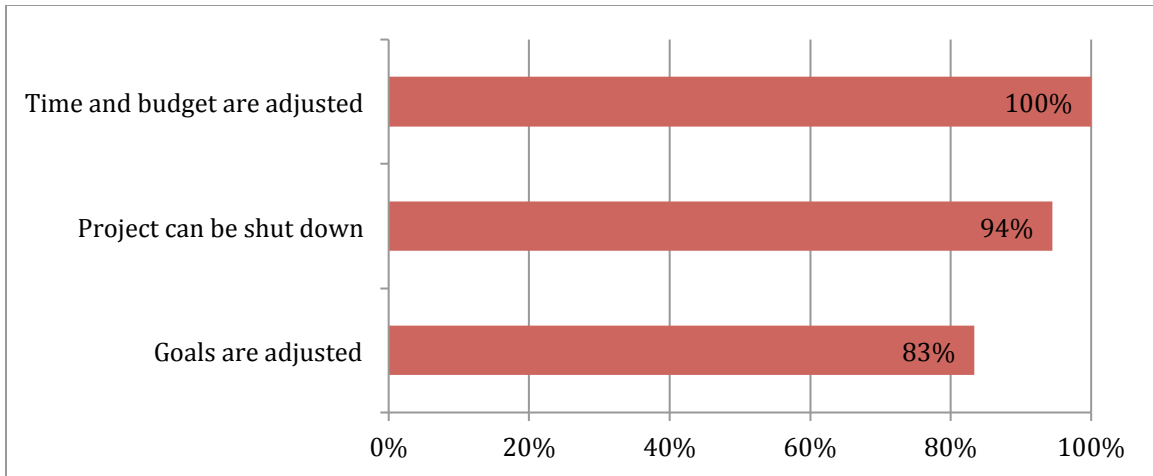


Figure 32 - Measures municipalities take to control projects

If investments change during the realization of the investment the business case should be updated. Figure 33 shows what percentage of municipalities does this.

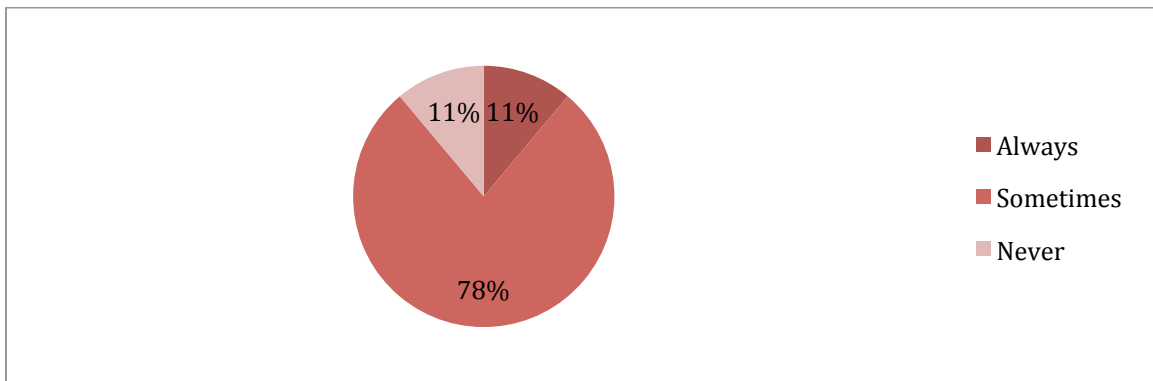


Figure 33 - Percentage of municipalities adjusting the business case while realizing investments

No municipality always updates the business case. The vast majority does it sometimes.

5.6 Exploit

Exploiting is the fourth step in the life cycle. For this stage the study looks into the use of value monitoring.

5.6.1 Value monitoring

Value monitoring is the activity of controlling and optimizing the value of investments that are being exploited. The first question asked regarding this activity is if value delivery of the investments is quantified and compared to expected value. Figure 34 shows the results of this question.

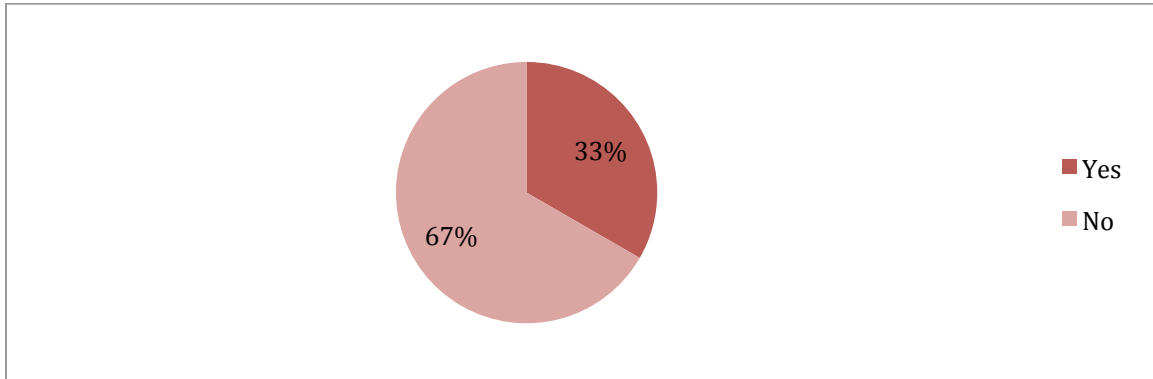


Figure 34 - Percentage of municipalities that quantify and compare expected and realized value when exploiting investments

Next we asked if the municipalities take measures if the value lags behind expected value. Figure 35 shows the results to the question "If the value lags behind expected value, does your municipality take measures that could increase the value?".

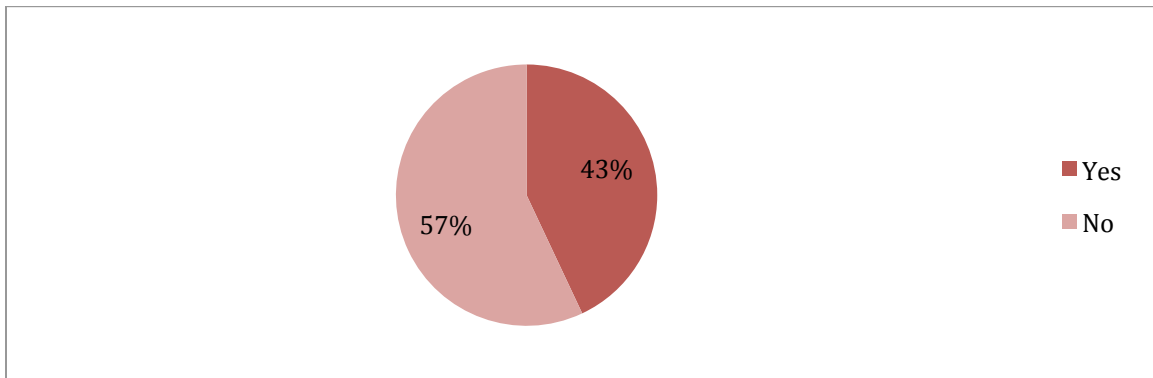


Figure 35 - Percentage of municipalities that take measures when value is not realized completely

For the municipalities that take measures (roughly half of the respondents) the measures that they can take are shown in Figure 36.

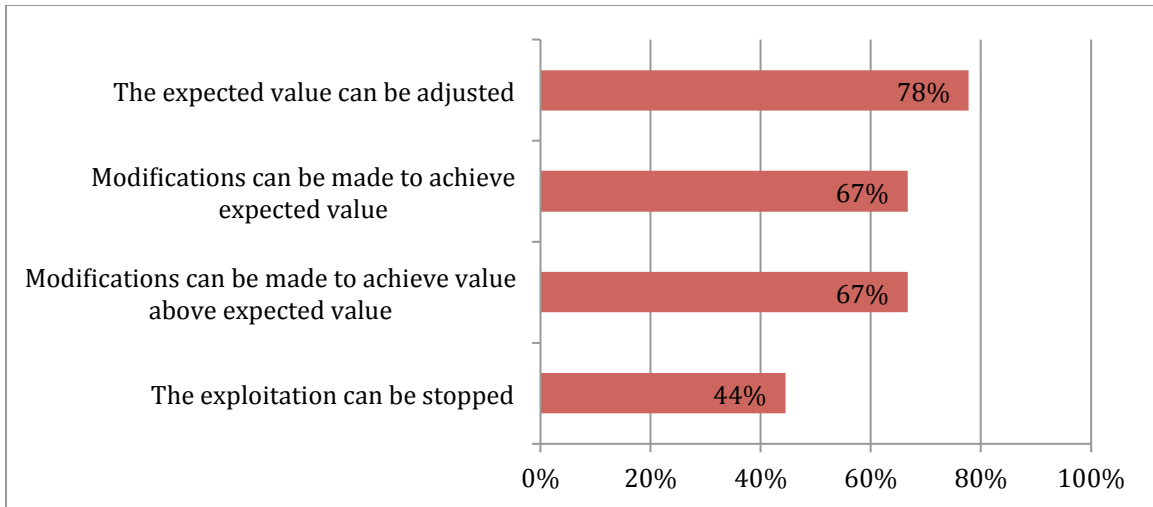


Figure 36 - Type of measures municipalities use while exploiting investments

5.7 Evaluate

Evaluating is the fifth step in the life cycle. For this stage the study looks into lessons learned.

5.7.1 Lessons learned

The first question was: “Does your municipality evaluate the value of the investments after the total life cycle of the investment (not after implementation but after the planned duration)?”. Results are shown in Figure 37.

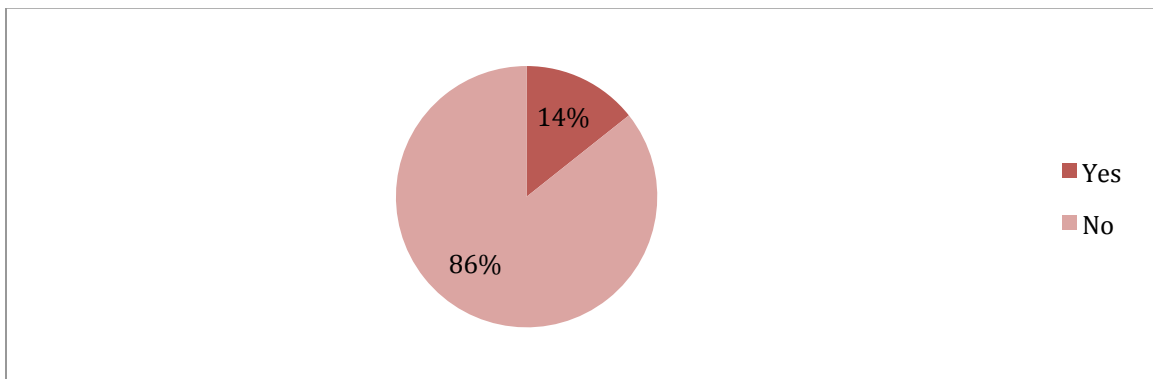


Figure 37 - Percentage of municipalities that evaluate the value of investments after the life-cycle of an investments has ended

The vast majority of the municipalities do not evaluate the value after the total life cycle.

5.8 Governance & Leadership

Governance and leadership is an umbrella category that covers the different elements that are not specifically part of another life cycle stage. Part of this study is the maturity of business alignment in the municipality.

5.8.1 Business alignment

The maturity of business alignment was tested via six statements. Respondents could answer via a likert scale of 1 to 5. Figure 38 shows the average rating the respondents gave to the statements and the total average of the statements.

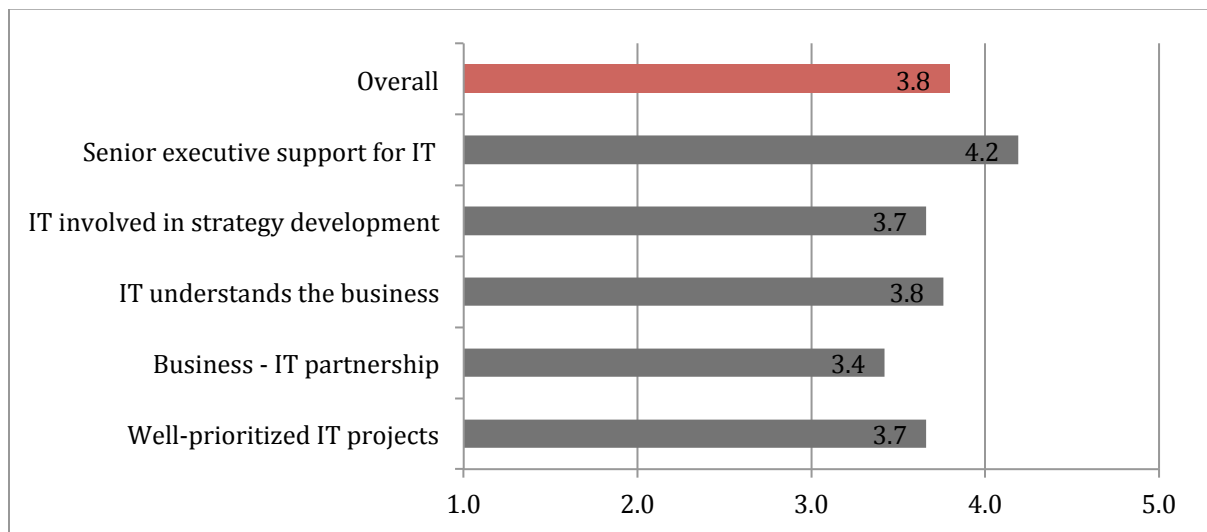


Figure 38 - Degree of presence of business alignment enablers

5.9 Perceived success of IT value management

A general extra chapter of the questionnaire was devoted to nine statements that cover the (perceived) success of IT value management. Respondents could answer via a likert scale of 1 to 5. Figure 39 shows the average rating the respondents gave to the statements.

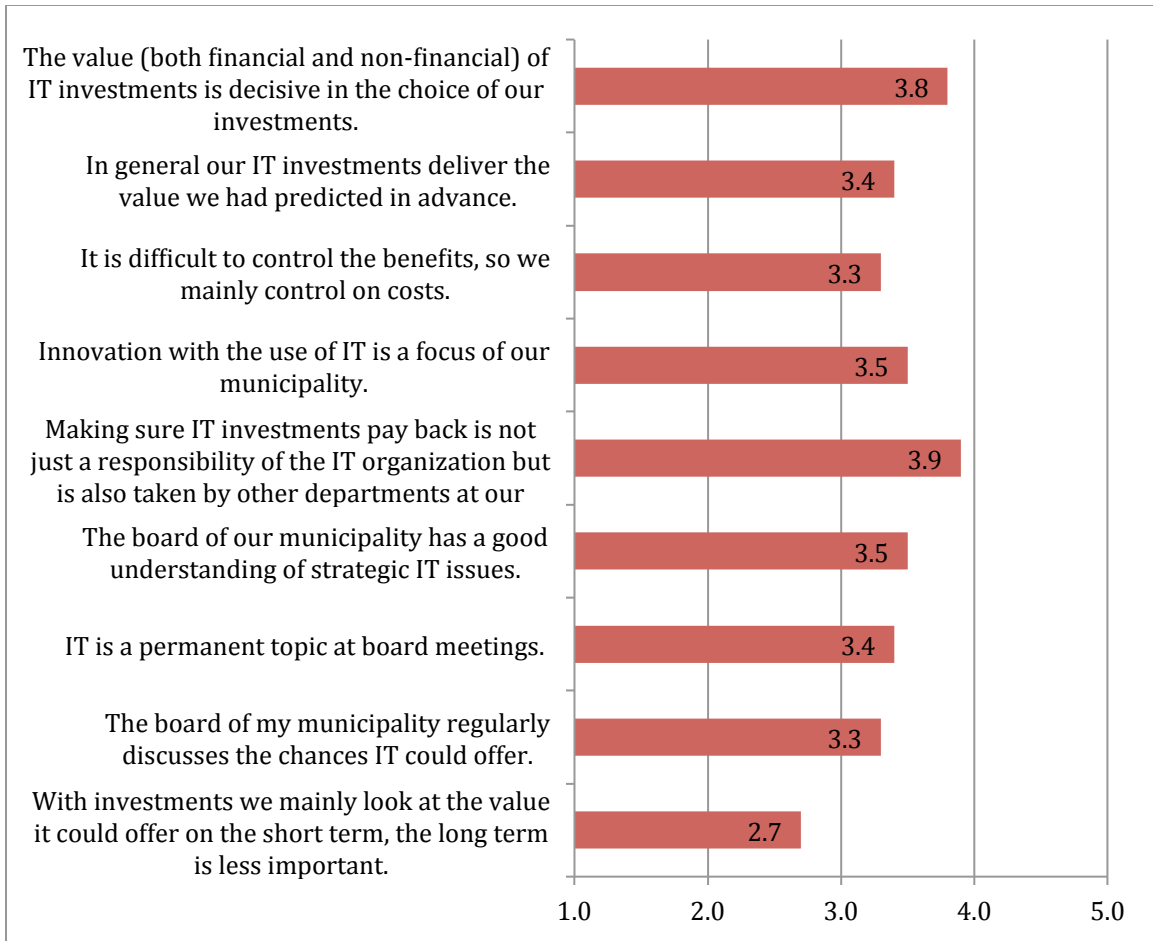


Figure 39 - Statements regarding perceived success of IT value management

5.10 Relationship between success and maturity

Does a higher maturity in the use of business cases or selection criteria lead to a higher perceived success in IT value management? The statement “*In general our IT investments deliver the value we had predicted in advance.*” from the previous question will be used as a general indicator of the (perceived) success of IT value management in the municipality. In the rest of this paragraph a reference to “(perceived) success of IT value management” refers to the results of this question. To look for a relation between these factors a correlation will be tested between three variables:

- Success of IT value management versus the maturity of the use of business cases
- Success of IT value management versus the maturity of the use of financial selection criteria

- Success of IT value management versus the maturity of the use of non-financial selection criteria

Success vs. the use of business cases

For this relationship we plot the success of IT value management against the constructed maturity of the use of business cases (as shown in Figure 14).

Figure 40 shows a bubble plot with on the Y-axis the success of IT value management and on the X-axis the maturity of the business case. The size of the bubble represents the frequency of the cases. The line is a trend line showing that there is a slight, negative trend. A look at the plot shows there is no clear correlation. The trend line has an R^2 of 0.015, meaning that it is a very bad predictor of the expected outcome. There is no significant correlation between these two variables.

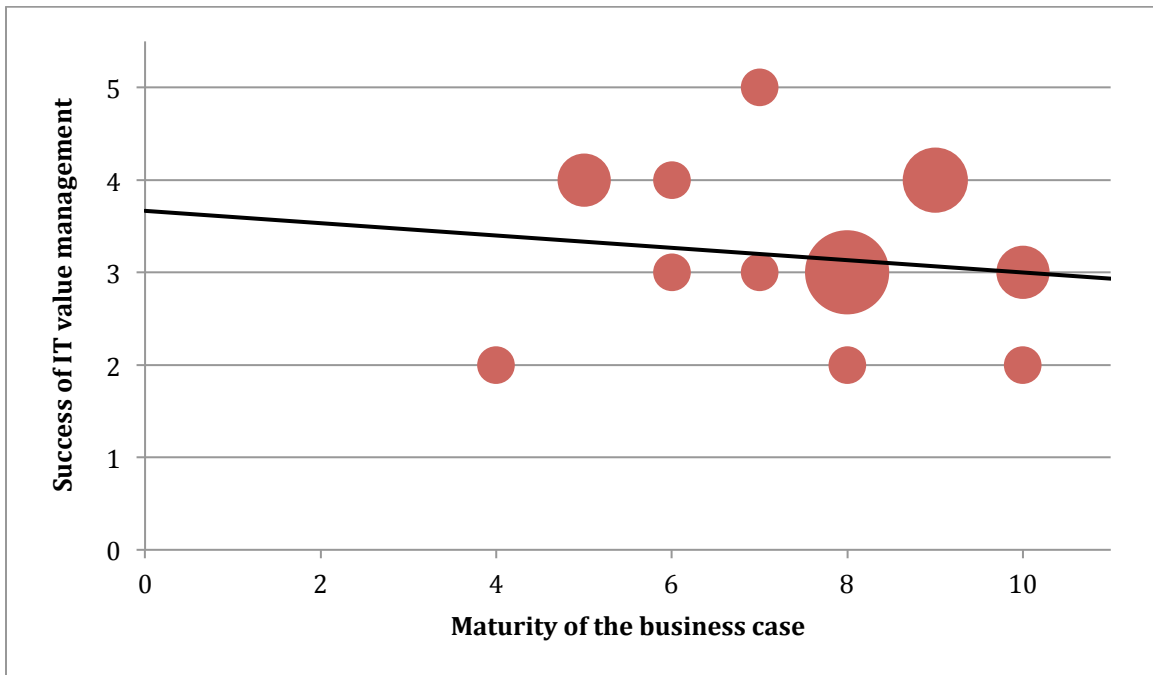


Figure 40 - Relationship between maturity of business cases and success of IT value management

Success vs. the use of financial selection criteria

For this relationship we plot the success of IT value management against the constructed maturity of the use of financial selection criteria (as shown in Figure 20).

Figure 41 shows a bubble plot with on the Y-axis the success of IT value management and on the X-axis the maturity of the financial selection criteria. The size of the bubble represents the frequency of the cases. The line is a trend line showing that there is a slight, negative trend. A look at the plot shows there is no clear correlation. The trend line has an R^2 of 0.004, meaning that it is a very bad predictor of the expected outcome. There is no significant correlation between these two variables.

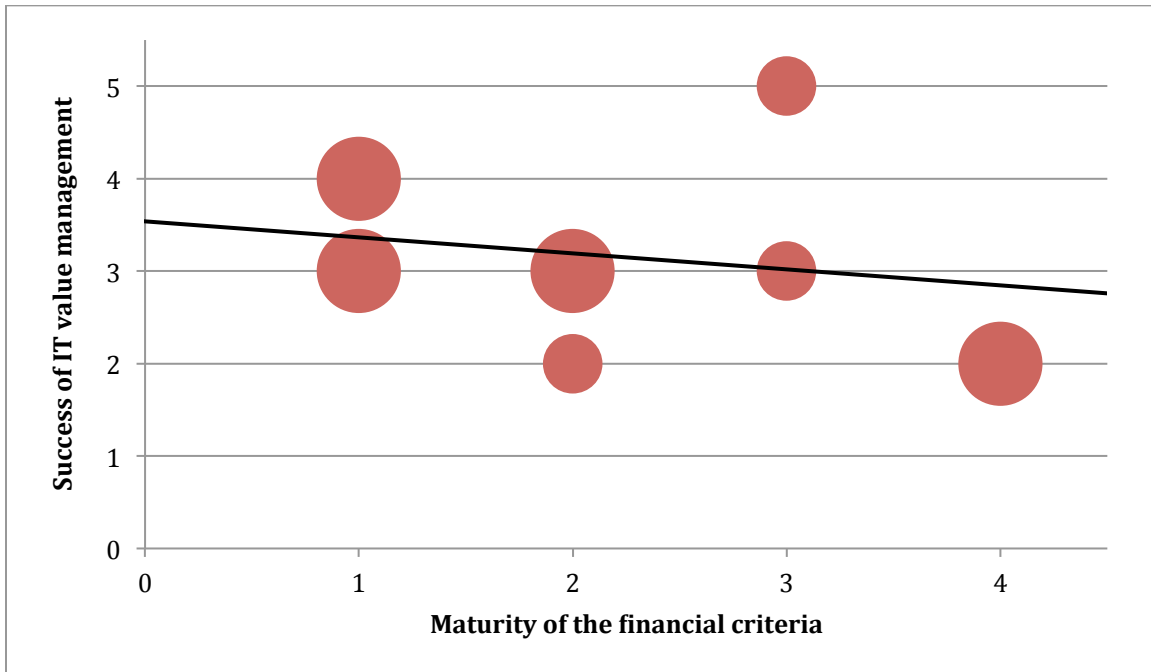


Figure 41 - Relationship between maturity of financial selection criteria and success of IT value management

Success vs. the use of non-financial selection criteria

For this relationship we plot the success of IT value management against the constructed maturity of the use of non-financial selection criteria (as shown in Figure 21).

Figure 42 shows a bubble plot with on the Y-axis the success of IT value management and on the X-axis the maturity of the non-financial selection criteria. The size of the bubble represents the frequency of the cases. The line is a trend line showing that there is a slight, positive trend. A look at the plot shows there is no clear correlation. The trend line has an R^2 of 0.066, meaning that it is a very bad predictor of the expected outcome. There is no significant correlation between these two variables.

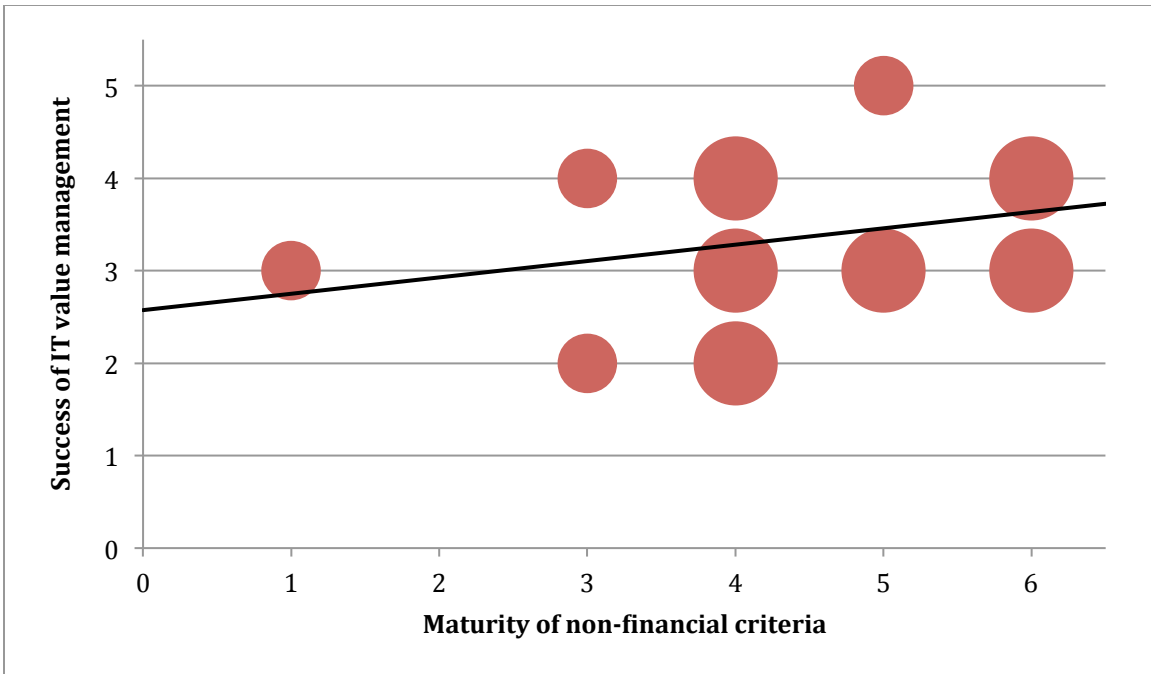


Figure 42 - Relationship between maturity of non-financial selection criteria and success of IT value management

Summarizing the relationships

The different variables show no clear relationship to the (perceived) success of IT value management.

6 Conclusion

Using the results from the questionnaire the main research questions will be answered. First the sub questions will be answered using the different stages of the life cycle. Next the main research question will be answered.

6.1 Responsibilities during the life-cycle

This paragraph will answer sub question A) *“Who is responsible for the IT enabled investment during the different steps of the life cycle?”*.

During the **identification** stage there is a strong role for the IT manager. The senior management (board of mayor and aldermen, city manager and department managers) is less often involved with the exception of the department managers being involved in the top-down process.

There were no questions in this study regarding the responsibilities for the **legitimization** stage.

During the **realization** stage the project leader is the role most often involved in controlling the projects. The business (the department concerned and / or the submitter of the investment proposal) play a role in fewer than half of the municipalities.

During the **exploitation** an **evaluation** stage no questions were asked regarding responsibilities.

6.2 Activities during the life-cycle

This paragraph will answer sub question B) *“What activities are performed to manage the value of the IT enabled investments during the different steps of the life cycle?”*.

In the **identification** stage most municipalities use all three suggested sources of investment proposals. To structure investment proposals 57.1% of municipalities use business cases. A third uses business cases in some occasions. On average the maturity of the business cases is 7.6 (on a scale of 0 to 11). The reason for the investment, expected benefits and costs are (almost) always defined. A detailed planning and change management plan are present in fewer than 20% of the municipalities. To manage their benefits most municipalities define the benefits, but fewer than half determine an owner, define necessary change or quantify the benefits.

In the **legitimization** stage it shows that half of the municipalities use formalized criteria. A quarter uses informal criteria and the other quarter does not use selection criteria. The average maturity of the use of financial criteria is 2.75 (on a scale from 0 to 4). No municipalities use net present value as criteria. ROI, payback period and an overview of costs and benefits are used in half of the municipalities. The costs and benefits are divided over initial and recurring in 70%. The average maturity for the non-financial criteria is 4.38 (on a scale from 0 to 6). Innovation stands out as a criteria being used by very few municipalities. Part of legitimization is portfolio management. The majority of municipalities have an overview of the investments in the different stages of their life cycles.

The third stage is the **realization** stage. All municipalities make use of a project management methodology and a vast majority uses PRINCE2. To control projects all steer on time and budget, but only 76% controls for quality. The majority of the municipalities can take pre-emptive measures when projects are not going according to plan. Shutting a project down or adjusting time and budget is done more often than adjusting the goals of a project. This seems to be in line with the smaller tendency to control for quality.

The fourth stage is the **exploitation** stage. One third of the municipalities checks the value of the investment when it is being exploited. 43% take action when the value is lagging. These actions can include adjusting the expected value in many municipalities but rarely include shutting the investment down.

The last stage is the **evaluation** stage. Only 14% of the municipalities makes a sum of the costs and benefits after the investments is being decommissioned.

6.3 Relationship between success and maturity

Correlations between the (perceived) success of IT value management and the maturity of the business and financial and non-financial criteria has not shown to be significant. This study cannot claim that there is a correlation between a higher maturity in these activities and a higher success in IT value management.

6.4 IT value management in municipalities

This paragraph will answer the main research question: *“How do Dutch municipalities manage the value of their IT enabled investments during the life cycle of these investments?”*.

The use of IT value management activities seems to be in an intermediate level of maturity. A small majority of the municipalities have activities to measure and maximize value of (possible) IT enabled investments during the first stages of the life-cycle. But as we progress in the life-cycle interest for the value decreases and activities decrease or become more informal.

Roles from the IT organization play the largest role in measuring and maximizing the value of (possible) IT enabled investments. Especially the IT manager is involved in the majority of the municipalities. Management plays a role in few municipalities in the stage of identifying investments and also the business is less involved during realization and exploitation.

A correlation between higher maturity and higher success could not be demonstrated.

To **summarize**: IT value management is reasonably well defined in municipalities in the start of the life cycle but especially during exploiting and evaluating the management of value is ad hoc or non existent. IT value management is an effort mainly executed by IT managers and other roles from the IT organization.

7 Discussion

This chapter includes three parts. First the weaknesses of this study are described. Next a comparison between the findings from theory and the results from this study is made. Last there are some suggestions for further research offered.

7.1 Weaknesses in the study

In general this study has been relatively high level. A broad range of activities was researched. This resulted in a relatively lower level of detail. Especially the rationale between doing an activity or not has not been researched in most cases. This was not part of this study but could have been interesting to research.

Some of the questions from the questionnaire have not been used directly to answer the research question. In retrospect these questions could have been deleted from the questionnaire. Resulting in a shorter questionnaire and perhaps increasing response.

The question can be asked If the level of quantity that was used for this study is the best way. The questionnaire was very structured and rigid. This made a good comparison possible but perhaps a more qualitative approach would have gathered more data and would have given more insight into the rationale behind certain choices of municipalities. Considering the size of the population and the sample a qualitative approach would have been possible.

7.2 Theory versus practice

To make a comparison between theory and practice of IT value management at Dutch municipalities. let's recall the definition of IT value management: *"The organizational processes, structures and relational mechanisms that enable business and IT to understand, initiate, prioritize, execute, organize, manage and evaluate IT enabled investments and their outcomes, to secure optimal value in the entire IT enabled investment portfolio for the organization."*(Maes et al., 2011).

Using this definition we can compare theory with practice in municipalities.

On average municipalities have an organized set of processes and structures in the context of IT value management. The relational mechanisms (“the soft factor”) is less developed. Especially if we look at the answer to statements as “*The board of our municipality has a good understanding of strategic IT issues*” (Score: 3.5), “*IT is a permanent topic at board meetings*” (3.4) and “*The board of my municipality regularly discusses the chances IT could offer*” (3.3). The score on these statements is on or just above average.

The next part of the definition looks at the different activities in the life cycle of investments. “*Understanding, initiating*” is well defined and most municipalities look at all sources of investment proposals. “*Prioritizing and organizing*” is moderately developed. Three quarters use formalized criteria and the maturity of those criteria is mediocre. “*Executing*” investments is of a higher level, all municipalities use project management although not all control for quality. The “*management*” of (existing) investments and “*evaluation*” is practiced on a low or ad hoc level of maturity.

7.3 Suggestions for further research

Since this study has been relatively high level it provides with a number of interesting opportunities for further research. These include:

- **The use of business cases**

What municipalities describe in their business cases and who does this has been part of this research. But what is part of a business case in the multiple stages a business case often takes and how a business case grows and adapts during the life cycle could be an interesting study.

- **The use of selection criteria**

The use of selection criteria has been researched in this study. But what selection criteria work and how they affect the outcome of a prioritization could be an interesting study.

- **The search for a relationship**

This study has tried to look for relationships between maturity and success. There is no demonstrated relationship between these two. There could be other ways to study or measure this, perhaps in a more qualitative approach that could verify this.

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9 Appendix

9.1 Questionnaire

1) Wat is de naam van uw gemeente?

Open answer

2) Wat is uw naam?

Open answer

3) E-mailadres

Open answer

4) Wat is uw functie binnen de gemeente?

MULTIPLE ANSWERS POSSIBLE:

CIO

Hoofd IT / automatisering / informatisering

Hoofd middelen / bedrijfsvoering

Projectleider ICT

Programmamanager

Beleidsmedewerker / beleidsadviseur

5) Heeft uw gemeente een CIO aangesteld?

ONE ANSWER POSSIBLE:

Ja

Nee, maar wel iemand met soortgelijke verantwoordelijkheid

Nee

6) Hoeveel IT medewerkers heeft uw gemeente? (FTE)

ONE ANSWER POSSIBLE:

Minder dan 50

Tussen de 50 en 100

Tussen de 100 en 250

Meer dan 250

7) Hoe groot is het jaarlijkse IT budget van uw gemeente?

ONE ANSWER POSSIBLE:

Minder dan € 1.000.000,-

Tussen de € 1.000.000,- en € 10.000.000,-

Tussen de € 10.000.000,- en € 25.000.000,-

Tussen de € 25.000.000,- en € 50.000.000,-

Meer dan € 50.000.000,-

8.1) De waarde (financieel en niet financieel) van IT investeringen is bepalend voor de keuze van onze investeringen

8.2) Onze IT investeringen leveren over het algemeen de waarde die we vooraf hadden ingeschat

8.3) Het is lastig om te sturen op baten, daarom sturen we voornamelijk op kosten

- 8.4) Innoveren met behulp van IT is een fOne answer possibleus in onze gemeente.
- 8.5) Zorgen dat IT investeringen renderen is bij onze gemeente niet alleen een verantwoordelijkheid van de IT organisatie maar deze wordt ook door andere afdelingen genomen.
- 8.6) Het directieteam in mijn gemeente heeft een goed begrip van strategische IT vraagstukken.
- 8.7) IT is een vast onderwerp bij ons directieteam aan tafel.
- 8.8) Het directieteam van mijn gemeente overlegt geregeld over de kansen die IT kan bieden
- 8.9) Bij investeringen kijken we vooral naar de waarde die het op korte termijn oplevert, minder naar de lange termijn.
- 5 points likert scale

- 9.1) Het directieteam erkent het belang van IT binnen onze gemeente
- 9.2) De IT organisatie is betrokken bij de ontwikkeling van de strategie
- 9.3) Onze IT organisatie begrijpt goed wat wij doen als gemeente
- 9.4) Er is voldoende overleg tussen de IT organisatie en de rest van de gemeente om te spreken van partnerschap
- 9.5) Onze gemeente is goed in staat IT projecten te prioriteren
- 9.6) De IT organisatie toont initiatief in onze gemeente
- 5 points likert scale

10) Evalueert uw gemeente de werkwijze omtrent IT investeringen?

ONE ANSWER POSSIBLE:

- Ja, er wordt structureel aandacht aan geschonken
- Ja, dit gebeurt ad hOne answer possible
- Nee

11) Implementeert uw gemeente "Lessons learned" uit deze evaluaties?

Yes / No

12) Wat kan aanleiding zijn voor het opstellen van een investeringsvoorstel?

MULTIPLE ANSWERS POSSIBLE

- De strategie en doelstellingen van de gemeente
- De huidige systemen en werkwijzen
- De beschikbaarheid van nieuwe technologie
- Anders...

13) U geeft aan dat strategie en doelstellingen aanleiding kunnen zijn voor het opstellen van investeringsvoorstellen. Wie kan dit soort voorstellen doen?

MULTIPLE ANSWERS POSSIBLE:

- Leden van B&W (incl. Wethouder verantwoordelijk voor ICT)
- Gemeentesecretaris
- Directieleden
- Afdelingshoofden
- Hoofd IT (CIO)

14) U geeft aan dat huidige systemen en prOne answer possibleessen aanleiding kunnen zijn voor het opstellen van investeringsvoorstellen. Wie kan dit soort voorstellen doen?

MULTIPLE ANSWERS POSSIBLE:

- Gemeentesecretaris
- Directieleden
- Afdelingshoofden
- Hoofd IT (CIO)

Eindgebruikers
Functioneel beheerders

15) U geeft aan dat de beschikbaarheid van nieuwe technologie aanleiding kan zijn voor het opstellen van investeringsvoorstellen. Wie kan dit soort voorstellen doen?

MULTIPLE ANSWERS POSSIBLE:

Leden van B&W (incl. Wethouder verantwoordelijk voor ICT)
Gemeentesecretaris
Directieleden
Afdelingshoofden
Hoofd IT (CIO)
Eindgebruikers
Functioneel beheerders
Daar is een rol voor belegd binnen de IT organisatie

16) U geeft aan dat er andere aanleidingen zijn om investeringsvoorstellen op te stellen. Wat zijn deze en wie kan deze voorstellen doen?

Open answer

17) Maakt uw gemeente gebruik van Business Cases (een sjabloon om informatie over het investeringsvoorstel in vast te leggen)?

ONE ANSWER POSSIBLE:

Altijd
Soms
Nooit

18) Wanneer moet er een Business Case worden opgesteld voor een investeringsvoorstel?

ONE ANSWER POSSIBLE:

Als het voorstel een bepaald bedrag overschrijdt
Als het voorstel meerdere afdelingen betreft
Als het voorstel bijdraagt aan bepaalde doelstellingen of strategie
Als het voorstel buiten de strategie of doelstellingen valt
Als het voorstel als risicovol wordt ingeschat
Als het voorstel betrekking heeft op bepaalde (cruciale) ICT systemen
Daar zijn geen criteria voor vastgelegd

19) U geeft aan dat vanaf een bepaald bedrag Business Cases moeten worden opgesteld. Kunt u aangeven vanaf welk bedrag dit ongeveer moet?

ONE ANSWER POSSIBLE:

Vanaf € 10.000,-
Vanaf € 50.000,-
Vanaf € 100.000,-
Vanaf € 250.000,-
Dit vertel ik liever niet.

20) Wat moet worden vastgelegd voor een investeringsvoorstel?

MULTIPLE ANSWERS POSSIBLE:

De reden van de investering
De voorgestelde aanpak
De beoogde organisatorische voordelen
De initiële kosten
De doorlopende kosten
De veranderingen in de organisatie
De risico's en maatregelen
De aansturing van het project

Een gedetailleerd plan van aanpak
De benodigde middelen
Een change management-plan

21) Hoe wordt de realisatie van de verwachte voordelen beschreven in een investeringsvoorstel?

MULTIPLE ANSWERS POSSIBLE:

Verwachte voordelen worden vastgelegd
Er wordt vastgelegd hoe deze voorstellen meetbaar worden gemaakt
Er wordt vastgelegd wie verantwoordelijk is voor de realisatie van de voordelen
Er wordt vastgelegd welke organisatorische veranderingen noodzakelijk zijn om de voordelen te realiseren

22) Wie is in de praktijk verantwoordelijk voor het opstellen van de business case?

ONE ANSWER POSSIBLE:

De indiener van het voorstel
Het organisatieonderdeel waar de investering betrekking op heeft
De IT organisatie
De (beoogd) projectleider

23) Is er in uw gemeente een centraal overzicht van alle IT investeringen?

ONE ANSWER POSSIBLE:

Ja, van de investeringen die worden uitgevoerd (actieve projecten)
Ja, van de investeringen die zijn uitgevoerd (afgeronde projecten)
Ja, van de investeringen die mogelijk worden uitgevoerd (ingediende voorstellen)
Nee

24) Wordt in uw gemeente onderscheid gemaakt tussen verschillende typen investeringen?

Yes / No

25) Welke categorieën worden in uw gemeente onderscheiden?

MULTIPLE ANSWERS POSSIBLE:

Strategische investeringen (om nieuwe producten of diensten mogelijk te maken)
Transformationele investeringen (om nieuwe werkwijze mogelijk te maken)
Transactionele investeringen (om efficiënter te werken)
Gedwongen investeringen (compliance)
Investeringen om de continuïteit te waarborgen
Anders, namelijk....

26) U geeft aan dat uw gemeente nog andere categorieën onderscheidt. Kunt u aangeven welke dit zijn?

Open answer

27) Verschilt de werkwijze per categorie ook?

MULTIPLE ANSWERS POSSIBLE:

Ja, de criteria waarop een investeringsvoorstel wordt beoordeeld verschilt
Ja, de informatie die wordt vastgelegd over de voortgang van het project verschilt
Nee

28) Op basis waarvan wordt een besluit genomen om een investering te doen?

Er zijn criteria op basis waarvan besloten wordt en deze zijn vastgelegd.
Er zijn criteria op basis waarvan besloten wordt maar die zijn niet vastgelegd.
Er zijn geen criteria op basis waarvan het besluit genomen wordt.

29) Welke van de volgende financiële selectiecriteria wordt gebruik bij het voorspellen van de waarde van IT investeringsvoorstellen?

MULTIPLE ANSWERS POSSIBLE:

- Return on investment (ROI)
- Net present value (NPV)
- Terugverdientijd
- Overzicht van kosten en baten uitgesplitst over realisatie en exploitatie
- Overzicht van kosten en baten

30) Welke van de volgende niet-financiële selectiecriteria wordt gebruik bij het beoordelen van IT investeringsvoorstellen?

MULTIPLE ANSWERS POSSIBLE:

- Bijdrage aan strategische doelen
- Passendheid in enterprise architectuur
- Intuïtie van beslissers
- Service aan klanten
- Flexibiliteit van infrastructuur en / of organisatie
- Innovativiteit
- Technische betrouwbaarheid

31) Gebruikt u nog andere criteria om investeringen op te beoordelen? Zo ja, welke?

Open answer

32) Is er een verschil in gewicht dat aan de verschillende criteria hangt?

ONE ANSWER POSSIBLE:

- Ja, sommige criteria wegen zwaarder dan anderen, dit is ook vastgelegd
- Ja, in praktijk wegen sommige criteria zwaarder dan anderen maar dit is niet vastgelegd
- Nee, alle criteria wegen even zwaar

33) Wat is – bij benadering – de verhouding in weging tussen financiële en niet financiële criteria?

ONE ANSWER POSSIBLE:

- De nadruk ligt op financiële selectiecriteria
- Financiële en niet-financiële selectiecriteria wegen ongeveer even zwaar
- De nadruk ligt op niet-financiële selectiecriteria

34) In hoeverre speelt intuïtie ("gut feeling") van de beslissende partij een rol bij het beoordelen van voorstellen?

ONE ANSWER POSSIBLE:

- Een grote rol
- Een kleine rol
- Geen rol

35) Hoe worden deze criteria gecommuniceerd binnen de organisatie?

ONE ANSWER POSSIBLE:

- Deze criteria worden actief onder de aandacht gebracht van alle medewerkers
- Deze criteria worden actief onder de aandacht gebracht van het management
- Deze criteria zijn inzichtelijk voor alle medewerkers
- Deze criteria zijn inzichtelijk voor het management
- Deze criteria worden niet gecommuniceerd binnen de organisatie

36) Maakt uw gemeente gebruik van een projectmanagementmethodiek?

ONE ANSWER POSSIBLE:

- Ja, namelijk PRINCE2 of een afgeleide daarvan.

Ja, namelijk een andere methodiek.
Nee

37) Welke van de volgende aspecten van een project worden gedurende de uitvoer bewaakt?

MULTIPLE ANSWERS POSSIBLE:

Tijd (Planning)
Budget (Kosten)
Kwaliteit
Geen

38) Wie is betrokken bij deze bewaking?

MULTIPLE ANSWERS POSSIBLE:

Hoofd IT
De indiener van het voorstel
Het organisatieonderdeel waar de investering betrekking op heeft
De projectleider
Anderen...

39) U geeft aan dat er nog anderen betrokken zijn bij de controle van de uitvoer van projecten. Wie zijn dit?

Open answer

40) Worden projecten waar nodig preventief bijgestuurd?

Ja / Nee

41) Welke maatregelen kunnen worden genomen?

MULTIPLE ANSWERS POSSIBLE:

De doelstellingen van een project kunnen worden bijgesteld
Tijd en middelen van een project kunnen worden aangepast
Een project kan tussentijds worden stopgezet
Anders

42) U geeft aan dat er nog andere maatregelen kunnen worden genomen. Kunt u aangeven welke dit zijn?

Open answer

43) Wordt in dit geval de Business Case van de investering waar nodig aangepast?

ONE ANSWER POSSIBLE:

Altijd
Soms
Nooit

44) Wordt bepaald welke waarde de investering oplevert en wordt deze vergeleken met de verwachte waarde?

Yes / No

45) Wie is verantwoordelijk voor deze toetsing van de waardelevering?

ONE ANSWER POSSIBLE:

De indiener van het investeringsvoorstel
Het organisatieonderdeel waar de investering betrekking op heeft
Hoofd IT
De projectleider
De stuurgroep

46) Als de waarde achterblijft, wordt er dan gekeken naar maatregelen die de waarde kunnen verhogen?

Yes / No

47) Welke maatregelen kunnen worden genomen?

MULTIPLE ANSWERS POSSIBLE:

Er kunnen aanpassingen en/of extra investeringen gedaan worden om de beloofde waarde te halen

Er kunnen aanpassingen en/of extra investeringen gedaan worden om mogelijke meerwaarde (boven de verwachte waarde) te halen

De verwachte waarde zoals vastgelegd in de Business Case kan worden bijgesteld

De exploitatie kan worden stopgezet

Anders

48) U geeft aan dat er nog andere maatregelen kunnen worden genomen. Kunt u aangeven welke dit zijn?

Open answer

49) Wordt na de looptijd van de investering (dus niet na implementatie, maar na de beoogde looptijd die gebruikt is bij bepaling van de waarde) de behaalde waarde van de investeringen getoetst?

Yes / No

50) Welke activiteiten voert u hiervoor uit?

MULTIPLE ANSWERS POSSIBLE:

Behaalde kwantitatieve voordelen worden berekend

Behaalde kwalitatieve voordelen worden beschreven

De behaalde voordelen worden met de verwachte voordelen vergeleken

De gemaakte kosten worden vergeleken met de verwachte kosten

De reden voor eventuele verschillen wordt geanalyseerd

51) Kan een evaluatie leiden tot een aanpassing in de werkwijze?

MULTIPLE ANSWERS POSSIBLE:

Evaluaties kunnen aanleiding zijn om de manier waarop investeringsvoorstellen worden opgesteld te herzien

Evaluaties kunnen aanleiding zijn om de manier waarop kosten en baten worden ingeschat te herzien

Evaluaties kunnen aanleiding zijn om de manier waarop investeringsvoorstellen worden beoordeeld te herzien

Evaluaties leiden niet tot aanpassingen in de werkwijze

9.2 List of municipalities part of this study

Municipality	Population ¹
Amsterdam	799,278
Rotterdam	616,294
Den Haag	505,856
Utrecht	321,916
Eindhoven	218,433
Tilburg	208,527
Groningen	195,418
Almere	195,213
Breda	178,140
Nijmegen	166,382
Enschede	158,627
Apeldoorn	157,315
Haarlem	153,093
Arnhem	149,827
Amersfoort	149,662
Zaanstad	149,622
Haarlemmermeer	144,153
s-Hertogenbosch	142,817
Zoetermeer	123,092
Zwolle	122,562
Maastricht	121,819
Leiden	119,800
Dordrecht	118,466
Ede	109,823
Emmen	108,392
Westland	102,698
Venlo	100,159
Delft	99,097
Deventer	98,581
Leeuwarden	95,949
Alkmaar	94,505
Sittard-Geleen	94,024
Helmond	89,023
Heerlen	88,747
Hilversum	86,017
Oss	84,861
Amstelveen	84,379
Súdwest Fryslân	82,639
Hengelo	80,952
Purmerend	79,482
Roosendaal	77,155
Schiedam	76,216
Lelystad	75,778

Alphen aan den Rijn	72,913
Almelo	72,729
Leidschendam- Voorburg	72,588
Spijkensisse	72,375
Hoorn	71,360
Vlaardingen	70,905
Gouda	70,904
Assen	67,204
Velsen	67,122
Bergen op Zoom	66,287
Capelle aan den IJssel	66,024
Stichtse Vecht	63,491
Veenendaal	63,032
Katwijk	62,688
Zeist	61,420
Nieuwegein	60,895
Hardenberg	59,585
Den Helder	56,947
Roermond	56,690
Lansingerland	56,506
Doetinchem	56,414
Smallingerland	55,454
Hoogeveen	54,874
Terneuzen	54,729
Barneveld	53,751
Oosterhout	53,686
Heerhugowaard	52,893
Kampen	50,924
Pijnacker-Nootdorp	50,454
Woerden	50,346

Municipalities in black background, white text responded to the questionnaire.

¹ Source: CBS Statline, populations of 2012