Bachelor Thesis

The applicability of the Qualitative System Analysis as decision-making tool in public administration by the example of the municipality Ludwigsburg

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1 Introduction

Imagine an apparatus with several levers and buttons. It is not intuitively clear how the manifold mechanisms work and coincide. The machine is applied on a trial and error approach, a button here and there initiates a random result and new processes here and there, eventually resulting in the desired outcome or in an inexplicable fail. The total effect that is originally hoped for seems unachievable. Obviously, there is a lack of a comprehensive understanding of the interrelations and links, the dynamics between the different elements of the apparatus to optimally operate and manage the manifold mechanisms, push and pull the proper levers. Although, the elements cannot be re-arranged in order to better suit certain goals or aspirations, the knowledge of the apparatus’ functioning can help to support well-grounded decisions how to use the machine.

The picture of the complex apparatus shall illustrate the situation in an increasingly complex and interconnected world. Accumulating bad political and economic decisions prove that we are utterly overwhelmed and helpless. The provision of seemingly endless information of big data does not provide the anticipated solution to overcome the powerlessness. It is of no use for decision-making to ignore the complex processes. The situation requires a new way of thinking, a system thinking in order to understand the interrelations of the current world’s reality. A system understanding and the competence to act are inevitable aspects for acting and orientating in a connected world (Vester 2002: p.13-37).

The example of the machine shows that non-systemic developments, positive and negative, evolve from not thinking connected and systemic. The use of the machine is decided whether the goals, the approach and the strategies are set based on a proper handling of the machine’s complexity. Frequently, projects are aligned based on isolated operations and interventions with often unintended consequences due to the inadequate definition and design of goals, approaches and strategies (2002: p.49-68). However, complexity is not necessarily to be compared to complication. It just requires adequate thinking and system-compatible planning and acting (2002: p.154-173).

There are several systemic approaches to assist with complex situations. The Qualitative System Analysis (QSA) is such an approach and instrument. The QSA identifies and describes the elements that impact the system and analyzes the
interrelations among these elements. In this manner, the QSA may be used to gain a general system understanding and the system’s behavior and its dynamics. The system comprehension can then provide a well-grounded basis for the definition of adequate strategies.

Strategies, however, are crucially important for the compilation of goals or the management of projects including the involvement of numerous and manifold actors and stakeholders. Particularly for long-term issues like sustainable development, strategies are mandatory. Therefore, the fundamental lack of processes that define adequate sustainability strategies in German municipalities (BECK, HEINRICHS AND HORN 2012: p.18) seems unfortunate against the background of the strong influence of municipalities on the citizen’s living conditions in general, and from the perspective of sustainable development.

Recognizing the need for system thinking and understanding, and the lack of reasoned sustainability strategies in German municipalities, the Qualitative System Analysis is a systemic approach that can support well-balanced decision-making in the context of 'Sustainability Management’ in municipal administration. The following thesis investigates the issue of applicability of a Qualitative System Analysis exemplary on the municipality Ludwigsburg.

1.1 Background

1.1.1 Municipal administration and the process towards a sustainable development

Local municipal administration have a crucial influence on the citizen’s living standards. Especially since the UN Conference on Environment and Development 1992 in Rio de Janeiro emphasized the importance of local efforts for a sustainable development, the responsibility of municipal administrations became the center of attention. However, German municipalities generally found themselves in need of reformation as traditional forms of municipal administration proved to have deficiencies concerning issues of effectiveness and efficiency. Encountering these deficiencies with management mechanism based on instruments known from business administration, the modernization did not respect the integration of management mechanisms considering principles of sustainable development. Even though, 'sustainability’ gained more relevance in municipal administration during the last decade, most municipalities are still lagging behind establishing an 'Integrated Sustainability Management’. Many already struggle with a fundamental lack of processes defining strategic and consistent goals (BECK, HEINRICHS AND HORN 2012).
The term ‘public administration’ as used in the title of this paper shall not be confused with government activity and refers rather to term ‘municipal administration’, which describes the administrative organization, structure, responsibilities, management mechanisms and tasks of the local municipality. Avoiding confusion, the paper will solely use the latter term.

Municipal administration do take a central role in respect to the local development as decisions on an European, Federal or ‘Länder’ level become primarily specific and concrete on the communal level. Most bills and laws in Germany are executed and implemented on the local level. Often, this has a rather restricting and limiting effect on the municipality’s field of action, particularly in case of unsuspected barriers or inconsistencies. Consequences are difficult to assess and become visible at the place of action: the municipality (Kirst, Trockel and Heinrichs 2014: p.550; Kopatz 2003: p.11). However, local public administrators do have a policy discretion within their responsibility of self-government, leaving the interpretation and enforcement of central tasks, guidelines and orders up to municipal politics and the municipalities’ municipal administration. The latter have a crucial role in particular as administrative staff are usually in charge of preparing everyday political decisions as well as executing and implementing them. In comparison to councilors municipal administrations are generally ahead in knowledge due to the professionalism of its staff, they are comparatively independent and often possess assured employment contracts. Theoretically, municipal administration do even have the capabilities thinking long-term, of course, restricted by the mutual relationship with political institutions. Without the political decisions even the best administrative preparations and work would come to nothing (Kopatz 2003: p.9-13).

Even though, municipal administration has always seen reforms and adaptation, German municipalities have undergone a significant process of modernization beginning in the early 1990s. Efforts of modernization, e.g. known as "Neues Steuerungsmodell" (NSM)(New Governance Model) or "New Public Management" (NPM), addressed several weaknesses of the traditional municipal administration in Germany, in particular

- the concentration on short-term thinking of local politics resulting in a lack of consistent strategies,
- maladjusted management processes due to rigid bureaucratic structures,
- low attractiveness and motivation discouraging capable candidates,
- and unsatisfied citizens and local companies causing a general lack of legitimacy.
The newly developed public management approaches intended to move municipalities towards more efficiency and effectiveness in order to remedy the identified weaknesses. Predominantly driven by growing financial restrictions and burdens, instruments strongly focused on business tools such as cost and performance accounting, budgeting, controlling, human resource management or quality management (Kirst, Trockel and Heinrichs 2014: p.557; Kopatz 2003: p.13-15; Kopatz 2006: p.114-116).

Comparable to the beginnings of the described modernization of municipal administration, the concept of 'sustainable development' gathered pace in politics, economy and civil society in the late 1980s with the Brundtlandt-Report or in the 90s, e.g. at the UN Conference on Environment and Development 1992 in Rio de Janeiro. The introduction and development of new management mechanisms in German municipalities during the same time period has not used the chance to integrate principles of sustainable development despite scrutinizing structures and processes anyway. The modernization discussion did not include the role of municipal administration for a sustainable development (Kirst, Trockel and Heinrichs 2014: p.558; Kopatz 2003: p.16).

Hence, the lack of a comprehensive integrative sustainability management in German municipalities seems unfortunate. Sustainability issues have appeared more relevant at a majority of municipalities during the last decade. Based on sustainable management instruments, some municipalities do have installed sustainability management mechanism to a certain extent (Beck, Heinrichs and Horn 2012: p.11-12; Schaltegger 2009), which do not satisfy claims of an integrative approach. Pilot schemes of integrative approaches such as the 'Projekt21' (ICLEI 2007) provide glimpses, but only tentatively cast off traditional structures and processes (Kirst, Trockel and Heinrichs 2014: p.559). A study by the 'Institut für den öffentlichen Sektor' notes that only a fourth of the municipalities even regularly follow a sustainability strategy (Beck, Heinrichs and Horn 2012: p.18). Lagging a sustainability strategy, the development and compilation of goals or the management of projects including numerous actors and stakeholder is hardly feasible.

**Strategies for Sustainable Development**

According to the definition by the OECD (2001: p.25) a strategy for sustainable development comprises:

A co-ordinated set of participatory and continuously process of analysis, debate, capacity-strengthening, planning and investment, which seeks to integrate the short and long term economic, social and environmental
objectives of society through mutually supportive approaches wherever possible and manages trade-offs where this is not possible.

Practically, a sustainable development strategy consists of the following components (2001: p.17):

- Regular multi-stakeholder fora and means for negotiation;
- A shared vision and set of broad strategic objectives;
- A set of mechanisms to pursue those objectives in ways that can adapt to change (notably an information system; communication capabilities, analytical processes; engagement; and co-ordinated means for policy integration, budgeting, monitoring, and accountability);
- Principles and standards to be adopted by sectors and stakeholders, through legislation, voluntary action, market-based instruments, etc.;
- A secretariat or other facility with authority for co-ordinating these mechanisms;
- A mandate for all above from a high-level central authority.

Initiated by the introduction of the national strategy for a sustainable development of the federal government of Germany, a growing number of federal states (e.g. Baden-Württemberg, Bayern, Hessen, Niedersachsen, Rheinland-Pfalz) set up sustainability strategies, although the most are in an early stage (QUITZOW 2011: p.123-124). Against this background, there are only exemplary cases of cities and municipalities that have developed sustainability strategies. Evidently, municipalities in Germany often fundamentally lack processes defining strategic and consistent goals in respect of striving for a sustainable development (BECK, HEINRICHS AND HORN 2012: p.18). Difficulties addressing sustainable development in an adequate strategy originates in "little documented experiences in most countries of developing such mechanisms and there are not tried and tested methodologies" (OECD 2001: p.23). Furthermore, a more pressing concern of German municipalities is the evaluation of costs in establishing institutions or processes to move towards a sustainable development (e.g. regular fora for participation, time and effort to engage in the process, mechanisms for collecting information) (2001: p.23-24).

All these issues need to be taken into account in steering a track towards sustainable development. They cannot be effectively dealt with an ad hoc or piecemeal basis. They require a strategic approach (2001: p.24).

The OECD (2001: p.43-45) especially remarks that
Strategies should be built on the analysis of key challenges and their underlying causes, the actual or potential short- and long-term impacts of approaches to deal with them, and corresponding policy and institutional frameworks. A careful analysis of links between local and national levels, and between national and global concerns is of particular importance to identify options for policy and institutional reforms. It should be backed by effective communication with stakeholders.

Recognizing this fact, the lack of processes for the development of sustainability strategies in municipalities presumably traces back to weak, low or non-existing technical capacities and methodological skills that are required for such an analysis and long-term planning (OECD 2001: p.44).

1.1.2 Qualitative System Analysis

The Qualitative System Analysis (QSA) has the potential to be exactly the type of approach that supports profound decision-making due to its knowledge-integrating, holistic and systemic nature. QSA characterizes, describes and analyzes the systemic components such as drivers and the interrelations between these factors. As such, it can assist municipalities in developing a comprehensive sustainability strategy. Nevertheless, QSA is a method that requires effort in administrational and organizing work (e.g. setting up expert workshops), consumes a large amount of time (e.g. describing the impact interrelationships) and is still very much grounded in a scientific surrounding (degree of complexity is very high). German municipalities often do not have the assets or competencies do cope with these challenges. In consequence, the QSA requires an assessment and eventually an adaptation concerning the applicability in the context of a system of 'Integrated Sustainable Management' in German municipalities.

Qualitative System Analysis - learning system, complexity, uncertainty, system dynamics, problem structuring

The Qualitative System Analysis as a term and a method frequently appeared during the last decade in a set of methods and procedures of the 'Transdisciplinary Case Studies' tackling complex and contextualized problems (Scholz and Tietje 2002; Scholz et al. 2006: p.238-246). However, the idea of the Qualitative System Analysis originates in Peter Checklands (1999) 'Soft Systems Methodology', various problem structuring methods (Rosenhead and Mingers 2001), system dynamics (Forrester 1971) and other systemic natural and social science methods (Scholz et al. 2006, Boman et al. 1997). A brief introduction of these methods enhances
the understanding of the QSA’s reasoning:

1. **Soft System Methodology** by Peter Checkland

   Soft Systems Methodology (SSM) originally provides an alternative system analysis to the traditional approaches of operational research. Known as ‘hard systems thinking’ that entails starting from a carefully defined objective or well-structured problem, traditional operational research applied empirical methods of natural sciences to real-world situations in a systematic manner, exploring how the objective might be achieved by manipulating the model. In contrast, ‘soft system thinking’ recognizes the world as a set of disorganized, confusing and complex realities that are perceived differently depending on multi-perspectives. Consequently, ‘Soft Systems Methodology’ is conceived as a ‘learning’ system aimed on learning about complex problems, finding purposeful actions and interventions for improvement in the situation.

   Practically, SSM is a series of seven steps or stages as represented in figure 1.1. Special attention should be directed to the division between the real-world situation, perceived as chaotic and complex, and the theoretical systems thinking that structures the situation and the thinking about it. Differences between the models and reality become the basis for planning changes (CHECKLAND AND SCHOLES 1998: p.1-17; CHECKLAND).

   ![Figure 1.1: The '7-stage' representation of SSM](image)

2. **Problem Structuring Methods** by Jonathan Rosenhead and John Mingers

   Jonathan Rosenhead and John Mingers (2008) provide a repertoire of methods for making progress with ill-structured problems. The so-called problem structuring methods (PSM) help with organizational problems of today and tomorrow by using appropriate forms of analysis. Decision-making in respect to this kind of problem situations takes place in conditions of complexity and uncertainty. ROSENHEAD and MINGERS present methods that originate in the contrast or in the crisis of traditional forms of tackling problems in
operational research, which emphasize a ‘technical-fix approach to problems of attaining pre-set goals in an efficient way, on the assumptions that the context remains constant or is knowable, that the goals are not contested, and that there is complete control over implementation’ (ROSENHEAD AND MINGERS 2008: p.10). PSMs are almost opposing. They are non-optimizing and rather seeking alternative solutions which are acceptable on separate dimensions, have a reduced data demand through the integration of hard and soft data with social judgments. Furthermore, they focus on simplicity and transparency and conceptualize people as active subjects. PSMs accept uncertainty (ROSENHEAD AND MINGERS 2008: p.1-10).

A problem context with attributes such as the involvement of multiple actors, multiple perspectives, conflicting interests and intangibles, requires methods that permit alternative perspectives and participative approaches that support commitment. The traditional methods are rather unhelpful and PSMs offer appropriate methods that outline possibilities, explore solution spaces or may illustrate scenarios (ROSENHEAD AND MINGERS 2008: p.14-15).

A great advantage of PSMs is the realization of its full potential in use with groups for example in a workshop format. The models are developed, integrated and transformed through the collaboration of the modeller and the group. In this case, the ‘analyst’ does not work in a back-room, but is responsible for the development of the model and for the constructive management of the group dynamics. Perceived as an iterative process, the model sees new versions until it is seen as adequate and finally becomes the property of the group. Already the process enhances the commitment of the involved stakeholders (ROSENHEAD AND MINGERS 2008: p.13-14).

3. System Dynamics by Jay W. Forrester

The basis of system dynamics was developed in the late 1950s by Jay Forrester. Initially, reflecting industrial systems, his work expanded to the analysis of the development of cities and the industrialized world (FORRESTER 1973). Especially, with the better quality of graphical software, system dynamics gained popularity and introductions to modern uses (ROSENHEAD AND MINGERS 2008: p.276).

Basically, system dynamics recognizes that "the behaviour of systems is seen as resulting not from the nature of the components themselves but from the relations between components" (2008: p.276). "System components are related to each other in multiple, complex ways, while cause and effect are not localized but often distant both in space and time, chains of influence are not linear but circular leading to positive and negative feedback" (2008: p.276).
Thus, the understanding of system behavior is rather counterintuitive and system dynamics may help to learn about the system, and use the models to investigate potential shifts and consequences of changes. Consequently, the models can be used to test different policies and strategies (2008: p.276-283).

*Qualitative System Analysis* is a systemic approach that identifies and describes impact factors and analyzes and illustrates the interrelations and interdependencies among these factors. It is an appropriate form of analysis for socio-technical systems that are too complex and dynamic for a quantitative analysis and modeling. The QSA provides a holistic, systemic understanding which enhances decision-making in problematic real-world situations with not necessarily known objectives. It unfolds its full potential in the participative characteristics as the method emphasizes the integration of different and manifold perspectives and knowledge, e.g. through group-model building. The connection to participation and involvement techniques within the QSA offers the opportunity to exchange information between stakeholders and particularly negotiate and mutually learn from each other. Hence, the developed system models are perceived as learning systems, constantly requiring adoptions depending on potential interventions based on the gained system insights. In general, QSA can be applied for knowledge integration, comprehensive system analysis, scenario construction, decision making and strategic planning in various fields (Wiek, Lang and Siegrist 2008: p.989; Lang et al. 2006: 108-110; Scholz and Tietje 2002: p.79-102).

**The steps of Qualitative System Analysis in detail**

The application of a *Qualitative System Analysis* basically consists of two steps: [1] the identification and selection of system variables and [2] the qualitative analysis of the mutual interactions among the variables (Wiek et al. 2008: p.990). The specific steps shall be briefly explained:

*Identification and selection of system variables*

The identification, selection and description of impact variables is an important and crucial step. The overall aim is the development of a sufficient set of variables, also called system variables, impact factors or case descriptors, for a proper description and modeling of the current state of a case or situation (Scholz and Tietje 2002: p.89-92). Depending on the goals and the context, there are more or less formalized and participatory methods, ranging from guided interviews, focus groups, agent-based modelling, cognitive mapping and group model building to the development of a common document (Newig et al. 2008; Vennix 1999), that can assist at the identification of impact variables. Additionally, these methods do just to the knowledge integrating character of the QSA, respecting multi-perspectives
and different types of knowledge. However, it is crucial to aspire precision and completeness. Usually, the analyst, modeller and the group end up with about 20-30 variables of different qualities of scaling and different domains. It is recommended in terms of practicalities for a comprehensive analysis to cluster, order and eliminate impact variables. Completing the step of identifying and selecting variables each variable needs a brief and crisp definition (Scholz and Tietje 2002: p.89-92).

**Impact Description and Analysis**

The basis for an analysis is the formation of an impact matrix that helps to describe the direct impact strength of each variable on the others.

Each cell of the matrix contains information about the strength and quality of the impact between two variables. Each variable defines a row and column of the matrix. A row indicates the impacts of a variable X on the other variables, whereas a column indicates the impacts of the other variables in variable X. (Wiek et al. 2008: p.990)

The scaling is subjective depending on the case-specific, scientific other available knowledge as there is no natural scale for judging impact strength. Theoretically, any kind of scaling is possible, it is of great importance to choose a scaling appropriate for the degree of detail and available information. It is common to use a three-digit ordinal scaling: 0=no or very little impact, 1=medium impact and 2=high impact. The judging group must always be aware of some prerequisites: It is of crucial importance to assess only the direct impacts of one variable on another, excluding any indirect impacts. This rule implies the consideration only of causalities instead of correlations. A judgment considers only the current state underlined with as much information as possible and case-specific information in contrast to general relations. As the formation of the impact matrix is performed in a group, there are risks of shifts within the group. One must be aware of these potential shifts while filling out the matrix pressing for consensus on every rating (Scholz and Tietje 2002: p.92-98; Wiek et al. 2008: p.990-991).

For the analysis the impact is processed using an MicMac-Analysis (Scholz and Tietje 2002: p.102-104), which yields in insights of activity and passivity of variables as well as in their systemic significance. The latter may be illustrated graphically in a system grid that is partitioned into four sectors or categories (Lang et al. 2006: p.110):

- **Active variables** strongly influence the system and are only slightly influenced themselves by the system. They are powerful regulators.

- **Ambivalent variables** are influenced by the system, but likewise strongly influence the system. They are 'catalyst' of the system.
• **Passive variables** are strongly influenced by the system and are suitable as indicators that illustrate effects of change in the system.

• **Buffering variables** are neither strongly influenced nor do they strongly influence the system. Thus, they may not be important for the understanding system behavior.

A graphical illustration "may cause a crucial change in communication" (Scholz and Tietje 2002: p.98). Another graphical representation is the system graph. It presents a structural view of the system model as a structured network (2002: p.98-100).

"[...] the system graph can reveal regulatory mechanisms of the system by visualizing the interferences of the impact factors. When analyzing the regulatory mechanisms it is possible to select relevant mechanisms based on: (i) the importance of the impact factors involved, (ii) the theoretical assumptions that impact factors of all domains should be included, and (iii) the explanatory power for a given question." (Lang et al. 2006: p.110)

The impact analysis is assisted by a suitable analytical software such as SystemQ by Systaim GmbH (2015) from Zurich.

**QSA in context of sustainable development and sustainability strategies**

The history of sustainable development originates in the early 18th century with Hans Carl von Carlowitz and the question of sustaining one of the most crucially important resources of that time - lumber. However, in mainstream scientific and popular discourses the concept of sustainable development emerged just recently in the late 1980s, and by the 1990s sustainability and sustainable development has turned into a common term. It has been defined in various ways, but the most accepted definition of sustainable development is that of the Brundtland Commission (Grosskurth and Rotmans 2005: p.136; WCED 1987: p.54):

"Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs."

As such, it is characterized by an openness-to-interpretation and thus resulted in numerous guiding principles and the chance to interpret it in various, not necessarily consistent, perspectives. Especially as a political definition it contains inevitable problems, particularly the normativeness, subjectivity, ambiguity and complexity (Grosskurth and Rotmans 2005: p.136).
CHAPTER 1. INTRODUCTION

QSA is designed to cope with such issues. It considers and integrates different perspectives and \textit{Weltanschauungen} and helps to understand and structure complexity. As such QSA has the potential to be the type of approach that supports profound decision-making to its knowledge-integrating, holistic and systemic nature. Against this background, the method qualifies to support efforts for sustainable development through providing a system understanding and revealing potential points of leverage. \textsc{Grosskurth and Rotmans} (2005: p.138) frame it likewise:

> Any approach should, as an end result, not only highlight the driving forces of sustainable development, but also the levers available to influence the system in cooperation with those who handle these levers.

In this manner, QSA can support the development of sustainability strategies in German municipalities as it may be one of the analysis tools demanded (OECD 2001: p.43-45) for a strategic approach for a sustainable development.

\textbf{Applicability of QSA}

Beyond a general system understanding QSA entails the opportunity to identify points of intervention with a potential leverage effect for the system. The knowledge about points of leverage in the system give rise to a comprehensive policy and strategy development. The \textit{Qualitative System Analysis} has been applied in multiple and different contexts and occasions. Several examples are known such as the emergence of nanotechnology in Switzerland (\textsc{Wiek, Lang and Siegrist} 2008), the case study on the Swiss canton ‘Appenzell Ausserrhoden’ (\textsc{Scholz et al.} 2003), the material flow management in bio-waste delivery (\textsc{Lang et al.} 2006), urban development within the ETH-UNS case study Zurich North (\textsc{Scholz and Tietje} 2002) or lately in a project on integrated sustainable management in German municipalities (\textsc{Heinrichs} 2015). The application of the \textit{QSA} mostly took place in a transdisciplinary setting thus based on a close interrelationship and exchange between scientists and practitioners. Considering the given potential of a \textit{Qualitative System Analysis}, it is of interest to strive for an investigation on the applicability of \textit{QSA} in different context, settings, institutions and organizations without the dependence on scientific companionship. However, as practical applications of ‘Problem Structuring Methods’ have shown (\textsc{Mingers and Rosenhead} 2004; \textsc{Rosenhead and Mingers} 2008) the transfer of the \textit{QSA} from a scientific tool to an applicable tool in support of decision-making is conceivable project.

A transferability of the \textit{QSA} from academia is not given naturally. The method is heavy in time consumption and workload. Especially, the time, financial and personnel resources required to set up an environment for the application of the \textit{QSA} is very high. Workshops and fora need to be organized and moderated,
willingness for communication must be given, processes of consensus building with multi-perspectives, various stakeholders, different types of knowledge along with the known risks of group behavior need to be considered. Furthermore, there is the inherent risk that results are still too complex and difficult to understand and communicate. A municipality does not necessarily have the competencies (skilled practitioners, technical abilities), resources (financially, human resources) and time in order to transfer the method of the *Qualitative System Analysis*, e.g. for the purposes of the development of sustainability strategies.

### 1.2 Scope of research

The interest of the thesis evolves from two aspects: [1] German municipalities often lack the processes for the development of sustainability strategies that are necessary for further actions to be taken and [2] the method *Qualitative System Analysis* has the potential to assist these German municipalities in sustainability strategy development, but is not generally transferable in practical terms to everyday administrative actions.

German municipalities are adapting their traditional management mechanisms towards higher effectiveness and more efficiency. However, there are stories of success, still, they are struggling to integrate principles of sustainable development. Municipalities already show a lack in proper processes to develop strategic goals. In consequence, when establishing and developing a system of an 'Integrated Sustainable Management’, municipalities particularly require and need to incorporate tools that support the development of strategic goals towards a sustainable development in order to lay the foundation for specific tasks, instruments and measurements.

There is not only a lot of potential in a system of integrated sustainable management for German municipalities in general, but there are already tools in existence that have the potential to set up, perform and monitor such a system. The elements and requirements of an 'Integrated Sustainability Management’ are described in section 1.2.3. In respect to identifying and developing strategic goals, the method often known as *Qualitative System Analysis* promises to be a supportive and expedient tool. Nevertheless, *QSA* is a method that requires effort in administrational and organizing work (e.g. setting up expert workshops), consumes a large amount of time (e.g. describing the impact interrelationships) and is still very much grounded in a scientific surrounding (degree of complexity is very high). German municipalities often do not have the assets or competencies do cope with these challenges. In consequence, *QSA* requires an assessment and eventually an adaptation concerning the applicability in the context of a system of 'Integrated Sustainable Management’ in German municipalities.
1.2.1 Research question of the thesis

The thesis seeks to contribute to the attempt of designing and implementing an exemplary 'Integrated Sustainable Management' in German municipalities as targeted in the research project at the Leuphana University Lueneburg "Nachhaltige Kommunalverwaltung in Deutschland" (see section 1.2.3). It strives to analyze and assess the method Qualitative System Analysis in terms of transferability and implementability in German municipalities considering the chances of such tool to be an expedient support for sustainability strategy development. Since the possibility of an implementation and integration of QSA in the context of everyday administrative action in principle is not naturally given, it is necessary to outline hindering factors for an integration and how the method must be revised in order to dismantle these barriers. Likewise, it is of importance to identify and outline specific starting points for a comprehensive integration of the method in the city administration’s context. The analysis will focus on the municipality Ludwigsburg (see section 1.2.2) and benefit from the city’s relative progress among other municipalities in Germany reflecting its experiences in developing a comprehensive public ‘sustainability management’.

Considering the given and described context, the guiding question for the proposed thesis reads as follows:

How must the tool Qualitative System Analysis be advanced in terms of applicability in order to assist decision-making in an 'Integrated Sustainable Management' for the municipality of Ludwigsburg?

• Which challenges, barriers or hindering factors emerge from the perspective of Ludwigsburg? What are potential steps to dismantle these?

• What are possible points of integration of such a tool within the already existing structures of sustainability management of the city?

1.2.2 The example presented in the thesis - 'Ludwigsburg'

As the case example of this thesis, Ludwigsburg is not a random selection. It is rather a choice based on the city’s outstanding efforts for a sustainable urban development, which received a national acknowledgement underlined by the "Deutscher Nachhaltigkeitspreis 2014" (Stiftung Deutscher Nachhaltigkeitspreis e.V. 2014). They introduced a new urban development concept developed hand in hand with the community of Ludwigsburg, which includes a re-organization of the
municipal administration enhancing an ‘Integrated Sustainability Management’. Ensuring its actuality, the concept constantly sees a revision and advancement in collaboration with the city’s citizens. Within this concept, the department "Nachhaltige Stadtentwicklung" plays a prominent role. It is directly assigned to the senior mayor and is the central organ responsible for the implementation of the ‘Sustainability Management’. Ludwigsburg qualifies as a suitable case example, not only as a leading city in a group of municipalities including Freiburg and Lüneburg. Especially, the comprehensive ‘Integrated Sustainability Management’ in place provides a basis for investigations on the applicability of a Qualitative System Analysis as a potentially crucial part in a ‘Sustainability Management’ system of this kind.

The process of bringing the city of Ludwigsburg on tracks towards a sustainable development, evolved in 2004 and is conceived as a ‘learning process’. From developing, defining and describing the basics for a sustainable urban development, through manifold modes of civic involvement to the concrete implementation, the process rests on the close exchange between the municipal administration as the initiator and driver, the municipal council guiding and controlling and the citizens, whose impulses contribute significantly to the process. A strong emphasis on community outreach, participation and transparency characterized the dialog events, future workshops and discussion panels between 2005 and 2006, which resulted in the identification of the key topical areas to be discussed and tackled in the following years. A ‘Masterplan’ for each of the eleven topical areas described the guiding principles, assigned responsibilities and named key partner, defined strategic goals and provided specific actions and tasks to be taken. Together, they constitute the urban development plan called ‘Chancen für Ludwigsburg’ (Chances for Ludwigsburg), which embodies the common ground for the administrative behavior (Spec, Geiger and Kurt 2010: p. 265-268).

To ensure that the guiding principles are followed, advanced and eventually modified, a management cycle has been developed that consists of five steps being repeated every two to four years (2010: p. 270):

1. **Inventory**: evaluation of the situation
2. **Target definition**: advancement of the strategic goals
3. **Political resolution** by the municipal council
4. **Implementation** of the ‘Masterplan’ plans
5. Indicator-based **reporting** and evaluation

Recognizing the city administration as an important driver, Ludwigsburg initiated
a re-organization of the municipal administration in order to improve the management cycle and particularly manage the tasks and challenges given by the urban development plan of the city. Therefore, the city’s administration established the department ‘Referat Nachhaltige Stadtentwicklung’ in 2008 that merge the newly developed tasks. The interdisciplinary department is directly assigned to the senior mayor and does justice to its integrative character due to its links in all departments. Generally, its tasks are structured in three topical fields: economic promotion, integrative urban development, and Europe and energy (2010: p. 273-274).

Among few other municipalities in Germany (Rat für Nachhaltige Entwicklung 2015) the city of Ludwigsburg takes an innovative role in respect of paving the way for a sustainable urban development. Conceptualized as a learning process and recognizing the importance of civic involvement, Ludwigsburg has re-organized its municipal administration substantially. The development of an ‘Integrated Sustainable Management’ performed, constantly advanced and modified by a cross-sectoral department illustrates the municipalities efforts for a sustainable development and sets Ludwigsburg apart other municipalities in Germany. Consequently, the atmosphere and interest for new approaches is given by the general interest for sustainable development and the willingness to learn and advance, but especially an ‘Integrated Sustainable Management’ system in place provides the suitable condition and starting points for research on the applicability of a Qualitative System Analysis.

1.2.3 The project ‘Nachhaltige Kommunalverwaltung in Deutschland’

Even though German municipalities missed chances to incorporate principles of sustainable development together with the general modernization at the first place, more and more municipalities have recognized and are tackling issues of sustainability more or less by now (Beck, Heinrichs and Horn 2012: p.14). Often the municipalities have undergone various, different and unique approaches in respect to establishing a system of sustainability management (Rat für Nachhaltige Entwicklung 2015) illustrated by the manifold cities awarded with ‘Deutscher Nachhaltigkeitspreis’ over the past few years (Stiftung Deutscher Nachhaltigkeitspreis e.V. 2015). While a lot of approaches evolved in a process of trial and error, different research projects are striving to provide some guidance (Kirst, Trockel and Heinrichs 2014: p.559) with generally transferable principles, requirements, tools and measures for an ‘Integrated Sustainability Management’ for municipal administration. According to the research project ‘Nachhaltige Kommunalverwaltung in Deutschland’ (Beck, Heinrichs and Horn 2012, p.7; Heinrichs 2015), a mission statement and its realization in specific goals, an indicator-based monitoring, an informative reporting system as well as a systemic integration of sustainability challenges in the organizational setup and
processing are key elements of an 'Integrated Sustainability Management'. The research project at the Leuphana University is lining up to work out and implement a best practice approach of an 'Integrated Sustainable Management' for German municipalities based on projects in key issues (accounting, energy management) in Freiburg, Germany and Lueneburg, Germany. Analyzing opportunities and limits of a systematic integration of sustainability as principle of action for the municipal administration, the project aims for an approach viable and adequate for the problem’s complexity and democratic-representative aspirations as well as the municipal administration’s structural and processual setup (Beck, Heinrichs and Horn 2012, p.7).

The method *Qualitative System Analysis* has been comprehensively applied during the phase of strategy development for the two exemplary cities of Freiburg and Lueneburg. The research team and their partners derived a set of impact variables that describes the elements of an 'Integrated Sustainable Management'. This set reflects key elements, requirements and demands on a management system of this kind. The impact variable set as well as a draft of the system analysis of Freiburg sustainability management’s status quo build a basis for the research design and methodology (see chapter 2) of this thesis and are available in the appendix (see chapter 8.2) in German language.

### 1.3 Outline

The thesis’ topical background is given in the chapter 1.1 and the section 1.1.1 ‘municipal administrations and the process towards a sustainable development’ and section 1.1.2 ‘Qualitative System Analysis’. Chapter 2 ‘Research Design and Methods’ provides an overview of the underlying methodological approach. The latter is distinguished in two steps, reflected in two personal meetings with a representative of Ludwigsburg. First, a description of the small, sample QSA (see section 2.1) with Ludwigsburg and its purpose in preparing the expert interview (see section 2.2), which constitutes the second methodological step. The expert interview takes a central role for the analysis in the chapter 3. The chapter 'Results and Analysis' illustrates the results from the exemplary QSA and the expert interview and will finally synthesize the significant results. Finally, the results will be discussed in respect to the research question (see chapter 4).
2 Research Design and Methods

The thesis’ analysis consists of two consecutive methodological steps. The first is a prerequisite in preparation of the second step. Each step requires a close contact and dialog with the practice partner in Ludwigsburg to ensure his basic understanding of the thesis’ interest and enable him to participate and reflect the potential applicability of a *Qualitative System Analysis* in Ludwigsburg. Meanwhile, the tight collaboration facilitates a comprehensive conception of Ludwigsburg’s sustainability management in respect to past, current and future developments, and the processual and structural conditions of the municipality’s administration.

The first step, described in the following section 2.1 'The sample 'Qualitative System Analysis’ for Ludwigsburg’, aims to enable the practice partner to reflect and discuss the method *QSA* in terms of applicability in the context of Ludwigsburg. A provision is made for a separate meeting dedicated to this only purpose as the reflection on the practical applicability of a scientific method such as the *QSA* is hardly feasible if the practice partner has never applied the method himself. Thus, a discussion beyond theoretical terms would not be conceivable. The sample *QSA* serves the purpose of introducing the theoretical background of the method while ensuring an adequate degree of practical application. The introduction of the method via a sample analysis stays within the scope of the bachelor thesis although a comprehensive analysis would be ideal.

The semi-structured expert interview as the second step (see section 2.2) seeks to gather the information needed in order to answer the overall research question. The expert’s information constitutes the thesis’ central data source striving to integrate the expertise in sustainable management in a municipal administration and the local knowledge about the municipalities context.

Overall, both steps focus to do justice to a research along an example.
2.1 The sample ‘Qualitative System Analysis’ for Ludwigsburg

The sample *Qualitative System Analysis* is a significantly reduced and adapted analysis for explanatory and illustrating purpose for the first meeting with the representative from Ludwigsburg. As expressed by the term ‘learning by doing’, the sample QSA aims to enhance the discussion about the method generally as well as in respect to an application in Ludwigsburg. The analysis is performed assisted and accompanied, i.e., explanations and instructions are provided while the representative is invited to raise questions to overall impart a better understanding of the idea, reasoning and functioning of the analysis. A basic comprehension is crucially important as prerequisite for a reflection of the method’s potential applicability in Ludwigsburg.

The representative of Ludwigsburg’s municipal administration received a brief written description of the QSA consisting of a general explanation of goals, the idea and potential use, and a brief application guideline stating basically the two major steps of the analysis. Additionally, he received a detailed oral introduction in the beginning of the meeting. At every point of the conversation, the representative had been invited to raise questions. Likewise, he presented the development and core elements of the municipality’s sustainability management facilitating the understanding of Ludwigsburg’s efforts towards a sustainable development. The introduction of both perspectives contributed to a constructive, professional and learning-focused discussion over the entire first meeting.

The sample analysis itself did not comprise an identification of variables as it would usually be the first step for a QSA. Instead, the basis of the sample analysis is the variable set of the research project *Nachhaltige Kommunalverwaltung in Deutschland* (see Appendix 8.2) and the first draft of the analysis from Freiburg. Simplifying the actual analysis, the sample analysis is based on a strongly reduced set of variables as visible in table 2.1. The reduction of the original set and the selection of the variables took different criteria into account: the consideration of various dimensions, the significance within the Freiburg analysis and the recommendations of Ev Kirst, who is involved with the research project *Nachhaltige Kommunalverwaltung in Deutschland* and holds suitable background knowledge (Kirst, Trockel and Heinrichs 2014). The selected variables gave rise to the corresponding impact matrix. Utilizing a scaling from 0-2, whereas 0 attributes no impact, 1 a low impact and 2 a strong impact between one variable on another, the representative from Ludwigsburg evaluated the current state of Ludwigsburg’s sustainability management.

The data processing and analysis did not take place during the meeting and has been
prepared in-between the first meeting and in preparation for the expert interview. However, the software had been illustrated and explained in order to at least provide a glimpse of the software-based data processing and analysis. The results have been transmitted to Ludwigsburg’s municipal administration a few days after, providing him the opportunity to examine particularly the graphical representation of the analysis’ results. SytemQ by Systaim GmbH (2015) from Zurich has been used to assist the impact analysis.

Table 2.1: Reduced variable set for the description of the municipal sustainability management including a German translation

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Impact Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception and target system</td>
<td>• understanding of sustainability (Nachhaltigkeits-verständnis)</td>
<td>▶ Consistent understanding of the meaning of the term sustainable development within the municipal administration</td>
</tr>
<tr>
<td></td>
<td>• role of leadership personality (Rolle der Führungspersönlichkeit)</td>
<td>▶ The administrative leaders proactively, systematically support the municipal sustainability strategy in a conscious manner by integrating it into their own field of responsibility, meanwhile they support the staff with the implementation</td>
</tr>
<tr>
<td>Organization and processes</td>
<td>• sustainability communication (Nachhaltigkeits-kommunikation)</td>
<td>▶ Diversity of channels, frequency and content of strategic communication of sustainability issues</td>
</tr>
<tr>
<td></td>
<td>• Participation and cooperation (Partizipation und Kooperation)</td>
<td>▶ Coordination of opportunities for creating acceptance, involvement of administrative-external resources and expertise of actors such as NGOs, local economy, local media, civic society and citizens</td>
</tr>
<tr>
<td>Organizational culture, human resource management</td>
<td>• employee participation (Mitarbeiterbeteiligung)</td>
<td>▶ Integration of subject relevant employees in decision-making processes</td>
</tr>
<tr>
<td></td>
<td>• willingness for reform (Reformbereitschaft)</td>
<td>▶ The willingness of municipal administration to evaluate additional value of reforms and potentially implement these</td>
</tr>
<tr>
<td>Influenceable external factors</td>
<td>• future trends and technological as well as social innovation (zukünftige Trends und Herausforderungen)</td>
<td>▶ The systematic consideration of future technological and social innovations within decision-making as well as assessing a possible implementation within the sustainability management</td>
</tr>
</tbody>
</table>
2.2 Expert interview

A semi-structured, responsive expert interview with open questions (Berg 2009: p.107-119, 128-149; Rubin 2012: p.95-101) has been conducted. The underlying reasoning has been to refer to the context-specific knowledge of Ludwigsburg’s administrational structure and organizational processes as well as everyday administrative actions in general. The interview’s focus lied on the link between the administrative context and the potential applicability of a *Qualitative System Analysis*.

An expert interview in general is a form of the guided interview and distinguishes itself by concentrating on the interrogation of an expert. An expert is a person who excels in a specific topical field. Usually, the expert interview as a method is used in order to underline a set hypothesis or as data basis for a scientific piece of work. Thereby, the interviewer’s interest lies on the special function and role of the expert in his/her field, his/her experiences or both. The expert is characterized by his/her professionalism, his/her connections to other subject and thematic-specific persons and holds a broad overview of knowledge and experience in his/her specific field (Mayer 2008: p.37-42; Bogner, Littig and Menz 2009: p. 7-17).

The expert interview has been chosen as a method that generates the required information quickly (Bogner, Littig and Menz 2009: p.8-10). The question of the practical applicability of the scientific method *QSA* can only be resolved with the contextual and practical knowledge, in this case the everyday administrational actions of Ludwigsburg. Furthermore, the semi-structured, responsive expert interview is flexible and open enough in order to do justice to an explorative character. The interview as exploration enables the chance to retrieve and reconstruct so far not known subjective and objective information and facts (2009: p.64-65; Lamnek 2010: p.316-320). The major interest in the selection of the expert interview is the opportunity of interlacing prior knowledge of the *QSA* and the information to be compiled on the practical application of the method.

**The expert**

The representative from Ludwigsburg* is the head of the division for sustainable urban development, one of the three departments (besides business development, Europe and energy) within the department for sustainable development. He is a suitable expert, because: His professional responsibilities are located in the hierarchic structure of the municipal administration on an intermediate level. Thus,

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*This publicly accessible version has been anonymized. The name of the representative from Ludwigsburg is not given and has been replaced. The transcript of the interview has been removed.*
he holds connections and knowledge about decisions, structures and processes of upper levels (e.g. department head, council men) and lower levels (executing staff). The representative from Ludwigsburg has been originally employed with the municipality in the field of construction regulation and planning as a studied urban planner. With the emergence of the process in 2006 of establishing a 'Sustainable Management' in Ludwigsburg, he joined the process from this perspectives, but soon has been promoted to his current position. Consequently, he did not only experience the entire process, but was an active and affecting person. Overall, he is holding broad knowledge on 'Sustainable Management' in municipalities due to his involvement with the process in Ludwigsburg as well as the exchange with other municipalities and the information on the administrational processes, structure and developments of the 'Sustainable Management' in Ludwigsburg.

Summing up, he has the expertise and exclusive access to information and knowledge in a very specific field. Likewise, the interviewer is a quasi-expert as he/she is required to intensively prepare for the interview and usually holds the academic knowledge in a specific field (Pfadenhauer 2009: p. 99-102). However, in the context of the thesis’ interest, there is a fundamental information asymmetry beyond the one given context and set up of an interview (Lamnek 2010: p.324): The representative from Ludwigsburg does not have any knowledge about the method QSA, which is crucially important for a reflection on the potential application. The knowledge on the method being on the interviewers side, this information gap has been resolved by a prior meeting exclusively assigned for the understanding of the QSA. The practical part has been covered with an exemplary analysis (see section 2.1).

Structure of interview

The questionnaire is attached to the appendix in chapter 8.1 in German language. The structure of the interview basically follows five stages. Each stage consists of main questions that provide structure to the interview in order to answer the research questions, not always, but often complemented with follow-up questions to get detail and depth (Rubin 2012: p.116-121). Probes questions that manage the conversation (keep interview on target, clarifications, etc.) are not part of the questionnaire and have been raised dependently on the course of the conversation. The five stages are:

1. Introduction/Easy Start: The past and future development of Ludwigsburg’s municipal administration in general and focused on sustainable development.

The first stage offers the chance to the interviewee to illustrate his expertise
and gaining a general overview of the specific characteristics of Ludwigsburg’s municipal administration.

2. **Sustainability Strategies**: Ludwigsburg has developed a set of comprehensive, topical-specific sustainability strategies. However, the publicly accessible strategy papers do not include a strategy paper for the municipal administration. Hence, the second stage has been dedicated to investigate the potential existence of a strategy for the municipal administration respectively the reasons for a lack of strategies. Follow-up questions aimed for information of the consideration of interrelationships of important elements (as transition to the QSA topic).

3. **Qualitative System Analysis - Introduction**: The introduction to the QSA topic included a brief summary of the first meeting and further inquiry whether the method has been understood, followed by a general opinion-seeking question regarding the tool QSA.

4. **Qualitative System Analysis - in detail**: This stage is designed as the main focus striving to investigate potential points of an integration of the QSA, hindering factors, necessary changes and adaptations. Several questions are structured along the context for an implementation and application, and the two methodological steps in detail.

5. **Finalization**: Has the interviewee found interest in the method or alike methods? The finalization included the opportunity for the interviewee to raise questions, give feedback or add additional information.

**Realization of the expert interview**

The interview has been conducted on March, 5th 2015 in the offices of the division for sustainable development in Ludwigsburg. The interview has been recorded and transcribed. Requirements and conditions for a proper interview setting and conversational partnership have been considered, including the ethical responsibilities. Rules, responsibilities and ethical issues have been clarified beforehand (Rubin 2012: p.71-92).

**Analysis**

The analysis of the responsive interview is carried out step by step from the raw data of the interview record to clear answers to the research questions. The individual steps are straightforward and follow the suggestions for data analysis of Rubin (2012: p.189-210), Lamnek (2010: p.366-371) and Mayer (2009: p. 47-51). The approach
is suitable as the purpose of the data analysis is the extraction of information that are directly answering the research question to some extent. The research question does not aim to illustrate interpretative patterns, ‘Weltanschauungen’ or linguistic specialties, which would require different and more comprehensive in-depth data analysis approaches (LAMNEK 2010: p.178-205, 434-446).

The carried out steps for the data analysis comprise:

1. **Transcription:** The transcription is rather technical and time-consuming, but nonetheless a crucially necessary analytical step. The audio recording of about 90 minutes is transformed into a written form in assistance with the software f4 (KOLLAN, PROESER AND NEUBAUER 2007). The transcript does not include and consider short or longer pauses, laughter, interruptions or non-verbal aspects as they are not of interest for the analysis (LAMNEK 2010: p.367-368).

2. **Individual Analysis:** After the transcription, the interview material is analyzed in detail aiming to concentrate the informative material.

   a) **Highlighting:** First of all, all text passages are highlighted that are obviously the answers to the according questions of the questionnaire. Furthermore, text passages that are more or less thematically relevant are highlighted as well.

   b) **Striking off and Reducing:** Trivialities and irrelevancies are struck off and following analysis will only consider the important highlighted passages. This step results in a strongly reduced and concentrated text.

   c) **Accentuating:** Particular and notable passages of special interest or information value are accentuated.

   d) **Commenting, labeling and coding:** The remaining text as well as considering the original interview transcript receives a commenting in respect to specialties, generalizable information or other important aspects (topically). The commenting may be consciously evaluative in order to carry out a first characterization of the interview. Highlighted and accentuated text passages are labeled/coded based on thematically appropriate codes and key words:

   • **Thematic classification:** Passages that are labeled 'thematic classification' connect the interview material with the overall research context of this thesis. Sub-topics and labels are targeting passages in respect to issues of municipal administration modernization, the relevance and emergence of sustainability questions, the develop-
ment of adminstrational sustainability strategies and the need for supportive instruments.

- **Context**: Passages that include information on the conditions and requirements for a practical application of a QSA in Ludwigsburg. Furthermore, information that may be linked to characteristic features of the method QSA are labeled within this category, too.

- **Potential points of integration/application**: A practical implementation for specific events, plans or systems in place that imply a practical application of a QSA as an approachable, manageable and supportive task. Furthermore, passages that indicate a point of potential integration that are not specified in detail and rather stay theoretical or have an unclear application field.

- **The identification and description of variables**: Information that is linked to the methodological step of identifying and describing impact variables.

- **Analysis**: Information that is linked to the methodological step of analyzing the interrelations among the impact variables.

- **Results**: Passages that provide insights on the derived results of a QSA.

e) **Sorting and resorting**: Along the selected labels and codes the material is sorted and resorted to summarize results, combine themes and information that belong together.

3. **Generalizing Analysis**: The purpose of the generalizing analysis is the view beyond single aspects towards more general understanding.

   a) **Summarizing and Integration**: Single aspects of the analysis are summarized to establish an overall logic and to integrate the derived information into the thesis’ context and the research question.

   b) **Topical-specific illustration**: Furthermore, the summary illustrates the derived information sorted thematically in respect to the research question.
3 Results and Analysis

3.1 The sample ’Qualitative System Analysis’ for Ludwigsburg

The following chapter summarizes the results of the sample Qualitative System Analysis for the current status of the sustainability management in Ludwigsburg. The analysis’ basis is the impact evaluation by a representative from Ludwigsburg performed as part of the first meeting in Ludwigsburg on 09.02.2015 reflected in the impact variable matrix in table 3.1. The results derived only provide a first idea and glimpses of interrelations and dynamics within the system of the sustainability management in Ludwigsburg due to the exemplary character of the QSA. Especially, the application with a reduced set of variables (see table 2.1) limits the derivation of comprehensive insights. In consequence, the results are hardly usable for an interpretation in respect to options or even recommendations for specific actions or strategies and the step is rather exploratory.

Table 3.1: Impact variable matrix of the sustainability management of Ludwigsburg

<table>
<thead>
<tr>
<th>Activity</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. understanding of sustainability</td>
<td></td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>2. role of leadership personality</td>
<td>2</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>3. Participation and cooperation</td>
<td>2</td>
<td>1</td>
<td></td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>4. sustainability communication</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>5. employee participation</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
<td>2</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>6. willingness for reform</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td></td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>7. future trends and technological as well as social innovation</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Passivity</td>
<td>9</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>11</td>
<td>12</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

0 → no impact; 1 → weak impact; 2 → strong impact
An overview of the causal network of the sustainability management in Ludwigsburg is illustrated in figure 3.1. The interrelations are represented by different thick arrows indicating a low and medium impact or a strong impact. A first glance reveals the obvious strong interrelations and impacts (Scholz and Tietje 2002: p.99-100). The variable ‘role of leadership personality’ as well as ‘understanding of sustainability’ unite numerous strong impacts bidirectional. ‘Willingness for reform’ and ‘participation and cooperation’ follow, while the variable ‘sustainability communication’ or ‘future trends and technological as well as social innovation’ do have a rather low impact respectively are slightly impacting other variables.

![Image of System Image and Causal Network](image)

Figure 3.1: System image and causal network of the sustainability management in Ludwigsburg with seven impact variables (for the variables’ description and translation see table 2.1)

The system image already highlights the different variables in different colors, which refer to the specific characteristics of each variable in the overall system. Yellow, in this case the variable ‘role of leadership personality’, indicates an active variable, which implies a variable that is highly active, and lowly passive. This means, the variable is strongly impacting the other variables in the system, while being almost not influenced by the others. In Ludwigsburg, the major and executive staff on higher organizational levels may be interpreted as the element with a potential leverage on the system. Four elements are highlighted as an ambivalent variable in a pink color. They are the most interlinked variables and are impacting other system variables and simultaneously impacted by others. Consequently, elements of
this category might behave critically in the system and eventually accelerate certain system behavior of positive or negative kind. The green-colored variable 'Sustainable Communication' is characterized by a low activity, but high passivity value. Hence, it falls into the category of passive variables that have low overall impact on the system, but may serve the purpose of indicators, because they are impacted by system behavior and dynamics. The last category of the buffering variables are least suitable for managing the system, as they are neither very active, nor passive. The latter category is not necessarily important for a system understanding. Hence, the variable ‘future trends and technological as well as social innovation’ are not relevant by all means to understand the system of sustainability management in Ludwigsburg (Lang et al. 2006: p.110).

Figure 3.2: System grid of the direct impacts (for the variables’ description and translation see table 2.1)

The transformation of the algebraic information of the impact matrix may be illustrated through a system grid, whereas the activity scores are displayed on the vertical axes and the passivity scores on the horizontal axes (Scholz and Tietje 2002: p.99). "The plane is divided by a vertical and a horizontal line through the mean activity and passivity scores. Hence, the impact variables are partitioned into four sets" (2002: p.99). Each of the quadrant and the variables within this quadrant are representing one of the characteristic categories explained in the previous passage. The system grid according to the information from Ludwigsburg is shown in figure 3.2.
By changing one variable in the system, it is likely to change other system variables in the system, too. The interconnected character of the system leads to indirect impacts on variables through another variables, and potentially induces a retroactive effect on the formerly changed variables. There are several of the so-called feedback loops in the system of Ludwigsburg. Figure 3.3 shows the feedback loop involved with the most important and strongest feedback loops. A general rule of thumb is: An impact that is involved in numerous feedback loops is particularly characteristic in the system. All impacts of this feedback loop require extra consideration and attention.

### 3.2 Expert interview

The results of the expert interview are based on the interview transcription and the analysis performed as described in section 2.2. The latter includes the labels that are used to thematically structure the presentation of the expert interview results.
The emergence of Ludwigsburg’s sustainability management and the need for supportive instruments in respect to strategy development

The municipal administration of Ludwigsburg used to be a traditional administration and appeared self-contained. Questions on past and current developments of the municipal administration revealed that it underwent fundamental changes since 2003. Major re-developments and organizational adaptations originated in a drive to open itself up outwards and relax rigid structures and processes. Guiding principles had been a comprehensive citizen involvement and approaches with integrative aspirations that resulted in adaptations of the administrative structures including the creation of new branches and departments. Current developments and future plans followed an extensive urban development and strategic concept.

As the key phrase "Die nachhaltige Stadt stellt der Zukunft keine Rechnung (The sustainable city does not invoice the future) indicates, the modernization in Ludwigsburg strongly evolves around sustainability issues that are arising from the community or the general societal circumstances. Guiding topics are the demographic change, the joint living of generations and nationalities, refugee issues or inter- and intragenerational justice. Consequently, the developments within municipal administration evolve from the attempt to manage these challenges and re-organizations take place future-oriented with citizen involvement as core element.

However, the organizational changes and re-developments were not uncontrolled, but have had a constant process of target setting. Although, not publicly accessible and officially announced, the municipal administration has a set of strategy papers. The thematic orientation ranges from budget consolidation, cooperation and exchange with other municipalities and the strategy paper under the name: innovative municipal administration. However, these strategy papers are not yet mandatory for the everyday administrational work or future developments. The representative from Ludwigsburg emphasized their temporary character and the current plan of processing these strategy papers, renew and refurbish the overall strategic direction guided by the principle of an 'inter- and intragenerational just’ municipal administration.

Against this background, the sustainability management in Ludwigsburg requires instruments that support decision-making for the growing complexity of re-developing the municipal administration. Especially, tools that help to set priorities, distinguish and rate importance and significance.
Requirements and contextual conditions for an application of the Qualitative System Analysis

The passages labeled 'context' yielded information that may be categorized in three topics:

- Links to characteristics of the Qualitative System Analysis
- Requirements and needs concerning the method for an application
- Requirements and conditions of the municipal administration in Ludwigsburg for an application of a QSA

Generally, the label 'context' is the most used when compared to other labels, especially in comparison to labels aiming to focus on the specific methodological steps of the QSA.

Links to characteristics of the Qualitative System Analysis

Ludwigsburg has eleven master plans that include numerous pages of goals and actions to be taken. The individual tasks are isolated and are strongly connected and interrelated to other tasks within the master plans, but especially to a broad set of administrational procedures. There is a management system in place that illustrates and displays, e.g., disruptions or malfunctions within the chain of procedures and stops all related processes. Processes are stopped that would otherwise lead to fatal errors or difficulties due to the disturbances in earlier procedures. The system in place helps to provide a general understanding of the relations between the administrational processes that are not necessarily linear, but rather diffuse over time and become quite complex. The systemic understanding illuminates disturbances, hence, highlights required decision-making and finally leads to selective solutions and acting. This operational principle is familiar to the design of the Qualitative System Analysis of a system understanding in order to enhance profound decision-making.

Further connections to the basic reasoning of the method becomes evident, too. The representative from Ludwigsburg recognizes that with a growing number of links, interrelations and interdependencies between these processes and numbers, the decision-making is characterized as a weighing-up process. He emphasizes that decision-making as trade-off requires a system that reduces and 'breaks down' complexity. This appears important as Ludwigsburg pursues to treat development in an integrative manner as well as following set targets integrated.

The analysis stresses that the factor of learning and a learning effect is crucially important for the so-called 'Ludwigsburger Weg' (the Ludwigsburgarian way). The importance of learning for Ludwigsburg appears rather in the context of the descriptions of the participatory processes and citizen involvement, which are the
fundamental core of the sustainability urban development in Ludwigsburg. From approaches of citizen involvement, the element learning seeped through especially in the beginning of the establishment of Ludwigsburg sustainability management, following the motto: 'learning by doing'. The learning effect arises particularly of the emphasis on extensive communication in respect to the dialog with citizen, but in various meetings within the administration, itself. The management system in place mentioned in the passages above serves as a communication tool, specifically as reporting tool. Alike, a QSA enhances the discussion and dialog between actors and facilitates a mutually beneficial learning.

Finally, the interview analysis showed the general drive to interlink the various approaches and management tools, which gives rise to the 'Integrated Sustainable Management' and 'Sustainable Urban Development' in Ludwigsburg in total. An isolated Quality System Analysis is probably of no comprehensive use either, but delivers its full potential in connection to other tools, e.g. in a set of methods and procedures of the 'Transdisciplinary Case Studies' tackling complex and contextualized problems.

Table 3.2: Key issues for an application of the Qualitative System Analysis from a contextual perspective

<table>
<thead>
<tr>
<th>Category</th>
<th>Link, requirement or condition</th>
</tr>
</thead>
</table>
| Links to characteristics of the Qualitative System Analysis | • Acting on a system understanding  
• Simplifying Complexity  
• Integrative approaches  
• Learning effect  
• Communication tool  
• Connection to other approaches |
| Requirements and needs concerning the method for an application | • Flexibility  
• Fast transmission of knowledge  
• Clearly and manageable arranged  
• Manageable pool of participants and variables  
• Application for a specific topical field, situation or occasion (simple frame)  
• Requirement of accompaniment |
| Requirements and conditions of the municipal administration in Ludwigsburg for an application of a QSA | • Leadership  
• Willingness  
• Staff  
• Human Resource Management  
• Provision of a coordinator  
• Finances  
• Information culture  
• Meeting Culture |

Requirements and needs concerning the method for an application
Overall, it shows that the method QSA in respect to an application in Ludwigsburg needs to meet a series of contextual requirements. However, a lot of these insights do not specify how to meet these requirements and rather state that they have to be met.

Flexibility is key in a quickly changing and moving administrative and societal frameworks. Instruments of any kind have to go with these developments or even more, assist the municipality to adapt their organizational structure along with the fast changes in order to be optimally positioned for new topics and changes. Decision-making in such an environment and under these conditions needs an instrument that is communicable on any level, from initiation (why is the instrument needed and for which purpose), to the performance and finally the results. Hence, it is necessary that the method is capable to quickly transmit the essential knowledge with information presented clearly and easy to understand. The representative from Ludwigsburg envisions a QSA that meets these requirements only if the analysis is applied with a manageable pool of participants and variables. Generally, comprehensibility and feasibility is crucially important. Otherwise, the method will require too much effort within the everyday administrational work.

The representative from Ludwigsburg mentions a condition that would be suitable for an application of a Qualitative System Analysis as additional assistance. An application is significantly more conceivable within a simple frame, which means an application specifically in a field of a certain topic, situation or occasion. An analysis for a wider system contradicts the feasibility and tends to be not manageable anymore. As soon as specific topics or goals are set such as the eleven master plans, it is the administrators responsibility to implement the plans, sections of the plans and the concrete projects. Questions arise on the handling, structuring and performing of the projects and tasks. In this context, the representative from Ludwigsburg sees the QSA as an instrument that supports the administration in critically assess these question and back-up decisions.

The design of the QSA is not self-explanatory. As the representative from Ludwigsburg illustrates that the coordination of the re-development in Ludwigsburg needs a "Kümmerer" (caretaker), who manages and moderates the development including the involvement of different actors. The application of the QSA requires support by a competent person. This person has the time, the knowledge about the method’s details and the competencies to impart the knowledge. Eventually, this person is asked to coordinate and moderate the method in its entirety.

Requirements and conditions of the municipal administration in Ludwigsburg for an application of a QSA
A major issue for the application of the QSA in Ludwigsburg is leadership. The role of leadership, the decision-makers and executive staff appeared several times during the interview. It has been recognized early on in the modernization process, the re-development of organizational structures or the establishment of an 'Integrated Sustainable Management' that the executive level has to back up and actively promote these developments. Likewise, the changes required the leaders to go with the changes and adapt ways of thinking, acting and guiding.

Consequently, even if an application of the QSA is possible in the way it is designed, but the leaders are not supporting the application or not convinced by its use, an ideal design does not matter at all. This implies a further issue. The issue of willingness. Sometimes people dislike change and rather prefer the status quo. The willingness to change something and cope with the eventual consequences is required for a QSA, too. The latter is not only demanded by executive staff, but also of the staff on lower levels, who perform the decided tasks and projects. Summarizing, the entire body of staff on all levels needs to be involved within the implementation as well as in the execution of the actual analysis. According to the representative from Ludwigsburg, a comprehensive human resource management perspective is needed that considers factors as flexibility, involvement or desired competencies. Especially, staff must be equipped with technical capacities and methodological skills.

Similar to the issue of leadership is the importance of finance. Financial concerns have been an issue during all parts of the interview, too. The representative from Ludwigsburg highlights that they do not have the financial resources as a public institution to apply every method. Attempts of applying methods following the guiding principle of trial and error is therefore not an option. The modernization and developments in Ludwigsburg always have been assessed by financial or economic criteria. The application of a QSA would be assessed on economic efficiency, too. Financial resources have not only to be provided in order for an application, but the implementation must justify its benefits to economic savings.

**Theoretical points for an integration of a QSA**

The interview outlined fields or action areas for an application of a QSA. There are two strands and a common and linking element to both of the outlined fields.
Firstly, a *Qualitative System Analysis* may be of use within the topical field of attuning the organizational structures in general. Secondly, concepts have no effect if not implemented. A QSA can help to prepare to optimally tackle and realize the decided concepts. However, both fields require a communication of plans and actions among the actors and particularly towards decision-makers that are comprehensively backed-up to justify the reasoning of planned steps of actions.

The framing conditions of the municipal administration is constantly changing at a rapid speed. According to the representative from Ludwigsburg this requires an evolutionary development along with the new demands, challenges and tasks:

> Ich denke wichtig ist es, dass man ein Bild hat von dem Organismus in der Form einer Amöbe, die sich dann eben auf diese Randbedingungen immer neu auch einstellen kann.

He stresses that the internal processes and procedures have not always been the focus of attention. But attuning to the new and changing conditions, lead to an optimization of the internal organizational structure and processes. Sustainability, particularly the topic of inter- and intragenerational justice, has become the guiding principles influencing the re-development of the municipal administration and its strategic orientation. Ludwigsburg initiated a 'situation analysis' in the beginning in order to assess their positioning, an approach with connections to the approach of a QSA.

The second strand is the application of a QSA in the context of identifying and performing the agreed concepts recorded in the eleven different master plans. This context does not only require a comprehensive analysis of the current positioning and preparedness, but an illustration of potential solution spaces.

> [...] jetzt haben wir das so im Masterplan, [...], den wir als Verwaltungssteuerung haben, dann kann ich sagen, ok gut, dann mache ich jetzt eine qualitative Systemanalyse, habe ein Thema und jetzt durchspiele die Wechselbeziehungen, [...].

A common theme to both strands is the utility of a systemic analysis summarized under the term communication. Apart from the general importance of communication for a QSA, this alludes the chances to back-up decisions, plans and actions and present the reasoning behind these to the decision-makers, who are finally in charge of approving specific actions.
Practical points for an integration of a QSA in Ludwigsburg

While the previous passages sketched rather frames for an application, implementation and potential use of a QSA, the interview resulted in a few very concrete points for an integration of a systemic analysis in Ludwigsburg.

In cooperation with the 'Führungsakademie Baden-Württemberg', Ludwigsburg has performed a 'Wertanalyse' (value analysis) that helps to identify potential for improvement in complex problems. The representative describes the process as very intensive in respect of time and the involvement of various actors. The analysis had the purpose of a comparison between chances and risks as well as the establishment of a general evaluation of progress. Now, five years after the analysis, Ludwigsburg wants to take stocks and is preparing a new analysis. The analysis will take place in collaboration with 'Führungsakademie Baden-Württemberg' again, but it is not clear, yet, how the actual analysis will be designed. Consequently, a QSA might be an additional tool within the tool box of the analysis that will be soon performed in order to assess the current organizational situation of the municipal administration in Ludwigsburg.

Ludwigsburg uses a 'traffic-light’ system to depict the status of different internal processes directly linked to the tasks and actions to be taken recorded in the master plans. The system has a systemic and integrated character, as it considers the links and interrelations among different processes. Currently, the system is based on a rather simple data bank and technical level. However, in collaboration with a big software company that is specialized on business information systems and big data, the city’s data center and IT services are currently setting up a more complex system. The system will perform and process the data assessment more elaborated and the municipal staff will be able to view the visualized results on tablets. The visualization on tablets will be an easy to access and manageable way of reporting and communicating. This technical system will particularly incorporate the 'traffic-light’ system and provide more detailed and comprehensive information. A QSA is compatible with the systemic design of the 'traffic-light’ system. Furthermore, the current development of an underlying IT and technical infrastructure can help to illustrate and present the results of the analysis easily accessible and eventually feed the analysis with more detailed information.

The representative from Ludwigsburg acknowledges that the sustainability management in Ludwigsburg requires a set of various tools and a QSA might have a place within this set. Thus, a QSA is conceivable in Ludwigsburg in connection to other sustainability management instruments. A method mentioned a few times is the Balanced Scorecard.

Finally, a potential integration point arises in the context of an INSEK, which is a
program on an integrated urban development concept with specific topical fields that need to be addressed. A lot of municipalities apply the program in order to receive funds. As the relevant topics and tasks are set by the program the QSA can help to fulfill these program requirements.

Generally, Ludwigsburg has an information and meeting culture, which means that several routine coordination and reporting meetings are held scheduled in order to realize the master plans. They are positioned on all hierarchical levels and across these levels. There are executing project groups, coordinating groups and meetings as well as meetings of the decision-makers. Especially the members of the latter have the daily routine and the knowledge about interrelations. Concluding, there are already fora suitable for a discussion and consensual identification of impact variables or the debate and evaluation of the interrelations among impact factors.

Problems and barriers

Identified problems or hindering factors for an application of a QSA mentioned within the interview are the following:

- **Leadership and individual interests**: The people within the administrative have different perspectives, skill levels and expertise. The process will not always succeed to involve everyone within the processes of re-development and change as the organizational change will require change on the micro-level, too. This is true for the normal staff, but becomes particularly a major barrier if decision-makers are not willing to go along with the changes including an integration of a QSA.

- **Requirement to adopt a detached perspective on a macro-level**: The identification and the evaluation of impact factors and interrelations among these requires the capability to a certain extent to have a macro-picture of a problem, the situation or developments. Not everyone within the municipal administration is capable to adopt a perspective detached from their own individual interests.

- **Top-down approach**: According to the representative from Ludwigsburg, the QSA is a top-down method, which depends too strongly on consultation, accompaniment and moderation. A top-down approach would not fit to the 'Ludwigsburger way’, which strongly emphasizes participatory approaches.

- **Finances**: A municipal administration has to allocate financial resources and has to justify expenditures. Consequently, a newly introduced method needs to be financially tolerable and have a clear purpose worth the expenditure.
• **Qualified personnel**: Personnel who are knowledgeable with approaches similar to QSA are required as well as the municipal administration in general must have qualified staff, but struggles to attract highly qualified candidates in competition with corporations.

• **Technicalities**: The QSA needs to be embedded in a more comprehensive IT structure that enables easy access to the information and results or assist the analysis.

• **Rapidly changing framing conditions**: The framing conditions are changing quickly and the topics, too. While the municipal administration has adapted to one change, it has to tackle the next. Results and insights of the QSA from yesterday may not be current today and the municipal administration is eventually a little sluggish. There is the fear to end up in a continuous loop of analyzing, rather then acting.

• **Organizational size**: An increasing organizational size, increases the complexity and and it will be a challenging tasks to manage the complexity of a big organization.

• **Advanced processes**: Related to the issue of organizational size is the question whether the process in Ludwigsburg is not already too advanced. An analysis of the entire administrational complex would be not manageable anymore.

• **Time and effort**: The application of a QSA is connected to the consumption of time. An already packed timetable, tight everyday time schedules and the effort required for the coordination between all actors costs effort and time.

### The feasibility of the specific methodological steps the QSA

The interview design aimed on filtering clues about problems and barriers of the different methodological steps as well as the approach of Ludwigsburg in the different steps. The interview analysis did result in only few insights on the individual steps. Thus, these insights are summarized within a block for each methodological step:

1. **Variable identification and description**: The representative from Ludwigsburg strongly refuses to use the variable set that describes an 'Integrated Sustainable Management' from the research project "Nachhaltige Kommunalverwaltung in Deutschland". A pre-defined set of variables determines the desired goals and targets as it sets requirements, demands and aspirations on an 'Integrated Sustainable Management'. He would prefer to develop a set specifically for Ludwigsburg that defines the 'Ludwigsburger' system in
connection to expert knowledge. Furthermore, he criticized the language used in the variable set from Lueneburg and Freiburg as hardly communicable to the staff and executive personnel.

2. **Analysis of the impact interrelations**: No detailed comments were made on the analysis of the impact interrelations.

3. **Results**: The sample *Qualitative System Analysis* and particularly the results made the understanding generally a lot more comprehensible. The graphical illustration highlights the complex system significantly clearer and more transparent. Still, the system pictures and graphs are not self-explanatory or intuitively comprehensible. In consequence, the illustrations still need explanations and the interpretation does not come naturally. It rather needs assistance, too. For the everyday use, the illustration needs to be eye-catching and an easy access to the insights must be given.

### 3.3 Synthesis

Ludwigsburg exhibits an 'Integrated Sustainable Management' that is fairly advanced. The municipality’s municipal administration underwent a fundamental change from a traditional administration to more open, service-oriented styles for over a decade, the municipal administration strove to contribute to a sustainable development, the re-development and advancement of the 'Sustainability Management' in a continuous, on-going process. The constant reformation in rapidly changing framing conditions requires a regular self-assessment in order to check the current situation and eventually adapt strategies and set new organizational emphases. The representative from Ludwigsburg acknowledges that the 'Sustainability Management' in Ludwigsburg needs an integrated set of tools and instruments that assist the decision-makers as well as staff. The municipal administration in Ludwigsburg currently operates with temporary strategy papers and is planning to set up renewed and more comprehensive strategies. The *Qualitative System Analysis* has the potential to provide a basis for this process of renewing the organizational and operational strategies.

Connecting factors between the daily operational actions and characteristics of the *QSA* are already given: coming to decisions based on broad understanding of important factors, process and interrelations, the attempt to manage and simplify complexity for a better comprehension and improved communicability. The latter including an emphasis on integrative approaches facilitate a mutually beneficial learning. Ludwigsburg is constantly looking for instruments that may be integrated in a set of instruments. As a *QSA* is seldom applied independently and is rather
embedded in chain of other instruments, e.g. scenario techniques, it qualifies to meet the demanded requirements in Ludwigsburg.

The interview analysis has already revealed a number of theoretical and practical points or fields for a potential integration of a QSA. On the one hand, the analysis can assist the municipality in its pursuit to optimize and attune the organizational structure and set the proper focuses. On the other hand, Ludwigsburg has developed master plans for eleven topical fields in collaboration with the city’s citizens. In return, the citizens are demanding that results are not going unused, but are put into action, instead. A QSA would help the municipal administration to check its positioning in order to realize the decided urban development concepts and eventually illustrate solutions spaces. From a practical point of view, a new cycle of self-assessment and reformation is planned and a set of analyses will applied.

This is a very specific field that provides a concrete application of a Qualitative System Analysis. In this manner, the re-development coincides with the development of a comprehensive and elaborated technical infrastructure for data storage, processing and presentation, which aims on expanding the so far used ‘traffic-light’ system. An embedding of a QSA within this system does not only match with the general systemic set up of the traffic-light’ system. It would provide an optimal platform for data feeding and easy processing, it would resolve problems of the tool in terms of managing the data and offering easy access to communicable results. The plan of an extensive use of tablets and other mobile devices has the potential to support the step of analyzing as participants would be able to do so individually on their mobile devices, while the system synchronizes the individual evaluations and highlights strongly differing assessments. Critical interrelations could be discussed within the manifold meetings and coordination platforms within the municipal administration. Other fields are the linking of the tool with other management tools, e.g the balance scorecard.

Relatively few information on necessary changes of the individual methodological steps of the QSA emerged. Instead, the interview with the representative showed numerous contextual demands on the method and vice versa requirements that the municipal administration has to fulfill from a context perspective.

In terms of the individual methodological steps, the variable set by the research project 'Nachhaltige Kommunalverwaltung in Deutschland' is definitely not an option in Ludwigsburg. The prepared set is determining the future picture of the administration to be pursued. They prefer to do the identification and description themselves reflecting their context and knowledge as well as integrating professional knowledge. Thus, Ludwigsburg wants to create their own picture of the design of an 'Integrated Sustainable Management'. Further findings relate to the presentation of the analysis’ results. The system graphs and pictures do help to understand the
system and the system dynamics, but they are not self-explanatory. Especially for decision-making, the results need to be more eye-catching.

The application of a QSA in Ludwigsburg depends on the resolution and consideration of the demands and requirements on the context. The majority of the information claims demands on general requirements on a QSA or necessary conditions that must be given within the municipality. The sample Qualitative System Analysis did not result in significant insights, but the factor ‘role of the leadership’ has been the variable with strong leverage. The active engagement for an application and a willingness by the decision-makers to perform the analysis and utilize the results is a key issue. The same applies to the executing staff, whereas even the most elaborate analysis design is obsolete without the strong support of the directors and head of departments. An analysis’ design that is flexible in its application with a manageable pool of participant and variables is more likely to be applied in Ludwigsburg. Especially, a focus on very concrete topics, situations or occasions would crucially increase the chances that a QSA is perceived as a feasible and helpful instrument.

However, the hindering barriers are evident: Staff and resources to support a time-consuming analysis, the search for sufficiently knowledgeable staff and financial pressure. The financial question is probably a question of willingness and the solution of the other problematic issues as financial effort may be lowered by a reduction of time needed to apply and perform the Qualitative System Analysis and staff capable to transfer gained insights into solutions that move the municipal administration forward. Ludwigsburg is aware that some of the directors and department heads are going to retire. The municipality is currently investing effort to establish a human resource management that ensures that new candidates are qualified, meanwhile attempting to raise the attractiveness of a public employment. The issue of time stress can be potentially decreased by an optimal and smooth integration of the QSA in the daily routines which is harmonized with a set of further management tools. The chances are high that the establishment of an elaborated technical infrastructure will significantly improve the user-friendliness of the QSA and lower the time needed to perform and understand the results of the analysis.
4 Discussion

The thesis aimed to elaborate how the method of Qualitative System Analysis may be used and transferred from a scientific background and potentially implemented in the practical context of the municipal administration in Ludwigsburg. The research sought to highlight potential points of integration and outline hindering factors and problems for an application of a QSA. Indeed, opportunities of theoretical or practical character for the integration of the QSA have been identified primarily via an expert interview with the representative from Ludwigsburg. The illustration of the fields and points for an integration show that a transfer of the method is possible.

Generally, it has become evident that the decisive issue for the success of an implementation lies in the well-conceived embedding of such a tool in the organizational context. The consideration of two perspectives are relevant: [1] the contextual frame within the municipal administration that enables an implementation and [2] otherwise the compliance with the contextual demands and requirements of the municipal administration by the method QSA. Although, problematic issues such as time stress, rigid financial budgeting or issues related to the personnel (willingness, individual interests) are difficult to overcome, there are promising approaches that potentially provide hope as well as facilitate a smooth integration of a QSA. Particularly, the connection and harmonization with other management tools within the 'Integrated Sustainability Management' and the improvement of usability through sophisticated and modern technical IT systems should receive attention. However, the sample QSA and the expert interview underlined that an implementation stands and falls with leaders in charge of decision-making. Hence, leadership is a key issue and the main leverage in Ludwigsburg to introduce new management approaches. Willingness, support and acceptance by the directors and heads of the departments have a crucial role on the development of the municipal administration complex. The application of a QSA with an optimal and elaborated methodological architecture has no chance without the executive back-up.

It was not the goal to deliver a practical guideline for an application of a Qualitative System Analysis in Ludwigsburg with detailed descriptions of the design, arrangement or performance of the method. Eventually, the chosen research design and chosen methods can be extended to enrich the results with more detailed analysis.
Although not feasible within the scope of this bachelor thesis, more rich, vivid and extensive information could be generated by the involvement of more participants for the expert interviews covering diverse backgrounds from different perspectives within the municipality of Ludwigsburg as well as experts on sustainability management in municipal administration or on Qualitative System Analysis and related methods. Furthermore, a comprehensive QSA for the city of Ludwigsburg would provide a better overall understanding of the method, knowledge transfer and coordination and increased reflection on specifics of the method and its applicability in future strategic development.

A field for further investigation arises through the contrast of Ludwigsburg to other municipalities in Germany. The 'Integrated Sustainability Management' in Ludwigsburg is fairly advanced and the city has found its unique way, the 'Ludwigsburgerian way' to set their goals and pursue those in order to contribute to a sustainable development. Ludwigsburg is an exemplary case in Germany. As illustrated in section 1.1.1, a majority of municipalities in Germany are only in the beginning and fundamentally lack processes to define strategic sustainability goals. The question is whether a QSA can support strategic goals for those other municipalities that are just considering to re-develop their municipal administration. If yes, is it possible to develop a general guideline for the application of Qualitative System Analysis for these municipalities? Consequently, the derived results may be generalized based on the experiences from Ludwigsburg, but need to be examined from this perspective.

In terms of a practical applicability it has become evident, too, that even a municipality like Ludwigsburg with elaborated processes and advanced management systems still requires assistance, particularly scientific assistance. The Qualitative System Analysis has the potential to be a supportive tool for the 'Sustainability Management' in municipal administrations. Thus, it is of interest to investigate how to facilitate the successful transfer of the tools from the scientific sphere to common analysis in sustainability management in other German municipalities.
5 Conclusion

The municipality of Ludwigsburg has achieved an outstanding result in bringing the city, its citizens and the administration towards a sustainable development. It is no surprise that they have been granted with the "Deutscher Nachhaltigkeitspreis 2014", an award appreciating exemplary accomplishments in the broad field of sustainability development. Ludwigsburg’s municipal administration has not only improved its image in the eyes of the community, it succeeded in re-developing the organizational and operational structure in order to meet current and up-coming challenges in order and achieve a positive impact on the city’s development.

While other municipalities lack processes to define sustainability strategies, the department for sustainable development coordinates and manages the development of the municipal administration. The cross-sectional department guides, moderates and integrates the entire municipal administration complex. In this manner, the administration does have three strategy papers of a rather temporary character, but with the goal to develop concrete and comprehensive strategies specifically for the municipal administration, soon. Beside the internal strategies, Ludwigsburg has strategy papers on eleven key issues.

*Qualitative System Analysis* can help to gain a systems understanding that illuminates elements with operational leverage as well as system behavior and dynamics. The connected and interrelated world and the complexity of sustainability challenges require a systemic thinking and approach to set proper goals, suitable methods and instruments, and adequate strategies. The *QSA* is seeking to prepare system-compatible planning and acting. In consequence, it has the potential to assist municipalities in decision-making, not necessarily, but obviously for an 'Integrated Sustainable Management', too. An applicability in a practical context in contrast to a scientific and scientifically accompanied context is connected with problematic issues, such as time or financial constraints or required technical capacities and methodological skills.

The thesis’ analysis has shown that these are critical issues in Ludwigsburg, too, and probably a lot of other municipalities do not have these assets. The thesis has illustrated potential points for an integration in Ludwigsburg. Based on the thesis’ results, an implementation as a common management tool within the 'Integrated Sustainability Management' in Ludwigsburg and an application of a
QSA is eventually a realistic and achievable project.

Generally, points of integration of an QSA in Ludwigsburg arise from the constant drive to optimize, refine and assess the organizational and operational structures. Part of this constant self-reflection are status-quo analyses, extensive horizontal and vertical exchanges within several meetings or workshops and the everyday search for solutions for the optimal execution of the eleven master plans. Chances for a practical implementation and fields that could derive an use of systemic insights are the current plan to establish a strategy for the municipal administration only, which includes a situation analysis of the current positioning of the administration complex and eventual structural re-developments based on the analysis. The analysis is complemented by the simultaneous development of an elaborated technical data processing system in order to facilitate the usability of the so far used indicator system based on ’traffic-light’-illustration. The QSA could be integrated as part of the situation analysis and within the new technical system. A successful embedding is decided by fulfilling and resolving primarily contextual demands and requirements, which can be split in two perspectives: [1] The QSA meets the demands of the municipality (flexibility, situation and topic specific, simple frame, connectivity to other approaches, fast transmission of knowledge) and [2] the QSA’s implementation demands a context of willingness and support by staff and executive personnel. The design of the methodological steps do not have to be changed significantly. Ludwigsburg prefers to develop a variable set on their own and the illustration of the results needs to be more eye-catching to be sufficiently communicable. Overall, the sample QSA and the interview show that the issue of leadership is the lever for an application of the method. The directors and head of departments need to actively support, participate and accept the QSA as a tool for the assistance for a profound decision-making.

Ludwigsburg’s way of developing an ‘Integrated Sustainable Management’ is unique in Germany and has been an intensive process. The results speak for themselves. The municipal administration is fairly advanced in respect to positioning itself for the challenges of a sustainable development. They are aware that the process probably has no end and it requires a continuous self-assessment and adaptation to the rapidly changing framing conditions. The representative from Ludwigsburg emphasized that the administration needs and is interested in tools that help to set reasonable priorities. The thesis has provided glimpses of the opportunities for an implementation of a Qualitative System Analysis. The introduction of the QSA would give rise to a decision-making based on systemic thinking and therefore prepare the municipal administration for the complex world and its challenging tasks towards a sustainable development.
6 Bibliography


7 Declaration of Academic Integrity

I hereby confirm that the present bachelor thesis (Exposé) on

The applicability of the Qualitative System Analysis as decision-making tool in municipal administrations by the example of the municipality Ludwigsburg

is solely my own work and that if any text passages or diagrams from books, papers, the Web or other sources have been copied or in any other way used, all references – including those found in electronic media – have been acknowledged and fully cited.

Lüneburg, March 30, 2015

Wadim Baslow
8 Appendix

8.1 Interview questionnaire

Interview Montag, 05.03.2015

Einstieg


1. Wie unterscheidet sich die Stadtverwaltung Ludwigsburg vor 10 Jahren im Vergleich zur Heutigen? Wie hat sich die Stadtverwaltung in Ludwigsburg verändert insbesondere im Umgang mit den Herausforderungen für eine nachhaltige Entwicklung?

[Wodurch zeichnet sich die Herangehensweise in diesem Veränderungsprozess aus?]

Im Vergleich dazu in die Zukunft blickend:

2. Wie wird sich die Stadtverwaltung in Ludwigsburg in den nächsten Jahren verändern und woran orientiert sich diese Entwicklung?

Überleitung zur QSA

In Ludwigsburg gibt es klare Nachhaltigkeitsstrategien zu den elf Schwerpunktthemen. Das Themenfeld Verwaltung ist nicht darunter, sondern ist in jedem Feld implizit enthalten.
3. Verfolgt die Stadtverwaltung Ludwigsburg eine nachhaltigkeitsorientierte Strategie?

Wenn ja, wie ist diese entstanden, woran orientiert sie sich und welches sind die Inhalte? Wenn nein, warum?

**Verbindung QSA, Strategie und Verwaltung**


4. In wieweit berücksichtigt Ludwigsburg Wechselbeziehungen zwischen den zahlreichen Einflüssen auf das Verwaltungshandeln (Akteure, Interessen, die Einbettung in innere und äußere Rahmenbedingungen, und vielen weiteren Faktoren) im alltäglichen Verwaltungskontext und in der Strategiebildung (falls es eine Strategie für die Verwaltung gibt)?

**Qualitative Systemanalyse**


5. Wie sind ihre ersten Eindrücke zu der der vorgestellten Methode der Qualitativen Systemanalyse?

(Grundsätzlich, aber insbesondere im Hinblick für die Relevanz und Anwendbarkeit in Ludwigsburg?)

**Anwendbarkeit der Analyse**

**KONTEXT**

Ein Gedankenspiel! Angenommen es wurde entschieden, die Qualitative Syste-
manalyse zur Unterstützung der Entscheidungsfindung im Prozess der Ziel- und Strategiebildung in der Stadtverwaltung Ludwigsburg anzuwenden.

6. Inwieweit ist die QSA für die Verwaltung in Ludwigsburg nützlich nützlich? In welchem Rahmen oder Kontext ist dieses Instrument denkbar und wenn nicht, warum?

7. Welche Herausforderungen, Probleme oder Hürden erkennen sie für eine Anwendbarkeit der QSA in Ludwigsburg (insbesondere im praktischen Sinne)?

8. Können sie sich vorstellen, was sich ändern müsste (die Methode oder die Rahmenbedingungen in der Verwaltung)?

**DIE BETRACHTUNG DER DURCHFÜHRUNGSSCHRITTE**


9. Zieht die Stadtverwaltung Ludwigsburg im Rahmen der Qualitativen Systemanalyse (in unserem Gedankenspiel) dieses von Fach- und Praxisexperten erarbeitete Set an Einflussvariablen? Was gefällt gut? Was gefällt nicht? Wenn nicht, warum? Wenn nicht, was wäre in Ludwigsburg anders? (Entstehungsprozess, Gestaltung, Beschreibung)


10. Wie wäre die Analyse in der Verwaltung Ludwigsburg gestaltet (Prozess, wer, wie, wo, wann). Welche Schwierigkeiten ergeben sich und welches sind die Gründe dafür? Was wäre anders?

11. Für wen sind die Ergebnisse interessant und ist die entsprechende Ergebnisdarstellung (grafische Aufarbeitung) als Unterstützung zur Entscheidungsfindung und Zielbildung, als auch zur Kommunikation der Ergebnisse geeignet?

**Abschluss**

Nach dem Sie nun einen Überblick über die QSA als unterstützendes Instrument zur Entscheidungsfindung im Prozess der Strategie- und Zielbildung haben und
diese im Bezug ihrer Anwendung in der Stadtverwaltung Ludwigsburg reflektieren konnten.

12. Werden Sie sich mit dieser Methode oder ähnlichen Ansätzen im Rahmen ihrer Arbeit weiter auseinandersetzen?

13. Haben Sie noch weitere Ideen, Anmerkungen, Kritik oder Vorschläge?
### 8.2 The variable set from the research project "Nachhaltige Kommunalverwaltung in Deutschland"

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Einflussvariable</th>
<th>Erläuterung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verständnis und Zielsystem</td>
<td>Nachhaltigkeitsverständnis</td>
<td>Einheitliche Vorstellung von einer konkreten Bedeutung des Begriffs nachhaltige Entwicklung in der Stadtverwaltung</td>
</tr>
<tr>
<td></td>
<td>Unterstützung durch Führungspersönlichkeiten</td>
<td>Die administrativen Führungspersonen ((Ober-) Bürgermeister und Dezernenten) unterstützen die kommunale Nachhaltigkeitsstrategie, indem sie Nachhaltigkeit proaktiv, systematisch und bewusst in die eigenen Aufgaben- und Verantwortungsbereiche integrieren sowie ihr Mitarbeiter bei der Umsetzung unterstützen und motivieren (Leaders for Sustainability).</td>
</tr>
<tr>
<td></td>
<td>Nachhaltigkeitszielsystem</td>
<td>Ausgestaltung eines Nachhaltigkeitszielsystems inkl. eines Leitbilds Handlungsfelder, Ziele, Maßnahmen und Handlungsanweisungen und eines systematischen Organisations- und Aufgabenbezugs in dieser Nachhaltigkeitsstrategie</td>
</tr>
<tr>
<td>Organisation und Prozesse</td>
<td>Querschnittsorientierung</td>
<td>Integration von ressortübergreifenden Themen in den vertikalen und insbesondere in den horizontalen Aufbau und Ablauf der Verwaltung z. B. durch Arbeitskreise und Querschnittsgruppen</td>
</tr>
<tr>
<td></td>
<td>Aufgewendete Ressourcen</td>
<td>Anzahl Planstellen für Nachhaltigkeit sowie die Höhe des jährlichen Budgets</td>
</tr>
<tr>
<td></td>
<td>Managementkreislauf</td>
<td>konsequente Anwendung aller Phasen (Bestandsaufnahme, Zieldefinition, Ratsbeschluss, Umsetzung und Monitoring, Evaluation und Berichterstattung) des Managementkreislaufs</td>
</tr>
<tr>
<td></td>
<td>Umgang mit Zielkonflikten</td>
<td>Systematische, transparente und konsensorientierte Bearbeitung von verwaltungsinternen und gesamtkommunalen Zielkonflikten</td>
</tr>
<tr>
<td></td>
<td>Nachhaltigkeitskommunikation</td>
<td>Vielfältig genutzte Kanäle, Frequenz und Inhalte strategischer Kommunikation von Nachhaltigkeitsthemen</td>
</tr>
</tbody>
</table>
Koordinierung von Möglichkeiten zur Akzeptanzschaffung, Mitbestimmung und Einbringung verwaltungsexterner Ressourcen und Expertise mit Akteursgruppen wie z.B. lokale Wirtschaft, NPOs, organisierte Zivilgesellschaft, EinwohnerInnen und lokalen Medien

Kommunale Unternehmen

Aktive Einbindung kommunaler Unternehmen in die Nachhaltigkeitsprozesse

Nachhaltigkeitsinstrumente

Instrumente zur effizienten und strategischen Nutzung von Nachhaltigkeitsinstrumenten wie z.B. Nachhaltigkeitsindikatoren, Nachhaltigkeitsberichte, Nachhaltigkeitsprüfungen etc.

Synergieeffekte

Prüfung und Nutzung von Synergieeffekten, die sich durch die Anwendung weiterer Instrumente der Kommunalverwaltung im Hinblick auf eine integrierte Nachhaltigkeitssteuerung ergeben, wie z.B. der Produkt- und Globalhaushalt des NPM und der Vermögens- und Ergebnisrechnung der Doppik

Organisationskultur

Personalentwicklung

Schulung und Weiterbildung

Angebot von Weiterbildungs- und Schulungsmaßnahmen zum Thema Nachhaltigkeit für und deren Besuche durch das Verwaltungspersonal

Individuelle Motivation

Engagement und Einsatz des einzelnen Verwaltungsmitarbeiters bei Nachhaltigkeitsprozessen der Verwaltung

Mitarbeiterbeteiligung

Einbindung themenrelevanter MitarbeiterInnen in Entscheidungsprozesse im Rahmen der Verwaltungsentwicklung

Reform- und Innovationsbereitschaft

Bereitschaft der Kommunalverwaltung den Mehrwert bestehender Reform- und Innovationsansätze zu prüfen und diese ggf. umzusetzen

Verwaltungskultur

Werte, Normen und Denkhaltungen innerhalb der Verwaltung, die z.B. die Entscheidungsfindung, die interne Kommunikation oder die Beziehungen zwischen Mitarbeitern beeinflussen können

beeinflussbare verwaltungsexterne Faktoren

nationale und internationale Vereinbarungen

Unterzeichnung nationaler und internationaler Vereinbarungen, die eine nachhaltige Entwicklung betreffen

Faktoren, die den Erfolg der nachhaltigen Entwicklung beeinflussen können.
### CHAPTER 8. APPENDIX

#### Normen und Standardisierungen

| Anwendungen von Normen und Standardisierungen auf nationaler, EU- und internationaler Ebene |

#### interkommunaler Austausch und Kooperationen

| Netzwerkpflege und Informationsaustausch zwischen Kommunen im Nachhaltigkeitsbereich (z.B. über Verbände, Netzwerke oder bilateral) |

#### zukünftige Trends und Herausforderungen

| Systematische Berücksichtigung zukünftiger Trends und Herausforderungen bei der Entscheidungsfindung im Rahmen einer nachhaltigen Kommunalentwicklung |

#### technologische und soziale Innovationen

| Prüfung des Mehrwerts/Machbarkeit und ggfl. Umsetzung technologischer und sozialer Innovationen für eine nachhaltige Kommunalentwicklung wie z.B. Car Sharing |

#### Rahmenbedingungen

<table>
<thead>
<tr>
<th>lokale Voraussetzungen</th>
</tr>
</thead>
<tbody>
<tr>
<td>sozio-ökonomische, sozio-kulturelle und naturräumliche Bedingungen in der Kommune</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Integration im Mehrebenenpolitiksystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zusammenarbeit und Kommunikation zwischen Bund, Ländern und Kommune</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vorzahnung Kommunalpolitik und -verwaltung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolle, welche die Politik gegenüber der Verwaltung einnimmt und die das Verhältnis zwischen den Kommunalvertretern in Richtung hierarchisch oder kooperativ beeinflusst</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Finanzsituation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget, das der Kommune zur Vergabe im Bereich Freiwilligenaufgaben jährlich zur Verfügung steht</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rechtsetzung und politische Rahmengebung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gesamtheit aller nachhaltigkeitsrelevanten EU-, Bundes- und Landesgesetze sowie Strategien und Förderprogramme</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gemeindetyp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Einwohnerzahl, rechtlicher Status und Siedlungsstruktur der Gemeinde</td>
</tr>
</tbody>
</table>