“Are we only the bin?”

A study of Malmö’s transition towards a sustainable waste society

Jonatan Stoltz Holgersson

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LUCSUS
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Abstract:

Waste generation is rapidly increasing globally, estimating that 11 billion tonnes of solid waste is produced every year. Cities and urban areas generate large and concentrated waste flows due to the density and multitude of inhabitants. Both waste and how we choose to treat it creates negative impacts on natural, economic and societal systems, both globally and locally. Greenhouse gas emissions, natural resource depletion and technological lock-ins are only a few of many negative effects waste can cause. Malmö, Sweden's third most populated city, is currently facing several waste challenges, such as increasing waste amounts due to rapid population growth and that incineration act as the main treatment process of waste, preventing a circular material system and recycling of valuable resources.

This thesis, using semi-structured interviews as well as a document review, investigate Malmö's current strategic and practical work for achieving a transition towards a sustainable waste society; identifying gaps and challenges in Malmö's is current transition process; and lastly, explored potential future pathways to overcome these challenges and secure a continued transition process. Transition management has been used as an analytical framework to help understand the current waste situation in Malmö and to suggest potential future pathways for overcoming identified gaps and challenges.

Several strategic and practical initiatives are currently in place in Malmö with the intention of climbing the waste hierarchy and promote a more sustainable waste situation. However, several gaps and challenges have been identified including lack of a clear collective transition vision, differentiating interpretation of waste goals and the waste hierarchy, unstable private-actor involvement and evaluation insecurity. Potential future pathways are development of a stronger multi-actor transition arena, implementing manufacturing requirements and using evaluation as a learning tool.

Keywords: sustainable waste management, transition management, governance, municipal solid waste

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LUMES has been an unforgettable experience for me, and I wish the best of luck to all LUMES:ians, wherever in the world they might be.

Abbreviations:

MLP - Multi-level perspective

MSW - Municipal solid waste

MSWM - Municipal solid waste management

R - Respondent

RQ - Research question

TM - Transition management

1 Introduction

Natural resources are being extracted globally at an accelerating speed, from 7 billion tonnes in the early 1900s to almost 72 billion tonnes in 2010 (OECD, 2015, p. 64). Resource extraction, production, global trade, consumption and population growth are all putting a burden on our planet, such as biodiversity extinction, pollution and natural resource depletion (Lehmann & Crocker, 2012, p. 1; Lenzen et al., 2012). Even though we live on a planet with finite resources, humanity has since the 1970s been extracting and using more natural resources annually than what the earth can regenerates (GFN, 2017). It is estimated that we currently are extracting and using natural resources equivalent to 1.6 earths annually, in terms of fulfilling our human demands (WWF, 2016). If the global population would live like average Swedish citizen, we would instead need 4.2 earths to fulfil the annual human demand (WWF, 2017).

Due to the dominating linear market system where resources are extracted, converted into products, sold and thrown away after its utility life has ended, a rapid increase of waste can be seen globally (Lehmann & Crocker, 2012, pp. 1-6). It is now estimated that about 11 billion tonnes of solid waste is produced globally per year, of which around 4 billion tonnes is municipal solid waste (MSW) generated in urban areas (Song, Li, & Zeng, 2015). The enormous amount and concentration of MSW in urban areas is causing and contributing to several negative environmental and health impacts such as chemical leakage, spreading of diseases, emissions as well as contamination of soil and groundwater (Song et al., 2015; UN-HABITAT, 2010). As global urbanization continues, with more people moving into cities, waste management is becoming one of the most important challenges for sustainable city design (Zaman & Lehmann, 2011b).

In this study, I investigate Malmö's transition towards a sustainable waste society. This will be done by analysing how Malmö municipality is strategically and practically working to achieve a sustainable waste society, identifying current challenges for the transition and to explore potential future pathways. In 2015, more than 4,7 million tonnes of MSW was generated in Sweden (Avfall Sverige, 2016a). A scenario analysis indicate that annual waste amounts will increase rapidly if current trajectories continue (Naturvårdsverket, 2015, p. 17), further driving natural resource depletion caused by linear and unsustainable waste systems (Lehmann & Crocker, 2012, pp. 1-6). This creates an importance to initiate a transition towards sustainable waste societies (Naturvårdsverket, 2012; VA Syd, 2016). Malmö, Sweden's third most populated city, has been chosen as a case study for this thesis since the municipality is actively working with sustainable municipal solid waste management (MSWM), but simultaneously face several challenges such as increasing waste amounts due to rapid

population growth (VA Syd, 2016) and that incineration act as the main treatment process of MSW, preventing a circular material system and recycling of valuable materials (Avfall Sverige, 2016b). This study aim to use transition management (TM), which is a governance approach designed to facilitate sustainability transitions by overcoming certain governance problems for social change (Kemp, Loorbach, & Rotmans, 2007; Loorbach, 2007), as a theoretical framework to understand the current situation in Malmö and to suggest potential future pathways.

1.1 Problem formulation

MSW is a complex phenomenon driven by human consumption which create negative impacts on environmental, economic and social systems, on both global and local levels (Lehmann & Crocker, 2012, pp. 1-6). For instance, the waste treatment process of landfilling and incineration has a strong correlation to extraction and depletion of natural resources as the MSW is treated in a linear system, instead of a circular system where the MSW material is being recycled and reused (Lehmann & Crocker, 2012, pp. 1-6). Several handling and treatment processes of MSW also emit greenhouse gases, contributing to climate change (Song et al., 2015). These treatment processes can further cause negative economic and social impacts as large investments need to be made to build treatment facilities with sufficient capacity to handle current and future waste flows (Lehmann & Crocker, 2012). Cities and urban areas are of high importance, as these generate large and concentrated waste flows (UN-HABITAT, 2010).

To address the growing issue of MSW and achieve a transition towards a sustainable waste society is a tremendous challenge (Zaman & Lehmann, 2011b). Municipalities play an important role for the transition process as they often have an overarching responsibility for the local MSWM (Zaman & Lehmann, 2011a). The strategic and practical work towards a sustainable waste society is not only complicated by current economic systems (Lehmann & Crocker, 2012) and socio-technical lock-ins, such as incineration facilities (Corvellec, Campos, & Zapata, 2013). The actual transition process can also lead to governance issues such as dissent between stakeholders and evaluation insecurity, complicating the progress for achieving a transition (Kemp et al., 2007). This makes management of the transition process important both in terms of overcoming internal governance challenges, but also for the development of a sustainable transition (Loorbach, 2007).

1.2 Research aims & Research questions

This thesis aims to critically investigate, using transition management as a theoretical framework, how Malmö municipality is strategically and practically working to achieve a sustainable waste transition and to explore potential future pathways. The following research questions (RQ) guide this study:

1. How is Malmö strategically and practically working to achieve a sustainable waste society?

2. What gaps and challenges exist in Malmö's current strategic and practical work for achieving a sustainable waste society?

3. What future pathways, based on transition management and collected empirical data, would be valuable for Malmö municipality to address current gaps and challenges for achieving a sustainable waste society?

1.3 Acknowledgment and contribution to Sustainability Science

Sustainability science is an emerging academic field that aims to understand the fundamental interactions between nature and society (Kates et al., 2001). The understanding of this interaction can further guide research within sustainability science on society´s capacity towards a sustainable transition (Kates, 2011; Kates et al., 2001). As waste is a phenomenon driven by human and societal demand that puts great pressure on the environment, this thesis is relevant for sustainability science. This argument is further justified as Kates et al. (2001) states that one of the core questions of sustainability science is how development reshape the interactions between nature and society, essential to sustainability.

Sustainability science is a dynamic multidisciplinary and transdisciplinary research field which acknowledges the complexity of sustainability challenges (Clark & Dickson, 2003; Kates, 2011; Lang et al., 2012). This means that involving actors outside academia, as well as using data from multiple academic fields, is necessary to fully understand these challenges (Lang et al., 2012). Sustainability science research is also action-orientated, moving knowledge and research into practical societal use (Kates, 2011). These aspects of sustainability science apply to my research as it goes beyond identifying the challenges of waste in Malmö, by presenting potential future pathways for a sustainable waste transition. These future pathways are based on transition management which is an influential theory for sustainable development and linked to sustainability science (Loorbach, 2007, pp. 35-36). Bridging the gap between theory, practice and policy is not only an essential aspect of sustainability science (Bettencourt & Kaur, 2011) but also for my research.

1.4 Research scope

The research is confined to the city of Malmö, Sweden, with an approximate population of 325.000 (Avfall Sverige, 2016b). The definition of waste can vary depending on perception. For instance, one person might discard something as waste, but another person could treat the same discarded object as a resource (Zaman & Lehmann, 2011a). Waste can come in different forms such as solid, liquid and gaseous and can be further categorised depending on its composition, type and origin (Zaman & Lehmann, 2011a). In this study the term municipal solid waste (MSW) will be used. MSW is a broad and dynamic term, but will for this study be defined as solid waste including any trash, garbage, refuse or abandoned materials from households or comparable waste from other operators (SFS, 1998:808). MSW covers everything from ordinary kitchen waste, packaging, mobile phones, batteries and textiles to bulkier items such as garden waste and furniture (Naturvårdsverket, 2012, p. 65). The reason why the term MSW is chosen instead of household waste is because the waste not exclusively has to come from a household and might include waste such as televisions and garden waste which are not a normality for every household. Municipal solid waste management (MSWM) considers both strategic and practical management of the generation, on-site storage, collection, transfer, transportation, processing, recovery and ultimately the disposal of MSW (Pichtel, 2005). MSWM refers to the systematic way of managing MSW by the local municipal authority (Zaman & Lehmann, 2011a). Several important stakeholders can be acknowledged in the MSWM process but this thesis focuses on actors working within or closely with Malmö municipality, as these actors have responsibility for the development of Malmö's sustainable MSWM (VA Syd, 2016).

2 Background

This chapter present background information needed to fully comprehend the topic of MSWM for this thesis. Firstly the European waste hierarchy model will be presented, followed by an overview of Sweden's and Malmö's current waste situations and waste plans.

2.1 The waste hierarchy

The European Union's waste framework directive and the Swedish waste policy both include the waste hierarchy model (see Figure 1) (EC, 2008). The waste hierarchy states in which order waste management policies and treatment process should be prioritised. Prevention of waste has highest priority, as this puts least pressure on the environment (EC, 2008). Strategies and policies for waste prevention should promote decreased production and consumption of goods that generate waste (EC, 2008). The second and third step, re-use and recycling, both promote a circular material system, as existing products are reused after disposal and recycled materials become input for new products (Hultman & Corvellec, 2012). The fourth and fifth step, energy recovery and disposal, are the least wanted waste treatment processes. Both of these are linear processes, as the waste is incinerated for energy or placed in landfills, which prevents material from being used again (Hultman & Corvellec, 2012).

Figure 1: The European Waste Hierarchy (EC, 2016)

2.2 Municipal solid waste management in Sweden

The Swedish waste system is divided into two responsibilities: municipal responsibility and producer responsibility (Naturvårdsverket, 2012). The producer responsibility derives from the polluter pays principle, and was introduced during the 1990s (Naturvårdsverket, 2012). The producer responsibility applies for any actor that import, fill, package or sell a product on the Swedish market

(Naturvårdsverket, 2012). The overarching purpose is to ensure that minimal resources are used and that generated waste from products are treated considering both environmental and health aspects (SFS, 2014:1073). Paper magazines, packages (metal, glass, plastic and cardboard), tires and medicine are all covered by the producer responsibility (Naturvårdsverket, 2012). The collection of MSW covered by the producer responsibility is organized by a private company[1] which have stationed waste containers in urban areas (Naturvårdsverket, 2012).

The municipal responsibility covers collection and handling of all other MSW, such as food waste and old furniture from households, organisations and private actors (Naturvårdsverket, 2012). However, this also means that waste covered by the producer responsibility that is not placed in correct waste containers, becomes the municipality's responsibility to handle. The waste is collected either directly from the source or at municipal recycling centres (Naturvårdsverket, 2012). The municipality is also responsible for giving households information about how to handle their MSW (Naturvårdsverket, 2012).

It has been prohibited to dispose unsorted combustible waste in landfills since 2002, and since 2005 the ban also covers organic waste (Naturvårdsverket, 2012, p. 18). This has led to that Sweden puts less than 1% of the total MSW to landfills (Naturvårdsverket, 2012). Instead has energy recovery, biological- and material recycling of MSW experienced a tremendous increase, today handling 99,2% of the total amount of MSW in Sweden (Avfall Sverige, 2016a). Although Sweden's MSWM has become more efficient over time, the total amount of MSW has nonetheless increased (Naturvårdsverket, 2012). The total amount of MSW treated in Sweden has increased from 3,5 million tonnes in 1994 to 4,7 million tonnes in 2015, a 34% increase (see Figure 2) (Avfall Sverige, 2016a). A scenario analysis conducted by Profu (2008) shows that the MSW in Sweden may increase fourfold until 2050 compared to levels in 2000 if current trajectories continue (Naturvårdsverket, 2015, p. 17).

[1] Förpacknings- & Tidningsinsamlingen (FTI)

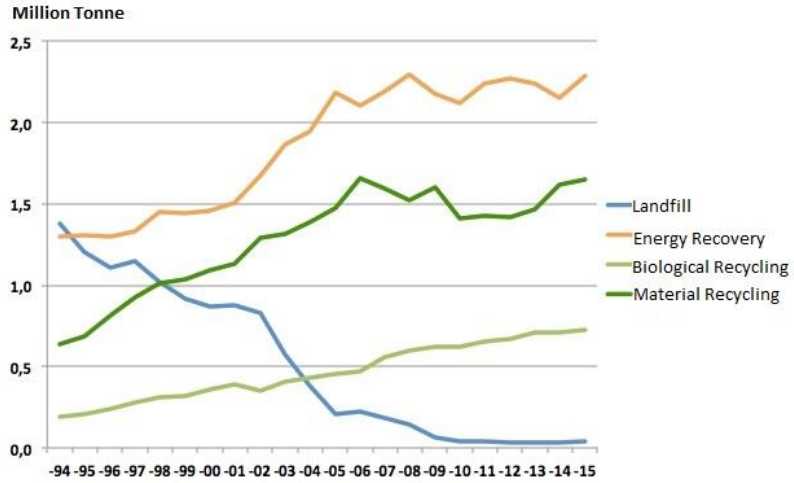

Figure 2. Treatment processes of Municipal Solid Waste in Sweden (Avfall Sverige, 2016a)

2.3 Sweden's national waste plan

Sweden's environmental protection agency (Naturvårdsverket) is responsible for creating and maintaining Sweden's national waste plan, as well as monitoring the development of Sweden's overarching waste situation (Naturvårdsverket, 2012). The overall purpose of the national waste plan is to steer waste management towards greater resource efficiency and to become more sustainable, all according to the EU waste hierarchy (Naturvårdsverket, 2012).

The national waste plan's target groups are municipalities, politicians and decision makers in public and private sectors (Naturvårdsverket, 2012 p. 11). However, the document also states that several stakeholders and sectors within society such as industry, municipal departments, research community and households need to be incorporated in the MSWM process (Naturvårdsverket, 2012). The national waste plan (Naturvårdsverket, 2012) states that MSWM in cities should focus on:

- The reuse of MSW shall increase, partly through making it easier for households to deliver materials and products for reuse or for preparation for reuse
- The reuse and recycling of textile waste shall increase
- The recycling of MSW shall increase
- The collection of electronic waste for recycling shall increase
- Litter generation shall decrease in urban areas, in natural areas and along coasts

Each of these focus areas comes with examples on what municipalities can do to work strategically and practically towards these aims (see Appendix A).

2.4 Municipal solid waste management in Malmö

According to Swedish law, all municipalities in Sweden need to have a waste management plan (SFS, 1998:808). Malmö's current waste plan was written by multiple municipal actors from Malmö and the neighbouring municipality Burlöv (VA Syd, 2016). The local waste plan present goals and strategies, with an overarching aim to create a sustainable waste society (VA Syd, 2016). The waste plan states three focus areas, including specified goals, which should be fulfilled before 2020 (VA Syd, 2016):

- **Sustainable consumption for reduced waste**
    - Less MSW per person compared to 2015
    - 50% less textiles in MSW from households compared to 2015
    - Less food waste per person compared to 2015
- **Sustainable sorting and increased recycling**
    - 50% or more of total food waste is biologically treated
    - 50% less packaging and newspapers in MSW from households compared to 2015
    - Less littering compared to 2016
- **Sustainable handling for a cleaner environment**
    - No hazardous household waste
    - Fossil free waste transports
    - Increased trust for the waste management compared to 2016
    - Decreased errors in waste pick-up processes compared to 2015
    - Sustaining low levels of customer complaints

Statistics show that the total amount of collected MSW per person in Malmö in 2015 was 461 kilograms (Avfall Sverige, 2016b). This can be compared to a national average of 405 kilograms collected per person for the same year, which means that a person living in Malmö threw away 56 kilograms more MSW than the national average in 2015 (Avfall Sverige, 2016c). Furthermore, in 2015, 56% of treated MSW in Malmö was incinerated, acting as the dominating treatment process (Avfall Sverige, 2016b).

3 Theoretical framework

This chapter present a brief overview of sustainable waste management as a theoretical concept, followed by a presentation regarding what TM is and which governance problems TM can help to overcome. The chapter end by presenting the TM cycle, which visualize the different steps of the TM process.

3.1 Brief overview of sustainable waste management

A sustainable MSWM needs to incorporate and consider both economic, environmental and social aspects (Morrissey & Browne, 2004; Nilsson-Djerf, 1999). The actual outcome of a MSWM is affected by the public's acceptance and trust for the specific system (Morrissey & Browne, 2004; Nilsson-Djerf, 1999) making public participation essential for creating a sustainable MSWM and climbing the waste hierarchy (Leal Filho, Moora, Stenmarck, & Kruopienė, 2014). But to achieve such involvement requires investments of time, money, efforts and collaborative long-term planning (Leal Filho et al., 2014).

MSWM is often based on several priorities that the decision maker(s) should take into consideration, such as cost efficiency. This can decrease the probability of choosing a sustainable MSWM system if certain priorities are considered to be more important than others (Morrissey & Browne, 2004).

There are several possible ways of defining what a sustainable waste society is and how it function. A common definition, which I will use in this thesis, is derived from the zero waste city concept, stating that a sustainable waste society is "a society without waste" (Zaman & Lehmann, 2011a). This definition however does not give a descriptive understanding of how a sustainable waste society functions. Five interconnected key principles have therefore been added to further describe what a city needs to fulfil to transform into a sustainable waste society (Zaman & Lehmann, 2011a). These are:

- Behaviour change and sustainable consumption
- Extended producer and consumer responsibility
- 100% recycling of municipal solid waste
- Legislated zero landfill and incineration
- 100% resource recovery from waste

A clarification for consumer responsibility is given, stating that consumers not only should manage their waste in a sustainable manner, but also be accountable for its environmental impact (Zaman & Lehmann, 2011a). This could for instance be done by adding a polluter fee on products.

3.2 Brief overview of transition management

Decades of top-down governance focused on technological and economic solutions, prioritizing growth and efficiency, have led to both societal and structural lock-ins (Loorbach, 2007, p. 16). To break free from these lock-ins and enable sustainable development, such as a sustainable MSWM, a transition to a new waste system is required, rather than continuing with current unsustainable system (Loorbach, 2007, pp. 16-17).

A transition can be described as "a transformation process where existing structures, institutions, culture and practices are broken down and new ones are established" (Loorbach, 2007, p. 17). The desire for initiating and controlling transitions have further led to the development of transition management (TM), by system and governance researchers, and can be defined as a "long term governance for sustainable development based on a complex adaptive system approach" (Loorbach, 2007, p. 44). TM see the term sustainable development as a continuous process, rather than a fixed goal, which cannot be given an objective description (Loorbach, 2007, pp. 23-25). Sustainable development has to be defined within the specific context, incorporating values and interests from multiple perspectives, to create a balanced understanding and definition of sustainability (Loorbach, 2007, pp. 23-25).

TM is in its essence a normative theory stating how a governance process for sustainable development should be managed (Loorbach, 2007, p. 37) but can also be used as an analytical framework to explore and understand historical and current transition processes, and use this understanding to further develop TM both in practice, and as a theory (Kemp, Parto, & Gibson, 2005).

3.3 Justification for using transition management

Every TM process is unique in its own context, and no single TM model or framework can guarantee an efficient and successful transition (Loorbach, 2010). Due to the complexity and continual dynamic evolution of society where unpredictable events occur, makes TM a sustainable development process which inherently consists of insecurity and uncertainty (Loorbach, 2010). There are nevertheless, according to Kemp et al. (2007) certain common governance issues for social change which TM can help to avoid.

Dissent: Complex societal problems, such as managing MSW, are possible to understand and handle in many ways. A multi-actor approach help to create a holistic understanding of the problem and acknowledge trade-offs between different societal aspects (Kemp et al., 2007).

Distributed control: Control is distributed between actors working towards common goals. Distributed control avoids the problem of having one single stakeholder possessing the capability to alone decide how work is carried out (Kemp et al., 2007).

Determination of short-term steps: It is uncertain how long-term structural change can be achieved through short-term strategies and practical actions (Kemp et al., 2007). To address this issue Kemp et al. (2007) propose forward reasoning using trends, forecasts and scenarios together with a backward reasoning drawing upon gained knowledge from previous experiments.

Danger of lock-in: TM should refrain from single large-scale investments which only fit within current social systems, and instead promote a variety of possible solutions which both fit current system and in a system that applies to the transition vision (Kemp et al., 2007; Rotmans, Kemp, & Van Asselt, 2001).

Political myopia: Transitions are long-term processes which takes one generation or more to complete (Kemp et al., 2007; Rotmans et al., 2001). During this time period, politic and societal change may occur. It is therefore important that the TM process survive through turbulent and uncertain times (Kemp et al., 2007). Promoting the importance of the transition, keeping all involved stakeholders updated and create a transition arena where stakeholders can meet and collaborate, can all contribute to the survival of the transition process (Kemp et al., 2007).

3.4 Multi-level perspective

Transitions consist of multiple phases which are caused by changes and actions at different levels of society (Loorbach, 2007, p. 20). To visualize this, I will use the multilevel perspective (MLP) which contains three levels (see Figure 3). The central level, meso-level, is where the regime exists. The term regime refers to the dominant existing culture and structure, which often is embodied as infrastructure, such as waste incineration facilities, but can also exist as routines and regulations (Loorbach, 2007, p. 20). The structures (regime) gives stability to the societal system and steers the behaviour of actors within the system (Loorbach, 2007, p. 20). However, these dominant structures can create a lock-in which prevent innovations that would alter or change them.

The lower level, micro-level, is where innovations (niches) are created, tested and diffused (Loorbach, 2007, p. 20). These innovations could consist of new technologies, legislations, projects, concepts or even ideas, with the intention to change or alter current dominating structures (regimes) of society (Loorbach, 2007, p. 20).

The macro-level, landscape, is where the overall societal setting in which process of change happen. This level consists of social values, political cultures, built environment, economic development and

trends (Loorbach, 2007, p. 20). The landscape usually develops by itself but has direct influence on both regime- and niche-level by shaping the room and direction for change (Loorbach, 2007, p. 20).

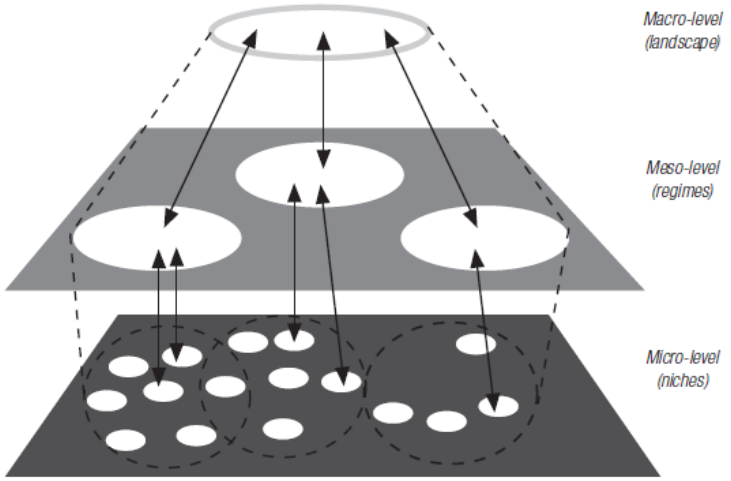

Figure 3. Interaction between different scale-levels (Geels & Kemp, 2000)

3.5 The transition management cycle

The TM cycle, described below, is a model which incorporates the different systematic instruments and central elements of the TM approach, providing the basis for managing transitions in an operational sense (Loorbach, 2010). The TM cycle (see Figure 4) helps to visualize the different steps of the TM process, promoting a learning-by-doing approach which is a fundamental part of TM and its experimental and explorative way of creating social innovations in practice (Loorbach, 2010).

3.5.1 Strategic: The transition arena

The first step is to structure the problem of interest and create long-term sustainability visions (Loorbach, 2010). This is done by establishing the transition arena, where a network of actors from both private and public sectors are integrated, enabling them to exchange knowledge regarding the complexity and their individual understanding of the problem, creating an open and evolving process of innovation (Loorbach, 2010). This creates a demand for development of new visions, goals and strategies that eventually will oppose current societal structures and regimes, creating conflicts between actors' perspectives (Loorbach, 2010). This phase of conflict is a natural step in the TM process as current structures and regimes need to be changed in terms of finding new and more sustainable societal systems. Included actors in the transition arena should possess both a willingness and capability to work towards set goals and visions, excluding actors that are merely representatives of their institution with no interest for the transition (Loorbach, 2010).

3.5.2 Tactical: The transition agenda

Second step is to evaluate which potential strategies and actions should be financed and carried out to fulfil set goals and aims, resulting in a transition agenda which can be defined as "a societal strategy to work towards shared visions, including a number of sub-strategies and concrete experiments" (Loorbach, 2007, p. 92). The aim of the agenda-building is to gain societal support and attention for an acknowledged issue by first stating it as an issue of importance, and further formulate solutions for it (Loorbach, 2007, p. 92). In a participatory context, shared visions and strategies are created and framed collectively which in turn can facilitate the spreading and acceptance of the agenda through-out society (Loorbach, 2007, p. 92). The tactical step also contains discussion about potential barriers and challenges that exist in current societal structures (regime), aggravating implementation of chosen actions (Loorbach, 2010).

3.5.3 Operational: Transition experiments

At the operational step, transition experiments are carried out in practice, which should fit with the developed vision and goals (Loorbach, 2010). A characteristic of these transition experiments is that they are carried out with a high level of uncertainty regarding what impact they may have on the transition process (Loorbach, 2010). These transition experiments are created with the intention of broadening, deepening and scaling up other previously implemented and future actions and inanities (Loorbach, 2010). New transition experiments are continuously developed through the inspiration from the evolving sustainability vision, aims and goals, created in the transition arena (Loorbach, 2010).

3.5.4 Reflexive: Monitoring and evaluation

Monitoring and evaluation of the transition process and of the TM are vital for the learning process (Loorbach, 2010). The transition agenda should be monitored regarding the actions, goals, projects and instruments which have been agreed upon and chosen (Loorbach, 2010). Transition experiments should also be monitored, evaluating new knowledge and insights gained throughout the process, which could be useful for new and future experiments (Loorbach, 2010). The transition process should also be monitored in terms of evaluating the rate of progress and acknowledged challenges (Loorbach, 2010). The continual monitoring and evaluation of different phases on all levels contribute to the learning process of involved actors. This process could be seen as social learning, trying to stimulate shifts of perspectives among included actors, so new ways of understanding sustainability can evolve, finding new ways of dealing with current and future problems and spread this knowledge through the actor networks, further increasing the possibility of the transition (Loorbach, 2007, pp. 99-100). This

leads to the understanding that visions and transition processes are mutually dependent, one effects the other in terms of developing new alternatives and future pathways for the transition.

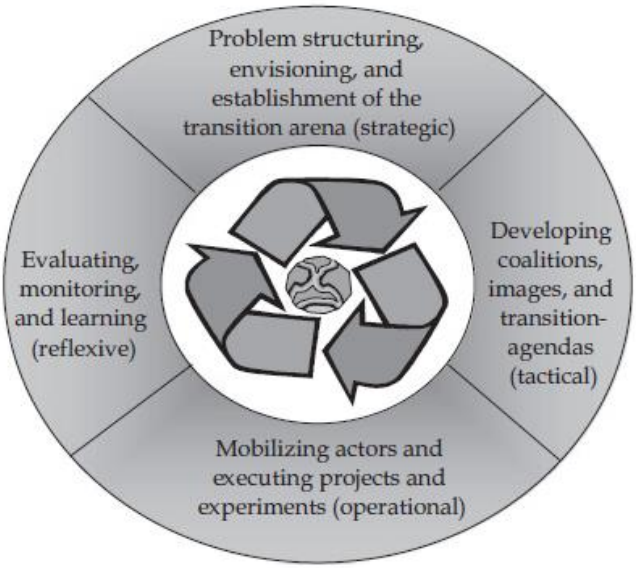

Figure 4. Transition management cycle (Loorbach, 2010)

4 Material & Methods

TM is used as a theoretical framework to analyse collected data regarding how Malmö municipality currently is working to achieve a sustainable waste transition. TM is also used as a normative theory, suggesting potential future pathways for overcoming identified gaps and challenges in the transition process. The character of this thesis is therefore descriptive and exploratory, using an abductive approach where theories of TM have been compared with collected empirical data (Bryman, 2016). In this chapter, my choice of a case study will be justified, followed by a discussion regarding chosen methods of document consultation and semi-structured qualitative interviews. Lastly, ontology and epistemology as well as acknowledged limitations for my methodological approach will be presented.

4.1 Case study design

This case study research method focuses on how Malmö municipality is strategically and practically working to achieve a transition towards a sustainable waste society. A case study is most suitable for this thesis as it explores the complexity and particular nature of a specific real-world case, where the researcher has no control over actual behavioural events (Stake, 1995; Yin, 2014). Malmö was chosen as a case study since the city is actively working towards a sustainable waste society, but is also facing current and future MSW challenges.

A critique for case studies is the issue of generalization, questioning if it is possible to apply any findings from a single case study in a different context (Bryman, 2016, p. 399). The goal of this case study is not to make statistical generalization that is applicable to populations or universes, as this often require multiple studies of a specific phenomenon. Instead is the aim of this case study to create analytical generalizations and generalize theories that can lead to theoretical propositions (Yin, 2014, p. 40).

4.2 Data collection and interpretation

Data was collected through a document consultation, in form of grey documents, and semi-structured qualitative interviews with five employees working with sustainable MSWM in Malmö. Below is a description of how data was collected, what the data consist of and how the data was analysed to answer my research questions.

4.2.1 Document consultation

Sweden's national and Malmö's local waste plan (Naturvårdsverket, 2012; VA-Syd, 2016) were initially studied to get an understanding of the current MSW situation and strategies for achieving a sustainable

waste society (RQ1). The document consultation has laid the foundation for the background section and has helped me to find relevant interviewees and specify interview questions. As I want to understand certain aspects of Malmö's MSWM operations, it is according to Bryman (2016, pp. 560-561) strongly recommended to validate and compare data from studied documents with other sources of data, such as interviews. This comparison can be further emphasized as the studied waste plans are promoting ambitious aims such as circular material systems, climbing the waste hierarchy and reducing MSW amounts (Naturvårdsverket, 2012; VA Syd, 2016), while statistics (see Figure 2, p. 7) indicate increasing amounts and incineration of waste (Avfall Sverige, 2016a; 2016b). A comparison can show whether the reflected reality described in the documents correspond to the contextual social reality.

4.2.2 Semi-structured interviews

Semi-structured interviews were conducted to complement data gained from studied documents, with the intention of finding out how Malmö is strategically and practically working to achieve a sustainable waste society (RQ1) and identifying gaps and challenges (RQ2). An interview guide was written considering Bryman's recommendation for designing interview questions (Bryman, 2016). The interview guide was tested and revised, securing that the questions were easy to understand and would be able to answer my research questions. See Appendix B for interview guide.

The first selection of potential respondents was found with help of Malmö´s waste plan (VA Syd, 2016) as well as Malmö's municipality homepage[2]. The potential respondents were contacted via email where I shortly described my thesis, and asked if s/he possessed experience of Malmö's local and Sweden's national waste plan as well as an insight of Malmö´s sustainable MSWM. These criteria were considered to increase the probability that chosen respondents would possess adequate knowledge to answer my questions. If the contacted person was not suitable or willing to participate, s/he was asked whether s/he knew anybody else that would be suitable for an interview, according to the snowball sampling technique (Bryman, 2016, p. 415).

A total of five interviews were conducted (see Table 1) in Swedish. Quotes that have been included in the thesis have been translated to English, reflecting the original Swedish quote as close as possible. All interviews were in-person, recorded and transcribed verbatim. Transcripts were also sent to interviewees for verification.

Interviews consist of several ethical and moral issues that need to be considered before, during and after conducted interviews (Kvale, 2007). One initial consideration is whether the respondents are put

[2] http://malmo.se/

at any risk or danger by participating in the interviews (Kvale, 2007, pp. 23-30). I argue after consideration that neither the topic of my thesis nor asked questions are of such controversy that the respondents would risk any harm by participation. However, to ensure that all respondents felt safe and free to speak their minds, they have been given a numerical value, instead of using their name, to keep their identity anonymous. Respondents also had the right to withdraw participation at any time. See Appendix C for extended list of respondents.

Collected data from interviews were analysed using TM as a theoretical framework, acknowledging strategies and practical actions which play an important role for the transition process. Data from interviews have also been analysed using theories of TM, to formulate suggestions for overcoming identified transition challenges.

Table 1. List of interviewed respondents

Respondent	Company / Department	Type/Affiliation	Title/Work	Transition arena actor
1	Malmö's environmental department	Municipal department	Project leader - Food waste	Yes
2	Malmö's environmental department	Municipal department	Environmental inspector - Consumable goods production	No
3	Avfall Sverige	Sweden's waste management association	Advisor - Waste prevention and reuse	External advisor
4	VA Syd	Municipal waste management	Development engineer and project leader - Waste prevention and reuse	Yes
5	Sysav	Waste treatment	Project leader - Municipality relations	Yes

4.3 Credibility of interviews

It is important to reflect upon the credibility (internal validity) of conducted interviews by questioning why I chose the specific respondents, why their answer are relevant for my research and potential issues that could be caused by relying on data given by the respondents (Bryman, 2016, p. 390). The specific respondents were chosen as I wanted to achieve a comprehensive understanding of Malmö's current MSWM by including actors from both municipal departments as well as external actors which work closely together with Malmö municipality. This could give a more nuanced reflection of the studied reality, by including respondents which are actively working with sustainable MSWM in Malmö, but eventually possess various perspectives and understandings of the issue, as they come from different departments and companies. It is though questionable to what extent the respondents

answers can be generalised for their departments or companies, as I only interviewed one or maximum two persons from each company. More interviews would need to be conducted to secure this issue.

4.4 Epistemology & Ontology

How we understand and define waste is on one hand a matter of perception. What one person discard as waste could be seen and treated as a resource by somebody else (Zaman & Lehmann, 2011a). It is though doubtful that the waste problems we are currently experiencing only are caused by differentiating perceptions and valuing issues. I therefore acknowledge MSW from a wider ontological perspective, which not only understand MSW as a perception- and value problem in a social context, but also the physical, chemical and biological traits waste have in an environmental context.

Further on I take the epistemological perspective of critical realism, which recognise the existence of a reality independent from the social world and our own perceptions (Bryman, 2016, p. 29). This thesis takes the perspective that while the problem of MSW for Malmö municipality and the environment is an objective reality, several different social constructions for understanding the issue and its potential solutions exist.

4.5 Limitations

One limitation that became clear during the interviews was that none of the respondents explicitly said that they were working with TM or were part of a transition arena, as they were unaware of the TM concept. Instead the respondents stated that they were working and trying to manage a transition towards a sustainable waste society, which I interpret as TM. The transition arenas which I have acknowledged are based on the respondent's descriptions of their working constellation. These constellations have further been compared with the descriptions of transition arenas described in Loorbach (2007), pinpointing a multi-actor working group trying to change current societal structures and create a transition towards a sustainable waste society. However, the acknowledged limitation does not drastically affect my research, since the aim of this study is not to evaluate the respondent's knowledge or opinion regarding TM, but rather use TM as a theoretical framework to understand the current situation in Malmö and analyse if and how TM can help to address identified transition challenges.

5 Results & Analytical discussion

The results and analytical discussion will be organized as follow: current work in Malmö, identified gaps and challenges, potential future pathways.

5.1 Current work in Malmö

This section outlines the results that help to answer RQ1; how Malmö is strategically and practical working to achieve a sustainable waste society. RQ1 is answered by using the TM cycle as a theoretical framework to identify current initiatives which play an important role for the transition process. The TM cycle also help to identify if certain important governance initiatives are missing in Malmö, which are fundamental from a TM perspective. The initiatives will be categorized as *strategic, tactical, operational* and *reflexive,* according to the TM cycle (Loorbach, 2010).

5.1.1 Strategic initiatives for sustainable municipal solid waste management

The first step is to identify and structure the problem which is of interest. This is done by establishing a transition arena where a network of frontrunners (actors) are integrated, enabling them to exchange knowledge regarding the complexity and their individual understanding of the problem, collectively formulating goals and visions for the transition (Loorbach, 2010).

Waste seems to have been an acknowledged issue for a long time according to studied waste plans and interviewed respondents. But to identify and structure the problem of waste in a simple way seem to be difficult due to its complexity, as waste can have negative impact on both local and global level, and on societal, environmental and economic systems at the same time (Lehmann & Crocker, 2012). A commonly expressed explanation stated in studied waste plans, as well by several respondents, is that our current dominating waste system is unsustainable due to its linearity, causing resource depletion. A circular waste system where we consume less and products are being reused multiple times before they are discarded, is therefore desired (Naturvårdsverket, 2012; VA Syd, 2016; R1; R4; R5). The promoted importance of a circular waste system seems to have led to a shift of perception stating that waste should be seen as a resource, and not as something without any value (Naturvårdsverket, 2012; R1; R5). This have led to that the issue of waste has gone from a simple collection and treatment issue to a complex and diverse resource problem (R4; R5).

> *"We need to see waste as a resource if we want it to become sustainable. Not only see waste as something that should be recycled or incinerated."* (R1, project leader, food waste, 2017)

To handle the growing complexity of waste, two different transition arenas seem to have evolved. One of these transition arenas is acting on a regional scale initiated by the waste treatment company Sysav (R4; R5). This regional transition arena includes actors from 14 municipalities with the intention to initiate and create collaboration between them (Sysav, 2016). Collective goals have been formulated in the regional transition arena which all participating municipalities have adapted in their own local waste plans, to make the municipalities work towards the same goals (Sysav, 2016).

The other transition arena, which I will focus on, is Malmö's local transition arena for sustainable MSWM. Malmö's local transition arena is initiated and led by VA Syd, containing several municipal actors from different public departments in Malmö such as city development, environmental department, urban services as well as representatives from Sysav (VA Syd, 2016). This working group also has a responsibility to create and develop Malmö's local waste plan (R4).

> *"It is VA Syd which have the responsibility for creating the local waste plan, but it is done in collaboration with several other municipal departments and Sysav. Sysav has a waste plan with the same goals as we have. We have added a few extra goals though. There has been one process in Sysav, but we have had one process locally in Malmö where we have involved different municipal departments and actors which can influence Malmö's sustainable waste management."* (R4, development engineer, waste prevention and reuse, 2017)

The waste plan describes Malmö's overarching MSWM processes and present focus-areas and goals (see section 2.5) which are argued to be important for creating a sustainable waste situation in Malmö (VA Syd, 2016). All respondents emphasize that the waste hierarchy model (see Figure 1, p. 5) is used as the overarching strategy for Malmö's sustainable waste work, clearly influencing the local waste plan.

5.1.2 Tactical steps for sustainable municipal solid waste management

After the transition arena has been established, problem(s) have been defined and goals have been chosen for the transition, leads us to the tactical step in the TM process.

In this step strategies and practical actions for reaching set goals are evaluated and chosen within the transition arena (Loorbach, 2010). It is also discussed which current structures of society that could hinder implementation of chosen strategies and actions (Loorbach, 2010). Tactical initiatives described below does not give a complete picture of Malmö's current waste work, but rather a general overview of what the respondents argue to be current important focus-areas for a transition towards a sustainable waste society.

5.1.2.1 Establish locations and systems for recycling, reuse, and repair

A commonly used proverb by the respondents is "it should be easy to do the right thing" (R1; R3; R4). This proverb is something of a central statement for Malmö's overall environmental work (Malmö Stad, 2009), clearly influencing Malmö's sustainable MSWM. The simple idea behind the proverb is that society [Malmö] should be shaped and function in a way which makes it effortless for citizens, businesses and Malmö's municipal organization to make sustainable choices when buying and consuming products as well as managing their waste (Malmö Stad, 2009). Malmö's local transition arena is currently discussing new systems for increasing the possibilities and make it easier to recycle, reuse and repair products (R1; R4).

> "*Our recycling centres receive tremendous amounts of waste, and they are designed in a way which makes it very easy to throw away things, and the possibilities for reuse is very small. To get the recycling centres to become a place for reuse, the employees at the centres should be the ones that decide what will be thrown away and what will be reused. A whole new system need to be implemented to take care of that waste flow. Since it is so easy to throw away things at the recycling centres, it becomes unsustainable*." (R4, development engineer, waste prevention and reuse, 2017)

Respondent 1 and 4 states that a fundamental idea of establishing locations and systems for reuse in Malmö is to promote sustainable consumption. This is done with the intention to give people the possibility to change their consumption behaviours, and to buy more products second-hand and to give away their old goods for repair and reuse instead of throwing them away as waste (R1; R4). All interviewed respondents used the term sustainable consumption as a mean of consuming less products, buying products which have a long utility life and can be repaired, or has a second-hand value, and are free from harmful chemicals.

> "*It should be more common with second-hand stores than stores where you can buy new products. Changing the view of consumption by changing the system. To offer more circular alternatives can be a solution*." (R4, development engineer, waste prevention and reuse, 2017)

5.1.2.2 Sustainable waste management as a natural part of Malmö's city planning

A short but interesting note was given by respondent 4, stating that sustainable MSWM should be a natural part of Malmö's current and future city planning. According to the respondent the current city planning is incorporating waste management in its most basic element, focusing on issues such as what type of waste bins that should be used and what size the waste room should have (R4).

> "*Waste planning has to become a part of the city planning. We will be more citizens, and much is being built, so the waste amounts increase, which in turn need to be managed. If we could include the circular and reuse concept in the city planning, then we might would be able to design the waste rooms as small as the city planners want*." (R4, development engineer, waste prevention and reuse, 2017)

Respondent 4 further states that a continuous lobbying towards local politicians and city planners for making sustainable MSWM a natural part of Malmö's city planning is carried out.

5.1.2.3 Societal structures hindering implementation of tactical initiatives

The tactical step of the TM cycle include reflection and discussion regarding existing societal structures (regimes) that may hinder implementation of tactical initiatives, acting as transition barriers (Loorbach, 2007, p. 20; 2010). Below I present what the respondents identified as societal structures preventing implementation of initiatives for sustainable MSWM in Malmö.

5.1.2.4 Production and consumption

All respondents stated that one of the root-causes of the unsustainable waste situation is caused by how products are produced and consumed. Due to the dominating linear market system where resources are extracted, converted into products, sold and thrown away after its utility life has ended, a rapid increase of waste can be seen globally (Lehmann & Crocker, 2012, pp. 1-6), including Malmö (Avfall Sverige, 2016b).

> "*We are encouraged to consume and our whole economy is based on it. It is difficult to imagine another way of life. We are supposed to work very much, earn a lot of money and then consume, and that is not sustainable. But there are no signs that society should function in another way, or that we should have another type of allocation than the market economy. And that is not the right way to go from a sustainability perspective*." (R5, project leader, municipality relations, 2017)

> "*What we buy, we throw away. The mind-set of people. But also the whole system. It is more expensive to repair than to buy new products. Bad products are produced and sold which need to be replaced by new."* (R1, project leader, food waste, 2017)

However, the linear market system is not the only societal structure that prevents Malmö from creating a sustainable waste society. Several respondents argue that current laws and regulations, as well as Malmö's commercial department, hinder implementation of tactical initiatives that has a direct negative effect on the local market economy (R1; R3; R4).

"The municipality has many sides. They also have a commercial side which promote consumption and economic development. So there are contradictions within the municipality which makes it difficult to agree on one line. You should not be negative to consumption in general, but rather be negative to the type of consumption we have today, which is unsustainable consumption. It is about the transition towards a circular economy that is needed, and if we ever should achieve such a transition, then the municipalities need to get more authority to work with it. The municipalities do not have so much possibilities today, due to laws and regulations." (R3, advisor, waste prevention and reuse, 2017)

5.1.2.5 Technical lock-in

Technical lock-in is a frequently mentioned issue for succeeding with sustainable development transitions (Kemp et al., 2007). The most commonly discussed technical lock-in by the respondents was the local waste incineration facility.

"*We want to sort all of our waste and prevent waste, which means that less waste goes to incineration. But on the same time, we have municipal companies which have built up gigantic incineration facilities and want to burn waste." (R4, development engineer, waste prevention and reuse, 2017)*

Even if majority of respondents stated that waste incineration hinders and stall the transition, respondent 3 argued that waste incineration is a necessity for achieving a sustainable waste society.

"There will always be waste that should be incinerated. And if it does not have any other value, then it at least has a heat and electricity – value, which we have need for in Malmö. Many materials should not be reused or recycled because they contain chemicals which can be harmful for both humans and the environment, and should therefore be incinerated." (R3, advisor, waste prevention and reuse, 2017)

5.1.3 Operational experiments for sustainable municipal solid waste management

Transition experiments are created with the intention to broaden, deepen and scaling up implemented initiatives, and comes with a high level of uncertainty regarding what impact it will have on the transition process (Loorbach, 2010). Two currently active transition experiments were mentioned by the respondents.

5.1.3.1 Spreading knowledge about waste

To give information and spread knowledge to citizens and actors regarding waste is argued to be one of the most important strategies and actions for achieving a sustainable waste society (R1; R3; R4; R5; VASYD, 2016). Information is spread through a variety of channels, such as information sheets sent out once per month to households, webpages and by organizing public campaigns (R4). The information mainly seeks to raise awareness regarding the negative effects waste have on the environment, what practical actions individuals can do to decrease their environmental impact caused by waste and lastly,

what positive environmental effects certain waste management procedures result in (R1; R4).

5.1.3.2 Neighbourhood recycling and reuse centre

Returen was mentioned several times during my interviews, and was argued to be a very important and unique transition experiment. Returen is a relatively new (2 years) and currently active experiment which combines the three previously mentioned tactical and experimental initiatives; spreading knowledge about waste, establishing new locations for recycling and reuse and making sustainable MSWM part of the city planning (R4).

Returen can be described as a local neighbourhood recycling and reuse centre, where people can bring MSW such as furniture, electronics, textiles and chemical products (R3; R4). These waste types would otherwise need to be transported to recycling centres located outside the city, hindering households without cars to manage this type of waste in an easy way (R4). Returen solves this problem by offering a location close to where people live. Returen also act as a knowledge-centre where the employees can speak multiple languages and can help to answer people's questions regarding waste (R4). This direct verbal communication regarding waste with citizens is new for Malmö, as the social aspect of waste collection and management is rare (R4).

> *"One of the employees spoke Arabic, and there came Arabic-speaking people from different parts of Malmö just to go there and ask question regarding waste, because they have not understood the waste system at all. That proves that conventional methods for information transferring does not work."* (R4, development engineer, waste prevention and reuse, 2017)
>
> "*VA Syd has not came so far regarding what social sustainability is and how it is connected to our business. We have a long way to go, but Returen took us a bit forward. We need to make progress together, not that we sit on all the necessary knowledge by ourselves.*" (R4, development engineer, waste prevention and reuse, 2017)

Returen also consist of a room where people can leave products for reuse and take things that other people have left, establishing a new location and system for reuse and sharing (R3; R4). The fundamental idea is to change the mind-set of people, trying to make them first go to Returen to see if there is anything of need, before going to a commercial stores and buy something new, making Returen a natural part of people consumption process (R4).

There are currently plans on scaling up the experiment by implementing up to 10 new Returen in old and new neighbourhoods, making it a natural part of Malmö's city planning and urban development (R3; R4).

5.1.4 Reflexive monitoring and evaluation

The last step in the TM cycle is regarding the monitoring and evaluation of both the transition process and the TM (Loorbach, 2010). All interviewed respondent's states that some type of monitoring and evaluation is carried out for initiatives affecting chosen waste goals. Respondent 1 and 4 mention that a continuous monitoring and evaluation is new for them, stating that previous methods have been more streamlined, where new initiatives have been implemented when old ones have been fulfilled, without any comprehensive evaluation made.

> "*To work iterative, not setting to high goals, but rather that we do a small activity, run it, evaluate it, learn what went wrong, improve it and then do a new attempt. That it goes in a spiral, which is a totally other mind-set than what is used when implementing technical solutions which should be streamlined. Building a sustainable city is difficult and complex, so taking these small steps and do the iterative thinking can be a way to reach the goals."* (R4, development engineer, waste prevention and reuse, 2017)

Regarding the question if and how implemented strategies and initiatives are affecting the progress and overall goal of achieving a transition, a variety of answers are given. Some respondents state that successful initiatives that result in climbing the waste hierarchy could be evaluated as a step towards a sustainable waste society (R1 & R2), others state that it is impossible to exactly know what impacts implemented strategies and actions have on the transition (R3 & R5) and another simply answered that such evaluations currently do not exist (R4).

5.2 Gaps and challenges

While Malmö municipality exhibits a wide range of initiatives working towards a sustainable waste society, there are areas where its strategies and practical actions seem inadequate. This section answer RQ2 by presenting identified gaps and challenges associated with Malmö's work towards a sustainable waste society. The identified gaps and challenges are summarised in Table 2, found in the end of this section.

5.2.1 Lack of a collective vision

A common thought between all interviewed respondents is that Malmö's current waste situation is unsustainable, due to the waste system's linearity. A transition towards a sustainable waste society is needed, and argued for in both local and national waste plans (VASYD, 2016 & Naturvårdsverket, 2016), as well as among the respondents. But when the respondents are asked what this sustainable waste situation is, which the collective work should lead to, a variety of uncertain answers are given.

"*It is very broad. It is everything from how we manage waste, and the working environment for those who work with it. But if we think about the waste hierarchy, then we should have as little waste as possible. Or we do not see waste as waste, but rather see it as a resource. (R1, project leader, food waste, 2017)*

"We are far from it. Increase the awareness of the citizens, I think that is a way to a sustainable waste situation." (R3, advisor, waste prevention and reuse, 2017)

"It is a societal change. Change of systems that generate waste. It should not be troublesome to prevent waste on an individual level. But the waste that still is generated should be possible to recycle in an environmental acceptable way." (R4, development engineer, waste prevention and reuse, 2017)

"We have our vision that no waste exists but… this becomes very goofy, but not to deplete the resources, but rather circulate them. But also to stop consume the way we do. We should be able to go around without taking more than we put in. Find a balance. That is where we are going." (R5, project leader, municipality relations, 2017)

Based on these answers it seems like the respondents lack a clear collective vision of what a sustainable waste situation is, and how a sustainable waste society function. The respondents did not express that the lack of a collective vision was a problem per se (probably because they are not aware of it), but rather something I identified as an issue of dissent (see chapter 3.3) in the current transition process.

5.2.2 Economic capacity

Actors working with sustainable MSWM in Malmö, specifically regarding waste prevention and reuse, have experienced difficulties funding their projects (R1; R4). The main reason seems to be that different departments within Malmö municipality have different possibilities to apply for funding. For instance, the municipal environmental department need to apply for funding for every project they want to implement (R1). This can be compared with VA Syd which has a fixed budget and inflow of capital, coming from waste management fees paid by households in Malmö (R4).

"*Malmö's environmental department live on project funding. We [VA Syd] do not. We have an even inflow of capital and we can calculate year after year how much money we will receive, because it is directly connected to the municipal waste fee. The truth is that having a stabile inflow of capital enable long-term acting, compared to the environmental department which need to apply for funding all the time.*" (R4, development engineer, waste prevention and reuse, 2017)

Funding restriction and political change could lead to the governance issue of political myopia (see chapter 3.3), making involved actors leave the transition arena and giving up on the transition (Kemp

et al., 2007), if their capability to work towards set goals is insufficient (Loorbach, 2010).

5.2.3 Lack of private actor involvement

Even if Malmö's transition arena incorporates several different actors, none of them are from the private sector (VA Syd, 2016, p. 16). This in turn does not mean that the private sector is entirely excluded from Malmö's transition process. One or two workshops are held every year, where multiple stakeholders from private, industrial and civil society are invited (R3; R4; R5). These workshops sometimes include discussions regarding sustainable MSWM (R3; R5). But arranging a workshop one or two times per year, where the industry eventually is present, does not guarantee a long-term commitment for a transition towards a sustainable waste society among the attendants (R5). On the same time are the industry and private sector argued to be one of the root-causes to the unsustainable waste situation, often due to planned obsolescence of products (Lehmann & Crocker, 2012, pp. 1 - 6).

> "*If I buy a product which is not built to be recycled, then it cannot be recycled. We are very dependent of the producers, that products are produced sustainably, and that they are possible to recycle*." (R5, project leader, municipality relations, 2017)

Including and securing both private and public actors in the transition arena is fundamental for a successful TM process (Loorbach, 2010). All respondents state that industry and private sector are important stakeholders in Malmö's transition process. The problem is that municipalities does not have any power or legal possibility to affect the industry and private sector, and neither does those sectors seem to be interested in working with sustainable waste management, if either money or time need to be invested (R3, R4 & R5).

5.2.4 Interpretation of goals and the waste hierarchy

As the local and national waste plan evolve over time, with new and updated goals, new and changed interpretations might occur among the readers. This could lead to the issue of dissent (Kemp et al., 2007) as Malmö's sustainable MSWM involves actors with different backgrounds, perspectives and understandings. The issue of dissent can be exemplified with one of Malmö's local waste goals stating "in 2020 is the total amount of textiles in the household waste 50% less compared to year 2015" (VA Syd, 2016).

> "*We see it as the textile waste is supposed to decrease in the waste bin, but not focusing on decreasing the consumption of textiles. So then they maybe invest in a collection system which lifts the textile out from the waste bin, but not addressing the root cause of the problem. And that is tragic*." (R4, development engineer, waste prevention and reuse, 2017)

The issue of interpretation and dissent is not only affecting how Malmö's waste goals are understood, but can also be traced to the overarching strategy that Malmö base its sustainable MSWM on, namely the waste hierarchy. As the waste hierarchy consist of five different steps ranging from the lowest step of landfilling to the top step of waste prevention (see Figure 1, p. 5), the initial impression that the waste hierarchy give is that we should work from the bottom of the hierarchy to the top. Or is it possible to interpret the waste hierarchy in other ways?

> "*It gives guidance. But it also gives options. It is possible to focus on recycling instead of prevention, and then is a lower step chosen. There is a recycling goal stated in the waste plan, and then we can justify focusing on something that is lower in the waste hierarchy*." (R4, development engineer, waste prevention and reuse, 2017)

Or as Respondent 3 express her interpretation of how to work according to the waste hierarchy;

> *"To strive upwards in the waste hierarchy… but on the same time work optimal in all of the steps individually."* (R3, advisor, waste prevention and reuse, 2017)

What we can derive from this is that the waste hierarchy is seen more as a guide rather than a clear plan on how to manage MSW. The issue regarding how actors can interpret the waste hierarchy model has previously been researched and discussed by Hultman and Corvellec (2012), stating that prevention of waste often is given a low priority among waste actors in Sweden. Priority is instead given to the recycling and reuse of waste since these steps contribute to material recycling, creating input for a circular economy, which enables continued consumption and economic growth (Hultman & Corvellec, 2012).

The dilemma for Malmö seem to be that all steps of the waste hierarchy can be chosen, regardless of its ranking, if it can be justified. The justification could for example be based on fulfilment of national or local waste goals, arguing that a certain treatment method is the most optimal choice or that one hierarchy step is more sustainable than another (Morrissey & Browne, 2004), eventually leading to dissent between actors (Kemp et al., 2007).

5.2.5 Evaluating the impact of performed actions

Some respondents are concerned regarding how to measure and evaluate the impact of performed strategic and practical actions on Malmö's waste goals, as well on the transition process (R3; R4; R5). One example is how to evaluate what impact Malmö's strategic and practical work have on total waste amounts.

> "*It is impossible to know even if we arrange activities to create awareness and behavioural change. It can be just as much economy, trends in society, legislation. There are so many things that affect."* (R5, project leader, municipality relations, 2017)

The issue of not knowing what impact performed short-term strategies and practical work have on long-term goals is a common governance issue for social change (Kemp et al., 2007). The issue of evaluation could potentially hinder both implementation and continuing of certain initiatives if it is impossible to show what positive affects it have contributed to (Kemp et al., 2007). It can also be argued that the uncertainty of what effects initiatives have further complicate the work of understanding which the most efficient and powerful initiatives for a sustainable waste transition are.

Table 2. List of identified gaps and challenges for Malmö's transition process towards a sustainable waste society

Gaps & Challenges
Lack of a collective vision
Interpretation of goals and the waste hierarchy model
Lack of private actor involvement
Funding issues
Evaluating the impact of performed actions

5.3 Potential future pathways

Several gaps and challenges have been acknowledged (see Table 2) along the research which could hinder and complicate Malmö's transition towards a sustainable waste society. In line with sustainability science's aim of "a solution-orientated approach" (Spangenberg, 2011, p. 276), and to answer RQ3, this section describe potential future pathways using theories of TM and collected empirical data. Identified gaps and challenges will be analysed regarding if and how TM can help to solve them, and formulate potential solutions. Identified challenges and their potential TM solutions are summarised in Table 3, found in the end of this sub-chapter.

5.3.1 Collective understanding of visions, strategies and goals

A crucial part of TM according to Loorbach (2007, pp. 88-92) is to create collective visions and goals. But solely creating a vision or goals is not sufficient as long as those are not shared and jointly understood by incorporated actors (Loorbach, 2007, pp. 88-92). As Malmö seems to have an active multi-actor agenda-building on both regional and local levels, where collective goals are discussed and agreed upon, it becomes clear during my interviews that a joint understanding of these goals as well

as a clear collective transition vision is lacking between the respondents. This could potentially obstruct the collaboration between actors towards a transition, if the vision and how to reach it is not commonly understood (Loorbach, 2007, pp. 88-92). It is therefore arguable from a TM perspective that current and future collective agenda-building sessions should incorporate a process where every agreed waste goal and strategy are jointly discussed in terms of how each actor interprets and understands them. This process may result in that current waste goals need to be re-written in a way which all actors can agree to, which is a standard procedure in TM (Loorbach, 2007, pp. 88-92). The same type of logic also applies to the collective formulation and understanding of what a sustainable waste society is (transition vision) (Loorbach, 2007, p. 119). The discussions towards a collective vision might create clashes between involved actors as their perspectives may differ. This process is also seen as a natural part of the evolvement of the transition, questioning what sustainability is and how it can be understood from different perspectives (Loorbach, 2007, pp. 98-99).

Applying the above described process to the agenda-building could be a viable step in terms of tackling acknowledged challenges regarding the lack of a collective vision for a sustainable waste society as well as the interpretation issues of set waste goals. I further argue that this process also could be used to create a collective agreement on how the waste hierarchy model should be interpreted and used, and to overcome the issue of dissent (Kemp et al., 2007) which currently seem to be existing between incorporated actors.

5.3.2 Private actor involvement

It is difficult to find any viable solution in studied TM literature regarding the challenge of incorporating private actors in the transition process. Malmö municipality is already trying to initiate collaboration with private actors, by inviting them to workshops, which Loorbach (2007, p. 139) argue to be a good opportunity to inquire about the willingness, possibility and commitment of actors to join the transition arena. The issue for Malmö seem to be that none of the invited private actors have any willingness to commit to a long-term transition process, if the commitment implies that money and time need to be invested (R3; R4; R5). As respondent 3 and 5 stated that municipalities do not possess any power or legal rights to affect private actors and industries to work with sustainable waste management, respondent 2 see it differently.

> "*The law states that you should recycle materials, but if the materials are mixed it cannot be sorted correctly and have to be incinerated. We can state requirements and demand that certain packages are not allowed to be manufactured."* (R2, environmental inspector, consumable goods, 2017)

Respondent 2 further states that he is not incorporated in the local transition arena, even if his own work could have a positive impact, not only on Malmö's, but even Sweden's waste situation, since many products that are produced in Malmö are sold and distributed nationally (R2). I did not receive any definitive explanation to why respondent 2 is not incorporated, but one potential reason could be that his work focus on industries, while Malmö's local waste plan focus on household waste (VA Syd, 2016). It is questionable how products that are produced by industries and private actors, which eventually will become household waste (MSW), such as a milk packages, should be seen and defined when it is still within the industrial production line. After all, several respondents stated the importance of tackling the root causes of waste, deriving from industry. By stating requirements and demands on private actors regarding how they are allowed to produce their products could eventually lead to an increased interest for cooperation and involvement, as the private actors would be directly affected by Malmö's transition process.

5.3.3 Evaluation as a learning process

A common uncertainty within governance for social change is what impacts short-term actions have on long-term structural change (Kemp et al., 2007) as modern societies can be influenced by several different factors affecting both the macro, meso and micro level of society (see Figure 3, p. 12) (Loorbach, 2007, pp. 16-21). This uncertainty has also been expressed within Malmö's sustainable MSWM (R3; R4; R5). TM does not suggest any specific solution to this problem, but rather give suggestions on potential ways of working with monitoring and evaluation, as well discussing perspectives on how evaluation could be seen (Kemp et al., 2007; Loorbach, 2007, p. 123). TM states that instead of evaluating the exact impact and result of an action, it could be useful to evaluate if the action was a success or not, based on initial hopes and visions within the transition arena in combination with lessons learned during the implementation and execution of the action (Kemp et al., 2007; Loorbach, 2007, p. 123). Knowledge gained from an implemented action or strategy can lay the foundation and help to optimise future implementations. This iterative process can be seen as a type of social learning, where interactions, cooperation and reflections within the implemented activities creates new insights and knowledge (Loorbach, 2007, p. 123).

Respondent 4 mention that VA Syd has started to implement an iterative evaluation of projects, which could indicate that this type of evaluation is being adopted. The mentioned challenge of not knowing the exact impact of a specific action might not be a problem per se, from a TM perspective, but rather something that has lived on as a perceived problem within the organisation based on previous linear evaluation methods.

5.3.4 Securing incorporated actors

Studied TM literature does not specifically discuss the challenges of economic funding which respondents 1 and 4 mention. However, the studied TM literature states that there should be a distributed control between stakeholders in the transition arena, meaning that all included actors should have a possibility to contribute towards collectively agreed goals and visions (Kemp et al., 2007). This TM "rule" could potentially help to set up an economic collaboration within the transition arena. If a certain actor within the transition arena fail to achieve funding for a project, that actor might instead be able to lend his or her expertise to another already active or coming project which is funded by another actor. Kemp et al. (2007) states that an openness for transdisciplinary collaboration within the transition arena is essential for the survival of the transition process, and to avoid political myopia by keeping all actors active and incorporated within the transition arena. The discussion above leads us to the conclusion that if an actor struggles with economic funding to realise a project, the actor should inform the rest of the transition arena stakeholders and together find an alternative option, such as joining another already active project.

Table 3. Summary of identified gaps and challenges and their potential transition management solutions (Loorbach, 2007; Kemp et al., 2007)

Gaps & Challenges	**Transition Management Solutions**
Lack of collective vision	Collective agenda building
Interpretation of goals and the waste hierarchy model	Collective agenda building
Lack of private actor involvement	Collective workshops
Evaluating the impact of performed actions	Evaluation as a learning process
Funding issues	Distributed control

6 Critical discussion on transition management

In this chapter I present a critical discussion on TM, including acknowledged limitations as well as what perspectives TM gives on my collected data.

TM has been used as a theoretical framework in this study to organize and understand the complex governance process (transition) for sustainable MSWM in Malmö. Strategies and practical actions were defined and labelled with help of the TM cycle. But since TM is a normative theory (Loorbach, 2007, p. 37), it also helped me to suggest potential solutions for acknowledged challenges. However, my analysis show that TM was insufficient in suggesting a clear and specific solution for the acknowledged funding problem. I therefore made a personal interpretation to formulate a potential solution, which might be weakly grounded in TM. My analysis also showed that the TM suggestion regarding collective workshops for increased private actor involvement already have been tested in Malmö, without success. Both of these identified weaknesses leads us to the question how useful TM is in practice, and not only in theory. The majority of pre-conditions needed to implement TM, such as a multi-actor involvement and economic funding, are not discussed in depth regarding how they actually should be achieved in studied TM literature (Loorbach, 2007). The lack of a clear and comprehensive description of how to overcome identified governance challenges (Kemp et al., 2007) make it uncertain to what extent TM can be useful for interviewed respondents. It can be argued that TM, and the problems it is designed to overcome, is more useful for actors which possess an overarching view and dominating power within a specific context, such as MSWM, to be able to gather multiple actors and possess adequate resources to implement initiatives. It is questionable if interviewed respondents possess these preconditions or if they are acting on a lower level within Malmö's MSWM, which prevent them from overcoming certain identified challenges. It can though be argued that certain fundamental parts of TM already seem to be in place in Malmö, such as a transition arena, which makes the suggested solution of a collective agenda building feasible to implement by the respondents.

Loorbach (2010) states that the complexity of society in combination with unpredictable external events makes it difficult, and sometimes even impossible, to manage transitions successfully. It is utterly doubtful if Malmö possesses the power to overcome and change current regime structures of consumption and waste generation. It might be that Malmö municipality is trapped within the iron cage of current regime structures and only able to influence and make current system more sustainable, rather than successfully make a transition to a new. So why should Malmö even try to manage a transition towards a sustainable waste society?

Forerunners of TM have given answers to these doubts by explaining that sustainability is an endlessly continuing work rather than an achievable goal (Kemp & Martens, 2007). The continuously managed

work towards a transition can eventually result in growth of a niche, to such an extent that it gains the strength and capability to influence the existing landscape level of society, and together overcome the unsustainable structures of the existing regime (Loorbach, 2007, p. 20). However, there are no guarantees that a TM process will lead to a transition, and it has historically been shown that transitions have evolved by themselves without any TM processes (Voß, Smith, & Grin, 2009). This makes it questionable why TM should be initiated at all, if transitions eventually will evolve by themselves when the time is right. TM is a reflexive governance approach (Loorbach, 2007, p. 84) which seems to open up new collaborations and ways of thinking and working, which have not been possible with previous linear governance approaches in Malmö (R4). The multi-actor approach seem to have led to new perspectives of sustainability issues, creation and implementation of diverse experiments and increased understanding regarding the importance of evaluation (R4). To me it seems, a bit ironically, that the greatest contribution of TM is not whether a transition will be achieved or not, but rather the possibility it gives for a new governance approach, enabling new ways of working with sustainability issues which previous governance approaches have led to.

During my interviews, I started to reflect whether Malmö's transition towards a sustainable waste society is one transition or if it should be a mix of different transitions. Several respondents stated that sustainable consumption is a crucial factor for the success of a sustainable waste society. It was at the same time expressed that the municipality does not have any possibility or power to affect private actors and industries which sets the preconditions for how we consume products. The lack of power and possibility to affect an important factor for a successful transition goes against the TM rule that all actors in the transition arena should have the capability to contribute towards set goals and visions (Loorbach, 2010). It is therefore questionable if Malmö's local transition arena for sustainable MSWM should focus on sustainable consumption, or let other more suitable actors work with it, and rather focus on trying to connect different transition arenas in Malmö, drawing on each other's strengths, instead of trying to fit all actors around the same table (Meadowcroft, 2009).

Another issue which became clear during my research is concerning power within the transition arena. TM is a multi-actor process which include actors from different sectors and levels of society (Loorbach, 2010). These actors are chosen along the principle that they both have the capability and willingness to contribute towards set goals and vision (Loorbach, 2007, pp. 88-89). This system of actor inclusion can create two distinct problems. Firstly, weak actors are excluded from the transition arena, if they do not possess the capability and power needed to contribute to set goals. This could potentially mean that marginalized actors do not have any power to affect decisions made within the transition arena, even if the decisions could have a direct effect on them, making already marginalized actors even weaker. The second acknowledged problem is that the actors within the transition arena themselves

choose which external actors to include. This could eventually lead to a group bias, where only actors which share the same visions and ideas as the transition arena, are invited, excluding other potential actors if they are a risk for the internal group relations (Shove & Walker, 2007). The same issue can be seen from a reversed perspective, where external actors which are invited to the transition arena refrain from joining, as they do not share the same visions as the one existing within the transition arena. This could be a reason to why Malmö municipality have difficulties to include and engage private actors and industries. The vision and goals of private actors and Malmö municipality might be so different that a trade-off or compromise is impossible to make, without one part becoming "the looser".

A last important reflection is how sustainability is defined based on the perspective of TM. Loorbach (2007, pp. 23-25) discusses the definition of sustainable development, stating that a single definition cannot be given, since it varies depending on where and for what it is applied. Loorbach (2007) further argue that the multi-actor approach of TM will lead to discussions, which in turn will create a definition of sustainability based on the different perspectives of the included actors. The definition of sustainability can come to change over time along with how general perceptions and society evolve, but the definition is always decided by the included actors, potentially excluding perspectives of sustainability from actors outside the transition arena.

Even if a clear collective understanding of a sustainable waste society seems to be lacking among the respondents, they seem to be clearer about how to achieve and work towards this transition. A diverse range of collective goals have been chosen by the actors within the regional and local transition arenas, such as increased recycling (VA Syd, 2016). But how can we know that these goals and strategies lead to a sustainable waste society? And are these goals sustainable for all actors in Malmö?

It is difficult to imagine how our lives would function in a sustainable waste society. If consumption drives waste, will we still have the freedom to choose, own and consume what we want in a sustainable waste society? The development and transition towards a sustainable waste society is not only a question of how to sustain the environment, but also how to sustain our own lives, and what trade-offs we are willing to make. Development can both be a burden and a strength for the environment, and this balance should be closely studied when deciding and formulating visions and goals for sustainable development (Amartya, 2009, p. 249).

7 Summary & Concluding remarks

Using transition management (TM) as a theoretical framework, this thesis has investigated the current strategic and practical work in Malmö to achieve a transition towards a sustainable waste society; identified gaps and challenges in the transition process; and lastly, explored potential future pathways to overcome these challenges and secure a continued transition process. This case study has been influenced by sustainability science's aim of trying to understand the fundamental interaction between nature and society (Kates et al., 2001) by bridging the gap between theory, practice and policy (Bettencourt & Kaur, 2011), with the intention of better understanding Malmö's capacity of achieving a transition towards a sustainable waste society. Even if this case study is location specific, problems caused by waste is not a unique issue for Malmö (Lehmann & Crocker, 2012; Song et al., 2015). Insights about Malmö's current waste work and its potential for future development can therefore be valuable for other cities.

The research reveals that Malmö is actively working towards a sustainable waste situation, mainly relying on the waste hierarchy model as guidance. A group of actors from different municipal departments and public companies in Malmö has formed a local transition arena, which has an important role for the creation and development of Malmö's local waste plan, by formulating goals and initiating strategic and practical actions.

The issue of waste is complex and so are the solutions, making it one of the most important challenges for sustainable city design (Zaman & Lehmann, 2011b). This study identify several challenges for Malmö's transition towards a sustainable waste society. Some of these challenges are caused by currently dominating structures of society, such as incineration facilities acting as a technical lock-ins. Other challenges derive from Malmö's governance process for sustainable MSWM, such as lack of a clear and collective transition vision, issues of incorporating private actors, differentiating interpretation of the waste hierarchy model and uncertainty of how to evaluate implemented strategic and practical initiatives.

TM have been used in combination with collected data from interviews to present potential solutions for the acknowledged challenges. Waste affect all actors in society (Lehmann & Crocker, 2012). Public and private actors should therefore be continuously incorporated in the transition arena, to collectively define and understand Malmö's waste goals (Loorbach, 2007, pp. 88-89). This multi-actor involvement is also fundamental for the creation of a collective vision for a sustainable waste society, and how the waste hierarchy model should be interpreted. The issue of private actor involvement could potentially be solved by increasing the pressure on these actors by implementing product requirements, making private actors more aware of the consequences of waste, and increase the

importance of collaboration. Furthermore, a redesign of Malmö's evaluation process for strategic and practical waste work is proposed, making evaluation a part of the learning-process rather than a tool for knowing the exact result of a certain initiative.

TM is still a young and evolving governance theory. Research like my own can help to further develop the theory, but also critically understand the capabilities TM possesses. My critical discussion on TM show that behind the clearly structured theory lays an uncertainty regarding the fundamental idea of transitions. It is questionable how transitions are managed best, or if transitions can be managed at all. TM also seems to be inadequate in explaining how to overcome certain governance issues which are fundamental for the implementation of TM in practice.

Two suggestions for future research have evolved during my research. Firstly, the concept of sustainable waste management need further exploration, as an uncertainty of its meaning have been identified both in literature and in practice. A better understanding of sustainable waste management could help both researchers and practitioners to develop future strategies to address the growing issue of waste. Secondly, further research need to be conducted regarding the practical outcomes of transition management. Future pathways presented in this thesis have only been suggested in a theoretical sense, and need to be further evaluated and implemented to fully understand its potential and capacity to facilitate a transition.

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Appendices

Appendix A – Examples for sustainable municipal waste management

Reuse and preparation for reuse:

- Work to ensure that products and waste that households wish to deliver to recycling centres are directed for reuse and preparation for reuse via private actors, municipal recycling centres/eco centres or other systems.
- Provide information on the environmental benefits associated with reuse and propose actors who will accept used products as part of the information on waste management given to municipal inhabitants.
- Work with actors who accept used products and offer them sites for collection within the municipality. This could for example take place at recycling centres, as well as at other sites within the municipality.

Textiles:

- Establish collection containers or other collection systems for textiles at all recycling centres in collaboration with second-hand actors.
- Permit second-hand actors to site containers for textile collection at other locations within the municipality and ensure that requirements are imposed on these actors to ensure that a good/professional actor is hired.
- Inform households as regards what they should do with their textile waste and the environmental benefits of reusing textiles.
- Objectives and measures for collecting textiles should be considered in the municipal waste plan.

Recycling and collection:

- View waste management as part of the infrastructure. Waste planning should be coordinated with other social planning within the municipality, e.g. energy and physical planning. Sites and land need to be allocated for waste management in the planning process.
- Develop waste planning by continually monitoring and evaluating the plans.

- Households need to regularly be given information concerning why, what and how they should sort. Strive to follow the waste hierarchy, which for example should lead to an increase in reuse wherever possible and the prioritisation of recycling over energy recovery.

Electrical waste and batteries

- In collaboration with the Swedish Environmental Protection Agency, the municipalities should carry out inspections of producers and actors that act on behalf of the producers.
- Increase inspections regarding the way in which refrigerators are dealt with to ensure that they are handled appropriately, so that ozone-degrading substances do not leak out into the environment.

Litter generation:

- Read the information and guidance that is being developed by the Swedish Environmental Protection Agency.
- Identify and prepare an inventory of problems relating to litter generation in order to develop an action plan with effective measures to reduce litter generation.
- Carry out activities aimed at reducing litter generation together with other actors within the municipality. This could for example involve the provision of more litter bins, more frequent emptying, school projects, local information campaigns and litter picking activities.
- Monitor the effects of the activities that are carried out, e.g. via litter measurements.
- Develop partnerships between the various departments within the municipality.
- Maintain a dialogue and exchange experiences with other municipalities in order to learn from good examples.

Appendix B – Interview guide

Do you accept that I audio-record this interview?

Do you accept that I use your name in my thesis or do you wish to be anonymous?

Do you know what transition management is?

Before we start I would shortly want to mention the scope for this interview:

Geographical scope: Malmö Municipality.

Waste type: Municipal solid waste. Here referred as household waste.

Do you have any questions before we begin?

*Start audio-recording

Intro:

- What is your title and what are your working tasks?
- How long have you been involved in Malmö municipality's waste management?

National and local waste plans:

- How are you today working with or according to Malmö municipality's waste plan?
- Who is responsible for the creation, development and execution of Malmö´s waste plan?
- Have you been involved in the creation or development of Malmö´s current waste plan?
- If yes; to what extent?
- What is your general perception and opinion of Malmö's waste plan?
- Do you know and / or have experience of Sweden's national waste plan and Sweden's national program for waste prevention?
- If yes; Briefly explain these documents and state if and how Malmö municipality integrate these into the local work with waste.
- Do you know and / or have experience of Sweden's national environmental objectives focusing on household waste?
- If yes; Briefly explain these national environmental objectives and state if and how Malmö municipality integrate these into the local work with waste.

Sustainable Municipal Solid Waste Management:

- What is sustainable waste management according to you? What characterizes sustainable waste management according to you?
- What characterizes a sustainable waste situation and/or a sustainable waste society according to you?
- Do you think that national environmental objectives together with national and local waste plans promote sustainable waste management and a sustainable waste situation?
- What is the best way of working with sustainable waste management according to you?
- What are the most critical aspects for the success of sustainable waste management on a local level?
- What aspects of Malmö´s current waste situation are sustainable, contra not sustainable, according to you? (E.g. collection, waste amounts, littering, treatment, etc.)

Current strategies and practical work in Malmö:

- What current strategies are used by Malmö municipality to achieve local and national targets for sustainable / resource efficient waste management?
- How are these strategies carried out in practice? How does Malmö municipality work in practice to achieve local and national targets for sustainable / resource efficient waste management? Give examples.
- How can Malmö municipality ensure that performed practical work contributes to achieve local and national targets for sustainable / resource efficient waste management?
- Can Malmö municipality measure/validate what impact their practical work have on the local waste situation? If yes; describe how and what that is being measured.
- Is Malmö's current strategic and practical waste management sufficient to achieve local and national waste targets and to create a sustainable waste situation in Malmö?
- Which specific strategies and/or practical work for achieving local and national targets for sustainable / resource efficient waste management do you wish that Malmö worked more with? Please explain why.
- Do you think that any specific strategies and/or practical work is missing in Malmö to achieve local and national targets for sustainable / resource efficient waste management?

Challenges:

- What are the major current and future challenges for Malmö's strategic and practical waste management, to achieve local and national waste targets for sustainable / resource efficient waste management?
- What do you see as viable strategies and solutions for overcoming these challenges?

Future and alternative pathways / Theoretical concepts:

- Is it according to you possible to achieve a sustainable waste management in Malmö?
- Are you familiar with the concept of "zero waste cities"?
- If yes; do you think that the concept of zero waste cities would be relevant/useful for Malmö, and possible to implement? Why? Why not?
- If no; explain the concept and ask previous question.

Ending:

- Are there other individuals you would advise I speak to for more information?

Appendix C – Interviewees

Respondent	Company / Department	Title / Work	Transition arena actor	Interview date
1	Malmö environmental department	Project leader - Food Waste	Yes	March 14, 2017
2	Malmö environmental department	Environmental inspector - Consumable goods production	No	March 17, 2017
3	Avfall Sverige	Advisor - Waste prevention & reuse	External advisor	March 15, 2017
4	VA SYD	Development engineer & project leader - Waste prevention and reuse	Yes	March 21, 2017
5	Sysav	Project leader - Municipality relations - Waste	Yes	March 28, 2017