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Sustainable Transitions: The Case of Swedish Vacation Practices

Master's thesis within the Master's Programme Industrial Ecology

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Abstract

Climate change and its effects on humanity and nature are becoming increasingly prevalent. Technological development is showing great promise to reduce the greenhouse gas (GHG) emissions from various human activities, but some areas call for lifestyle changes. Long distance travel is one of the areas where technological development may not entirely solve the problem. Especially emissions from aviation have recently been brought to light, as these emissions continue to increase. If development is to change direction, there is a need for methods to describe our habits and the interplay between different levels of society.

The focus of this thesis has been to integrate aspects from transition theory and sustainable consumption, i.e. the multi-level perspective and practice theory, and apply this integrated framework on Swedish vacation practices. This entailed working with the theoretical framework and the application thereof, through literature studies, statistical analysis of empirical mobility data to identify common vacation practices, and GHG emission calculations of identified practices.

Applying the multi-level perspective and practice theory in an integrated manner showed fruitful in the case of Swedish vacation practices. This approach allows for analysis of cases where lifestyle changes might be more relevant than technological development, while still having the dynamics of the multi-level perspective in mind. For the case of Swedish vacation practices, airborne holidays showed to be common, partly due to the efficient time use of aviation and flexible infrastructure compared to e.g. trains. In terms of GHG emissions, the different practices displayed large variations and thus climate impact, where holidays by air were the most carbon-intensive. A carbon budget for vacation travel was suggested, which showed that vacation travel is possible, but the mode of transport and the distance travelled dictates how often.

Key words: practice theory, multi-level perspective, sustainable consumption, vacation, aviation, emissions

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Abbreviations

GHG	Greenhouse gas
GWP-100	Global Warming Potential with a 100-year perspective
RES0506	The national travel survey of 2005/2006
RVU1114	The national travel survey of 2011-2014

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1 Introduction

1.1 Background

As the effects of climate change become increasingly prevalent, we seek ways in which we can reduce our carbon footprint. Many studies have been conducted, with a consumption perspective in mind, to explore what human activities cause the largest environmental impacts and the main priorities are the same; mobility (car and air transport), food, and housing (Tukker et al., 2008). Some of these impacts can be abated with technological solutions while other call for lifestyle changes. One of the areas where practices are being questioned in pursuit of more sustainable solutions is mobility. Especially emissions from aviation have been brought to light lately as our air travel continues to increase. For change to take place we need methods for understanding our behaviours and habits and the way they intermingle with different levels of society.

Sweden's official statistics show a clear trend; greenhouse gas (GHG) emissions from the Swedish territory have been in decline since the 1990s (Naturvårdsverket, 2015). However, if a consumption-based method is used to calculate emissions the opposite is shown. Swedish emissions from consumption have on the contrary increased on average 0.8 percent per year 1993-2012 with increasing emissions abroad and decreasing domestic emissions (Naturvårdsverk, 2014). Clearly these statistics paint different pictures of the current situation and emphasize different aspects.

If we want to reduce our emissions there are a variety of approaches we can look into, and one of these approaches is working with sustainable consumption and production. Looking at sustainable consumption there have been two dominating positions; one focusing on technological improvements and "greening" the current system, and the one looking instead on reduction of consumption and criticising the existing system (Geels et al., 2014; Tukker et al., 2008). These dichotomized approaches may hamper the debate of sustainable consumption as they simplify solution options to these two opposites, both lacking regard for the aspects of the other side (Geels et al., 2014). Lately, voices have been raised to tackle sustainable consumption and production in an alternative way, using methods similar to studying transitions between socio-technical systems. These suggest that looking at the problem from a multi-level perspective, analysing both bottom-up and top-down framework interactions, could bring new insight to the problem (Geels et al., 2014; Tukker et al., 2008).

In the past decades there has been a considerable increase in the number of international flights per person and year in Sweden, see Figure 1. The average growth rate in number of flights per capita was 4.1 percent per year 1993-2013

(Larsson et al., 2015). How many Swedish residents that vacation travel at least one week per year has however not seen the same development, see Figure 2. These developments could indicate that certain groups are travelling by air much more frequently than others. According to international estimates, tourism and global travel will increase by about three percent per year until 2030 (Tillväxtverket, 2012). If this is also true for Swedish air vacation it is especially worrying, as emissions are large and arise from both combustion of fossil fuels and contrails at high altitudes, resulting in a multiplication factor of 1.7 (Azar and Johansson, 2012) to 1.9 (Lee et al., 2010) when converting to CO_2-equivalents for Global Warming Potential with a 100-year perspective (GWP-100).

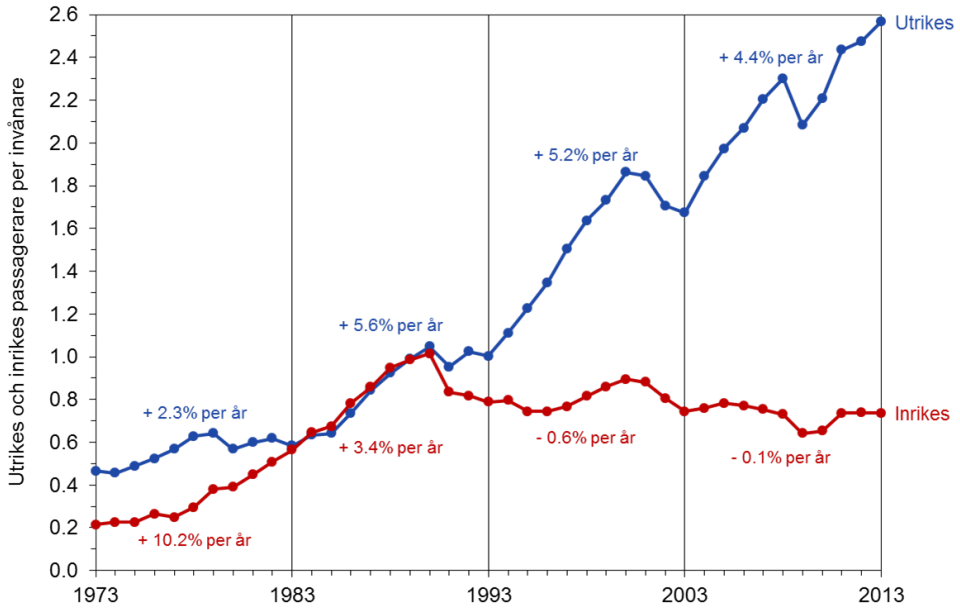

Figure 1 Number of domestic and international trips by air per person and year, 1973-2013. Red data shows domestic flights and blue data shows international flights. Data includes both charter and scheduled flights, as well as private and buisness flights. (Larsson et al., 2015)

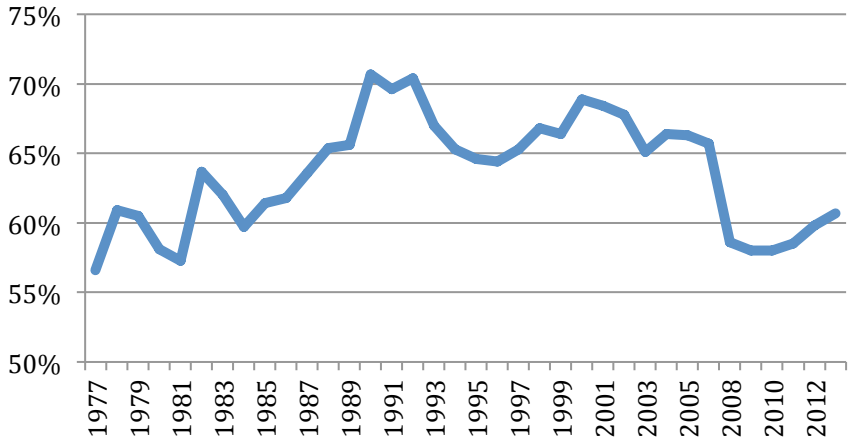

Figure 2 Proportion of the Swedish residents (16 years old and up) who vacation travelled for at least one week during a 12-month period. (Statistiska Centralbyrån, 2014)

Increased tourism and travel is a double-edged sword; it brings economic and cultural opportunity at the same time as it has negative consequences. On the plus-side there are e.g. creation of employment for both the skilled and the unskilled, increased GDP, improved quality of life, and promotion of global community and understanding. On the minus-side we find excess demand for resources, contribution to economic fluctuations, degradation of natural environments, and increased pollution and GHG emissions. (Goeldner and Ritchie, 2010) Hence, conflict of interest arises when economic and social opportunities arise at the cost of environmental degradation.

From a climate perspective the mode of transport is the most important factor to focus on as it accounts for 75-90 percent of GHG emissions produced by tourism (Peeters et al., 2006). For long-distance and middle-distance vacations air dominates, while car dominates short-distance trips (Goeldner and Ritchie, 2010). Still, an estimated 75 percent of the GHG emissions caused by tourism transport originate from aviation although land-based transport dominates in terms of number of trips, indicating relatively high energy use and GHG emissions from aviation (Peeters et al., 2006).

Choice of transport is consequently important to look at and depending on the destination a simple substitution from air to train or bus could reduce the GHG emissions drastically. However, for many destinations this may not be possible to achieve, e.g. due to lack of infrastructure or time constraints, which makes the discussion of destination choice important as well. There are many reasons why people choose to spend their vacation in a certain way and place, but tourism demand can generally be divided into three groups; *economic determinants* (e.g. disposable income, cost level at destination, relative prices among competitors, physical distance and marketing effectiveness), *socio-psychological determinants*

(e.g. demographic factors, motivations, travel preferences, benefits sought, awareness of opportunities, amount of leisure time, health and wellness, cultural similarities and family circumstances), and *exogenous determinants* (e.g. availability of supply resources, economic growth and stability, political environment, technological development, safety factors, natural disaster effects and rules and laws) (Wall and Mathieson, 2006). All of these play a role in the creation of vacation habits and thus need to be considered.

1.2 Purpose and problem definition

The purpose of this thesis is to investigate Swedish vacation practices by drawing from transition theory and sustainable consumption theory. More specifically it aims to make an analysis where two theoretical frameworks, the multi-level perspective and practice theory, are applied in an integrated manner. This integrated application is intended to develop a method for analysing sustainable consumption with a similar approach as which is commonly applied on technical systems.

This approach includes looking into how practices can be described in the micro, meso, and macro level, i.e. niches, regimes, and landscape structures. It also demands consideration of how patterns of transition from one regime to another can be applied in practice theory. Potential obstacles and possibilities for desired developments are identified. In doing so, this thesis can for example add to the discussion of policy in terms of personal travel and vacationing.

To be able to analyse structures of the vacation practices of Swedish residents, identifying the practices is a fundamental starting point. This involves finding out e.g. choice of destinations and what mode of transport is used. Next, the practices are to be set in the multi-level perspective of niche, regime and landscape levels. In light of describing the practices in a multi-level model, the dynamics of transitions between different levels will also be looked into. When possible, these dynamics will be coupled with desired developments in terms of sustainable vacation practices. This requires looking into the sustainability of the different practices in terms of GHG emissions.

All in all, this can be summarized into three research questions.

- What are the current dominating vacation practices and their carbon footprints?
- How can the multi-level perspective and practice theory be applied in an integrated manner?
- How can a regime vacation practice and a challenging niche practice be understood when the integrated perspective is applied?

1.3 Limitations

Plenty of information and statistics can be found regarding the personal travel of the Swedish residents and many of these statistics include travel for business and daily mobility. This thesis will only consider statistics of private travel, i.e. not travel for business, and with the specified purpose of “vacation” or “visit family and friends”. Also, only trips extending at least 3 days will be considered, as this typically requires at least one vacation day off from work.

Furthermore, this thesis will look at the consumption practices and not producer practices. However, no analysis will be done on different groups of Swedish residents, e.g. gender or income distribution. Nor will the motivations and drivers behind vacation choices be investigated in detail.

Additionally, the complexity of policy solutions for sustainable vacation practices will not be explored. Neither will the social and economic benefits and costs of vacations and tourism be addressed at length. Also, environmental impacts of vacation practices will be limited to GHG emissions done at a basic level.

2 Method

This thesis has mainly been done by literature studies and statistical analysis. The literature study was primarily done to develop the theoretical framework, focusing on two research areas: transition theory and practice theory. The multi-level perspective, practice theory, and a few endeavours of combining them were explored theoretically, as well as innovation and pathways for change in both theories. As a result, an integrated framework was established, where practices become the object of analysis in the multi-level perspective rather than technology.

The integrated framework was applied to two cases; first the regime practice of air charter and second the failed niche practice of train charter. Analysis of the charter practice was done in three steps; first the growth from novelty to regime was described through niche and landscape developments, second the stable regime was explained centred around the seven dimensions of a regime, and third regime challenges through landscape changes and niche developments were described. The developments of the failed niche train charter were illustrated through the context of the existing regime and the landscape.

Common vacation practices of the Swedish people were found through statistical analysis, using data of the travel habits of the Swedish residents. Data sets from several years were used to see changes over time. All data was filtered by the previously defined concept of vacation, i.e. a vacation of at least 3 days and with the given purpose of “vacation” or “family and friends”, and was scaled to the population of Sweden. Common practices were found by looking into which countries the Swedish residents travel to and which mode of transport they use, in Sweden, Europe and outside of Europe. When common pairs of destination and mode of transport were identified, these practices were described further by the mean distance travelled, mean duration of trip and number of trips as well as assumptions about social interaction. Examples of niche practices were found through literature studies of niche tourism, both generally and specifically for Swedish outbound tourism.

In order to make comparison of the environmental sustainability possible, the emissions of CO_2-equivalents were calculated in several ways. Calculations were done to illustrate climate impact both on an individual and a societal level, i.e. emissions from one holiday trip and emissions from the sum of holiday trips of each practice. Also, a vacation carbon budget is calculated to illustrate how often each practice would be possible.

3 Theoretical framework

The basis for analysis of the Swedish residents' vacation practices is a modification of the two theoretical frameworks *the multi-level perspective* and *practice theory*. The core concepts of these theories will be presented, followed by a joint model where practices replace technologies as the object of analysis in the multi-level perspective.

3.1 The multi-level perspective

The multi-level perspective framework is intended to describe how socio-technical system transition takes place and the patterns and mechanisms involved in these change processes (Geels, 2002). The idea is that change is not a straightforward process, but rather occurs from interaction between different levels of the system; the niches, the regimes, and the landscape (Geels, 2012). The levels are hierarchically organised as shown in Figure 3, where the regimes at the meso-level represent the stability of an existing socio-technical system distinguished by well-established technologies, norms, knowledge, regulations and so on. The niches at micro-level are where new innovations may develop, depending on the relationship with the landscape and pressure from the regimes. The landscape is macro-level factors that may induce or prevent innovation and influence the stability of the regimes, but are not easily affected. (Markard and Truffer, 2008) An established regime and the links between different elements are somewhat stable, where involved groups, e.g. engineers and organisation, reproduce the links and remember by doing in a routine-based fashion (Geels, 2002).

3.1.1 Meso level: Regimes

The regime has been referred to as the main concept of the multi-level perspective (Markard and Truffer, 2008). The concept of the *socio-technical regime* originates from the definition of the *technological regime*.

> "A technological regime is the rule-set or grammar embedded in a complex of engineering practices, production process technologies, product characteristics, skills and procedures, ways of handling relevant artefacts and persons, ways of defining problems; all of them embedded in institutions and infrastructures" (Rip and Kemp, 1998, p. 338)

This explains the technological regime as a set of rules, expressed by engineers and production processes as well as institutions Geels (2002). suggested that socio-technical change is influenced by a broader set of stakeholders, such as policy makers, users, banks etc. Geels therefore proposed using the term *socio-technical regime*, to emphasise the rules and practices used by this wider group. The regime

can be described to have 7 dimensions; *technology*, *markets and user practices*, *culture and symbolic meaning*, *infrastructure*, *industrial networks and strategic games*, *sectoral policy*, and *techno-scientific knowledge* (Geels, 2002). Rules are reproduced within these dimensions and give the regime its stability, resulting in incremental innovation due to lock-in mechanisms and path dependence, causing predictable and stable trajectories (Geels, 2012).

Within a socio-technical system, several regimes can exist at once. There may be a dominant regime and several subordinate regimes. Mobility is a clear example, where auto-mobility is the dominating regime. Trains do serve a smaller percentage of travellers, but has a well-developed system and stability. Consequently, trains should be referred to as a subordinate regime rather than a niche. (Geels, 2012) This patchwork of several regimes can be seen in Figure 3.

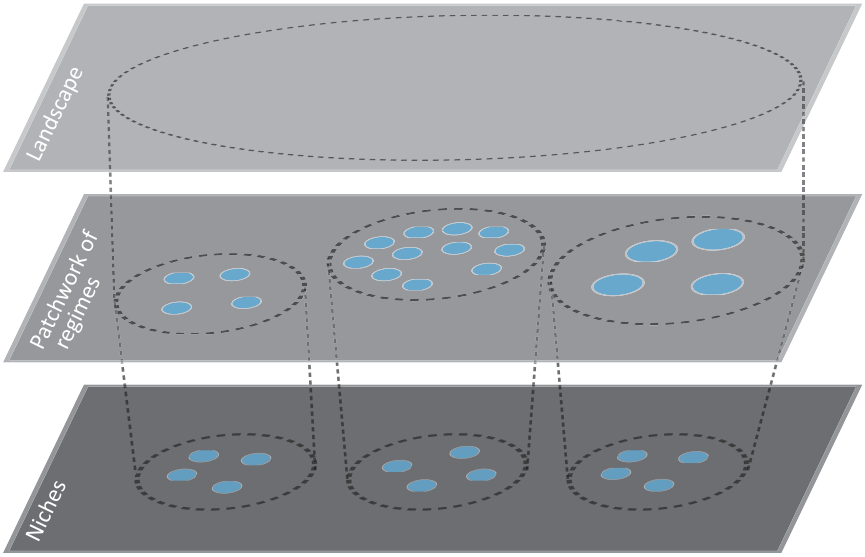

Figure 3 The levels of the multi-level perspective. The three levels have a nested character, meaning that niches are embedded in regimes and regimes in the landscape. Adapted from (Geels, 2002).

3.1.2 Micro level: Niches

Radical innovation does not occur in the regime, but in the *niches* of the system. Niches are often stated as protected areas that are isolated from typical market selection found in the regimes (Geels, 2002; Markard and Truffer, 2008). Two main types of niches can be characterized; market niches and technological niches. Market niches develop due to specific preferences or applications, while technological niches are developed deliberately by actors to investigate potentials of emerging technologies (Markard and Truffer, 2008). In land-based transportation there are several niches, e.g. battery-electric vehicles, fuel cell vehicles, and public bike-sharing schemes (Geels, 2012).

Niches are important for learning processes (Geels, 2002) and their development, i.e. if they brake through to become new regimes or fail to reach markets, may be determined by their relationship to existing regimes, e.g. compatibility with regimes and solving inherent problems of existing regimes (Markard and Truffer, 2008). Niches advance if legitimacy is gained in bigger social networks, if a dominant design is found and if visions become more distinct (Geels, 2002).

3.1.3 Macro level: Landscape

The landscape consists of factors external to the specific technology that change over longer time-scales than niches and regimes (Geels, 2002). Such factors have been described as

> "… a set of heterogeneous factors, such as oil prices, economic growth, wars, emigration, broad political coalitions, cultural and normative values, environmental problems." (Geels, 2002)

The key notion is that these factors influence both niches and regimes, but are to a large extent independent from impact from the niches and regimes, at least over short to mid term scale (Markard and Truffer, 2008). Two recent landscape changes in terms of land-based transportation are climate change awareness and the notion of peak-oil, both destabilizing for the automobility regime (Geels, 2012).

3.2 Practice theory

Practice theory is a concept describing human activities as a somewhat routinized behaviour existing in-between individual choice and systemic influence. All domains of human behaviour can be conceptualized as practices, e.g. gardening, mobility, shopping, and sports. Practices could serve as an important link between society and the individual and has as such been brought forward as an important object of analysis (Holmberg et al., 2011). The analysis of human impact on the environment has been dominated by two approaches, the individualist and systemic. The individual approach sees the end-users determining the outcome for green products, where the users attitudes and choices are the objects of analysis while the systemic approach on the other hand see technologies and markets determining the outcome and producers and their strategies as being the object of analysis (Spaargaren, 2011). These two approaches both have limits to entirely understand the complexity of the quest for more sustainable consumption; the individualist approach neglects the system in which individual act and shape their conception while the systemic approach fail to explain the role of consumers within the system (Røpke, 2009; Spaargaren, 2011).

Due to these shortcomings of dominating approaches there has been a call for a new approach that considers both the individual and the system, i.e. *practice theory*. Everyday life is conceptualized to recurring practices repeated by agents, using a set of rules and resources specific for different spheres of social life (Røpke, 2009; Spaargaren, 2011). Individuals are thus highly influenced by routines and previous experiences. These repetitive actions must be performed by a number of people to be considered practices, and may or may not need interplay between individuals (Røpke, 2009). These practices become the object of analysis, instead of the individual or the system as in the other approaches. Also, it is not the consumption itself that is the object of analysis, but rather the practices that happen to involve consumption (Røpke, 2009; Spaargaren, 2011).

A practice is characterized by this routinized behaviour consisting of various interrelated elements, depending on all of them and not one alone:

> "… forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge." (Reckwitz 2002, p. 249)

These elements have been defined as consisting of three concrete ones, i.e. *material*, *meaning* and *competence*. Material includes objects, equipment and bodies required to perform a specific practice. Meaning covers emotions, beliefs, understanding and ideas of "goodness" of a practice. Competence deals with the skills and knowledge needed. Practices exist within these structures of social life that present rules and resources needed for agents to reproduce practices. These rules and resources can be both enabling and limiting for agents. Income, labour markets, energy price, time, etc. are very real aspects for agents in performing practices and become essential for the possibility of different practices. (Røpke, 2009) These elements can be described as in Table 1, where practices become the link between the individual and the system aspects (Holmberg et al., 2011).

Table 1 The practice perspective, showing the link between the individual and the system. (Holmberg et al., 2011)

Individual	**Practices**	**System/Structures**
• Ideas / notions of comfort, necessities and desires • Habits • Formation of meaning and identity • Quality of life • Economic resources	• Use of time • Consumption • Social interaction	• Institutions and infrastructure • Common rules and resources • Norms and social structures • Technical systems • Prices

3.3 Innovation, transition and pathways for change

The following sections will describe innovation and transition patterns in practice theory and the multi-level perspective.

3.3.1 Practice innovation

Practices are somewhat stable units over time and space, but they do change as new practices emerge and others disappear (Røpke, 2009). Innovation towards practices of more sustainable character can be achieved both through more sustainable technologies and products and through new norms and ideas. The technological and cultural dimensions are of importance for practice innovation and ultimately transition towards sustainable consumption to take place: (Spaargaren, 2011)

> "…sustainable consumption patterns are seen to result from innovations in (chains of) practices situated within distinct consumption domains such as food, housing, mobility, leisure and clothing and personal care. Innovations in consumption practices refer to the introduction of new, more sustainable ways of 'doing', 'saying', 'knowing' and 'thinking' from the side of practitioners. For an in-depth understanding of the dynamics of change involved, a combined focus on technological and cultural dimensions of innovation in consumption practices is required." (Spaargaren 2011, p.821)

Furthermore, time is essential in the emergence and transformation of practices, as time is a finite resource. When new practices develop, they claim time and attention that was preciously demanded by other practices. Doing two things at once becomes impossible, in the same way as being in two places is impossible. Therefor the spatial dimension also becomes of essence, as moving through space makes demands on the practitioners limited time resource. (Røpke, 2009) Important in the sense of sustainable practices is what happens when practices become more efficient, e.g. in time use by using a dishwasher instead of doing it by hand. Efficiency increases could potentially lead to rebound effects, meaning that practitioners have time (or other resources) left over for additional practices (Jalas, 2002).

Additionally, aspects such as *legitimacy, path dependency* (Røpke, 2009) and *lock-in mechanisms* are important aspects in development of new practices, or in other words, in *practice innovation* (Spaargaren, 2011). Path dependency to some extent sets the boundary to which new practices we adopt. Previous experiences remains in body and mind and opens up to new practices while at the same time closing the doors to others, e.g. knowing how to drive a car is critical in the decision of going on a road trip, in the same way as the practices we actually come in contact with broaden or narrow our horizons (Røpke, 2009). Regarding lock-in mechanisms,

agents are often locked in to certain technologies and infrastructures when options do not exist or we are unaware of them within our time-space frame (Spaargaren, 2011).

For innovation to take place technological change is often found to be central, as well as *selection environment*. For practice innovation the selection environment may consist of aspects such as infrastructure, institutions, and other practices that either help or hinder developments. In the practice innovation process, a period of experimentation can be seen before a *dominant design* is found, similar tendencies as in technological innovation research. When new practices diffuse to the wider public they tend to change shape, adapting to the practitioners setting. The practice may also change meaning for the practitioner over time, becoming more or less significant. (Røpke, 2009)

3.3.2 Pathways for change in the multi-level perspective

A key concept of the multi-level perspective is that for a novelty in a niche to succeed to wider diffusion, not only the niche processes are important. Alignment of development within all three levels is needed, i.e. including the existing regime and the landscape. In other words, there is no simple distinguishable cause for change but rather many simultaneous processes at multiple levels. Typically the innovations gain momentum in the niches, landscape changes put pressure on the existing regime and destabilisation of the regime creates a "window of opportunity". If these processes do not align in an enabling way for the niches they may very well fail, e.g. because insufficient niche-momentum was gained at the right time. (Geels, 2002)

In the transition phase from one regime to another, four phases can be noted. First novelties surface in niches, where experimentation and improvisation of different solutions takes place. Second, the new technology is applied in niche markets, where gradual improvements are made. Definition of common rules, user preferences and a dominant design slowly emerges. Third, break-through to wider diffusion and competition with existing regimes occurs, due to both internal developments (e.g. price/performance improvements) and external developments creating windows of opportunity (e.g. sudden landscape developments). Finally the novelty replaces the old one, or establishes itself in parallel with the old, and hence becomes a new regime. (Geels, 2005) An illustration of these processes can be seen in Figure 4. The longer arrows of the seven dimensions represent incremental innovation in the regime, while the shorter ones represent tensions and instability.

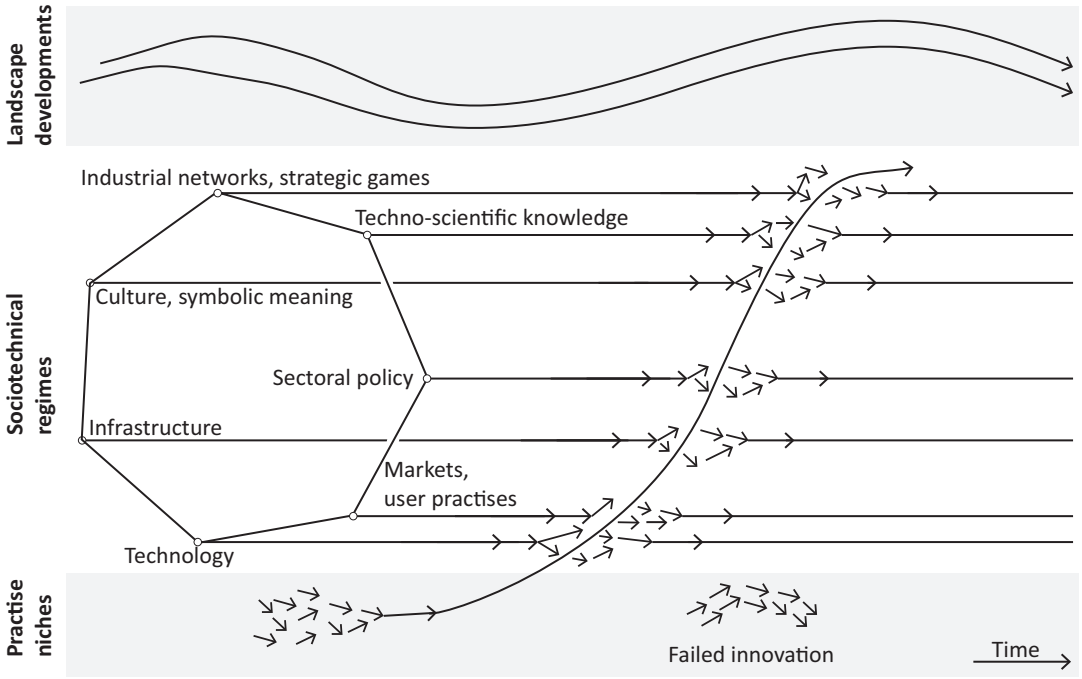

Figure 4 Illustration of transition processes within the multi-level perspective. The linkage of the seven dimensions of the regime is shown to the left. The longer arrows represent incremental innovation in the regime, while the shorter ones represent tensions and instability. A failed innovation that missed its window of opportunity is shown at the bottom right. Adapted from (Geels, 2002)

Several patterns have been identified in system innovation. First off there are different routes for system innovation within the system. The *technological substitution route is* characterized by an "underground" development in the niche with a sudden break-through of a technology-push character. In the *wider transformation route* the existing regime becomes unstable (either because of internal problems or landscape changes) and opens up for experimentation and development of new technologies. (Geels, 2005)

When new technologies leap from niche to regime level, this typically happens gradually and not over night. This gradual transition is characterized by *niche accumulation* where niches slowly enter new application areas and may also happen in *co-evolution of technologies*, where interlocking, alignment and positive feedback help generate momentum (Geels, 2005). Diffusion can then happen either through *replication*, *scaling-up* or *translation into institution* (Smith and Seyfang, 2013) or in other words *multiplying, up-scaling* or *embedding* (Backhaus et al., 2011). Furthermore, a pattern of *fit-stretch* has been identified in both a technological and a social sense. At the beginning a new technology has to fit in with existing technological contexts as well as user functionality and expectations and with time, the technology transforms into new forms and users develop new experiences and the technology "stretches" and changes both dimensions (Geels, 2005; Smith and Seyfang, 2013).

Finally, changes in firms, policy, culture, and user preferences are important for diffusion patterns. Policy often plays a major role in diffusion of technologies that are initially less competitive. Firms may involve themselves in strategic games to hinder diffusion, or when being threatened by novelties try to significantly improve existing regime technologies. If technologies happen to coincide with cultural and social visions, legitimation is naturally created and diffusion can happen more smoothly. (Geels, 2005)

3.4 Integrating the multi-level perspective and practice theory

Building upon the general framework of the multi-level perspective, a modified model focusing on practices instead of technology will be presented. Similar endeavours have been made previously, which the following framework is based on. Existing regimes, landscape and niche developments will be presented in the context of practices that result in consumption and interact with technology.

Typically, transition studies tend to find the technological dimension of the socio-technical system as the natural starting point of analysis and several studies have shown this starting point to be fruitful for understanding system change. Even though the importance of agents and their behaviour is not given as much attention they are still recognized to be important. A shift in agents' rule sets and resources can be observed and could very well be the object of analysis, which emphasizes that transitions are man-made phenomena. It is however important to realize that this emphasis on agency does not necessarily mean that transition processes are brought about by conscious choices. Practices are routinized and often without conscious reflection on "why" or the consequences thereof. (Spaargaren et al., 2012)

Niches is where *novel practices* emerge with new rules and resources compared to existing regimes. These new rule-sets and resources are still unknown to the wider public and there is still a process of experimentation, as with technological novelties. The concept of the *landscape* is similar to that of technological studies and inhabits characteristics that affect all major institutions in society but are themselves stable over longer time scales, not easily affected by regime or niche developments. The *regime practices* are the most common and well-known practices and have rule-sets and resources that are more stable in both time and space. These stable practices tend to be reproduced by large groups of actors, partly due to lock-in mechanisms, even when awareness of negative side-effect has become mainstream. (Shove, 2003; Spaargaren et al., 2012)

This modified version of the multi-level perspective has many similarities with the original one, with the major difference being the object of analysis. A version of the nested hierarchy can be seen in Figure 5, showing patchworks of regimes,

niches and the landscape. Change processes can happen through bottom-up dynamics, where novel practices gain momentum and move from niche-level to regime-level and eventually influences the landscape. Alternatively, landscape-changes can destabilize existing regimes and open up windows of opportunity for novel practices do diffuse. (Shove, 2003) In this figure, different pathways for practices to diffuse are also noted:

- *Embedding* is a process where new practices become entrenched in the system through e.g. social, technical or legal changes.
- *Multiplying* is when niche practices are simply replicated by new groups or in new regions.
- *Up-scaling* comprises the growth form small-scale to system-scale practices (Backhaus et al., 2011)

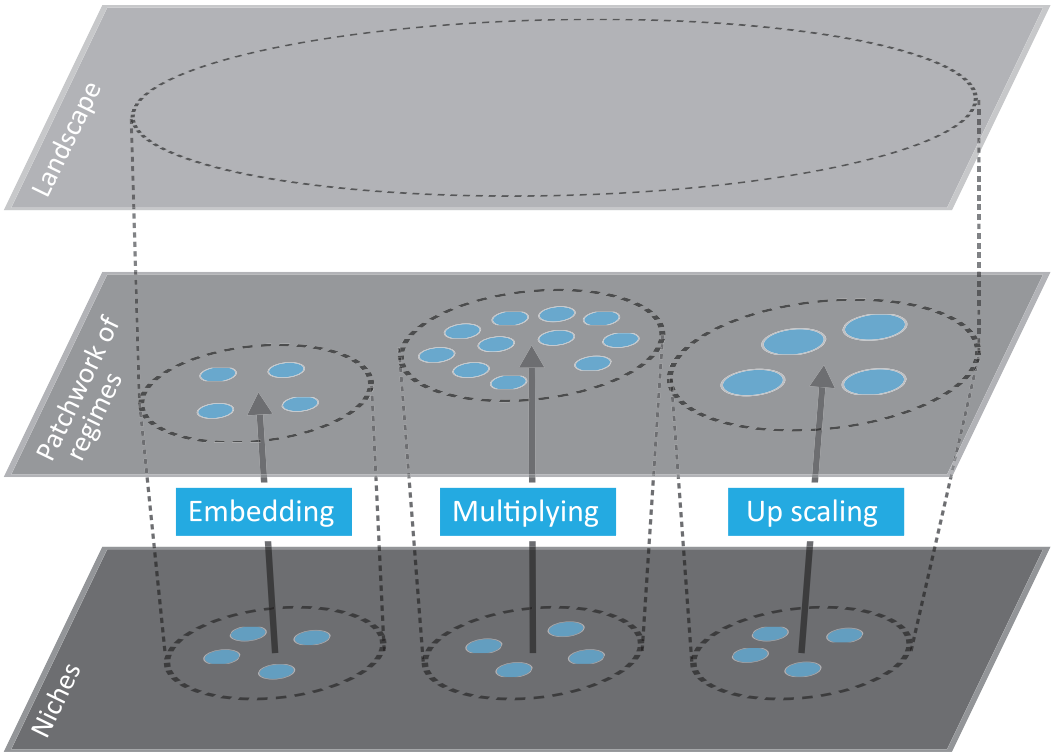

Figure 5 The levels of the multi-level, showing pathways for change for niche practices. Adapted from (Backhaus et al., 2011, p. 96).

These transitions are however not easy or straightforward, in the same way as transitions in the technology perspective. In many ways practitioners are locked into existing patterns, due to e.g. infrastructural embedding of practices, which limits the possibility for individual choice. Also, there is a need to "un-learn" old behaviours and practices to be able to adapt new ones. (Backhaus et al., 2011)

For transition to happen there is a need to manage society, with a multi-actor and multi-level perspective in mind. Change processes are brought about by groups of human agents, but this does not imply that change necessarily can be put forward intentionally. These processes are complex and unpredictable, but human actors are however in charge of processes such as lobbying and steering to shift change to a designated direction or focus (Spaargaren et al., 2012). Either way, suitable landscape changes are needed for change to happen. Two approaches to attempt to steer transition has gathered more attention in the last few years; top-down transition management and bottom-up strategic niche-management, where the former focuses on policy and governance while the latter focuses on easing the adoption of desirable innovative practices (Backhaus et al., 2011).

4 Identifying common vacation practices

In the following sections several vacation practices of the Swedish residents will be presented. First follows a statistical analysis of empirical data in order to identify common vacation practices. These are studied based on the aspects of a practice presented in section 3.2. Next follows a record of niche practices, which are described more briefly.

4.1 The national travel survey

The main source of data for the identification of practices is the Swedish national travel survey (*Den nationella resvaneundersökningen*, *RVU Sverige*) carried out by Trafikanalys. Data has been processed from the travel survey of 2005-2006 (*RES0506*) and of 2011-2014 (*RVU1114*). These surveys consist of data concerning Swedish residents of 6 to 84 years of age. Telephone interviews were carried out between October 2005 and September 2006 for RES0506, covering one year of travel. A total of 27 000 interviews were conducted, tallying a response rate of 68 percent (SIKA, 2007). For RVU114 39 000 telephone interviews were conducted, totalling a response rate of 42 percent (Trafikanalys, 2015).

The large drop in response rate is a concern and could potentially have negative effects on the reliability of the survey. This problem has been addressed by Trafikanalys and a stratification of responses is done to minimise the effect. Responses are weighed to correspond to the share of the region/gender/age group, making it possible to up-scale data to the population of Sweden (Trafikanalys, 2012), which is done for all analysis of data. Underestimations have however been documented, possibly due to failure to remember trips, which would be more likely with very frequent travellers, or due to the difficulty to reach frequent travellers over the phone to conduct an interview, resulting in a low representation of frequent travellers in data (Åkerman, 2012; Frändberg and Vilhelmson, 2002). Hence, results are likely underestimated. Furthermore, interpreting results with low occurrence should be done with caution. Since data is up-scaled to the Swedish population, where approximately 20 000 respondents per year represents a population of nine million, every respondent signifies on average 450 people.

In the survey, distinction is made between everyday movements and longer less frequent journeys. Everyday movements are recorded on a specific day, the measurement day of the respondent. Of interest for this analysis are the long-distance trips. This data set consists of all trips longer than 100 km and international trips shorter than 100 km made during 30 days preceding the measurement day and all trips longer than 300 km made during the past 60 days (Trafikanalys, 2012). While the data contains a multitude of variables it does unfortunately lack more detailed destination data abroad. The only information

given is the destination country, not destination city or municipality, making the delamination of different vacation practices more difficult and consequently some assumptions are necessary.

4.2 Common holidays in Sweden

Starting off with the most simple question, do Swedish residents mainly stay in Sweden or go abroad on vacation? The answer to that question can be found in Table 2. Looking at the numbers, it is approximately twice as common to stay in Sweden as to go abroad. Holidays abroad are mostly done by air (see section 4.3.1 and 4.3.2). When focusing on the domestic holidays, a few common holidays can be identified (highlighted in grey):

- *Car holidays in* Sweden: Out of the domestic holidays more than 70 percent are done by car, making this the most dominating mode of transport.
- *Train holidays in Sweden*: Holidays by train are fairly common in Sweden, especially if compared to train holidays abroad.
- *Air holidays in Sweden*: Air however is far less common than car, but still almost half a million domestic holiday trips are made in Sweden by air every year.
- *Bus holidays in Sweden*: Bus holidays are also common to the extent that they need to be represented on their own.

Table 2 Holidays by Swedish residents in 2011 worldwide, divided by mode of transport and destination in Sweden or abroad. Data has been scaled to represent the Swedish population, based on RVU 2011.

		Mode of transport								Total
		Mc	Boat	Ferry	Train	Bus	Air	Car	Other	
Destination	In Sweden	14 000	2 100	62 000	1 500 000	320 000	480 000	7 000 000	53 000	9 400 000
	Abroad	24 000	2 100	210 000	59 000	140 000	2 900 000	920 000	22 000	4 300 000
Total		38 000	4 200	270 000	1 600 000	460 000	3 400 000	7 900 000	75 000	14 000 000

4.3 Common holidays abroad

Moving on to holidays abroad, the first analysis is looking at which continents people were travelling to and by which mode of transport. The results can be seen in Table 3, where it is easy to see that European holidays are by far the most common and air is the dominating mode of transport. Based on these results, looking further into European destinations by countries and mode of transport seems key in identifying the dominating vacation practices and regimes.

Table 3 Holidays abroad by Swedish residents in 2011 worldwide, divided by continent and mode of transport. Data has been scaled to represent the Swedish population, based on RVU 2011.

		Mode of transport								Total
		Mc	Boat	Ferry	Train	Bus	Air	Car	Other	
Destination	Africa	0	0	0	0	0	100 000	0	0	100 000
	Asia	0	0	0	0	0	510 000	12 000	0	520 000
	Europe	24 000	2 100	200 000	59 000	140 000	2 100 000	910 000	22 000	3 500 000
	North America	0	0	603	0	0	210 000	0	0	210 000
	Oceania	0	0	0	0	0	470	0	0	470
	South America	0	0	0	0	0	11 000	1 200	0	12 000
Total		24 000	2 100	210 000	59 000	140 000	2 900 000	920 000	22 000	4 300 000

4.3.1 Common European holidays

Among the many countries and modes of transportation there are some that are more common than others, which can be seen in Table 4. While the number of highlighted entries is high, these can be aggregated into different groups, i.e. different practices. The most common practices are:

- *Ferry holidays*: Almost all of the maritime holidays are destined to Germany, Denmark, Finland, and Latvia.
- *Bus holidays*: Although the number of bus holidays is lower than for other modes of transport, there is a fair amount of people travelling by bus to European countries, with Germany being the most common destination.
- *Car holidays to neighbouring countries*: Car holidays are mainly to our Nordic neighbours, i.e. Denmark, Finland and Norway, and Germany.
- *Charter to the Mediterranean Sea*: Four out of five of the most frequent air destinations have coasts to the Mediterranean Sea and especially among charter flights these countries are popular. Including all of the countries with coastlines to the Mediterranean (also non-European countries such as Turkey and Egypt), this is surely a common European vacation practice.
- *Scheduled flights to Europe*: Scheduled flights are common to a number of countries, with Spain, France, United Kingdom, and Italy being the most popular.

Table 4 Holidays abroad by Swedish residents in 2011 to European destinations, divided by country and mode of transport. Data has been scaled to represent the Swedish population, based on RVU 2011.

		Mode of transport									Total
		Mc	Boat	Ferry	Train	Bus	Air, charter	Air, scheduled	Car	Other	
Destination	Austria	10 000	0	0	0	910	26 000	28 000	9 600	0	76 000
	Belgium	0	0	0	0	0	0	36 000	0	0	36 000
	Bulgaria	0	0	0	0	0	12 000	0	0	0	12 000
	Switzerland	0	0	0	0	0	0	13 000	0	12 000	25 000
	Czech Republic	0	0	0	1 700	920	0	60 000	15 000	0	77 000
	Germany	0	390	43 000	280	56 000	2 500	36 000	190 000	8 900	340 000
	Denmark	1 200	0	34 000	49 000	12 000	0	29 000	250 000	150	370 000
	Estonia	0	0	34 000	0	5 800	0	22 000	290	0	62 000
	Spain	0	0	0	0	2 000	220 000	250 000	5 500	0	480 000
	Finland	0	1 700	39 000	0	2 700	0	47 000	120 000	700	210 000
	France	0	0	0	2 000	8 000	21 000	150 000	38 000	0	220 000
	United Kingdom	0	0	0	0	0	11 000	270 000	0	0	280 000
	Greece	0	0	0	0	0	190 000	31 000	0	0	220 000
	Croatia	0	0	0	0	0	18 000	30 000	2 900	0	52 000
	Hungary	0	0	0	780	0	130	40 000	520	0	41 000
	Ireland	0	0	490	0	0	0	18 000	0	0	19 000
	Island	0	0	0	0	0	8 000	14 000	0	0	22 000
	Italy	0	0	0	0	19 000	71 000	230 000	12 000	0	340 000
	Lithuania	0	0	0	0	0	0	8 100	0	0	8 100
	Latvia	0	0	51 000	0	0	0	21 000	860	0	73 000
	Montenegro	0	0	0	0	0	0	11 000	0	0	11 000
	Malta	0	0	0	0	0	28 000	8 800	0	0	37 000
	Netherlands	0	0	0	0	0	0	26 000	18 000	0	44 000
	Norway	12 000	0	430	4 700	21 000	640	29 000	240 000	430	310 000
	Poland	280	0	0	0	0	470	44 000	1 800	0	46 000
	Portugal	0	0	0	0	0	18 000	4 100	0	0	22 000
	Romania	0	0	290	0	0	0	0	0	0	290
	Serbia	0	0	0	0	11 000	0	1 900	920	0	14 000
	Russia	0	0	2 700	520	0	0	1 100	0	0	4 300
	Ukraine	0	0	0	0	0	0	790	0	0	790
Total		24 000	2 100	200 000	59 000	140 000	630 000	1 500 000	910 000	22 000	3 500 000

4.3.2 Common non-European holidays

As mentioned, even though the non-European holidays are smaller in number this does not imply that they are unimportant, especially from a GHG emission perspective due to the long-distance flights. Table 5 shows the non-European airborne holidays by Swedish residents in 2011. First off, Turkey in Asia and Egypt in Africa are indeed common destinations. However, as countries with coastlines to the Mediterranean sea they can be seen as the practice *Charter to the Mediterranean Sea* in section 4.3.1. Second, the USA is certainly the most recurring country in North America and Thailand in Asia.

Based on these observations, two additional common vacation practices can be identified:

- *Holidays to Thailand*: Although there are numerous holidays to other Asian countries, this specific one deserves more attention due to its frequency.
- *Holidays to the USA*: Representing almost all of the holidays to North America, holidays to the USA represent its own practice.

Table 5 Holidays to Asia, Africa, and North America by air by Swedish residents in 2011, divided by country and mode of transport. Data has been scaled to represent the Swedish population, based on RVU 2011.

Asia			Africa			North America		
Destination country	United Arab Emirates	6 600	Destination country	Cap Verde	3 100	Destination country	Aruba	690
	China	29 000		Egypt	77 000		Canada	280
	Cyprus	81 000		Ghana	5 300		Cuba	6 700
	Israel	24 000		Gambia	2 300		Mexico	6 600
	India	15 000		Morocco	930		Nicaragua	650
	Iraq	7 000		Mauritius	740		USA	190 000
	Iran	14 000		Tunisia	13 000	Total		210 000
	Japan	1 700		South Africa	1 400			
	Kenya	2 300		Zambia	910			
	South Korea	19 000	Total		100 000			
	Kazakhstan	520						
	Lebanon	480						
	Sri Lanka	3 300						
	Malaysia	7 800						
	Oman	5 900						
	Singapore	130						
	Syria	10 000						
	Thailand	120 000						
	Turkey	160 000						
	Vietnam	8 600						
Total		510 000						

4.4 Categorizing common practice findings

A number of common vacation practices in terms of destinations and mode of transport were found in the previous sections. In Table 1, use of time, consumption, and social interaction are listed as central aspects to describe a practice. Time use of the practice can be defined as the duration of a trip, which is included in the data. Consumption includes a number of aspects, but can to some extent be defined by the type of holiday a practitioner chooses, i.e. destination and mode of transport, which has already been discussed. Social interaction or "purpose" of the vacation, i.e. what the practitioner engages in at destinations, is however more difficult to isolate through the national travel survey. Consequently, below follows a list of assumptions:

- *Swedish holidays:* When trying to define social interaction, difficulties arise for all four common Swedish vacation practices. A holiday could imply e.g. a hiking holiday, gastronomic holiday or a city holiday, all very different practices. It becomes difficult to classify these findings into well-defined practices and therefore they are assumed to be aggregated practices.
- *European holidays*
    - *Charter to the Mediterranean*: Holidays by charter flights to the Mediterranean are assumed to typically signify a package deal, including travel arrangements and accommodation, to a costal destination where practitioners spend time at the beach.
    - *Scheduled flights to Europe*: Destination data is limited to country, making a more detailed destination analysis problematic. A considerable share of these trips is assumed to be destined for the big cities of Europe, e.g. Barcelona or Paris. Hence, the scheduled flights to European countries are assumed to represent city holidays and therefore renamed to *European city holidays.*
    - *Ferry holidays*: Holidays by ferry typically take one day of travel in each direction[1]. Due to this considerable time use, the trip itself on board the ferry is assumed to be an important part of the holiday.
    - *Long-distance bus holidays*: As with Swedish holidays, what travellers do at end destinations is difficult to assess. However, many bus holidays are assumed to be organised circular tours in Europe.

[1] Based on timetables from Vikingline, e.g. Stockholm (SE) – Åbo (FI) 12h, Stockholm (SE) - Tallin (EE) 20h. http://www.vikingline.se/hitta-resa/tidtabeller-anslutningar/tidtabeller/cinderellakryssningar/

- *Car holidays to neighbouring countries*: Based on the same principles as with Swedish holidays, social interaction of this practice is difficult to define.

- *Non-European holidays*
  - *Holidays by air to the USA*: Especially New York City has seen an increase in the past years and represented 35 percent of USA trips in 2011 (Andersson, 2012). Certainly other big cities represent a share of these trips. Hence, many of the flights to the USA are assumed to be city holidays.
  - *Holidays by air to Thailand*: People travelling to Thailand are assumed to participate in similar activities as people traveling the Mediterranean Sea, i.e. relaxation and spending time at the beach.

With these assumptions in mind, Table 6 describes each vacation practice in more detail. *Duration of trip* represents time use and *number of trips* shows how common each practice is. *Distance travelled* highlights an additional aspect of each practice, as longer trips typically lead to larger GHG emissions (which will be investigated further in section 5).

Table 6 Duration of trip, number of trips and distance travelled of identified practices. Data is scaled to the population of Sweden and based on RES05/06 and RVU11-14.

	Identified practice	Duration of trip (5% trimmed mean) [days]	Number of trips			Distance travelled (5% trimmed mean) [km]
		2011	2005/5006	2011	2014	2011
Swedish	Swedish car holiday	4	8 300 000	7 000 000	7 300 000	600
	Swedish train holiday	4	1 700 000	1 500 000	1 600 000	700
	Swedish air holiday	6	430 000	480 000	540 000	1 600
	Swedish bus holiday	5	610 000	320 000	310 000	540
European	Charter to the Mediterranean	9	1 000 000	820 000	910 000	6 200
	European city holidays	7	1 400 000	1 500 000	1 700 000	3 500
	Ferry holidays	4	440 000	200 000	320 000	1 200
	Long-distance bus holidays	7	350 000	140 000	130 000	1 900
	Car holidays to neighbouring countries	7	940 000	800 000	610 000	1 100
Non-European	Holidays by air to the USA	12	130 000	190 000	270 000	14 000
	Holidays by air to Thailand	20	140 000	120 000	120 000	16 000

Domestic car holidays have decreased slightly from 2005/2006, as well as Swedish train holidays. Swedish air holidays on the other hand have increased, while Swedish bus holidays have almost halved from 2005/2006 to 2014. Charter holidays to the Mediterranean have stayed more or less stable over the years, while city holidays have increased by almost 25 percent. Charter holidays to the Mediterranean have almost twice as long distance travelled as city holidays. Ferry holidays have fluctuated in numbers, while long-distance bus holidays have decreased by 60 percent and car holidays have decreased by 35 percent. Holidays to the USA and Thailand have longer distances travelled. While Thailand holidays have stayed stable, holidays to the USA have doubled.

4.5 Niche vacation practices

Niche practices are not easy to identify through statistical analysis using the national travel survey. The concept of *niche tourism* has however been studied both internationally and in Sweden. Niche tourism is the counterpart to *mass tourism*, where the most dominating vacation practices can be found. For a holiday practitioner, niche tourism has been claimed to offer more meaningful experiences and responds to specific tourist needs and expression of identity (Novelli, 2005). There is an increasing demand for niche tourism, which allows for many new vacation practices to gain momentum. Niches, e.g. cultural tourism, rural tourism or sport tourism, each contains a variety of micro-niches, e.g. cycling or climbing tourism (Novelli, 2005). Depending on the level of stratification, an infinite number of niche vacation practices could be defined. Hence, selected groups of niche practices will be presented to exemplify the vast collection of niche practices.

Generally, Sweden has seen an increasing interest in niche holidays in the past years. Developments could both be due to instabilities in existing regimes and landscape developments generating niche innovation. The Swedish Chambers of Commerce (2011) have identified a few niche practices that have become increasingly common for Swedish outbound tourism:

- *Adventure tourism*: Swedish travellers appear to be looking for adventure while on holiday and adventure tourism is one of the fastest growing segments in Swedish niche vacation practices. Typical holidays within this niche are e.g. hiking/trekking, diving, cycling and safaris. These niches can be understood as an effect of that people are seeking unique experiences and enrichment rather than an escape from everyday life. Approximately one in ten Swedes show interest in adventurous or active holidays and interest is especially high among young and senior age groups.
- *Cultural tourism*: Interest for cultural holidays has grown, especially in the 50+ age group, wanting to experience other cultures and explore unknown

regions. People particularly seek contact with local residents, not just visiting heritage sites, e.g. through workshops with locals.

- *Eco/sustainable tourism*: More Swedes seem to show awareness of their environmental and social impacts of their holiday habits. Conserving natural environments and improving wellbeing of locals are motivations behind the growing interest in this practice. Particular interest has been shown by the young for volunteer holidays.
- *Cruise tourism*: Swedes are going on more cruises, both in Europe and in the Caribbean. Although cruises have been around for a long time, this practice has spread to new social groups (especially young people and families) due to decreasing prices in the past years. Also, new forms of the practice are emerging such as "Fly & Cruise" where travellers fly to a far away destination and cruise in that region.

Similarly, there are global niches that surely create ripples in Sweden as well. There is a myriad of niche vacation practices and only a few are exemplified here:

- *Staycation*: Staycation usually implies staying at home, but the definition has extended to involve holidays taken in the vicinity of one's home. Staycation has typically been widespread among low-income households (Beaver, 2012). In recent years tourists are becoming more aware of climate change and environmental impact of travelling. Carasuk and Fisher (2008) claims that this has led to growing popularity of staycation for ideological reasons.
- *Farm tourism*: In Europe and globally farms can be found that can be described as "open farms" where travellers are invited to a variety of leisure activities (e.g. to help with farm work, learn, and partake in recreation), and where accommodation is available (Beaver, 2012). Farm tourism is still a niche practice and accounts for a modest contribution to overall holiday numbers, but websites have recently opened up for wider user groups, with direct connections to nature, uniqueness and authenticity, and personal contact being reported as motivation for practitioners (Potočnik-Slavič and Schmitz, 2013).
- *Food tourism*: People who are identifying themselves as "foodies" tend to travel with food experiences as the main purpose of holidays. They participate in an assortment of planned events such as markets, festivals, and gastronomic experiences at restaurants, with the most popular destinations being Paris, London, Barcelona, New York and Rome (Vujicic et al., 2013).

5 Climate impact of common holidays

The following section presents a calculation of GHG emissions from transports of common holidays, illustrating the climate impact of each practice. Since transports account for 75-90 percent of GHG emissions from tourism (Peeters et al., 2006), the majority of emissions for each practice are accounted for when including only emissions from transport. Specific emissions were based on data from Åkerman (2012), where GWP-100 was chosen as metric to indicate climate impact. Aircrafts[2] have specific emissions of 0.25 kg CO_2-equivalents per person-km (kg CO_2-eq/p-km), cars[3] 0.14 kg CO_2-eq/p-km, ferries[4] 0.17 kg CO_2-eq/p-km, and buses[5] 0.02 kg CO_2-eq/p-km. Trains in Sweden[6] have specific emissions of less than 0.01 kg CO_2-eq/p-km (The Network for Transport and Environment, 2015).

Emissions from each holiday trip can be seen in Figure 6, where the typical distances travelled from Table 6 have been multiplied by the specific emissions. Thailand holidays are responsible for the highest emissions, closely followed by holidays to the USA.[7] Charter holidays cause more emissions than city holidays, which is due to the longer hauls in charter holidays. Ferry holidays' and car holidays' emissions are of equal size, but are considerably smaller than all the holidays by air. Bus holidays have even smaller contributions. Swedish car, train, and bus holidays result in smaller emissions, with Swedish air holidays causing slightly larger emissions.

[2] Water vapour at high altitudes and nitrogen oxides are significant GHG emissions besides CO_2, resulting in an up-lift factor of 1.9 in GWP-100.

[3] The proportion of ethanol is assumed to correspond with the Swedish ethanol consumption in 2005, giving on average lower life-cycle emissions compared to petrol. Also, average occupancy in cars during vacation is two persons per car according to RVU 2005/2006.

[4] Emissions are allocated to volume occupied (25 percent to goods vehicles and 75 percent to passengers).

[5] Average fuel consumption is assumed to have 20 percent higher than fuel consumption of a bus from 2008.

[6] Åkerman's (2012) data is based on a mix of diesel and electric trains and the EU-25 electric mix. Since train holidays are only looked on in Sweden, with electric trains and another electricity mix, additional data was necessary.

[7] Due to the simplification of equal emissions per person-km for charter and scheduled trips charter emissions could be overestimated and schedules flights be underestimated. Also, layovers and the impact of lifting/landing have not been taken into account. This holds for charter vacations to the Mediterranean, city vacations in Europe, USA vacations and Thailand vacations.

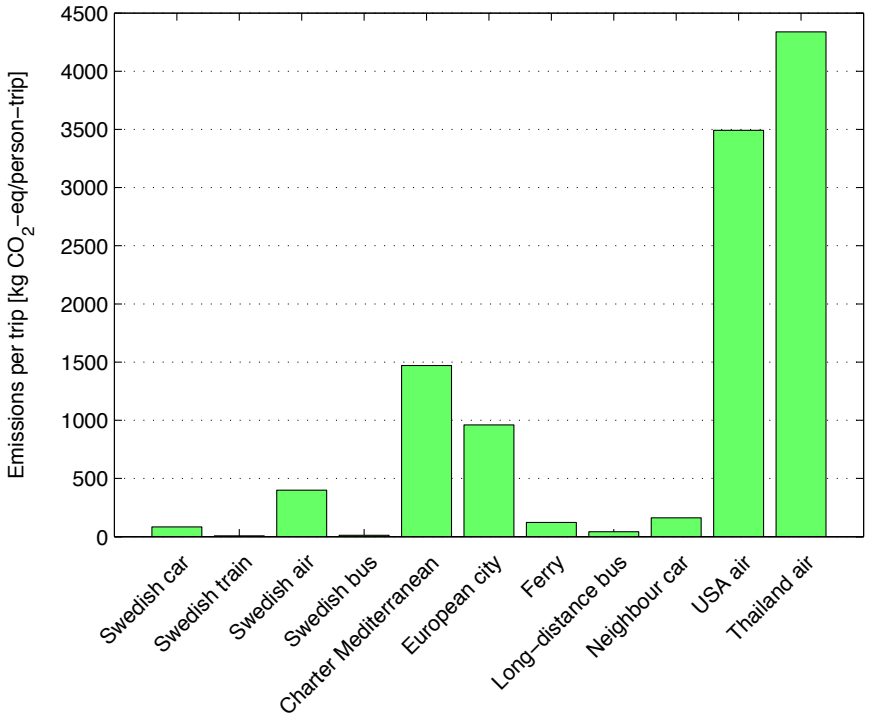

Figure 6 Emissions of CO_2-equivalents per trip and person for different holidays. Calculations are based on methods from Åkerman (2012) *and data from RVU2014.*

Next, Figure 7 shows the total contribution each practice makes in regards of CO_2-equivalents, i.e. the emissions per holiday trip has been multiplied with the corresponding number of trips form Table 6. The relative order of largest to smallest emissions has changed compared to Figure 6. City holidays now have the largest total emissions, followed by charter. Next are USA holidays with almost twice as big contributions as Thailand holidays. Swedish car holidays, which showed small emissions in Figure 6, now contribute to larger emissions than Thailand holidays. Car holidays to neighbouring countries have smaller contributions, closely followed by ferry holidays. Lastly, bus holidays in Sweden and Europe and Swedish train holidays are hardly noticeable in comparison with the holidays by air.

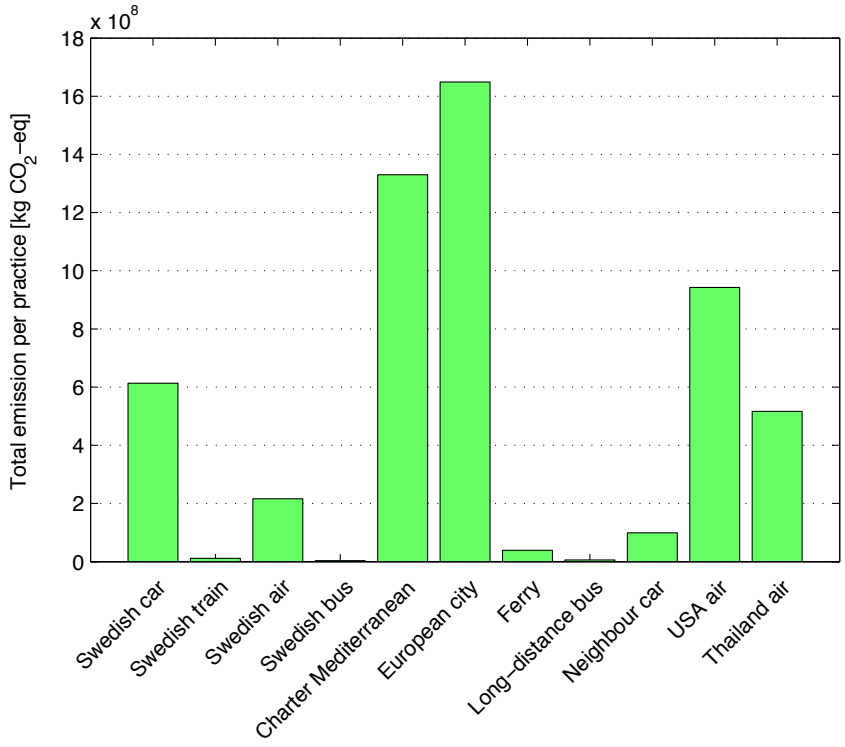

Figure 7 Total emissions of CO_2-equivalents for different holidays. Calculations are based on methods from Åkerman (2012) *and data from RVU2014.*

By 2050, emissions should be below 2 tonnes of CO_2-equivalents per person and year to be sustainable in order to reach the 2°C target (Rogelj et al., 2011). A radical "low-carbon" scenario for 2050 was developed based on technological potentials for cars, power production etc. as well as from lifestyle changes (Larsson and Bolin, 2014). In the low-carbon scenario, emissions from transport for vacationing (air, car, bus and train) is 0.5 tonnes per person and year, i.e. a quarter of total emissions in 2050. In this scenario emissions per person-km for aviation are assumed to decrease by 1.2 percent per year (Karyd, 2013) and emissions from cars, buses, trains are expected to be very low as vehicles are assumed to run on renewable energy. Assuming the same level of person-km for vacationing today as in 2050, the corresponding emissions today would be approximately 1 tonne, 0.75 tonnes from air and 0.25 from the other modes, which is thus based on emissions per person-km being halved between 2015 and 2050 (Larsson and Bolin, 2014; estimates by Jörgen Larsson). This 1 tonne can be thought of as a vacation carbon budget, which will be halved by 2050 through technological development. How the budget is allocated between different holidays is thus up to each resident to choose.

Subsequently, *Figure 8* shows the number of holiday trips per person and year that could be considered to be in line with this vacation carbon budget. According to these estimates, Swedish residents could go on numerous bus, train, ferry, and/or car holidays within the carbon budget. Swedish air holidays would be possible a couple of times every year, while charter holidays would be possible once every other year and city holidays once every year. USA and Thailand holidays on the other hand would only be possible every fourth and fifth year, respectively.

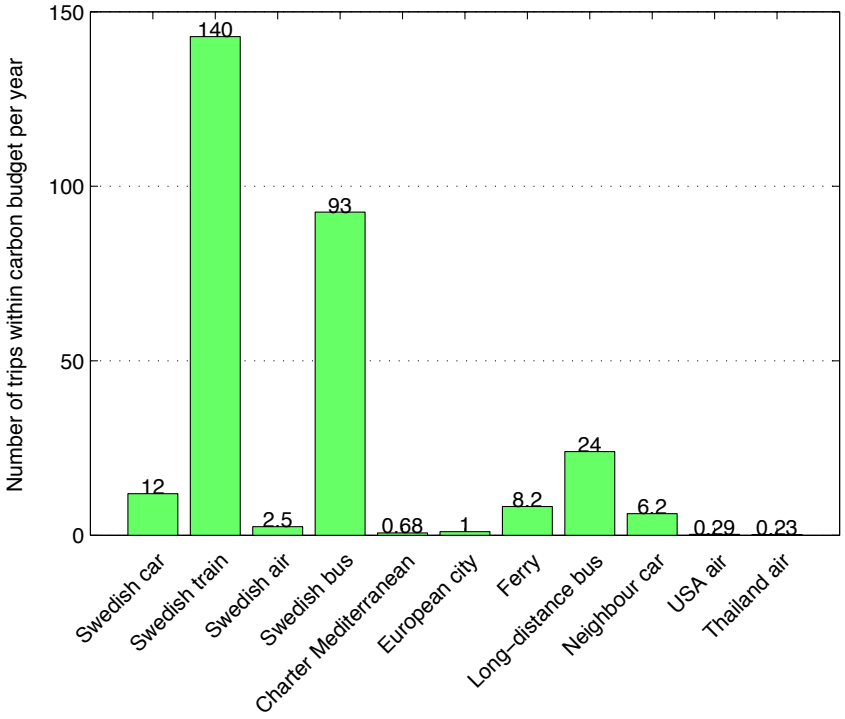

Figure 8 Number of holidays allowed per person and year, within the vacation carbon budget of 1 tonne CO_2-equivalents per person and year as benchmark.

Lastly, Figure 9 shows two examples of holiday combinations over a five-year period that would be within the vacation carbon budget of 1 tonne CO_2-equivalents, i.e. 5 tonnes over five year. Case 1, to the left, shows emissions from one Thailand holiday, barely within the budget. Case 2, to the right, shows emissions from one European city holiday, two charter holidays, one ferry holiday and one car holiday, still leaving room for additional low-emission holidays.

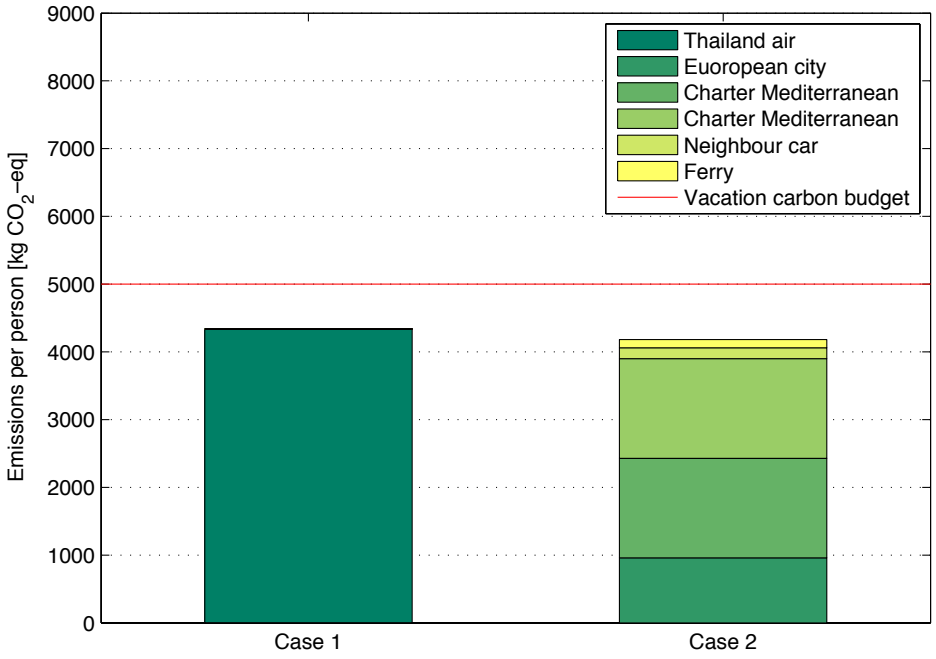

Figure 9 Examples of holidays during a five-year period that are within the vacation carbon budget, indicated by the red line. Case 1 shows emissions from one Thailand holiday. Case 2 shows the stacked emissions from one city holiday in Europe, two charter holidays, one ferry holiday and one car holiday.

6 Applying the multi-level perspective on vacation practices

Air charter has been the most common and persistent practice for a long time, which makes it interesting to investigate further, especially taking into account the considerable GHG emissions this practice causes. Hence, an analysis of its journey from niche to regime might bring interesting aspects to light. Also more sustainable practices that could challenge this climate intensive regime would be of interest, which is why the failed niche of train charter will also be investigated.

6.1 The multi-level perspective on Charter to the Mediterranean Sea

Charter holidays by air to the Mediterranean Sea have been a dominating vacation practice throughout the past few decades. In the fifties only a few thousand took part in this new vacation practice (von Seth, 2008), while over 900'000 Swedish residents were charter practitioners in 2014. How the novelty of charter practice developed into a regime can be illustrated by a number of coinciding circumstances at different levels of the socio-technical system. The seven dimensions of the regime (see Figure 4) will be core in illustrating these developments.

6.1.1 Novelty stage: niche and landscape developments

The first charter flights to the Mediterranean left Sweden in 1957, but the idea of charter holidays, i.e. group organized package holidays, had already been around for some time. Probably the first charter trips from Sweden were organized by Sweden's first travel agent Reso in 1937 and went to the world fair in Paris by bus. Although only 1732 people participated, it indicated the demand for this emerging holiday form. (von Seth, 2008) *Culture and symbolic meaning* was important as Reso had an ideological foundation, believing that Swedish travellers should see the world, learn from and cooperate with different countries and cultures rather than relax during their holidays (Dinkelspiel, 2015; von Seth, 2008).

Important for the emerging vacation practice was the *landscape development* of legislated paid holiday in the 1930s. Previously, holidays were not possible due to simple time constraints, but from the 1930s and onward everyone was at least allowed vacation time. First it was one week, which has since increase to two weeks in 1938, three weeks in 1951, four weeks in 1963 and finally five weeks in 1978. Simultaneously working hours have decreased from 60 hours per week in

1900 to 40 hours per week in the 1970s, giving Swedish residents even more leisure time.

More or less all holiday trips came to a halt during World War II, delaying further developments. The war did however create specific *landscape conditions* for the Swedish vacation market. Most Swedish homes had a radio and during the war, when nations closed their borders, there was coverage from around the world creating an allure of foreign counties. Additionally, the Swedes wanted to see the effects of the war with their own eyes. This led to an accumulated desire to travel and as many countries opened up their borders after the war it became possible to travel again. (von Seth, 2008) Moreover, the Swedish economy was stronger than other European countries', since Sweden was not affected by the war to the same extent as many other countries (Dinkelspiel, 2015; von Seth, 2008).

Demand for continental holidays increased, but bus as mode of transport was not ideal from a time perspective. Getting to destinations took several days, requiring long vacations. This was where aviation had a great advantage, making it possible to travel long distances in short time frames, but for air charter to break through several aspects had to align. (Dinkelspiel, 2015; von Seth, 2008) Important was unquestionably technological development, improving both *technology* and *techno-specific knowledge*. World War II had helped greatly; planes were now faster and could go further. Furthermore, Europe had a big aircraft fleet used during the war that could be transferred to civil aviation. (von Seth, 2001) During the 1950s the jet engine came, allowing for even faster aircrafts travelling longer distances (von Seth, 2008). Additionally, the travel agents organising holiday trips by bus or train had already established marketing strategies, offices and client bases. This suggests that when aviation was introduced to the charter holiday, the *market and user practices* were to some extent already in place.

The first charter flight, departed in 1954, was operated by Transair and set for Hamburg where travellers continued by bus to different destinations. This concept was successful and several travel agents adopted the notion and a period of *experimentation* followed. In the following year, the first trip to Mallorca departed under the description "rest and recreation trip" (Dinkelspiel, 2015; von Seth, 2008). In other words, the beach charter was born, with other *culture and symbolic meaning* than previous learning-oriented bus charters. 1955 was a break-through year for air charter; the first travel agents offering air charter showed great success and several new actors entered the market (von Seth, 2008). The air charter practice was slowly gaining momentum.

During the 1950s, the ideological motivations behind the idea of travelling abroad still prevailed. But in 1959 a different kind of travel agent came along, i.e. Spies Rejser. The founder, Simon Spies, was a man trailed by scandals about his frivolous life and Spies Rejser sold trips under the slogan " rejs og vaer glad"

("travel and be happy"). Spies sold charter trips at a low price and also started selling unbooked trips at a cheaper last-minute price, which was not custom in the industry at the time. Spies started changing the very idea of what a charter holiday was; people started looking for recreation and social life rather than cultural exchange (Dinkelspiel, 2015; Willis, 2014), which further changed the *culture and symbolic meaning* of the charter practice. During the 1960s as the drivers behind holiday traveling diversified as actors started focusing on different market segments. Club 33 was founded in 1961, for traveller between 18 and 33 years old (von Seth, 2008). Slowly, the charter practice was entering new markets and experiencing a period of *niche accumulation*, with *fit-stretch* patterns as it moved to new user groups.

As charter kept growing during the 1960s, it became clear to the traditional aviation companies that they had new competition. Scandinavian Airlines (SAS) started lobbying (*strategic games*) to establish *sectoral policy* to limit charter's growth. Partly due o SAS's lobbying, a complex set of rules and regulations arose for arranging charter trips, e.g. that half board had to be included and that at least 15 guests had to have the same length of stay. (von Seth, 2008, 2001)

Despite the existing traditional aviation regime's best efforts, charter was becoming a popular movement in the 1960s, with a *dominant design* slowly emerging. Up till then charter holidays had still been too expensive for a wider consumer base and had been considered luxurious and exotic. But in the 1960s competition had driven the prices down and charter was being marketed as " for ordinary people" (von Seth, 2008; Willis, 2014). Now marketed to and performed by a growing number of people in Sweden, the charter vacation practice was gaining more momentum and starting to create an entire system around it, i.e. creating a new regime.

Also, actors started building their own hotels to be able to offer their Swedish customers what they asked for, making the cultural divide of home and abroad narrower. First to open was hotel *Nueva Suecia* (The New Sweden) on Gran Canaria in 1967. Several actors followed suit and soon Swedish hotels could be found in many European countries. This period can be considered the complete *break-through* for charter holidays (Dinkelspiel, 2015; von Seth, 2008), with signs of *multiplying* as several new actors saw the light of day and the practice spreading to several new groups of society. During this period, with many new hotels and new destinations being developed, a more rigid *infrastructure* is being formed, further strengthening the evolving practice regime.

6.1.2 The air charter regime

The niche developments and landscape changes in the early stages of the charter practice have now been described. An interpretation of the stable charter regime in terms of the seven regime dimensions will follow.

During the second half of the 1960s, several trade organisations and *industrial networks* emerged in order to simplify the increasingly complex regulations. As interests were similar in other European countries international organisations were established as well, working on simplifying bureaucracy and licencing in destination countries. Laws were also passed, e.g. the Travel guarantee act from 1967 guaranteeing customers money back if a travel company goes bankrupt. (von Seth, 2001) In other words, during the 1960s increasing *sectoral policy* developed that further strengthens the charter regime. Many old regulations and laws are still valid today, as with the Chicago Convention of 1944, where a set of principles were agreed upon to promote collaboration between people and nations. This is a problem today since it hinders the implementation of climate tax on aviation fuel (Larsson et al., 2015). The fact that there is no climate tax on aviation fuel, in Sweden or in other member states of the ICAO (International Civil Aviation Organization), gives aviation a competitive advantage that strengthens the charter practice regime. Old regimes, tend to have well developed policies and committed policy makers that strengthens the regime (Geels, 2012), which aviation has.

Air charter is highly dependant on the aircraft, i.e. its *technology*, and the *techno-specific knowledge*. Technological development in aviation is characterized by incremental innovation (Karyd, 2013), typical for a regime. There is however still potential for more radical technological development, and recently there has been promising developments towards a so-called Mach 5 engine. If, or when, introduced this would result in a flight time of 4 hours or less to anywhere in the world (Jivraj et al., 2007). If realized, aviation is at the brink of a revolution of the same magnitude as the introduction of the jet engine, which would potentially strengthen the air charter regime even further.

Culture and symbolic meaning of charter holidays has changed over time, but in general the idea of charter holidays as rest and recreation holidays "for ordinary people" prevails. Charter opened up the Mediterranean to the wider Swedish public (Willis, 2014), and is probably what many people imagine when thinking of vacation. However, there is still incremental innovation in this regime dimension. Many travel agents now offer themes in addition to relaxation, e.g. study trips and food experiences. Especially trips offering physical activities, e.g. yoga or bike trips, have seen an increase, which is at odds with the relaxation notion. (Dinkelspiel, 2015) Closely linked to culture and symbolic meaning is *markets and user practices*. The charter vacation practice itself is stable in number of booked holidays and seem to still primarily contain relaxation, although the incremental

innovation described also widens the spectrum of activities in the practice. The primary market, "ordinary people", is a seemingly stable wide social group with many practitioners. Naturally, the charter practice also enters new markets with the diversification of additional activities.

Aviation's great advantage is the time benefit, which is naturally dependent on the technology, but also on *infrastructure*. The vast airport system across Europe, and worldwide, is important for access for Swedish residents. Since aircrafts only need these stations, and no "road", there is flexibility in the infrastructure that makes it possible to adjust supply relatively easily according to demand. Also, the construction of hotels has continued over the decades, creating a large capacity to receive vacation practitioners. Thus, there is a well-established infrastructure that conceivably stabilizes the regime.

Both travel agents and aviation have a long history of *industrial networks and strategic games*. Alliances has become common in the airline industry, to improve service and to become more resilient towards economic and regulatory changes (Liou et al., 2011). Also, the tourism industry is exceedingly integrated, with boundaries between airlines, hotels, and travel agents becoming gradually more blurred and strategic alliances developing within and between the industry and other economic sectors (Pansiri, 2008). These alliances can be effective in stabilizing the regime and creating continued growth and competiveness.

6.1.3 Regime challenges through landscape and niche developments

In the past few years charter travel has not seen continued drastic increases, in fact volumes are about the same today as 20 years ago, which indicates a stable regime. Holiday travel has however continued to increase during this period; more people are especially choosing scheduled flights since the introduction of low cost aviation has reduced the prices significantly. Percentage wise, charter is loosing ground to scheduled flights, with 71 percent of people travelling to the Mediterranean Sea in 2000 choosing charter while by 2013 the share had decreased to 47 percent. With this competition, many charter companies have chosen to focus on longer haul trips, such as Thailand. (Dinkelspiel, 2015) Since scheduled flights use the same physical infrastructure (i.e. airports and aircrafts) as charter, it is not surprising that when prises decreased scheduled flights could easily increase its market share. Also, many destinations have been overexploited with fast builds; charm has slowly been declining in many destinations, leading to a substantial decrease of charter tourists (Dinkelspiel, 2015; Willis, 2014).

There are several landscape developments that have affected the charter regime. Throughout history, political unrest has made people switch destination choice or even to stay in Sweden; e.g. Franco's dictatorship led to a boycott of Spain during

the 1970s, bombs in Antalya Turkey made tourism decline drastically and the September 11 attacks in New York City temporarily caused a decline in demand. Also natural disasters have had similar effects, such as the Tsunami catastrophe in Thailand of 2004. Of course, economic unrest has also had its effects; e.g. in the 1970s there was an oil crisis, in the 1980s and 1990s Sweden went through currency devaluation making it more expensive for Swedish residents to travel and certainly the resent financial crisis has had its effects. (von Seth, 2008) All of these things have led to decreasing volumes of travellers and have led to a destabilization the charter regime. Natural disasters, political and economic unrest are bound to continue destabilising the charter regime. As the climate debate continues to attract attention, there is a risk of negative effects for the aviation industry as a whole due to increasing awareness among practitioners. Potential climate taxation could also lead to aviation loosing competitive advantage; air charter could become more expensive, which could destabilise the regime considerably.

The rise of the Internet has had positive effects for the tourism industry as a whole, making marketing and informing customers easier. Also, social media is playing an increasingly important role in inducing tourism demand. (von Seth, 2008). On the other hand, the Internet has made it easier to make travel arrangements and accommodation reservations independently. This has potentially decreased the need for travel agents and thus helped low cost aviation to progress. Hence, the Internet has had both stabilising and destabilising effects on the regime.

Looking at the current situation and into the future, charter seems to still constitute a practice regime, although not as dominating. Innovation within the regime is expected to further develop the idea of charter with additional meaning. This means more of the diversification previously described, with increase of e.g. exercise trips or slow travel with several destinations in the same trip (Dinkelspiel, 2015).

6.2 The multi-level perspective and the failed niche "Blue train"

In an attempt to address climate impact of air charter, Fritidsresor launched the niche novelty train charter "Blue train" in 2007 in collaboration with SJ. In terms of CO_2-emissions there was a big reduction per passenger, with a Blue train passenger emitting approximately 75 kg of CO_2 and a typical flight passenger emitting 530-720 kg of CO_2[8] (TUI Nordic, 2010). They launched it as a new form of travel, still as a package deal including transport and accommodation, with a

[8] These numbers are TUI Nordic's own calculations of direct CO_2-emissions, not including GHG emissions due to high altitude emissions of water vapour.

new way of experiencing travel. The train journey typically took around 20 hours from Malmö, with several changes of train and an additional bus transfer of a couple of hours to final destination. In marketing train charter was compared with traditional air charter, emphasising the tranquillity of something moving slowly in our increasingly stressful society; "… experience the magic of travelling… see the landscape slowly change outside the window … change trains at central stations filled with atmosphere." (Fritidsresor, 2008) In that sense, Fritidsresor tried to change *user practices* as well as *culture and symbolic meaning* of the charter practice.

The first trips were organised to the Opera festival in Verona, Italy, in July 2007. Initially 4 trips were arranged, but already in March of 2007 plans were being made to widen the concept with several destinations and activities. (Fritidsresor and SJ, 2007) At first it seemed as if this new niche practice was gaining momentum, with 2700 customers the financial year of 2008/2009 and 3420 customers 2009/2010, but then something happened in the following financial year as the number of customers dropped to 515 (TUI Nordic, 2011). All but one destination was cancelled after the summer of 2010. It was difficult to make this new niche into a competitive product; low cost aircraft carriers are faster and cost down to a third of the price. Train charter was perceived as too slow and too complicated, with several train changes and different operators. (Öjemar, 2010) As prices, availability of supply resources, and travel preferences are stated as important for tourism demand, these difficulties became problematic.

To some extent practitioners were limited by *path dependency*, constrained by their perceptions of the role of travel during holidays and not open to adapt this new practice. Also, train charter suffered from *lock-in* to the existing railway infrastructure and network of old national train operators. There was a lack of direct and convenient train connections, a problem that has become even greater since Deutche Bahn has cancelled night trains from Copenhagen as of November 2014 (TT, 2014). *Selection environments* could consequently be said to be unfavourable. Train charter did however correspond nicely with landscape changes towards sustainability considerations. Timing might also be a contributing factor to the failure, either missing its *window of opportunity* or emerging before sufficient instabilities of the current regime.

Looking into the future, when *infrastructure* developments might have made high-speed trains to the Continent a reality, there is still hope for train charter. Lottie Knutson, Communications Director at Fritidsresor, still believes in the idea and estimates that trains could replace one in five flights from Sweden to northern Mediterranean (Öjemar, 2010). Since train charter had difficulties fitting into existing regimes it would however require major changes of the system and the minds of people.

7 Discussion

The stating point for this thesis was to some extent the increasing number of flights of the Swedish residents and finding that international holidays were dominated by air-travel was hardly surprising. Finding differences between charter flights and scheduled flights was however interesting, as seen in Table 6. Charter holidays showed stability, indicating a stable regime, while European city holidays were increasing, still showing patterns of accumulation. Reduction in prices due to the deregulation of the industry and the introduction of low cost aviation can to some extent explain the increase, but it would be interesting to investigate this practice further. With access to more detailed information on destinations abroad (e.g. city) and social interaction, the city holiday practice could be an interesting case study for the integrated multi-level approach.

Section 5 showed that GHG emissions varied considerably for the different practices, as expected. Emissions from holiday trips by air were significantly larger than emissions from holidays using all other modes of transport. The larger emissions depend on two factors; the longer distances travelled and the higher specific emissions for aircrafts. Figure 6 illustrates the significance of choice of destination with emissions growing drastically with distance, as holidays to Thailand and the USA have much larger emissions. Specific emissions per person-km are higher than for the other modes of transport, which is partly due to high specific energy use but mainly due to emissions of water vapour at high altitude, resulting in the high up-lift factor of 1.9 for GWP-100 calculations. Technological development will probably reduce the specific energy use, but emissions of water vapour are likely to remain a problem.

Technological development is what the aviation industry highlights when climate impact caused by aviation is discussed. If a 1.2 percent yearly reduction of emissions per person-km is possible, which is assumed in the low-carbon scenario for 2050 described in section 5, there will be a significant reduction of emissions from aviation. However, with the current growth rate of 4.1 percent for total air-born trips it will be difficult to offset with projected rates of technological development. Also, there is a substantial time lag from invention to implementation in the aircraft industry, suggesting that perhaps not all faith should stand with technology to solve the problem. Hence, there is a need to look at consumer practices critically and discuss lifestyle changes. At the very least, the current growth in person-km needs to be halted in order to decrease emissions.

Higher specific emissions for air have somehow created a notion that flying is intrinsically bad as choice of transport. This is to some extent true as there are several other modes of transport with substantially lower emissions per person-km, but the distance travelled when flying is also of great importance. Consequently,

all holidays by air should not be looked upon equally from a climate perspective. When discussing climate impact from holiday or travelling, it does not need to be a "to fly or not to fly" type of discussion, but could rather be a discussion of where to fly and how often. Flying shorter distances in Europe is not as damaging as flying long hauls such as to Thailand or the USA.

Therefore, a more fruitful approach could be to look upon vacation travel to be restricted by a carbon budget, which was illustrated in *Figure 8* and Figure 9. The exact level of the carbon budget would need further investigation and results of how often each holiday would be possible should therefore be interpreted with some caution. Still, it is an important illustration of the importance of holiday choices. Carbon-intensive holidays, e.g. Thailand holidays, would then still be acceptable, just far more seldom than less intensive holidays, e.g. city holidays in Europe. Travelling certainly is important for cultural understanding and cooperation in our increasingly globalized world. These calculations indicate that international vacation travel is possible in future low-carbon scenarios, but the choice of destination and mode of transport dictates how often.

Applying the multi-level perspective and practice theory in an integrated manner showed to be fruitful in the Swedish vacation case. Switching the object of analysis from technology to practices made it possible to look at habitual actions involved in consumption and causing GHG emissions. Focusing on technology has been shown to be a successful starting point in the multi-level perspective in several cases, but it may also be constraining to some extent. In this case, switching to practices highlighted that using carbon-intensive technology is not equally "bad" in all cases and that user practices and habits is of great importance. These different starting points highlight different aspects and the choice between them depends on the case study.

Analysing vacation behaviours as practices were not straightforward, as vacation choices and behaviours do not have routinized characteristics to the same extent as many other practices. Commuting to work for example often does not include reflection at all, while choosing vacation destination, mode of transport, social interaction, etc. often includes reflection to some extent. It could be looked on as having varying degrees of routine, where many people more or less spend their vacation the same way every year with previous experiences strongly influencing vacation choices, while others seek new experiences each time. Vacation behaviours have been classified as practices in previous studies and analysing them with the integrated multi-level perspective was promising, but future case studies of more routinized practices could further develop the framework.

In the emergence of the charter practice from niche to regime level, many factors at all three levels were found to coincide. Legislated paid vacation were undoubtedly important, especially since time is such an important resource in adopting new

practices; more leisure time made room for more vacation travel. Efficient time use was also to aviation's advantage over existing options, making Europe accessible within only a few hours of travel. Culture and symbolic meaning were also found to be important, and a charter holiday at the beach is what many practitioners imagine when thinking of vacation time. If the goal is to make people vacation travel less by air, making efforts to change the perception of what a vacation should entail could be essential. Staycation, bus holidays and other less carbon-intensive holidays could need some rebranding to become more attractive at a societal level.

Prices most certainly also played a central role in making charter holidays the holiday of the "ordinary people"; charter holidays are cheap and within budget constraints of most Swedish residents. If climate tax on aviation fuel would become reality, prices could possibly go up and make this vacation practice less attractive. Also, the increasing awareness of climate impact from aviation could make vacation travel by air less appealing and possibly also stigmatised. If the charter regime would become destabilized and the charter practice become less popular, it is important that it is replaced by a less carbon-intensive practice.

Blue train was a genuine attempt to challenge the charter regime and to lower emissions from Swedish travellers. It is discouraging to see that it failed, especially since bureaucracy and the European national train companies' inability to cooperate seemed to be such a contributing factor. Inadequate infrastructure also contributed to train charters demise, so if (or when) train infrastructure is improved to include high-speed train across the European continent there is huge potential for train charter. Train charter could potentially replace a large share of today's air charter, which would significantly reduce the total emissions from the air charter practice.

8 Suggestions for further research

Vacation behaviours showed somewhat difficult to analyse as practices considering its less routinized character. For future applications of the integrated multi-level framework it would be recommended to look at more routine-based practices, e.g. food related practices. Different practices could then hopefully be more distinctly defined and the framework could be developed further. The seven dimensions of the regime could possibly be adjusted when using the practices as object of analysis to describe agency of the regime in a more detailed manner. Also, pathways for change and transition patterns for practice transitions could benefit from additional exploration.

Policy measures were not examined, e.g. climate tax on aviation fuel, but has potential to change Swedish vacation practices towards becoming more sustainable. Exploring policy options through a practice lens could be an interesting complement to the findings of this thesis. Studying differences in vacation practices between social groups could also have potential for future research, perhaps in a policy context.

A vacation carbon budget was proposed in this thesis, but the exact level of it could benefit from further inquiry. Further research could entail e.g. different scenarios for technological development, emission reduction, and long-term effects of different budget levels. More detailed calculations of GHG emissions for each practice, especially reduction potentials with technological development, would also be needed for more credible interpretations of a carbon budget.

9 Conclusion

Applying the multi-level perspective and practice theory in an integrated manner showed fruitful in the case of Swedish vacation practices. Agency was already taken into account to some extent in the multi-level perspective, and focusing more on practices rather than technology was achievable. This approach allows for analysis of sustainable consumption cases where lifestyle changes might be of more relevance than technological development, while still having the dynamics of the multi-level perspective in mind. In the future, applying this approach on cases of more routinized practices could help develop it further to describe agency in more detail.

In the application of the integrated framework on air charter holidays and train charter holidays, time use, infrastructure, and culture and symbolic meaning were found to be important. Aviation's great advantage is the efficient time use and if trains in Europe are to challenge this regime, infrastructural improvements were found to be crucial to make better use of practitioners limited time resources. Also, the symbolic image practitioners have is crucial and could be an entry point to change practices to become more sustainable.

Among the many practices found, climate impact varied to a large extent and vacations by air were shown to cause large GHG emissions. These large emissions do however not make travelling by air impossible from a climate perspective. If a vacation carbon budget, which would be in line with the 2˚C target, would be employed, practitioners could allocate it as they please. Within the budget, there is room for numerous low-carbon holidays and holidays by air would also be acceptable, just far more seldom than low-carbon holidays. Hence, the question is not whether to fly or not to fly, but to where and how often.

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