

Reframing deadlocked airport policy discourse

New perspectives on sustainable aviation in the
Netherlands

by

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Summary

To facilitate the rising demand for international travel, many of the Dutch airports have ambitions to expand. However, airport expansion is often called into question. Supporting the development of aviation has social and economic benefits, but emissions and noise caused by aviation are getting increasingly more attention. To deal with the different interest of aviation, policy-makers have turned to collaborative planning arrangements to make the issues for policy-making more tractable. These arrangements bring actors from different networks together, to represent their interests and foster new relations. However, successful collaborative planning is dependent on that the various goals of the actors can be achieved at the same time. Yet, over the past decades, the dual objective of improving economic developments and reducing environmental effects at the same time was unrealistic. This has resulted in a conflicting debate along the line of economy versus environment. Resulting in institutionalization of sub-optimal solutions and ever growing distrust among actors. This situation is referred to as a policy deadlock, in which collaborative planning arrangements are ineffective to balance the different actors' interest.

To improve collaborative planning arrangements, the policy discourse of collaborative planning should avert from the policy deadlock. This thesis aimed to reframe the deadlocked policy discourse to a new discourse in which actors are encouraged to pursue congruent goals instead of conflicting goals. Reframing the policy discourse refers to a shift of the actors' sense-making and acting upon issues in collaborative planning arrangements. An actor's perspective represents this sense-making and acting upon issues. Reframing thus triggers actors to communicate and collaborate on the basis of their different perspectives. To reframe the policy discourse to resolve deadlock, *sustainability as a boundary object* was used as a central concept. A boundary object is an object that is used and understood differently by different actors, yet has a common identity among actors that allows them to collaborate on a common task. Sustainability seeks to balance economic development, social development, and environmental protection. It is therefore subject to ambiguities and uncertainties, but it can bring actors together for the needs of future generations. Hence sustainability is understood differently, but has attraction as a unifying concept. That is why sustainability was used in this thesis to reframe a policy discourse in which policy deadlock could be averted.

The first step was to develop a better understanding on how the policy discourse has resulted in a policy deadlock. Therefore, the literature was consulted to analyze what the different perspectives of actors on aviation policy-making was. Two important aspects of perspectives are that they can change over time and actors can take on different perspectives, dependent on the situation they are in. Different perspectives were identified in the deadlocked policy discourse. Apart from economic and environmental perspectives, also a variety of other perspectives was identified. However, the dual objective of improving economic benefits and at the same time reducing environmental effects is so institutionalized that variety is marginalized. This has become a self-reinforcing loop that results in actors to either support the economic or environmental objective.

The next step was to construct a policy discourse around sustainability in which the dichotomy of economic and environmental perspective wasn't dominant. This was done by means of an application of Q-methodology. Q-methodology is a methodology that aims to analyze people's subjectivity in a statistical interpretable form. It was used to capture perspectives that actors take on in a policy discourse constructed around sustainability. The focus was to incorporate new issues, new actors, and focus on the more complex, long-term aspects of sustainability. As part of the Q-methodology, actors were interviewed about their perspective on *sustainable aviation*. 27 respondents took part in the research to construct their perspective on sustainable aviation. The perspectives were both quantitatively and qualitatively analyzed to construct a set of perspectives that describe the group of actors best. Five perspectives were identified and narratively explained:

- Perspective 1: Accelerate innovation with economic instruments

On the long-term, technological developments will eventually enable environmentally friendly air travel. Policies to mitigate environmental effects of aviation should be implemented, but carefully so, since connectivity is of increasing importance for economic development. Market-based policies could allow for money flow which could be invested back into the sector to develop the infrastructure for the future vision.

- Perspective 2: Change travel patterns to achieve climate goals

Supporting development of aircraft technology alone does not suffice to mitigate the environmental effects of aviation. To achieve climate goals, demand for air travel should be limited and travel patterns of travellers should change. Short term environmental policy could be implemented, such as increased ticket prices or a restriction on further expansion of airports.

- Perspective 3: Adaptive region

In the broader scope of the region, there is just a small role for the airport in the region. Noise and emission have become a symbol of negativity for airports. Therefore, the way the airport is used should change. In the first place, the region needs a breath of fresh air, the established consultation bodies are not sufficient anymore, they have been on opposing positions for too long. As a region, you can make a conscious decision about the way you facilitate mobility, economic activity, and quality of life in general. Because of the ample resources at an airport, it has many opportunities to become more connected with the region and become a symbol of the region in a positive way.

- Perspective 4: A thriving region with aviation

The aviation industry is eminently innovative. By enabling the industry to innovate, becoming a transport hub for different modalities, and connecting with the region in new ways, an airport can become the centre of a thriving region. There are many technological possibilities untested that could be successfully implemented. But aviation has become strictly regulated and actor positions are predefined, limiting airport activity and limiting possibilities for the airport to facilitate the region.

- Perspective 5: New governance for uncertain times

Because of a lack of sufficient international policy, the Netherlands is on its own to deal with increasing uncertainties about development of aviation, uncertainties such as technological developments, airspace capacity, and the veracity of the mainport-concept. The way governance is arranged, e.g. in consultation bodies, needs to evolve towards a state in which it is constructive for policy-making in an uncertain world. These bodies should be constrained to give advice that isn't necessarily used for policy-making.

After the identification and interpretation of the perspectives, the perspectives were analyzed for the emergence of congruent goals. Also, the perspectives were analyzed on their diversity to check if possible new dichotomies rise in the reframed policy discourse. Correlation between perspectives were calculated and the perspectives were interpreted for similarities and differences for nine categories. Perspective 3 ('adaptive region') and especially perspective 5 ('new governance for uncertain times') were identified to have many similarities with other perspectives. It seems that engaging with sustainable aviation as a boundary objective enables actors to develop new ways to connect the airport and the region and to rethink governance and institutional processes. It was also identified that increased ticket prices for travellers is generally regarded as a fair policy. On the other hand, new possible dichotomies were identified. The most obvious difference in underlying assumptions of perspectives was the potential of technological developments. Supporters of perspective 1 ('accelerate innovation with economic instruments') and perspective 4 ('a thriving region with aviation') assume that in the next fifty years, economic and environmental goals can be able to be achieved at the same time with technological developments. The other three perspectives generally do not agree that this is the case. Furthermore, there is a diversity in the underlying assumption of the function of an airport to a region, which has similarities with the dichotomy in the policy deadlock. However, this diversity in the assumptions on the function of the airport are more nuanced. But, this dichotomy can't fully be averted. Nonetheless, it was interesting to identify that all the perspectives on sustainable aviation engaged with balancing the economic, environmental, and social objectives of sustainability. The perspectives did not just focus on optimizing one. The perspectives also focused more on strategies to best deal with the diverging interest than the perspectives in the deadlock policy discourse.

By synthesizing these findings, it is concluded that reframing by means of sustainability can be an effective strategy to improve collaborative planning arrangement. It allows actors to come to the conclusion that change of the policy discourse is necessary, can make actors aware of the boundaries in which they formulate their ideas and can question actors underlying assumptions. In general, it created more nuance in the otherwise polarized policy discourse. However, the economic versus environment dichotomy wasn't completely averted and possible new dichotomies about the potential of technological developments could rise. Also, a shift to a discourse in which diverging assumptions about the potential of technological rise, could already be an improvement as this potential is well researched.

Given the diversity of the perspectives, recommendations were developed. Most importantly, collaborative planning arrangements should be organized on the basis of the perspectives on sustainable aviation. Sustainability should not be regarded as a pillar next to other objectives, but as the overarching objective of collaborative planning. Secondly, actors should work to connect the airport and the region in new ways. The research identified opportunities for this connection. Thirdly, the institutional government should be reformed in which assumptions about the capacity of the Dutch airspace, the veracity of the mainport-concept, and the potential of technological developments are regarded as uncertainties. Fourth, actors should develop knowledge on the potential of technological developments for the next fifty years. Fifth, a more unified policy discourse with collaborative planning that spans boundaries of different airports in the Netherlands should be initiated. Finally, the analysis of policy alternatives should do more justice to the different future scenario's of sustainable aviation. This involves a broader scope in which alternatives for international travel, economic activity, and urban planning are also taken into account.

Although the application of the methodology was effective to reframe the policy discourse, there were some remarks to be made. In the first place, respondents that constructed their perspective on sustainable aviation are limited by the researchers choice and formulation of the issues they engaged with. Secondly, other boundary objectives could likely result in the identification of a different policy discourse. Boundary objects such as resilience, safety, or vulnerability could for example be used. Thirdly, this thesis focused on identifying perspectives about the future, which are hard to validate. The identified perspectives are thus more exploratory than descriptive. Also, most respondent felt that the perspective they constructed reflected what they really thought quite well. However, not all respondents were equally motivated to engage with the issues they were confronted with. This indicated that there is tension among actors which isn't fully demonstrated in the reframed discourse. Finally, it was emphasized that improving collaborative planning comes down to not only identifying ways to improve the situation, but actually engaging with actors in a collaborative fashion. This thesis was limited to individual interviews with actors. That is why the many methods that engage with actors in practice to arrange effective collaborative planning are so important. The findings of this thesis can add to those methods to develop a basis on which actors can start to work on congruent goals. Future research could engage with the best design principles for collaborative planning arrangements, based on the perspectives on sustainable aviation, could analyze how other boundary objects can be used for reframing of the policy discourse, or how reframing by means of boundary objects can be applied in other sectors.

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Introduction

1.1. Aviation policy-making in the Netherlands

Aviation is one of the fastest growing sectors in the global economy. In Europe, the number of flights is expected to increase by 50% in 2035 (Eurocontrol, 2013). To facilitate the increasing demand for air travel, different airports in the Netherlands have ambition to expand. However, airport development, in particular expansion of airport capacity, is often questioned by a variety of policy-makers and transport analysts for several reasons.

There are many benefits that come with stimulating growth of the aviation industry, such as job creation, economic growth, and social benefits in terms of enhanced opportunities and choices (Caves, 2003). But on the other hand, aviation causes significant noise and emissions. Also, airport infrastructure requires considerable space. This is why increasing the capacity of an airport is often an issue of intense debate among policy-makers, aviation industry, environmental groups, and residents in areas around airports (Howarth and Griggs, 2013).

Noise caused by transportation, such as that from air, rail and road traffic has a negative impact on health, quality of life and well-being (World Health Organization, 2011). Also, increased levels of stress, anxiety and hypertension are found among residents exposed to higher levels of aviation noise (e.g. Black et al., 2007, Rosenlund et al., 2001). Furthermore, studies have linked increased air pollution to an increase of adverse effects on human health (e.g. Ayres, 1998, Kampa and Castanas, 2008). Aviation is one of the contributors of decreased air quality near airports (e.g. Carslaw et al., 2006, Mazaheri et al., 2009). In a recent study conducted by TNO (2018) is estimated what the contribution of 26,400 aircraft movements per year from Rotterdam-The Hague Airport is on the number of ultra-fine particles per cm^3 in a nearby residential area. A yearly average of about 7,400 ultra-fine particles per cm^3 was estimated, accounting for about 15% of the total amount of ultra-fine particles in the air of that nearby residential area.

Also, the impact of aviation on global warming is getting increasingly more attention. It is estimated that aviation accounts for 2-3% of the globally emitted CO_2 emissions (Owen et al., 2010). Where many other industries are reducing their environmental footprint, mitigation efforts and policies to combat CO_2 emissions from the aviation industry are lacking (Cames et al., 2015). The aviation industry's global share of CO_2 emission could rise to 22% by 2050 (Cames et al., 2015). Top-down international policy-making is generally the most effective strategy for solving global problems, but sufficient international policy measures to address the sectors contribution to global warming are lacking too (Gössling and Cohen, 2014, Peeters et al., 2016, Sabel and Victor, 2017).

Given the lack of mitigation measures, a way to respond to these challenges is decomposing it into discrete, problem-solving efforts (Sabel and Victor, 2017). However, solving the more discrete aviation challenges at the level of specific airports, has been troublesome for policy-makers in itself. Policy-makers are not able to effectively strike a balance between diverging economic and environmental interests. The policy-making processes at airports play a vital role in the national debate on development of aviation. Many of

the Dutch airports aim to expand their capacity to facilitate rising demand for international travel, but are contested by local residents and environmental groups.

1.2. The challenges of collaborative planning

Ensuring a future for aviation in which the diverging goals are effectively met, depends on the strategic actions of public and private actors to consider the environmental limits and effectively balance these with social and economic considerations (e.g. Steffen et al., 2015, Whiteman et al., 2013). Collaborative planning arrangements bring these actors together to develop shared visions and balance different actors' interests (e.g. Moore et al., 2014, Olsson et al., 2004, Vacik et al., 2014). These arrangements focus on activating individual actors from different networks, representing actors and their interests, and fostering new interactions and relations (Van Buuren et al., 2012). Different actors with different views and interests should be part of collaborative planning arrangements. For collaborative planning to be successful, it is fundamental that it results in conditional cooperation with effective communication, trust, and reciprocity (Ostrom, 2014). It is thus important to have a detailed understanding of the different perspectives that actors have towards aviation. These perspectives describe how actors make sense of aviation policy-making and act accordingly in collaborative planning. Identifying and including these different actors' perspectives can be used to make the challenges for aviation policy-making more manageable (Van Eeten, 2001).

In collaborative planning, the underlying premise of including diverging perspectives in airport policy-making is that diverging goals can be achieved at the same time (Kroesen et al., 2011). However, it seems that achieving the various goals of actors in aviation policy-making simultaneously, can't be achieved. This is the result of a dominant dichotomy of irreconcilable economic and environmental objectives (Huijs, 2011). Actors in collaborative planning either favour the economic or environmental objective, resulting in opposing positions. As a result, a conflicting debate along the line of economy versus environment follows (Kroesen et al., 2011). The repetition of this debate in collaborative planning arrangements has resulted in a laborious policy discourse. Laborious policy discourses aren't necessarily a problem. However, if the policy discourse gives way to sub-optimal solutions that aren't favourable, without a way out, the policy discourse becomes problematic (Huijs, 2011). Because of an ongoing institutionalization of practices and positionings and an ever growing distrust among actors, this was the case in the Netherlands (Huijs, 2011). This situation is referred to as a policy deadlock, in which only a small subset of a broad scope of issues finds its way in the policy discourse and little effective policy-making takes place (Boons et al., 2010). A paragraph from Huijs (2011) about what the symptoms of a policy deadlock are, is cited below:

“The symptoms of such a situation are well-known and include the presence of taboos and myths, repetition of activities and discussions, vicious circles, exasperating delays, escalated conflicts, controversy and distrust among actors, policy accumulation, the creation of ad-hoc policies, people talking past one another (dialogue of the deaf), group-think and people clinging to inefficient rules even when there are clear signals of their finiteness (see Hajer, 1995, In 't Veld et al., 1991, Sabatier, 1988, Sabel et al., 1999, Senge, 1990, Termeer, 1993, Termeer and Kessener, 2007, Van Eeten, 1999).”

It is thus important to avert from policy deadlock for collaborative planning to be successful. This can be done by transforming the policy discourse. There are a variety of ways in which this can be done. In the first place, transformation of a policy discourse to improve collaborative planning could be established by making actors aware of the 'boundaries' in which they formulate their ideas and actions (Huijs, 2011). An effective policy discourse should be able to put an actors' very basic assumptions and beliefs into question. Real change of a policy discourse has an implication that the perspectives of the involved actors have to change. Therefore, they have to come to the conclusion that change is necessary. There is a need to get rid of the dual 'for or against' dichotomy, which should be acknowledged by all actors involved (Huijs, 2011).

Also, the scope of aviation policy-making can be broadened to change the policy discourse (Boons et al., 2010, Termeer and Kessener, 2007). This can be done by introducing new actors to policy-making processes, or introducing new issues that allow for a broader range of perspectives and ambitions. Although a better understanding of the actors' perspectives has resulted in some new regulations and policy solutions (Van Eeten, 2001), it has not resulted in change of the policy discourse. Thirdly, the policy-making processes of aviation takes place at different governance levels; regional, national, and international. At each level, knowledge is developed in its own way. Thereby, actors tend to contest the 'facts' that are reasoned by actors with opposing

perspectives (Boons et al., 2010). That is why the system should evolve towards higher level where knowledge is developed in such a way that it creates a basis for a shared vision on the future of the airport and aviation within regional, national, and international society (Boons et al., 2010).

1.3. Research objective and research question

Aviation is a complex sector with many involved actors with different perspectives on aviation. Thereby, the future of aviation is uncertain. To deal with complexity and an uncertain future, traditional stakeholder analysis methods assist organizations to strategize based on their own means and objectives by implying 'for or against' positions (e.g. Eden and Ackermann, 1998, Jonker and Foster, 2002). But instead, to avert from policy deadlock, actors in aviation policy discourse shouldn't enforce opposing positions by supporting either the economic or environmental objective, but should work to define congruent objectives. Congruency means that the objectives of the different actors aren't fully shared, but diverging objectives somewhat overlap and can be incorporated alongside each other in policy-making (Cuppen, 2010). This understanding is based on the rationale that common action doesn't require that actors fully share the same objectives, but only congruent objectives (Grin et al., 1996).

To stimulate actors to get rid of the dual 'for or against' dichotomy, actors should strategize to achieve congruent goals. A possible successful way for actors to engage together is the *boundary object* sustainability (Brand and Jax, 2007). A boundary object is an object which can be used in different ways by different actors, yet is robust enough to maintain a common identity among the different actors. Boundary objects can link different actors together, as they allow different actors to collaborate on a common task (Wenger, 1999). Sustainability can be defined as a boundary object, it seeks to balance economic development, social development, and environmental protection (World Commission on Environment and Development, 1987). Sustainability is hence subject to uncertainties and ambiguities, but can bring actors together which were formerly thought contrary, for the needs of future generations (Brand and Jax, 2007). Sustainability as a boundary object could therefore provide a means to define congruent objectives. It can broaden the scope from economy versus environment by introducing new social challenges, it allows for new actors to be involved, and can be the basis to develop a congruent vision for the future of aviation. Therefore, it contains the elements to construct a policy discourse that averts from policy deadlock.

The objective of this research is to contribute to improve the organization of collaborative planning arrangements in the Netherlands. Collaborative planning should be organized as such that it averts from a policy deadlock. In this research it is studied how this can be done by analyzing how sustainability as a boundary object can be used to reframe the policy discourse. The following research question is proposed:

How can sustainability as a boundary object be used to reframe deadlocked aviation policy discourse in the Netherlands?

Figure 1.1 conceptualizes this reframing. The circle on the left conceptualizes the deadlocked policy discourse, with two dominant perspectives; for airport expansion and against airport expansion. The circle on the right conceptualizes a reframed policy discourse in which actors on the basis of other perspectives can strategize to achieve congruent goals. This circle is also bigger, to emphasize that a broader range of issues and new actors should be included in this policy discourse. Finally, the arrow conceptualizes the reframing. Reframing refers to a process of shifting actors' thinking into a different structure of concepts, language and cognition (Jerneck and Olsson, 2011). It can trigger the redefinition of conflicts, dilemma's, or problems and reveal new resolutions. In this thesis, reframing is defined as a shift of the aggregate of the perspectives, that shape the policy discourse, to another set of perspectives that shape a new discourse. This new discourse will be constructed around sustainability as a boundary object. It is therefore required to identify actor perspectives on sustainable aviation to conceptualize the reframed discourse. The concepts of perspectives, reframing, and boundary objects will be further elaborated on in chapter 3.

In a successfully reframed policy discourse, new actor relations, different argumentations, and new strategies can be identified. To allow for reframing, it is important that actors think outside of current practices and positions and engage with different socio-technical configurations. This can be done by making actors engage with issues for aviation in a broader scope, engaging with new issues, and including new actors. Sustainability as a boundary object will be used for that purpose. The deadlocked policy discourse has been

described by identifying actors' perspectives that come forward (Kroesen et al., 2010, Van Eeten, 2001). To analyze the effects the reframing, perspectives should be able to be identified in the reframed discourse. This also allows to compare the reframed policy discourse with the deadlocked policy discourse.

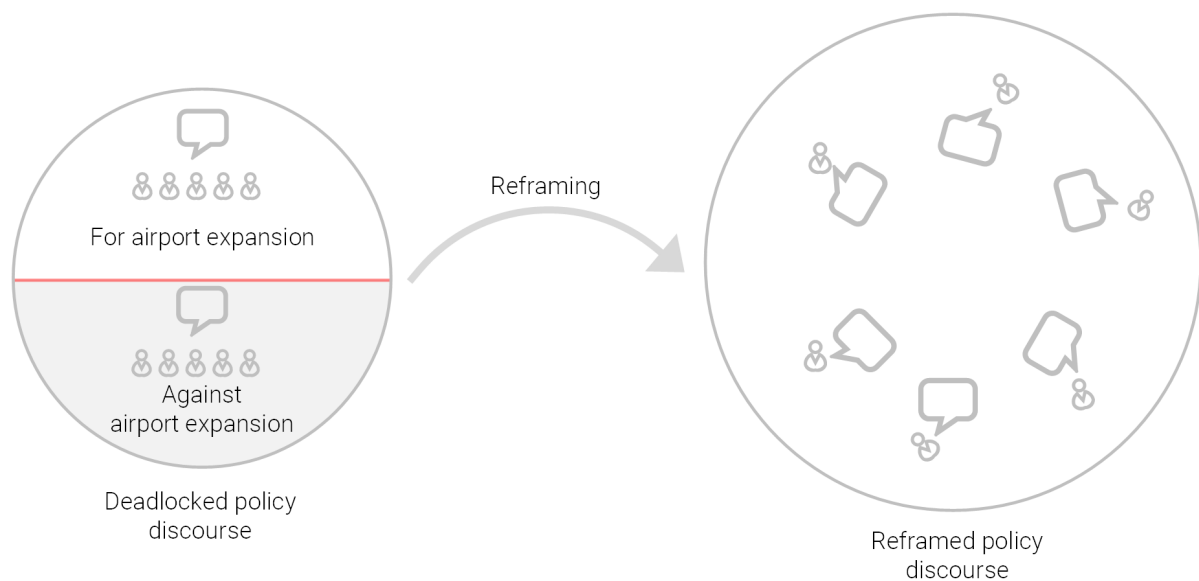


Figure 1.1: Reframing of deadlocked policy discourse

The following subquestions are answered throughout this thesis to answer the main research question.

1. What are the dominant perspectives in deadlocked aviation policy discourse in the Netherlands?
2. What perspectives on sustainable aviation in the Netherlands can be identified?
3. What congruent goals and possible new dichotomies can be identified among the perspectives on sustainable aviation?
4. What are the implications of reframing aviation policy discourse by means of sustainability as a boundary object?

1.4. Research overview

This paragraph explains the research flow and the purpose of the chapters of this thesis. A research flow diagram is constructed to provide an overview of the thesis, see figure 1.2.

Chapter 2 provides background to aviation policy-making in the Netherlands. The chapter goes into what institutions are in place, discusses formal actor relations, and the Dutch airport network. Rotterdam-The Hague Airport (RTHA), the Netherlands' third largest airport, is used as an example in this chapter to illustrate how practices have resulted in a policy deadlock. This airport will also be used to provide context to construct the perspectives on sustainable aviation when answering subquestion 2 in chapter 6. RTHA is selected as example to provide context, for a couple of reasons: (1) RTHA is the third largest airport in the Netherlands, after Amsterdam Airport Schiphol and Eindhoven Airport; (2) RTHA is a relatively smaller airport, without a hub function for connecting flights, making RTHA interlinked with its region, without hefty national interests, concretizing the analysis; (3) RTHA is currently fully utilizing its licensed environmental capacity. RTHA has ambitions to expand this capacity, but this expansion is subject to intense debate for environmental groups and residents from surrounding areas; (4) the symptoms of a problematic policy deadlock are easily identified at RTHA.

Chapter 3 provides a literature review to continue on the theoretical starting points that were introduced in this first introduction chapter. Collaborative planning, perspectives, framing, reframing, and sustainability

as a boundary object are the concepts that are elaborated on in chapter 3. This literature review develops a better understanding on what reframing of the policy discourse means and how it can improve collaborative planning.

Chapter 4 provides answer to the first subquestion. The current understanding of perspectives in aviation policy discourse is explored. To answer this research question, the literature about perspectives on aviation is consulted to understand how perspectives in aviation policy discourse have shaped the policy deadlock. This chapter provides a better conceptual understanding of aviation policy discourses.

Chapter 5 explains how Q-methodology is used to reframe the policy discourse by constructing perspectives on sustainable aviation. Part of the Q-methodological approach are interviews with actors in which actors construct these perspectives. What Q-methodology is, how the exercises are set-up, and how the collected data from these exercises is used, is explained in this chapter. Q-methodology follows a step-wise approach (see figure 1.2), this step-wise approach structures chapter 5.

Chapter 6 provides an answer to the second subquestion. Using the Q-methodological research design from chapter 5, perspectives on sustainable aviation are constructed. These perspectives are narratively explained. The identification of the perspectives on sustainable aviation is the first step to understand how the policy discourse can be reframed (see right circle in figure 1.1).

Chapter 7 explores the congruency and diversity of the perspectives on sustainable aviation and provides answer to the third subquestion. Based on the perspectives identified with Q-methodology, the similarities and differences among these perspectives are explored. Similarities among perspectives can be used to define congruent goals. Identifying the diversity among perspectives can be used to analyze if possible new dichotomies could rise. Statistical results, such as correlations among perspectives, from the Q-methodological approach will be used to identify these similarities and differences. The conclusion of this chapter is the second and last step to understand how the policy discourse is reframed.

Chapter 8 provides the conclusion of this thesis. This chapter first summarizes the answers to the first three subquestions. The fourth subquestion synthesizes the outcomes of the first three subquestions to discuss if the reframed policy discourse could be an improvement over the current policy discourse. This allows to come to an answer on the main research question. Next, recommendations for collaborative planning and aviation policy-making are developed.

Chapter 9 further discusses the implications of reframing. On one hand the methodological implications and on the other hand the implications for aviation policy-making in the Netherlands. Also the use of the methodology and the results are discussed. Finally, recommendations for further research are developed.

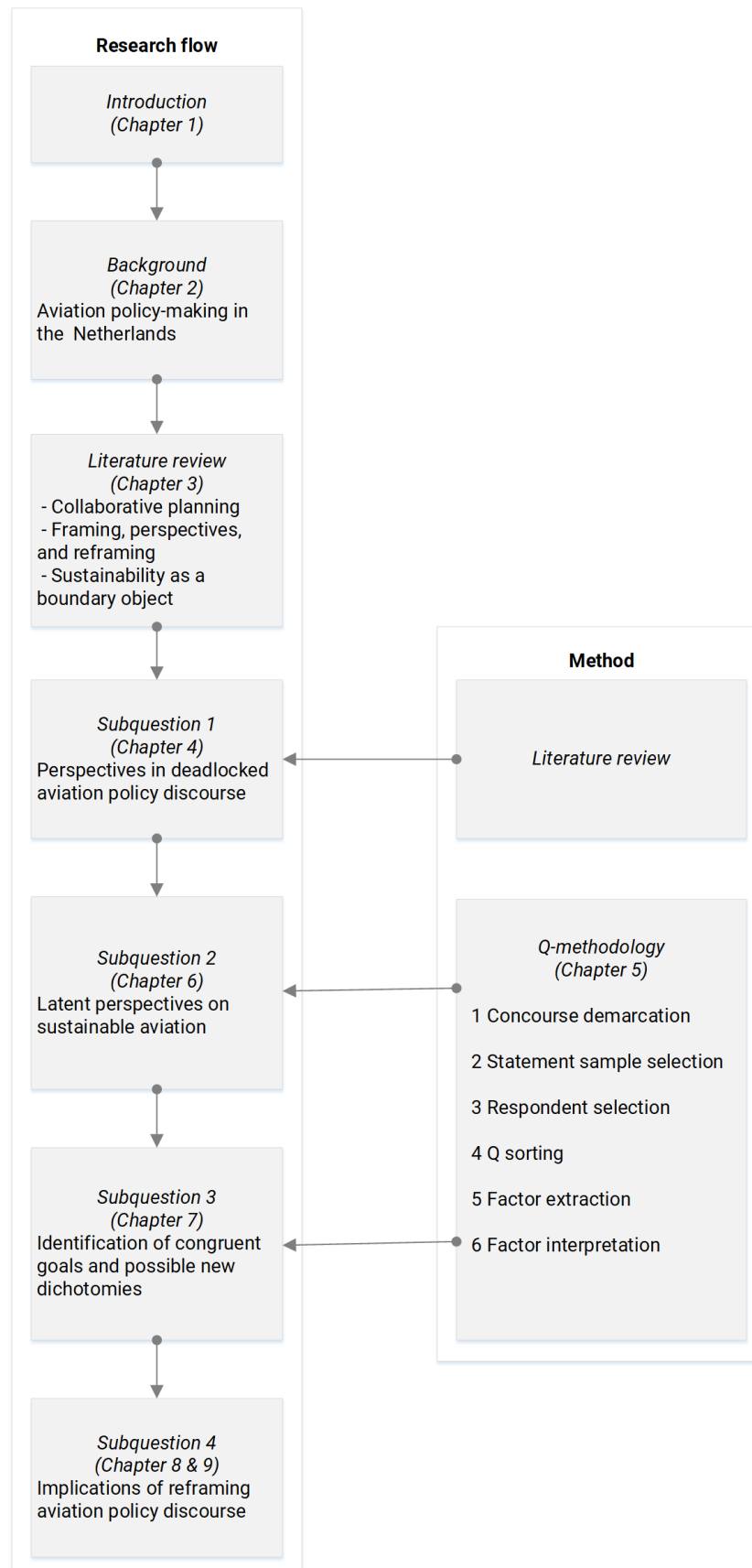


Figure 1.2: Research flow diagram

2

Aviation policy-making in the Netherlands

This chapter provides context on aviation policy-making in the Netherlands. The focus of this chapter is put on how policy discourse at airports in the Netherlands is shaped and how that effects national aviation policy-making. First a general introduction of the Dutch airport network is provided in 2.1. Next, an example of institutionalization of practices and positionings at Rotterdam-The Hague Airport is provided, starting with the policy-making process in 2.2, followed by the collaborative planning arrangement in 2.3.

2.1. Airports in the Netherlands

The Netherlands is currently home to five airports of national relevance, soon to be six when Lelystad Airport is opened for commercial traffic. In 2017, a total of 590,138 aircraft movements took place from these airports (CBS, 2018). Amsterdam Airport Schiphol is by far the largest airport. Schiphol has a hub function for connecting flights in a global hub-and-spoke airport network. Schiphol is mainly operated by the SkyTeam alliance, of which the Dutch national airliner, KLM Royal Dutch Airlines, is a member. Table 2.1 gives an overview of the number of aircraft movements from each airport. Figure 2.1 pictures the geographical location of the six airports and the urban areas they facilitate. Lelystad Airport is currently under constructing to be used as facilitator of slots for flights to touristic destinations that would otherwise be facilitated by Schiphol Airport. This would create space at Schiphol Airport for air traffic that is important for Schiphol's hub function.

The operation of airports is liberalized to a large degree. However, the national government is the supervising authority of the six airports of national relevance.

Table 2.1: Number of aircraft movement per airport in 2017 (CBS, 2018)

Airport	Aircraft movements (2017)
Amsterdam Airport Schiphol	508,917
Rotterdam-The Hague Airport	26,249
Eindhoven Airport	36,487
Maastricht Aachen Airport	9,053
Groningen Airport Eelde	9,432
Total	590,138

2.2. Institutionalization of practices and positionings: Rotterdam-The Hague Airport

In this paragraph, how practices and positionings are institutionalized is explained. Rotterdam-The Hague Airport (RTHA) is used for the provide an example. Airports of national relevance are part of aviation policy-making of the national government, but also have their own institutions in place. Figure 2.2 illustrates re-



Figure 2.1: Urban networks in relation to national airports (Ministerie van V&W & Ministerie van VROM, 2009)

gional institutions and 2.3 illustrates national and international institutions.

As of 2016, RTHA, currently the Netherlands' third largest airport, has ambition to grow (RTHA, 2016). Because the regional demand for air transport is expected to increase in the coming years, the airport investigates possibilities to further extent their operations. Specifically, RTHA aims to strengthen its portfolio of 'business flights' to contribute to the international competitiveness of the Rotterdam metropolitan area. However, airport development is an issue of intense debate for environmental groups and local residents (Howarth and Griggs, 2013). Airport expansion in particular, often induces this public resistance.

To accommodate the future ambition of RTHA, the Dutch ministry of Infrastructure and Water Management (IW) has to revise RTHA's operations permit (in Dutch: luchthavenbesluit) and enlarge the licensed environmental space. The revision of RTHA's operations permit is a process that requires different reports and studies on environmental effects, economic effects, and public support for development of the airport. Also, a social cost-benefit analysis (SCBA) which is commissioned by RTHA has been drafted (Ecorys, 2015). Subsequently, regional inhabitant commissioned a second opinion on this SCBA (Annema and Van Wee, 2015). In this second opinion, the possibility of different interpretations of the SCBA is highlighted. As a result, the SCBA becomes controversial and distrust among actors is growing. Eventually, a trade-off between the economic benefits and environmental losses is expected to be made by the minister of IW in the revised operations permit.

This policy-making process clearly indicates that policy discourse is structured around a 'for or against' dichotomy. Ascribable to controversies that result from this dichotomy, the policy-making process of RTHA is idle for the time being, not improving regional economics nor community health or climate effects.

Due to the controversy of airport expansion, the minister postponed the revision of the airport operations permit until national aviation projects, i.e. Aviation Note 2020-2050 (Luchtvaartnota 2020-2050) and the Airspace Review (Luchtruimherziening) are completed. Until then, only marginal expansion is allowed if there is public support for expansion.

2.3. Collaborative planning in practice: BRR and CRO

The administrative body of RTHA (BRR) is a collaborative planning arrangement consisting of the deputy of the province of South-Holland and the responsible aldermen of the municipalities nearby RTHA, i.e. Rotterdam, Lansingerland, and Schiedam. The BRR has an advisory role to aid in policy-making of the minister of IW. The BRR has commissioned to research the public support for a possible airport expansion. This adminis-

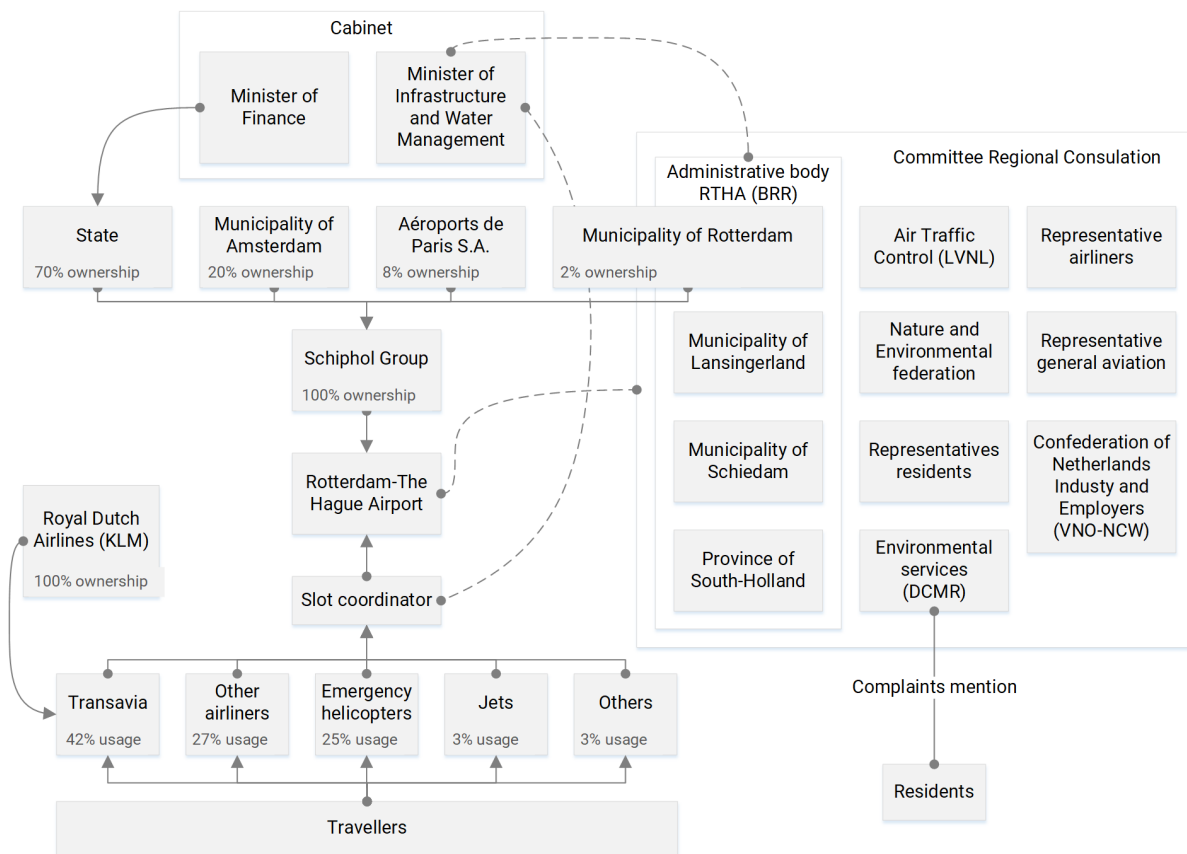


Figure 2.2: Formal relations, ownership and participation structures (based on (Schrijnen et al., 2017))

trative body consist of three municipalities in RTHA's direct surroundings and the province of South-Holland, see figure 2.2. The BRR concluded in its advisory letter to the ministry of IW that there is insufficient public support for expansion of the currently licensed environmental space.

In accordance with the 'arrangement for regional civil aviation aviation committees of national significance' of 2012 (IENM/BSK-2012/145416), all airports of national relevance have put a Committee Regional Consultation (in Dutch: Commissie Regionaal Overleg) in operation. The objective of the committee, the CRO, is to optimize the use of the airport within the licensed environmental space. On the one hand this implies stimulating the use of the airport for the economy of the region. On the other hand this means, to means to optimize flight schedules and patterns to improve the quality of the living environment. This CRO can optimize within the boundaries of the permit. Anything outside of the permit requires the permit to be revised, which is a task of the minister of IW. The aim is of this committee is to improve consultation between members of the committee, to do justice to represent their interests, and to inform the minister of Infrastructure and Water Management or the administrative body of an airport. The CRO consists of an independent chair and representatives for the province, municipality, airport operator, air traffic control, regional inhabitant, environmental organizations, and users of the airport. See figure 2.2 for the composition of RTHA's CRO. Members are appointed for four years, but can be reappointed for another four years.

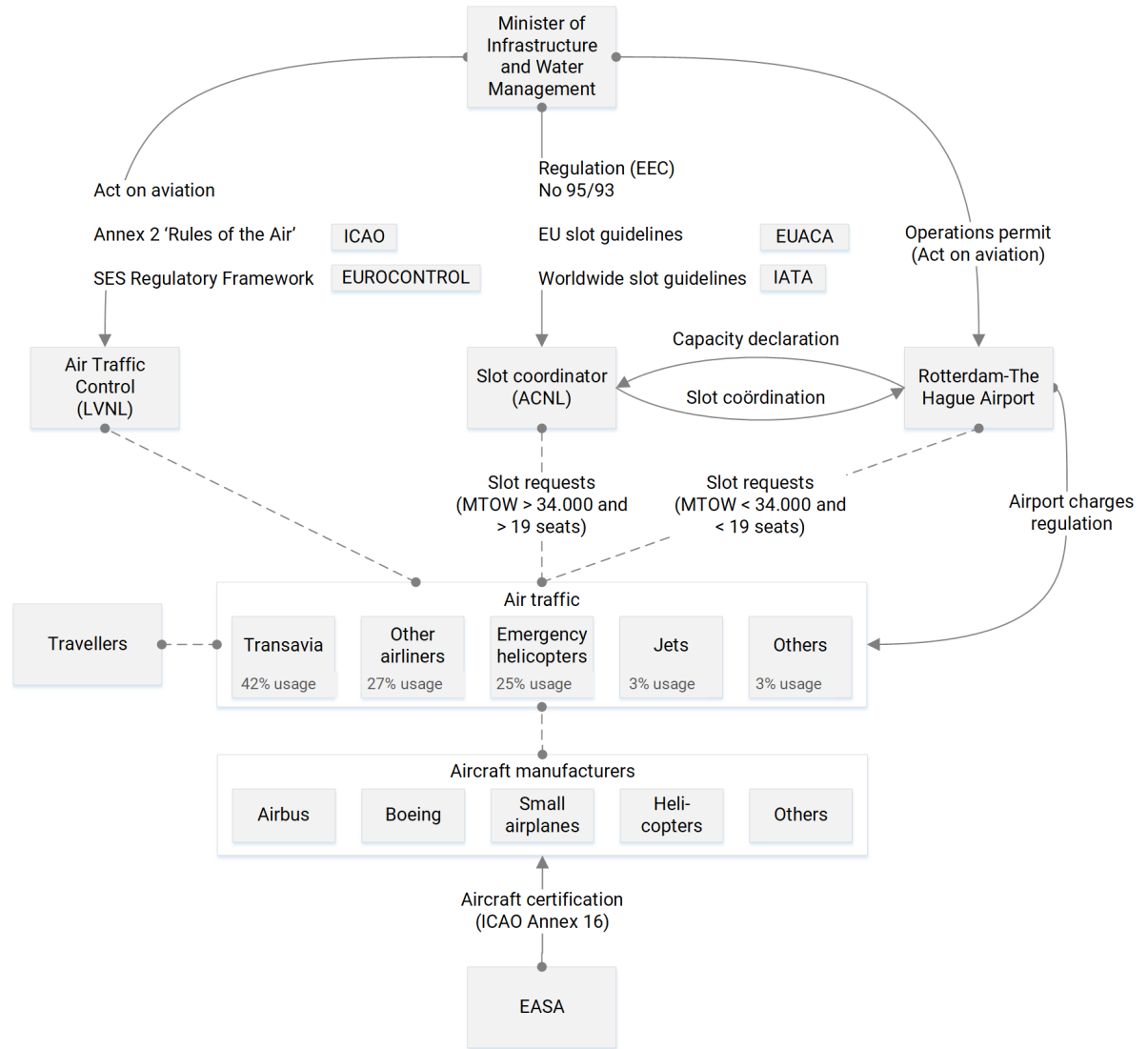


Figure 2.3: Formal governance structure Air Traffic Control, slot coordination and aircraft certification)

3

Literature review

In this chapter, the concepts that were introduced in the previous chapters are elaborated on. In 3.1 is explained that despite the challenges for successful collaborative planning, it is a viable means to overcome pressing challenges for the aviation industry. In 3.2 is elaborated on the concepts of framing, perspectives, and reframing. Finally, in 3.3 is explained how sustainability as a *boundary object* can be used for reframing of a policy discourse.

3.1. Collaborative planning

Collaborative planning among actors is regarded as a potential solution to overcome pressing issues in society (Starik and Rands, 1995). Collaborative planning brings together different actors from different levels (individuals, organizations, government) to develop shared visions and initiate joint action to overcome these pressing issues (e.g. Moore et al., 2014, Olsson et al., 2004, Vacik et al., 2014). Regardless of the benefits of collaborative planning, the ability to successfully organize collaborative planning has been questioned. In the first place, actors tend only to engage in collective planning if there are mutual benefits (Olson, 1965). Secondly, even when collaborative planning is likely to yield mutual benefits, self-interested actors won't act accordingly (Hardin, 1968). Successful collaborative planning is therefore conditional. But despite the problems of collaborative planning, the literature provides evidence that collaborative planning is a viable means to overcome pressing, or even wicked, problems (Van Buuren et al., 2012, van Buuren et al., 2006). Van Buuren et al. (2012), who did a case study on collaborative planning at Schiphol Airport, lists three preconditions for successful collaborative planning. In the first place, collaborative planning arrangements (such as the CRO and BRR) should be accepted by actors and other subsystems in aviation policy-making to have some degree of authority. Collaborative arrangements cannot succeed without sufficient authority to enforce implementation of policies. Secondly, it is important to understand the path dependency that exists in collaborative approaches. Path dependency is defined as the result of policy-making by actors that do not change their perspectives. Added to understanding the path dependency, strategies to change undesired path dependency should be developed. Thirdly, collaborative arrangements should aim to make issues more complex. By adding complexity, actors are able to bring new solutions and keep away from unproductive paths.

Collaborative planning should result in reflexive dialogue (Healey, 1997). This is based on the idea that reflexive dialogue is what eventually allows for effective communication, trust building, and reciprocity. Thus, the quality of the relations among actors is an important asset for collaborative planning (Healey, 2003, Wagenaar and Specht, 2010). Despite the challenges to organize collaborative planning, when organized effectively, it allows actors to improve relationships with actors, to gain external knowledge and ideas from other actors, to put together new improved policies, to better question there underlying assumptions, and to overcome controversy (Kickert, Walter, 1997, Koppenjan and Klijn, 2004, Van Buuren et al., 2012).

3.2. Framing, perspectives and reframing

Framing in social sciences refers to how individuals, groups, or even societies perceive, communicate, and organize reality. The first developments of the concept are formulated by Burke (1937) and Bateson (1955).

Framing builds on the idea that the world can be described and understood in different ways, by different frames. In the policy discourse of complex systems, different frames exist simultaneously and are never neutral. Through interactions in the policy discourse, frames can be reproduced by other actors (Hajer, 1995). The concept can be broadly categorized in two distinct ways. Frames can be used to conceptualize and explain one's *internal* processes of sense-making (e.g. Weick, 1995), these are referred to as *frames in thought*. The other use of frames are the *external*, strategic processes to act upon reality, for example to evoke meaning, mobilize support, and gaining legitimacy (e.g. Creed et al., 2002). These are referred to as *frames in communication*.

Although the concepts of a frame and a perspective are similar, the definition of a perspective in this thesis is different from that of a frame. When a perspective in this thesis is observed, the definition of a perspective by Cuppen (2010) is followed. Instead of distinguishing thought and communication, a perspective integrates both and as such, represents a way of sense-making and acting upon reality. Underlying value orientations, knowledge, experience, and interests shape one's perspective (Cuppen, 2010). Perspectives can change over time, and dependent on the situation one is in, people can take on different perspectives. For example in transport policy, individuals in their role as citizens assign substantially more value to safety than travel time when compared to their role as consumer (Mouter et al., 2017). In line with this definition of a perspective, the policy discourse can be defined more concretely as the aggregate of the actors' perspectives in collaborative planning. Although actors can take on multiple perspectives, the ones that come forward in collaborative planning arrangements define the policy discourse.

When further relating perspectives with collaborative planning, the aim of collaborative planning is to align the different perspectives and to allow for reflexive dialogue to find congruent solutions (e.g. De Roo and Porter, 2007, Dewulf et al., 2004, Putnam and Holmer, 1992). If the policy discourse, i.e. the aggregate of perspectives in collaborative planning, does not result in reflexive dialogue or hinders certain perspectives, reframing can be used to shift the policy discourse (Jerneck and Olsson, 2011, Schön and Rein, 1994). Reframing thus means that actors are triggered to take on a different, latent perspective for communication and collaboration. This could for example be a shift of collaboration among actors as consumers to a collaboration among actors as citizens.

Thus, reframing the policy discourse is not neutral (Coyne, 1985). The rhetoric around defining what the relevant issues for collaborative planning are, means that certain aspects are included, while others are excluded (see Lakoff and Ferguson, 2006). As a result, some of the aspects that are relevant for certain actors might not be included. Reframing is thus subject to bias and should be done carefully, but can be an effective strategy to reconfigure problematic discourse (Jerneck and Olsson, 2011).

3.3. Sustainability as a boundary object

Something that can allow an actor to communicate and collaborate in collaborative planning with a different perspective, is a *boundary object* (Bechky, 2003). The term boundary object was first introduced by Star and Griesemer (1989, p.393) and is defined as an object which can be used in different ways by different communities, yet is robust enough to maintain a common identity across the different communities. When boundary objects are used individually they are strongly structured, but when boundary objects are used collaboratively, the structures become weak. The definition of a boundary object is not limited to physical objects, as they may be abstract or concrete (Star and Griesemer, 1989, p.393). Wenger (1999) developed the concept further and describes boundary objects as entities that link different actors together, as they allow different actors to collaborate on a common task. Boundary objects are appealing to provide common ground for actors in a polarized discourse (Molle, 2008).

The boundary object that is used for reframing should fit with actor's underlying value orientations, knowledge, experience, and interest. It will then provide more leverage to overcome biases and conventional ways of thinking (see Jarratt and Mahaffie, 2009). A boundary object that can be successfully used by actors to engage together is *sustainability* (Brand and Jax, 2007). Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). "Consisting of three pillars, sus-

tainable development seeks to achieve, in a balanced manner, economic development, social development and environmental protection.” Because sustainable policy-making has to deal with the different ‘pillars’, it is subject to ambiguities, uncertainties, and contestations. Hence tough questions around what sustainability means, to whom, and in which context result (Raven et al., 2017). Sustainability then becomes an idiom that is perceived differently by different actors, but still has attraction as a unifying concept (Weichselgartner and Kelman, 2015). The three-pillar conception of sustainability (i.e. economic, social, and environmental development) has connection to the perspectives that the actors on both sides of the dichotomy already have. It fits with the economic and environmental values of actors, but also allows to broaden the policy discourse and provide common ground. Sustainability as a boundary object can allow actors to engage together in collaborative planning based on their perspective in which more complex, long-term issues for aviation policy-making come forward.

4

Perspectives in deadlocked aviation policy discourse

The objective of this chapter is to develop a better understanding on how actors' perspectives in policy discourse can shape deadlocked aviation policy discourse. 4.1 develops an understanding on perspectives identified in aviation policy discourse and 4.2 goes into how the Dutch aviation policy deadlock has come about. This chapter provides an answer to the first subquestion:

Subquestion 1: What are the dominant perspectives in deadlocked aviation policy discourse in the Netherlands?

4.1. Perspectives in aviation policy discourse

Multiple studies have identified different perspectives in the context of aviation. Each of these perspectives describe challenges for aviation in its own way. The most relevant literature describes studies about perspectives on noise around Schiphol Airport (Kroesen and Bröer, 2009), perspective on expansion of Schiphol Airport (Van Eeten, 2001), and perspectives on aviation in Australian airport network (Kivits and Charles, 2015). These studies have analyzed perspectives on aviation using Q-methodology, see table 4.1.

Van Eeten (2001) analyzed expansion of Amsterdam Airport Schiphol. In his study, he found five perspectives for actors' policy arguments that co-exist in the policy discourse of expansion of Schiphol Airport. Apart from an economic 'for' and an environmental 'against' perspective, three other perspectives that relate to social integration, ecological modernization and sustainable solutions were identified. The study analyzing the Australian airport network by Kivits and Charles (2015) found a similar set of perspectives that co-exist.

Kroesen and Bröer (2009) conducted research using the same methodology to analyze residents around Schiphol Airport's perspectives on noise caused by aviation. They also found an economic and an environmental perspective towards aviation, but also perspectives that related more to policy and politics. The researchers conclude that the experience of aircraft noise is intrinsically related to the perspectives, meaning that the levels of noise annoyance are not just caused by acoustical factors, but also by the perspectives of actors towards aviation. Actors that support economic 'for' arguments could experience less noise annoyance than people that support environmental 'against' arguments, even when acoustical noise levels are similar.

In these studies, there is also a difference between perspectives that refer to the 'function' of the airport on one side and the 'power struggle' on the other (Kivits and Charles, 2015). Perspectives that relate to the function of the airport emphasize economic contributions, benefits for travellers or the effect of airport activity on the environment. These actors approach discussion from a functional perspective, e.g. what methods can be used to reduce noise and emissions. Others can approach the same discussion from a 'power struggle' perspective, i.e. who makes decisions and who should make decisions (Van Tatenhove et al., 2010). The set of perspectives found by Kivits and Charles (2015) represent the difference between 'function' and 'power struggle' less than the Dutch studies do and also identifies perspectives relating to aviation alternatives and

aviation as having the ability to overcome sustainability issues.

Table 4.1: Perspectives on aviation, underlined perspectives reflect the dichotomy of economic and environmental perspectives (Kivits and Charles, 2015, Kroesen and Bröer, 2009, Van Eeten, 2001)

Van Eeten (2001): Airport planning policy Schiphol Airport					
Societal integration of a growing airport (A)	Expansion of civil aviation infrastructure as a necessity in the face of international economic competition (B1)	Expansion of civil aviation infrastructure as an unjustified use of public funds (B2)	Ecological modernization of the civil aviation sector (C)	Sustainable solutions to a growing demand for mobility (D)	
Kroesen and Bröer (2009): Airport noise annoyance Schiphol Airport					
Long live aviation!	Aviation: an ecological threat	Aviation and the environment: a solvable problem	Aircraft noise: not a problem	Aviation: a local problem	
Kivits and Charles (2015): Airport planning policy Australian airports					
Aviation - an important economic contributor	Aviation - a threat to environmental sustainability and health	Aviation - connecting Australians	Back to centralized planning	Aviation alternatives	Collaboration - the way forward

4.2. Understanding the Dutch policy deadlock

To better understand how the collaboration among actor with different perspectives has resulted in a policy deadlock, the PhD thesis of Huijs (2011) is consulted. In his study, he developed an approach that allows to uncover reproductive tendencies of aviation policy discourse and applied this to Amsterdam Airport Schiphol. This approach is based on theories from Michel Foucault that focus on power relationships as expressed through language and practices and how these uncovered over time.

The main characteristics of the Dutch policy-making context was defined as a democratic culture of consensualism, in which policy decisions are made in networks of mutually dependent actors. This process resulted in a new strategy for Schiphol in the 1980s of which the mainport-concept became a firmly embedded cornerstone. The issue of this strategy was that the core of this strategy was that traffic volumes could grow, while simultaneously improving the quality of the living environment. In the next twenty years, this dual objective became increasingly institutionalized which turned out to be infeasible every time. Because the mainport objective was hierarchical superior, the balance of the dual objective was distorted. Over the twenty years of institutionalization it became harder to produce variety from the infeasible dual objective. Although variety was constantly produced, institutionalization to support new ideas lacked. Instead of developing new, potentially better objectives than the dual objective, actors automatically chose sides (for or against), reinforcing the dichotomy. This became a self-reinforcing loop that makes the reproductive tendencies of the policy discourse so strong. As such, variety in the policy discourse was marginalized. In 2007 this changed with the introduction of the Alders table. The Alders table is a consultation table about the development of Schiphol in its surrounding environment. In the following years, variety has been produced and some of that also institutionalized. However, Huijs concludes that the reproductive tendency of the policy discourse remains stable nonetheless, because the ways of talking and acting that are deemed meaningful and legitimate have changed very little.

With a better understanding of the policy deadlock, Huijs emphasizes that it is necessary to allow for

the creation of room to develop new alternatives that draw on different assumptions, scenarios, norms, and methodologies as this could give rise to new problem definitions, ideas, alternative, roles, and relationships.

4.3. Conclusion

This chapter provided an answer to the first subquestion:

Subquestion 1: What are the dominant perspectives in deadlocked aviation policy discourse in the Netherlands?

The most dominant perspectives in deadlocked aviation policy discourse are the economic (for) and the environmental (against) perspectives. These perspectives in Dutch policy discourse refer mostly to the 'function' of an airport. In a policy discourse with such a dichotomy, actors generally do not believe that they can define congruent goals with actors with an opposing perspective. As a result, actors tend to only reproduce and favour the economic or environmental perspective, polarizing the discourse in two dominant groups. Although some actors have a variety of different perspectives, that are more nuanced than the economic and environmental perspectives, they do not seem to find their way into the policy discourse. See figure 4.1 for a conceptualization, using the perspectives from Van Eeten (2001).

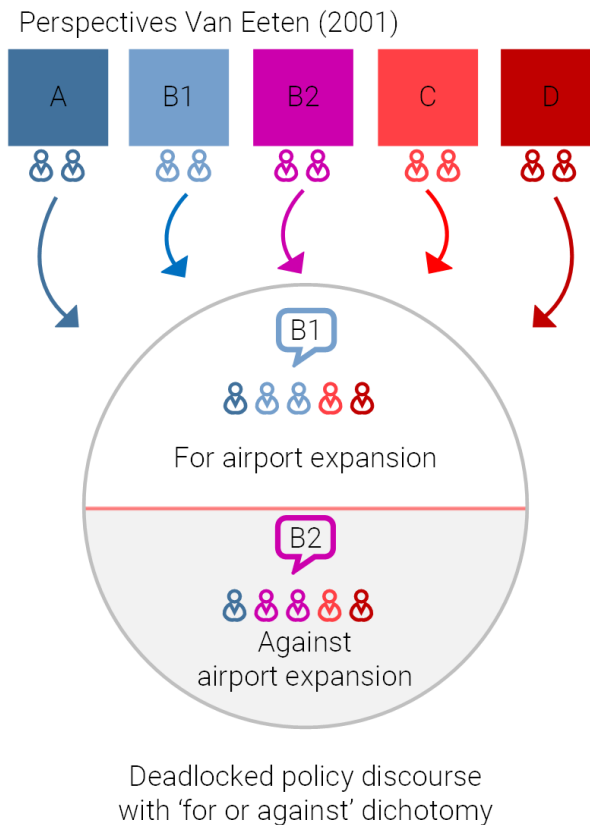


Figure 4.1: Perspectives in deadlocked policy discourse

5

Research methodology

This chapter describes how Q-methodology is used for the identification of the perspectives on sustainable aviation. First, in 5.1 is explained what Q-methodology is. Next, in 5.2 is explained how Q-methodology is used for reframing of the policy discourse using sustainability as a boundary object. Finally, 5.3 explains the step-wise approach of Q-methodology. For each step is explained what the intent of the step is and how it is used for the research objective.

5.1. What is Q-methodology

Q-methodology is at the same time both a qualitative and quantitative methodology that aims to analyze people's subjectivity. It was developed by William Stephenson (1953) and has since been applied in a vast range of disciplines, among which political science (Brown, 1980) and environmental science (Barry and Proops, 1999). Q-methodology has been used to identify hidden views, to understand opinions in depth, discover points of consensus (Zabala et al., 2018), or to construct nuanced perspectives about the future (Ligtvoet et al., 2016).

Part of the Q-methodology is the factor analysis, which is a statistical method used to describe the variability of a dataset with a lower number of unobserved variables, called factors. Correlations among all variables in this dataset are used to identify groups of similar variables and describe this group with one or more factors. An example: the correlations among twenty variables in a dataset that describe the length of twenty people are calculated. Based on the correlations of all the variables with all other variables, the twenty variables can be grouped based on similar values. Each of these groups could be described by a factor, for example two groups; a tall group and a short group. The researcher could also choose to describe the dataset with three factors; a tall group, a regular size group, and a short group. Both are possible, thus the number of factors that is used to describe the variability of the dataset is therefore a choice of the researcher.

Q-methodology however uses a different kind of data than traditional factor analysis. Instead of passive measurements, respondents in Q-methodology are presented with a heterogeneous set of data that they must actively rank (Watts and Stenner, 2012), i.e. a set of statements related to a certain topic, for this thesis sustainable aviation. Thus, Q-methodology is carried out from a subjective point of view. In order to quantify the subjectivity, respondents rank order the statements in a grid (see figure 5.1) ranging from most disagree (-4) to most agree (+4). The grid that is used could be any shape or size, as long as all respondents use the same grid. This grid is fixed, to force respondents to prioritize within the statements and encourage them to think about the relationship among the statements more systematically. The grid in figure 5.1 is a quasi-normal grid distribution, to represent the probability of placing a statement at a certain place in the grid. This quasi-normal grid distribution could be wider and flatter (e.g. -6 to +6) if it's expected that the subjectivity of different actors is more apparent or could be narrower (e.g. -2 to +2) if the diversity of the subjectivity of actors is expected to be more nuanced.

Each sorting of the statements by a respondent, i.e. a Q-sort, is a reflection of that respondent's perspective on the research topic. All the Q-sort that are collected are analyzed by performing the factor analysis.

-4	-3	-2	-1	0	1	2	3	4

Figure 5.1: Quasi-normal fixed grid distribution

Extraction of the factors in Q-methodology is a process in which the researcher iteratively goes back and forth between different steps in the analysis, and also checks the quantitative data with qualitative data about the respondents to find coherent and meaningful set of factors (Watts and Stenner, 2012). As a result, the set of factors that the researcher settles upon is not just affected by the statistics, but mainly by the goal of the research (Watts and Stenner, 2012). A factor can be interpreted as a perspective that represents a group of respondents that sorted the statements similarly, i.e. respondents with similar subjectivity. As such, the perspectives that are most apparent among the respondents can be identified.

5.2. How can Q-methodology be used for the research objective

Q-methodology can be used to identify perspectives on a certain topic. In chapter 4 was elaborated on how the methodology was used to identify perspectives on aviation in different settings. Q-methodology allows a researcher to define what topic the respondents engage with, but at the same time allows the respondents to express their perspective on the topic. Dependent on the situation an actor is in, actors can take on multiple perspectives. For this application of Q-methodology, the topic of the research is 'sustainable aviation'. When the topic of the research changes, the underlying values of actors do not change, but actors might take on a different perspective. For reframing to be effective, it is also important that the policy discourse fits with actors' underlying values. In this thesis the interest is in capturing the different perspectives of actors on the more abstract and complex, long-term issues of sustainable aviation. These new perspectives come from actors themselves, but are aimed to be different than the perspectives in the deadlocked aviation discourse. By means of a careful selection of the respondents and statements, the Q-methodological approach can be structured around sustainability without neglecting the underlying values of actors. Because the different respondents all have a different perspective on sustainable aviation, they sort the statements differently. This makes that 'sustainable aviation' is multi-interpretable and becomes a boundary object. By identifying the different perspectives of actors, it can be analyzed if the reframed policy discourse, i.e. the aggregate of the perspectives on sustainable aviation, averts from a policy deadlock.

To reframe the policy discourse to one constructed around sustainability, respondents should be able to think about issues outside of existing processes and institutional arrangements when sorting the statements. Exploring future scenario's can help actors with that. Such scenarios are useful when some expected future dominates the policy discourse and helps actors develop strategies that deal with more complex and ambiguous issues (Ligtvoet et al., 2016). This is helpful to explore the complexity and ambiguity of sustainability. Therefore, respondent will be asked to construct their perspective on development of sustainable aviation in the next fifty years. This is far enough in the future for respondents to think outside of existing processes and institutional arrangements, but not too far that respondents have to think too abstractly.

This application of Q-methodology becomes quite demanding for the respondents. To concretize the sorting exercise for respondent, so that respondents are not required to think about some abstract future for aviation in the Netherlands, an example airport will be used to provide context. It allows respondents to engage more practically with improvements for aviation in the context of an airport that they are familiar with.

This is also in line with how collaborative planning arrangements are usually organized in the Netherlands. As elaborated in 1.4, the airport used to provide context is Rotterdam-The Hague Airport (RTHA).

5.3. Q-methodology for perspectives on sustainable aviation

Q-methodology comprises several steps, see figure 5.2. How each step in the process is proceeded is explained in this paragraph.

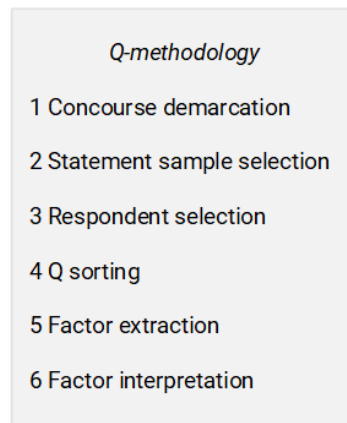


Figure 5.2: Step-wise approach of Q-methodology

5.3.1. Concourse demarcation

The first step in the process of a Q-methodological study is to define the concourse. This concourse is a reflection on the entire range of opinions, ideas and assumptions that are relevant for the issue that is studied. The main aim of demarcating the concourse is that it provides good coverage in relation with the research questions (Watts and Stenner, 2012). Demarcating the concourse means defining the boundaries of what relevant 'sustainable aviation' issues are. To define the concourse, sources to gather the statements from are identified. The sources that are included were based on three criteria. In the first place, transformation to a more sustainable system in which a bigger variety of actor perspectives is included, denotes not only technical change, but also societal change (Raven et al., 2017). Hence, both social and technical issues are included in the demarcation of the concourse. Secondly, the concourse should engage with balancing the different 'pillars' of sustainability, not just optimizing one of the pillars. Thirdly, the sources should engage with the more complex, long-term issues for sustainable aviation in the next fifty years. This encourages respondents to construct perspectives about the future, instead of describing the current deadlocked situation.

Various sources were identified that align with the criteria, including blog posts, newspapers, committee meetings, reports, essays, and television broadcasts (see appendix A for the complete list). Some of which discuss the technical challenges, others discuss the challenges of arranging governance. Besides, reports from international governance are identified (e.g. ICAO and IATA), but also national and regional governance (e.g. committee meeting). Furthermore, the sources are public or private, are abstract or concrete, are corporate viewpoints from large organizations or blog posts from individuals, and are composed by entities that have engaged with aviation for decades or entities that express their viewpoint for the first time.

From these sources, statements are collected. The aim is to gather a complete set of statements to get a grasp on the entirely demarcated concourse. Thoughts, expectations and ideas about sustainable aviation from the various sources are gathered. The main criterium for the identification of the statements to be included in the sample is the following: *A statement should introduce an expectation, idea or other thought about the future of sustainable aviation and the role of Rotterdam-The Hague Airport in that future.* Diversity in statements is preferred over a strict demarcation of statements. Committee meetings about aviation, such as those in the Dutch parliament, in which many different actors were represented, are especially useful

to collect statements from. Also, the essay collection ‘De adaptieve luchthaven’ (Van Faassen and De Jong, 2016) in which among others scientists, opinion makers, and architects expressed their vision on the future of aviation, was very useful. From these sources, short snippets of text and speech that meet the criteria are noted. These snippets are one or two sentences long and are initially cited literally. A sample of about 220 statements was collected from the sources.

5.3.2. Statement sample selection

The next step is to reduce the 220 statements to a manageable number, while still reflecting as much of the diversity of the larger sample as possible. Reducing the sample is inevitably a trade-off between the ease of sorting for respondents and completeness of the Q-sample. A sample of about forty to eighty items is usually adequate (Curt, 1994, Stainton Rogers, 1995, Watts and Stenner, 2012). Higher than eighty statements makes the sorting process too demanding, lower than forty statements tends to be too restricting. Because the sorting exercise is already quite demanding for respondents, the aim in this thesis is to construct a sample at the lower spectrum of the forty to eighty statements. The sample of statements collected should also not be biased to a certain viewpoint. As it should not make a respondent feel limited, restricted or frustrated when sorting the statements. However, for this application of Q-methodology it is important to trigger the redefinition of conflicts, dilemma’s, or problems and reveal new resolutions. As such, it does require respondents to think outside of current practices and may result in actors to feel more limited, when they are very engaged with day-to-day policy-making.

The initial 220 statements are first categorized in 14 groups that emerged when similar statements were grouped:

- Alternatives
- Business
- Climate
- Creativity
- Culture
- Digital revolution
- Economy
- Energy
- Function
- Goals
- Governance
- Innovation
- Intensity
- Psychology

Within these groups, similar statements were merged, redundant statements removed, and statements are rephrased until a manageable, balanced set of statements was achieved. Not all groups are equally represented in the final Q-sample. For example more statements from the *governance* category are represented in the sample than from *energy*. From the *energy* category only a statement about airports as hubs for circularity (36, see Appendix B) is added, while from *governance* several statements about e.g. associating with region (22), policy processes (27), distribution of benefits (30), and power (33) are included. A final sample of 43 statements was used for this thesis. The sorting of these 43 statements was tested with a couple respondents, both experiences and inexperienced in aviation. The main aim of these tests was to test if the phrasing of the statements was clear and concise, to avoid statements to be interpreted differently by different respondents. The phrasing of some statements was changed after the tests. The respondents that tested the sorting of the statements did not participate in the definite sorting exercise. The statements were translated in Dutch and English to be used in the interviews, see appendix B and C. Because of linguistic differences, the Dutch statements were used as much as possible for the interviews and interpretation thereof to reduce loss of subtle meaning of the statements.

5.3.3. Respondent selection

Selection of the actors that are approached for the sorting exercise is the next methodological step. The aim is to discover relevant viewpoints, which means that it is important to find respondents whose viewpoints matter in the context of the research. Since Q-methodology uses a reversed data matrix, the Q-sorts of the respondents are the variables. Hence, the respondent selection as such becomes a selection of the variables.

Therefore, a good selection of respondents is more theoretical than accidental (Brown, 1980, p.192). Also, because of the reversed data matrix, the required number of respondents is smaller than in conventional survey methods (McKeown and Thomas, 1988).

Because the scope of this research is collaborative planning in the Netherlands, and Rotterdam-The Hague Airport is used to provide context, the analysis of aviation policy-making in the Netherlands (chapter 2) is the starting point for selection of respondents. Actors figured in figure 2.2 were approached to be involved in the research. Furthermore, researchers and other actors that aren't necessarily part of the current collaborative planning arrangements, but have connections with the airport and/or are expected to have different viewpoints on sustainable aviation were approached to perform the sorting exercise. If a particular actor was expected to have different viewpoints on the matter, it was reason to include that actor as respondent in the research. Instead of demographic representativity, the research should be representative for diversity in viewpoints. Snowballing was used to include a number of respondents from key actor groups.

5.3.4. Q-sorting

Q-sorting is the methodological step in which the data is collected. The sorting exercise can be performed in person or digitally. Both have their pros and cons. A digital Q-sorting exercise is more convenient, but in person collection of data allows to gather qualitative data that can't easily be gather digitally and allows to better guide the respondent through the sorting exercise.

In this thesis, the sorting exercise was performed in person and in an individual setting. The interviews usually lasted about one to two hours. In the interviews, the respondents were asked to sort the statements from the Q-sample by answering the following question: *when thinking about Rotterdam-The Hague Airport and the future of sustainable aviation in the Netherlands in the next 50 years, on a scale from -4 (least agree) to 4 (most agree), what is your opinion about the following statements?* The quasi-normal grid distribution from figure 5.1 was used to sort the 43 statements. The statements were printed on small cards and the grid was printed on a large paper sheet so that the respondents can physically sort the statements. Respondents put the cards on the sheet in accordance with their viewpoints and can easily move around the different cards. The respondents were asked to first sort the statements in three stacks (disagree, neutral, agree). Next to sort the stack of statements they agreed with onto the grid. Followed by stack of the statements they disagreed with. Finally, respondents sorted the neutral statements in between. This sorting process eases the sorting exercise.

Additional to the sorting exercise, respondents were asked to reflect on the Q-sort by replying to several additional questions:

1. Why did you most agree with the statements at 4? And why did you least agree with the statements at -4?
2. Are there any other statement you want to follow-up on?
3. Did you find it easy or hard to sort the statements? Do you feel you would sort the statements the same next week?
4. Do you think that there are statements missing from the sample?
5. Where in the grid would you say is the boundary between statements you agree with and statements you disagree with?
6. What would be a first initial step to eventually achieve your perspective on sustainable aviation?

Response to the additional questions, comments of respondents while sorting the statements, and other remarks were noted to aid the interpretation of the collected data.

5.3.5. Factor extraction

The next methodological step is the extraction of factors from the quantitative data. This step is clearly statistical. The Ken-Q web application for Q-methodology can execute the necessary statistical calculations for the extraction of the factors. As explained in 5.1, a factor describes a common way of sorting the statements by a particular subset of respondents that share a perspective on sustainable aviation. To extract the factors, a matrix of the inter-correlations of all Q-sorts is constructed first. Next, the goal of the factor extraction process is to account for as much of the variance in this matrix as possible, by identifying 'any sizeable portion or dimensions of *shared* meaning that are present" (Watts and Stenner, 2012). These sizeable portions are the factors. The most common technique for the extraction of factors is the centroid factor analysis, because of its relative simplicity, yet statistical accuracy (Brown, 1980). Centroid factor analysis is an iterative process. The factor that is extracted first will account for the largest amount of variance in the data. The next extracted factor describes as much variance as possible that is not yet explained by a factor, and so on. As such, the extraction of successive factors account for an increasingly lower amount of variance.

When the desired number of factors are extracted, a matrix with the correlations between individual Q-sorts and the factors is constructed to identify Q-sorts with a significant factor loading with a factor. The factor loadings that are deemed significant is based on Humprey's rule for significant factor loadings:

$$\text{significant factor loading} > \frac{2.58}{\sqrt{\text{number of items in Q sample}}}$$

The significant factor loadings are useful to identify what group of respondents are described most explicitly by a factor. This allows to align the qualitative data gathered in the interviews with the corresponding factors.

The next step is to rotate the factors, see figure 5.3. Unrotated factors maximize explained variance accounted for by the factors that are extracted first, followed by the subsequent factors. This forces the factors to maximize orthogonality. As a result, the factor that is extracted first has more Q-sorts that substantially load on the factor, followed by the factors that are extracted subsequently. Therefore, the factors are rotated by seeking Q-sorts that load strongly with one factor and weakly with all other factors, thus making the factors more easily understandable. An objective rotation technique that does not change the orthogonal basis, is varimax. Varimax maximizes the sum of the variance of the squared factor loadings on all Q-sorts. In other words, this means that for most Q-sorts the variance of the factor loadings becomes larger. As a result, the Q-sorts tend to have either a high or low factor loading with the different factors.

5.3.6. Factor interpretation

The final methodological step is to interpret the extracted factors as perspectives on sustainable aviation. Interpretation of the factors means that the quantitative and qualitative data are aligned to give meaning to the data. Factors can be interpreted as a perspective in different ways. Although narratives are most common for the interpretation, pictures could for example also be used. This methodological step overlaps with the previous step, as the researcher goes back to the factor extraction to check what number of extracted factors aligns with the qualitative data best, to try and find a coherent and meaningful set of perspectives.

In this thesis, the extracted factors are narratively interpreted as perspectives. There are different strategies for the interpretation. However, for a consistent and objective interpretation of the factors, the strategy of Watts and Stenner (2012) is followed. They provide a method for the interpretation, which includes composite Q-sorts, cribs sheets, and transcript of the interviews. A composite Q-sort is a Q-sort that reflects how a respondent with a factor loading of 1.00 would sort the statements. Composite Q-sorts are created for all rotated factors. Based on the composite Q-sorts, crib sheets can be constructed. Crib sheets are sheets that summarize the distinguishing statements of a composite Q-sort in a table. A crib sheets highlights 1) what statements are ranked highest at +4; 2) what statements are ranked lowest at -4; 3) what statements are ranked higher or equally high as the statement in the composite Q-sorts of all other factors; 4) what statements are ranked lower or equally low as the statement in the composite Q-sorts of all other factors. The cribs sheets provide a clear overview of what makes a factor distinguish from other factors. For the interpretation, the

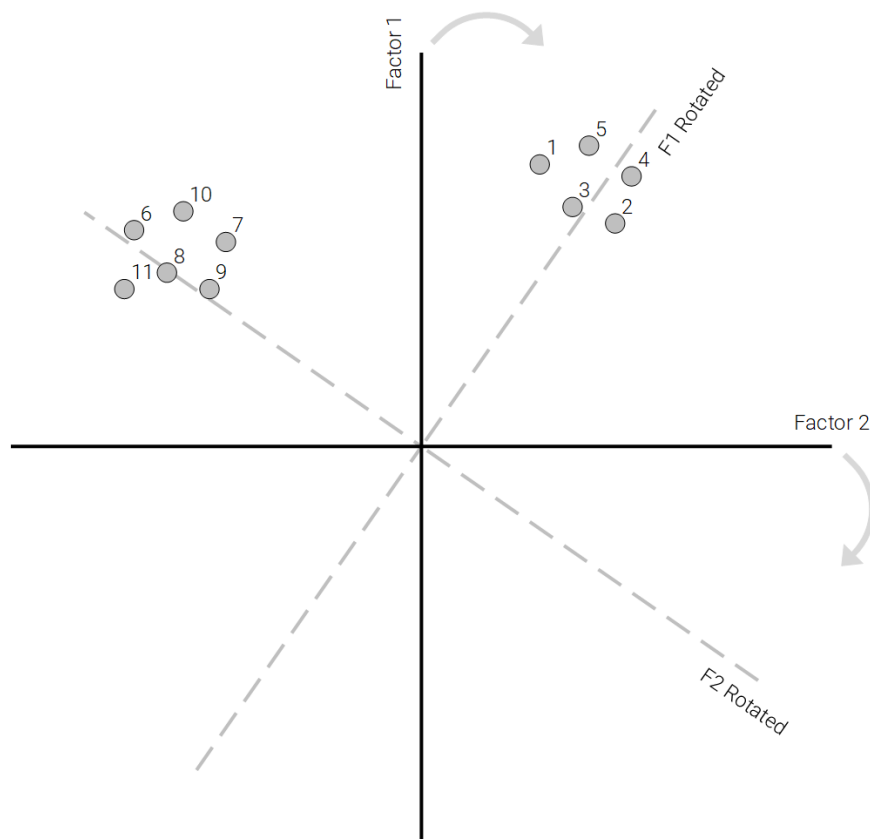


Figure 5.3: Example of an orthogonal factor rotation in which the dots represent Q-sorts

statements at +4 and -4 are most important. The statements that are ranked higher or lower compared to other statements also aid the interpretation, but aren't necessarily defining for that factor. The interviews are transcribed to find argumentations of why the statements are sorted as they are and to identify quotes that aid the interpretation. The transcriptions of interviews with respondents that have a significant factor loading with one factor are used for the interpretation of that factor. Quotes that are picked up in the interviews that align with the perspective can be phrased throughout the narratives. The narratives are also provided with a title to capture the essence of a perspective and give them a ready identity.

Following Ligtoet et al. (2016), the writing of the narrative of the perspective needs to be precise (to reflect the intention of the statements in combination with the comments), distinct, evocative (to be recognizable as different from other perspectives), and concise (not adding more information than is provided by the respondents).

6

Results: perspectives on sustainable aviation

This chapter provides answer to the second subquestion.

Subquestion 2: What perspectives on sustainable aviation in the Netherlands can be identified?

The step-wise methodological approach from chapter 5 is followed to construct narratives of the perspectives on sustainable aviation. 27 respondents from the following actor groups have performed the sorting exercise: airlines, airports, environmental interest groups, residential interest groups, research institutes, universities, national government, and consultancy firms. Respondents from the different actor groups responded on personal title and preferred to remain anonymous. The interviews with the respondents were transcribed to aid the interpretation. Since the respondents preferred to remain anonymous, the appendices does not include a list of the respondents nor transcripts of the interviews.

After the collection of the data, factors can be extracted. In Q-methodology, extracting seven initial factors is generally suitable (Brown, 1980, p.44). Therefore, seven initial factors are extracted, rotated, and checked with the qualitative data if they were meaningful. The seven factors seem to describe the data quite well and could be explained with the qualitative data. Extracting other amounts of factors was also tested. Extracting eight factors resulted in the identification of an additional factor, but based on the qualitative data, this factor seemed to resemble common 'noise' rather than a common perspective. Extracting six factors resulted in dropping a relevant factor for the analysis. Eventually, the next step of the analysis was entered with seven factors that were identified using the centroid analysis method. See figure 6.1 for the comparison of the factor's eigenvalues of extracting six, seven, or eight factors. The eigenvalue is an indication for potential explanatory power of an extracted factor.

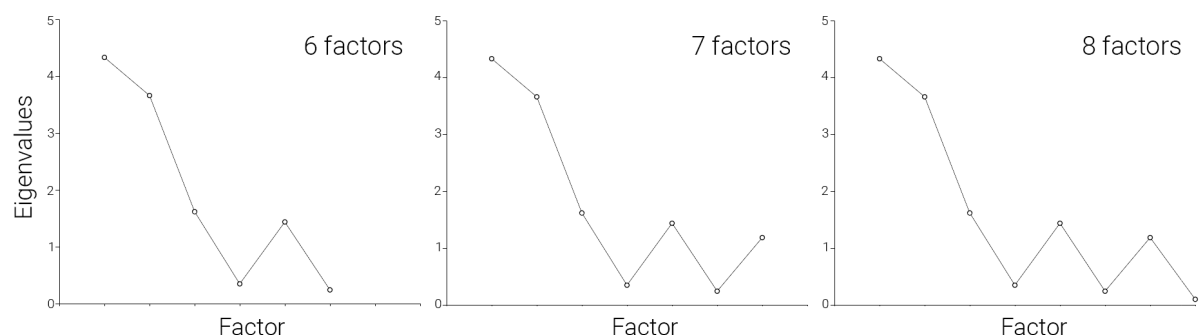


Figure 6.1: Comparison of factor eigenvalues

Although the eigenvalues of the factors give an indication of the explanatory power of a factor, they are less meaningful in Q-methodology, because the factors are rotated and interpreted on the basis of not only the

statistics (see Brown, 1980, p.233). Identification of the relevant factors is done on the basis of Humprey's rule for significant factor loadings; a factor should have at least two significant factor loadings with respondents to be sufficiently interpreted. Because two of the factors (the two with the lowest eigenvalue in figure 6.1) were only significant for less than two respondents, they were dropped. This resulted in five remaining factors to interpret. The extraction process was retried by extracting five factors, to check if they would be more concise. However, this would result in dropping a factor because of a lack of significantly loading Q-sorts. Since this factor did seem to align with the qualitative data, the five factors that resulted from extracting seven initial factors are used for the interpretation of the data. The relevant extracted factors were numbered 1 to 5. From these five extracted factors, composite Q-sorts and crib sheets are constructed. See appendix D,E,F,G, and H for the composite Q-sorts and the crib sheets of the factors. Also, the factor loadings of the rotated factors are calculated to identify what respondents significantly load on a factor. See table 6.1 for the factor loadings of the respondents per factor. Some respondents have significant factor loading with more than one factor or have negative factor loading with a factor. In the interpretation of the factors, the focus was to interpret the factors as such that it aligns with the respondents that only have a significant factor loading with that factor.

Table 6.1: Factor loadings rotated factors

Respondent (Q-sort)	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1	0,1682	0,1165	0,1986	0,0560	0,5226
2	0,5497	0,1226	0,2428	-0,2066	0,2567
3	0,2431	0,3307	0,4007	0,2956	-0,1322
4	0,1933	-0,0281	-0,0772	0,2238	0,4659
5	0,5796	0,1391	-0,2688	0,1781	0,1596
6	-0,3163	0,7597	0,3137	-0,1140	0,0100
7	-0,0407	0,5582	0,5765	-0,1218	-0,153
8	0,0543	0,4618	0,0589	0,0713	0,2910
9	0,2513	0,1722	0,1556	0,1536	0,639
10	0,0040	-0,0428	0,6458	0,1858	0,1702
11	0,1872	0,5423	0,4670	0,1815	-0,0751
12	0,2315	0,1506	0,4372	-0,0285	0,2187
13	-0,0726	0,0025	0,0314	0,7998	0,1602
14	0,1307	-0,0617	0,1180	0,5460	0,0720
15	0,0911	-0,4662	0,1616	0,3308	0,1867
16	0,6171	-0,0075	-0,0258	0,0310	0,1295
17	-0,0562	-0,0163	0,4041	0,2542	0,1024
18	-0,2222	0,5972	0,1062	-0,2277	0,2223
19	0,1950	-0,0184	0,2967	0,1237	-0,2551
20	0,5369	-0,1083	0,1756	0,1051	-0,0292
21	0,4599	-0,2926	0,3698	0,0431	0,2360
22	0,0601	0,4790	-0,0009	0,1069	0,1494
23	-0,1201	0,1967	0,4105	-0,0989	0,0124
24	0,4163	-0,4254	0,1811	0,3719	0,0894
25	0,8027	-0,0659	0,0743	0,0561	0,1207
26	0,5105	0,2033	0,0735	0,4685	0,2191
27	0,6783	-0,1102	-0,1299	-0,0203	0,0962
% Explained variance	13	10	9	7	6
Number of respondents with significant factor loading	9	6	7	3	3

The next step is to interpret the factors to construct narratives of the perspectives. In the following para-

graphs, the five perspectives are narratively explained. The narratives are written based on the composite Q-sorts, crib sheets, and interviews to align with the viewpoints of the respondents that significantly load with the factor. The position (Y) of the sorted statement (X) in the composite Q-sort of the concerning factor is noted as (X:Y) in the narratives of the perspectives. For example (15:-3) means that statement number 15 is placed at -3 in the composite Q-sort. This formulation is used in the narratives of the perspectives to support the interpretation.

Each paragraph of this chapter describes a narrative of a perspective. The final paragraph concludes this chapter by providing an answer to the second research question.

6.1. Perspective 1: Accelerate innovation with economic instruments

The current generation of aircraft is much more fuel efficient than the older generation and with new generations of aircraft that are in the pipeline, this trend will continue. Aviation is an innovative industry and is eminently capable to implement these innovations (15:-3), especially if you put some pressure on the sector (9:4).

“On the long term, technological developments will enable growth of air travel without growing environmental effects.”

A first glimpse of future aircraft technology is already visible with electric aircraft and new fuel technology. However, demand for air travel is increasing at a fast pace, faster than innovation can currently compensate for. Policies to mitigate environmental effects should be implemented, but carefully so, since connectivity is of increasing importance for economic development (39:3). Short term policies should be limitedly focused on restricting development of aviation.

“CO₂ compensation is an essential tool for the aviation industry to be able to contribute to climate goals on short term.”

The long-term vision for aviation policy-making should be to support technological developments to eventually enable environmentally friendly air travel. This includes targeted investments and market-based measures, such as CO₂ compensation (31:3), or a ticket tax (16:3). These market-based measures (MBMs) should be implemented in a smart way, not just a flat ticket tax to fill the public treasury or to decrease demand for air travel, because MBMs can have a devastating effect on the economy if they're not implemented in a smart way.

“Ideally every sector realizes CO₂ reduction internally. But if it costs you €1 euro to realize a kilo CO₂ reduction and me €10 euro, it makes sense that I pay you to reduce CO₂ in your sector. That is much more cost efficient.”

Money flow induced by smartly implemented policies should be invested back into the sector to develop the infrastructure for the future vision, e.g. biofuel installation, phasing in new aircraft technology, and high-speed trains for competitive destinations.

“Aviation can't do anything right at this moment, the industry realizes this very well. But we should be careful with something that took dozens of years to build up. You don't just switch to another kind of service provision.”

Because of the polarized debate, one party should decide, that has to be the national government (33:4). Regional actors have to abide by the national vision. Regional consultation structures shouldn't be put on a pedestal, they are of limited importance.

“Consultation results in too many technical arrangements that parties keep each other tide too. Airlines sometimes throw away 500 kg of extra fuel to follow some different approach procedure, not even knowing why.”

6.2. Perspective 2: Change travel patterns to achieve climate goals

Supporting development of aircraft technology alone does not suffice to mitigate the environmental effects of aviation. On one hand, only little environmental innovation will take place (9:-4) and on the other hand, new technology is very slowly implemented in practice (15:4).

“Technology has surprised us before. However, for years it is said that new technology is on its way, but every time something is available, implementation takes ages.”

To overcome challenges of technological development, you have to face them more international, but that process is going to take too long (26:2). Most important to achieve climate goals is to limit the demand for air travel and change travel patterns of travellers.

“It’s a societal issue, just like smoking, you should educate people about the effects of their behaviour.”

Alternatives such as an island in the sea, fuel technology, aircraft technology, SpaceX, or Hyperloop are arguments that give the idea that the playing field is big, but on the contrary, they provide issues by themselves or could result in making international travel even more accessible, increasing environmental problems. Instead, the focus should be put on the following policy options:

- Ticket prices should be increased (16:3). Ticket prices should reflect the real price of aviation, wherein softer interests are also reflected, to make alternative destinations and other modes of transport more competitive.

“Just like when you buy meat in the supermarket, you check what meat has a certification mark. It is more expensive, but that isn’t necessarily true, because you pay for the external costs of the product.”

“The government tends to take the side of where the money is and ignores the softer interest that aren’t directly economical, but eventually those choices will come around.”

- A restriction on further expansion of airports (34:3). There is a limit to the amount of emissions and nuisance the environment can handle, growth of aviation has to be limited. We can try to squeeze even more air traffic in the already full airspace (42:-4), but there is already conflict between air traffic of Rotterdam-The Hague Airport and Schiphol Airport. Restricting airport capacity is not as big of an influence to the economic growth of the region as is often assumed (19:-3), more important to welfare in the region is for example the quality of the living environment. International connectivity of the area is already really good, there is no necessity for further expansion, take on the bigger bottleneck first.

“If you eventually become one of the dirtiest areas in Europe, that is not going to help to become an international competitive region either.”

6.3. Perspective 3: Adaptive region

Noise and emission have become a symbol of negativity for aviation. To mitigate negativity that describes the policy discourses of airports, the way an airport is used should change (24:4) and noise and emissions should be mitigated in new ways (22:3). Important is to regard the airport and the surrounding areas as one connected region (12:3), both physically and socially. Traditionally the airport and spatial planning are two separate domains, but they shouldn’t be anymore (12:3).

“If you look at the amount of resources an airport uses, you have enormous opportunities, for example as an energy buffer.”

Only a small part of the regional citizens is included in consultation bodies, but to allow for more creativity (32:-4) and to be more connected with the region, more diverse regional inhabitants should be included. Because of all the institutionalization that has taken place over the years, creativity is lacking. The established consultation bodies are not sufficient anymore, they have been on opposing positions for too long. The region needs a breath of fresh air.

“A new level of governance in which the government, the airport and local residents establish new dynamics to be more connected should be initiated on a small scale.”

Nuisance of aviation is more than just the level of noise one is exposed to; the way airport development is justified to other actors is often of bigger importance. Policy-making processes should allow for creative space to allow different actors to engage collaboratively on how the region can benefit from an airport (32:-4). Policy-making processes should focus more on how to develop the region, rather than solely focus on developing aviation.

In the broader scope of the region, there is just a small role for the airport as facilitator of international travel and employment, also companies such as Google, Uber, and SpaceX are likely to redefine international travel (8:3). There're many feasible alternatives for aviation. Not just alternatives in the sense of international travel (1:4 and 8:3), but also alternatives for economic growth of the region (19:-3) and where employment is facilitated (6:2).

“There are ample opportunities for employment and economic growth. One of those opportunities is investing in the airport, but other sectors such as IT or new technology provide way more opportunity.”

Worldwide aviation discourses might go in other directions, the Netherlands is not a frontrunner in airport policy making (17:-4), but as a region, you can make a conscious decision about the way you facilitate mobility, economic activity and quality of life in general. Because of the ample resources the airport uses, it has many opportunities to become more connected with the region and become a symbol of the region in a positive way. The airport is the subordinate to the needs of the region and should be adaptive to those needs. The airport is not a necessity (40:-2).

“There is a mantra of an ever growing aviation industry. This is fed by the idea of aviation as the engine of the economy, but this idea is outdated.”

6.4. Perspective 4: A thriving region with aviation

The aviation industry is eminently innovative. There are many technological possibilities untested that could possibly be implemented. But aviation has become strictly regulated and actor positions are predefined, limiting airport activity and limiting possibilities to be innovative (34:-4). Consequently, aviation is losing some of its allure. People should rely on innovations in the field of noise and emission to eventually achieve environmentally friendly aviation (10:2) and allow for more room to experiment (37:4). By enabling the industry to innovate (22:3), becoming a transport hub for different modalities (35:4), and connecting with the region in new ways (12:3), an airport can become the centre of a thriving region.

“If you're really invested in changing aviation, experimentation is essential. There are many innovations under development at companies and universities waiting to be tested.”

Start-ups, research institutes and other organizations should be able to access the airport and its facilities more easily. Although it is likely that air travel will become more expensive in the next fifty years (41:3), people should be able to easily enjoy the benefits of airports and aviation.

“Travelling will always be very important to people. There are many valid reasons to fly. I don't think people will ever feel ashamed for travelling by plane.”

The airport would not just be a hub for aviation, but also for different modes of transportation, experimentation, innovation, and economic activity. It could become the facilitator of a thriving region. The role of the government and other policy-makers should be facilitating instead of controlling (33:-2).

“As an airport, you shouldn't be strictly focused on your own operations, you have to engage with the region to explore how you can be more facilitating.”

6.5. Perspective 5: New governance for uncertain times

Because of a lack of sufficient international policy measures (31:4), the Netherlands is on its own to deal with increasing uncertainties about development of aviation, uncertainties such as technological developments (9:1, 15:0), airspace capacity (42:1), and the veracity of the mainport-concept (13:1).

“International is the best level to discuss issues, but for a lot of countries, sustainability is not the most important item. But if you wait for other countries, change is too slow.”

The way we arrange governance and actor participation needs to evolve towards a state in which it is constructive for policy-making in an uncertain world. Participation structures lack creativity (32:-4). If we can't facilitate participation in a creative manner, these structures should be constrained to give advice that isn't necessarily used for policy-making (43:4). Policy making should take place at governmental level (33:3).

“There is no response to the tension between aviation and the spatial environment, the Netherlands is too small. It is the task to find a balance between living environment, housing, and economic value.”

“The primary focus of municipalities is to build windmills and houses. That is why you can't decide about aviation on municipal level, that is a central task of the national government.”

“We can build an island in the sea or invest more in high-speed trains, but this takes time. Those alternatives are escape routes from the discussion about the limits we are reaching now.”

Aviation is not an industry to be controlled by regional actors, it has become a national issue. The way we communicate with the region and how we used to arrange participation does not suffice for the next fifty years. In aviation policy-making, broader interests should be considered, not just those that are currently established in regional consultation bodies. These bodies can have an advisory role, but advice shouldn't be directly implemented. The aviation industry should be subject to a broader comparison of interest, which is why we should use more and different methods to assess policy alternatives (4:3).

The Netherlands isn't a leading country when it comes to aviation, other countries are less concerned about the environmental effects of aviation, but the Netherlands has to make its own trade-off on the way we want to live, work and travel. This trade-off is not explicitly made, and currently unbalanced. The distribution of benefits and burdens is unfair (18:3).

Aviation is of increasingly complexity, both socially and technically. For efficient policy-making to deal with uncertainty, we should adjust the institutions in accordance.

“We are not always discussing growth of aviation anymore. This implies that there really is a change coming, growth is now considered suggestive.”

“Maybe we should define sustainability different, or the mainport-concept. There is a truth in the story that the mainport-concept is not viable anymore, but this idea does not fit well in current institutions.”

6.6. Conclusion

In this chapter the first step to conceptualize the reframed policy discourse is made by constructing narratives of the perspectives in aviation policy discourse. The second subquestion is therefore answered:

Subquestion 2: What perspectives on sustainable aviation in the Netherlands can be identified?

The actor perspectives on sustainable aviation that are identified in a reframed policy discourse are the following:

- Perspective 1: Accelerate innovation with economic instruments
- Perspective 2: Change travel behaviour to achieve climate goals
- Perspective 3: Adaptive region
- Perspective 4: A thriving region with aviation
- Perspective 5: New governance for uncertain times

7

Results: congruent goals and possible new dichotomies

Based on the perspectives, the most explicit similarities and differences among the perspectives are explored in this chapter. Although the perspectives aim to achieve similar objectives, i.e. sustainable aviation, the assumptions on which the perspectives are based differs. It is especially useful to understand the assumptions of the different perspective to identify what similarities can be used to define congruent goals and what diversities could cause new dichotomies. Thus providing answer to the third subquestion:

Subquestion 3: What congruent goals and possible new dichotomies can be identified among the perspectives on sustainable aviation?

This chapter first explains similar correlations between perspectives in 7.1 and provides an overview of the most explicit assumptions for nine topics relation to sustainable aviation in 7.2. These topics are explored to identify congruency and diversity. A conclusion with an answer to the third research question can be found in 7.3.

7.1. Correlations among perspectives

To explore congruency and diversity, the similarities and differences among perspectives are analyzed. Therefore, the correlations between the factor were calculated using the Ken-Q web application for Q-methodology, see table 7.1. All perspectives have similarities and differences among each other. To analyze what perspectives have many similarities and less differences the correlations between the factors are calculated. The higher the correlation between two factors, the more similar the statements are sorted. Naturally, the higher the correlation, the less differences they have. The similarities and differences are interpreted based on the description of the perspective, composite Q-sorts, crib sheets, and transcriptions of interviews.

Table 7.1: Correlations between factor scores

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	Accelerate innovation with economic instruments	-	-0.2078	0.1325	0.0452	0.3848
Factor 2	Sustainable aviation means less aviation		-	0.3039	-0.1300	0.2562
Factor 3	Adaptive region			-	0.2846	0.2251
Factor 4	A thriving region with aviation				-	0.3015
Factor 5	New governance in uncertain times					-

In the first place, perspective 1 ('Accelerate innovation with economic instruments') and perspective 5 ('New governance for uncertain times') have the highest correlation ($r=0.3848$). This indicates that the these

perspectives are most alike. When looking into the similarities in how the statements were sorted, both perspectives see aviation as becoming of increased importance to people and industry. However, the perspectives also have differences. Perspective 1 is more positive about CO₂ compensation, technological developments, and effective international policy than perspective 5. Perspective 5 emphasizes different methods to analyze policy alternatives and changing governance structures.

Secondly, perspective 2 ('sustainable aviation means less aviation') and perspective 3 ('adaptive region') show similarities ($r=0.3039$). These two perspectives are similar based on that they see little importance for expansion of the airport for economic growth. Furthermore, they both emphasize that an airport should have more possibilities to decide on the type of flights and passengers that use the airport. The main difference between these perspectives stem from the role of technology in achieving sustainability, which perspective 3 is a lot more positive about than perspective 2.

Next, perspective 2 ('sustainable aviation means less aviation') and perspective 5 ('new governance for uncertain times') are similar ($r=0.2562$). The perspectives are most similar based on the expectation that public attitudes towards aviation will harden and they both regards economic instruments as insufficient to achieve sustainable aviation. Like perspective 2, perspective 5 considers that sustainable aviation also means restraining aviation to some extent. However, perspective 5 is more optimistic about technological developments to achieve sustainable aviation than perspective 2. Also, perspective 2 sees a more significant role for current consultation structures in aviation policy-making than perspective 5.

Finally, perspective 3 ('adaptive region') and perspective 4 ('a thriving region with aviation') have a high correlation ($r=0.2846$). They have a similar perception that the airport and the surrounding areas should be regarded as one connected region. Also, both see opportunity to resolve tension between urban development and the space that aviation requires. A third similarity between the perspectives is that both expect companies like Google, Uber, and SpaceX to redefine international transport. On the other hand, the perspectives are different based on the perception of the importance of an airport. Perspective 4 regards the airport as an important asset of a region, but perspective 3 is more skeptical about the importance of an airport as important facilitator of a region.

Perspective 3 ('adaptive region') and 5 ('new governance for uncertain times') show most similarities with other perspectives, the corresponding factors even have a positive correlation with all other perspectives. These two perspectives, especially perspective 5, also tend to be the most nuanced about the description of sustainable aviation.

7.2. Congruency and diversity per category

The most explicit assumptions behind the perspectives are explored in this paragraph to further search for congruency and diversity. The underlying assumptions of the perspectives are explained for nine categories that the perspectives are explicit about.

7.2.1. Level of governance for sustainable aviation

The governance level of the policy discourse described by the different perspectives differs. The accelerate innovation perspective (1) and change travel patterns perspective (2) have a national/international focus. The adaptive region perspective (3) and the thriving region perspective (4) focus more on the region in proximity of the airport. Finally, the new governance perspective (5) is more disconnected from a level of governance. However, perspective 5 assumes that the national level of governance will be increasingly designated with policy-making issues.

7.2.2. Technology

Technological developments in aviation are the most convenient way to achieve both economic and environmental goals and has a central role in the policy discourse on sustainable aviation. The accelerate innovation and changing travel patterns perspectives (1 and 2) are strongly influenced by assumptions on technological development. Both acknowledge that technological developments alone will not suffice to mitigate environmental issues in the next ten to twenty years, but differ about how much faith we should have that technological development will eventually solve environmental issues in the decades thereafter. The accelerate

innovation perspective (1) promotes a strategy to facilitate technological development to eventually solve environmental issues while limiting the amount of policies that tap the growth of aviation. The change travel patterns perspective (2) argues that technological development alone will not suffice and policy-making should aim to decrease the supply of air travel to achieve climate goals.

7.2.3. Alternative means

The accelerate innovation perspective (1) is neutral with regard to alternative means for international travel. The change travel pattern perspective (2) is positive about high speed trains as alternative means of transportation, but more negative about innovations from companies such as Google, Uber, and SpaceX and alternative locations (e.g. airport on an island in the sea). On the other hand, the adaptive region perspective (3) is generally positive about alternative means. The thriving region with aviation perspective (4) emphasizes a significant function for aviation in comparison to alternative means.

The new governance perspective (5) assumes that alternative means that have been repeated in the past should be limitedly engaged with (i.e. high-speed trains and an island in the sea). This is in retrospect to more unexplored alternatives, such as innovations from the likes of Google, Uber, and SpaceX and alternative means for policy analysis, which should be more engaged with according to this perspective.

7.2.4. Role of the government and consultation bodies

The adaptive region perspective (3) assumes an important role for consultation bodies to contribute to policy-making about what the function of the airport for the region should be. The accelerate innovation perspective (1) and the new governance perspective (5) assume a role to advise is relevant, but policy-making should take place at (national) governmental level. The change travel pattern perspective (2) and the thriving region with aviation perspective (4) are more neutral about consultation bodies and the role of the government. All perspectives generally agree that there's a lack of creativity in consultation bodies.

7.2.5. Economy and employment

The thriving region with aviation perspective (4) is most explicit about the airport as important factor for economic activity and employment in the region. The other perspectives don't emphasize the airport as facilitator of economic growth or employment, although the accelerate innovation perspective (1) assumes the airport is an important enabler of connectivity for the economic hinterland. The change travel patterns perspective (2) and the new governance perspective (5) especially assume that the airport is not as big of an influence to economic activity of the region. For the adaptive region perspective (3), the airport can be used as an enabler for economic activity, but assumes there are ample alternatives to establish economic growth and employment.

7.2.6. Function of an airport

Foremost the adaptive region (3) and thriving region with aviation perspective (4) discuss the role of the airport. The adaptive region perspective (3) assumes an adaptive role of the airport and an airport that is more aware of the needs of the region. The thriving region with aviation perspective (4) assumes that the airport should be allowed more room to experiment and connect with the region, assuming a much more dominant role for the airport in the region than in the adaptive region perspective (3). The changing travel patterns perspective (2) marginalizes the role of the airport, as it should be subject to a restriction to further expand. The accelerate innovation perspective (1) and new governance perspective (5) are less pronounced about the role of the airport.

7.2.7. International institutions

The adaptive region perspective (3) assumes significant top-down policy-making to mitigate environmental effects will take place. This could be explained by the assumption of possibilities of effective new ways to collaborate, mainly regional, but also international. Other perspectives generally assume international policy-making to be slow and ineffective. The accelerate innovation (1) is not too optimistic about international policy-making, although they assume a clear role for international market-based measures. The new governance perspective (5) clearly marks international policy-making about emission reduction as ineffective. The thriving region with aviation perspective (4) is not pronounced about international institutions.

7.2.8. Distribution of benefits and burdens

Apart from the thriving region with aviation perspective (4), all perspectives assume it is reasonable that passengers will eventually pay for increased ticket prices when a ticket tax is introduced.

Financial compensation for aviation nuisance is assumed as a possibility to achieve a fair distribution of benefits and burdens by the more nationally focused perspectives (1, 2, and 5). The regional perspectives (3 and 4) are less pronounced about financial compensation.

7.2.9. Climate Change

Statement number 5 gives an indication of the sense of the urgency of climate change: *“Because of climate change and the rise of the sea levels, there is a chance that the airport won’t be able to exist at the current location in the polder.”* All perspectives negatively scored this statement. Rising sea levels caused by climate change is not perceived as a substantive threat by any of the perspectives. The change travel patterns perspective (2) scored the statement highest with -1. One of the reasons for rising sea levels caused by climate change effects to be scored low by the perspectives is the context of the research. The Netherlands, a country of which the majority lies underneath the sea-level, is known for its profound water management. Actors from all perspective seem to have faith in the water management agencies to keep the Netherlands save. The perspectives are not affected by the effects of sea-level rise on other countries and other indirect effects of greenhouse gasses.

7.3. Conclusion

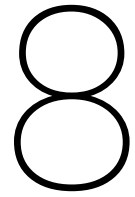
This chapter provided an answer to the third subquestion by exploring the similarities and diversity of the underlying assumption behind the perspectives.

Subquestion 3: What congruent goals and possible new dichotomies can be identified among the perspectives on sustainable aviation?

A first congruent goal of the perspectives is to better connect the airport and its regions, as comes forward in perspective 3 (‘adaptive region’). Also, as in perspective 5, when actors engage with sustainable aviation, it seems to make them contemplate new governance structures for policy-making in uncertain times, which is often accompanied with a strong role for the national government. Thirdly, it is considered reasonable by all perspectives that passengers eventually pay for increased ticket prices when a ticket tax is introduced.

The diverging underlying assumptions of the perspectives were also explored to analyze if possible new dichotomies could rise. The biggest divergence is found between perspective 1 (‘accelerate innovation with economic instruments’) and 2 (‘change travel behaviour to achieve climate goals’). Perspective 1 has more faith in technological developments to eventually enable environmentally friendly international travel. Perspective 2 is more skeptical about technology, instead, policy-making should be focused on changing travel behaviour to limit environmental effects. Another diverging assumption is the function of an airport in the region. Perspective 3 and perspective 4 have opposing assumptions about the importance of a nearby airport for a region. Although the dichotomy is less apparent in the reframed discourse and the perspectives nuance the opposing position by emphasizing to connect the airport and the region better, it is a similar dichotomy as the ‘for or against’ positionings in deadlocked discourse. These diverging assumptions should be considered when organizing collaborative planning in accordance with the perspectives on sustainable aviation, so that they do not result in a self-reinforcing polarization of the policy discourse.

Furthermore, other diverging and similar assumptions about alternatives, role of government and consultation bodies, economy and employment, international institutions, fair distribution of benefits and burdens, and climate change were explored.



Conclusion

The objective of this thesis is to analyze how collaborative planning approaches in aviation policy-making in the Netherlands can better engage with congruent goals to come out of the deadlock. This was analyzed by reframing the policy discourse using sustainability as a boundary object. The following research question was proposed:

How can sustainability as a boundary object be used to reframe deadlocked aviation policy discourse in the Netherlands?

This research question is answered in 8.1. Based on the answers on the research questions, recommendations to organize collaborative planning arrangements for aviation policy-making in the Netherlands are provided in 8.2. Also recommendations for aviation policy-making in general are provided in 8.2.

8.1. Conclusions regarding the research questions

To answer the main research question, answers on the subquestions are derived. The answers on the first three subquestions that were answered in the previous chapters are summarized and next synthesized by answering the fourth subquestion.

Subquestion 1: What are the dominant perspectives in deadlocked aviation policy discourse?

In chapter 4 was analyzed what the most dominant perspectives in current deadlocked aviation policy discourse are. The aviation policy discourse is typically described by two dominant perspectives, an economic and an environmental perspective. In Dutch policy discourse these perspectives refer mostly to the 'function' of an airport. In a policy discourse with such a dichotomy, actors generally do not believe that they can define congruent goals with actors with an opposing perspective. As a result, actors tend to only reproduce and favour the economic or environmental perspective, polarizing the discourse. Although other actors in deadlocked policy discourse have different perspectives, that are more nuanced than the economic and environmental perspectives, their views do not find their way into the policy discourse. This is caused by the reproductive tendency of the policy discourse. The ways of talking and acting that are deemed meaningful and legitimate have changed very little over the last decades.

Subquestion 2: What latent perspectives can be identified in a reframed sustainable aviation policy discourse?

By means of an application of Q-methodology, five latent perspectives on sustainable aviation are narratively explained in chapter 6:

- Perspective 1: Accelerate innovation with economic instruments

On the long-term, technological developments will eventually enable environmentally friendly air travel. Policies to mitigate environmental effects of aviation should be implemented, but carefully so, since connectivity is of increasing importance for economic development. Market-based policies could allow for money flow which could be invested back into the sector to develop the infrastructure for the future vision.

- Perspective 2: Change travel patterns to achieve climate goals

Supporting development of aircraft technology alone does not suffice to mitigate the environmental effects of aviation. To achieve climate goals, demand for air travel should be limited and travel patterns of travellers should change. Short term environmental policy could be implemented, such as increased ticket prices or a restriction on further expansion of airports.

- Perspective 3: Adaptive region

In the broader scope of the region, there is just a small role for the airport in the region. Noise and emission have become a symbol of negativity for airports. Therefore, the way the airport is used should change. In the first place, the region needs a breath of fresh air, the established consultation bodies are not sufficient anymore, they have been on opposing positions for too long. As a region, you can make a conscious decision about the way you facilitate mobility, economic activity, and quality of life in general. Because of the ample resources at an airport, it has many opportunities to become more connected with the region and become a symbol of the region in a positive way.

- Perspective 4: A thriving region with aviation

The aviation industry is eminently innovative. By enabling the industry to innovate, becoming a transport hub for different modalities, and connecting with the region in new ways, an airport can become the centre of a thriving region. There are many technological possibilities untested that could be successfully implemented. But aviation has become strictly regulated and actor positions are predefined, limiting airport activity and limiting possibilities for the airport to facilitate the region.

- Perspective 5: New governance for uncertain times

Because of a lack of sufficient international policy, the Netherlands is on its own to deal with increasing uncertainties about development of aviation, uncertainties such as technological developments, airspace capacity, and the veracity of the mainport-concept. The way governance is arranged, e.g. in consultation bodies, needs to evolve towards a state in which it is constructive for policy-making in an uncertain world. These bodies should be constrained to give advice that isn't necessarily used for policy-making.

Subquestion 3: What congruent goals and possible new dichotomies can be identified among the latent perspectives in a reframed sustainable aviation policy discourse?

By exploring the similarities and differences among perspectives in chapter 7, congruency and diversity was explored. Congruency can be identified in that the airport and its regions should be connected, as is more explicitly explained in perspective 3. Also, as in perspective 5, when actors engage with sustainable aviation, it seems to make them contemplate new governance structures for policy-making in uncertain times and emphasize a stronger role for the national government. Thirdly, a ticket tax that increases ticket prices for travellers is generally regarded as a fair policy.

The biggest divergence is found between perspective 1 ('accelerate innovation with economic instruments') and perspective 2 ('change travel patterns to achieve climate goals'). The assumption that technology will enable both economic and environmental prosperity differs. Perspective 1 assumes that technological developments will eventually enable environmentally friendly international travel. Perspective 2 contradicts this assumption, instead policy-making should be focused on changing travel behaviour. Another diverging assumption is the importance of an airport for the region. Perspective 3 ('adaptive region') sees many alternatives for the airport, perspective 4 ('a thriving region with aviation') assumes a central role for the airport in the future. These diverging assumptions also refer to the 'function' of an airport, similar to those identified in deadlocked aviation policy discourse. In the reframed discourse, this diversity has a less prominent position, but it should be considered that the dichotomy can not completely be avoided in the reframed discourse.

Subquestion 4: What are the implications of reframing aviation policy discourse by means of sustainability as a boundary object?

By synthesizing the first three subquestions, implications of the reframing of the aviation policy discourse can be identified.

The reframed discourse diverges from the traditional discourse with an explicit dichotomy of economic and environmental perspectives. Instead of optimizing single objectives, all perspectives engage with balancing the economic, environmental, and social pillars of sustainability. The perspectives on sustainable aviation seem to describe strategies to find an optimal balance between the different pillars. Apart from the congruent goals that were identified, sustainability itself as an overarching theme can allow the perspectives to be more nuanced. Also, two perspectives with many similarities with other perspectives, i.e. perspective 3 ('adaptive region') and perspective 5 ('new governance for uncertain times') were identified. The application of Q-methodology enabled actors to engage with other opportunities to improve economic, environmental, and social goals. The results showed actors deemed change of the policy discourse necessary to allow for their perspective on sustainable aviation to be achieved. Also, respondents would often emphasize in interviews that they expected other respondents to sort the statements differently, therefore recognized that different perspectives on sustainable aviation co-exist. Thus, the reframing resulted in making people more aware of the boundaries in which they formulate their ideas.

To elaborate on the nuance that was created in the reframed discourse, the dichotomy of economic and environmental perspectives can be aligned with perspectives in the reframed discourse. Traditional economic perspectives that would support airport expansion, could engage with environmental objectives by means of economic instruments or connecting the airport and region better. On the other hand, the traditional environmental perspectives could engage with changing travel patterns and facilitating economic activity with other means than aviation. In the otherwise polarized discourse, sustainability as an overarching objective for aviation policy discourse is alleviating.

However, reframing the policy discourse did not completely resolve the dichotomy. Opposing positions, especially regarding technology were identified. It should be noted that dichotomies in policy-making aren't necessarily a problem (Huijs, 2011). A shift in aviation policy-making from a 'for or against' airport expansion dichotomy to a dichotomy on technological developments could already be an improvement. Especially since the capabilities of technology to reduce noise and emissions are well researched, for example by Cheliah et al. (2016), Dray et al. (2014), Grampella et al. (2017), Hileman and Stratton (2014), Jimenez and Mavris (2017), Moolchandani et al. (2013). It should be noted that these studies are generally not too optimistic. Even significant improvements above those that can be expected from an extrapolation of past trends fall well short to achieve climate goals (Graham et al., 2014). As a result of high expectations, actors may justify non-action towards environmental objectives. Therefore, actors and policy-makers should take uncertainties on technological development into account (Peeters et al., 2016).

In previous research conducted by Kroesen et al. (2011) was identified that it seemed that people generally do not believe that both the economic and environmental objectives can be achieved at the same time, which would in turn result in a continuing debate along the line economy versus environment. From this analysis it seems when discussing the future, some actors, especially supporters of perspective 1 ('Accelerate innovation with economic instruments'), perspective 3 ('adaptive region'), and perspective 4 ('A thriving region with aviation'), do believe that economic and environmental goals to be achieved simultaneously.

In short, ensuring a future for aviation in which diverging objectives are effectively met, is dependent on the strategic actions of public and private actors (Steffen et al., 2015, Whiteman et al., 2013). Collaborative planning efforts are important to initiate actions that focus on achieving these objectives (e.g. Moore et al., 2014, Olsson et al., 2004, Vacik et al., 2014). For these approaches to be successful, it is important to avert from policy deadlock. Making actors engage in policy discourse with sustainability as an overarching objective allows actors to approach issues from their latent perspectives that balance the different economic, environmental, and social objectives. This reframing allowed to identify congruent objective, but other possible dichotomies did come forward. Collaborative planning can be improved by reframing the aviation policy discourse in a broader scope, including new actors, and getting rid of the dichotomy of economic and environmental perspectives. This can be done by organizing collaborative planning from the latent perspectives identified in this thesis and setting sustainability as the overarching objective.

8.2. Recommendations for policy-making

While considering the diversity of the perspectives on sustainable aviation, recommendations for collaborative planning and aviation policy-making in the Netherlands are developed.

Most importantly, collaborative planning should be organized with the perspectives on sustainable aviation as a starting point. Sustainability should not be a pillar next to other objectives, but should be regarded as the single overarching objective of collaborative planning. It should be recognized that sustainability “seeks to achieve, in a balanced manner, economic development, social development and environmental protection” (World Commission on Environment and Development, 1987) and is therefore not some exogenous feature. Argumentations for or against airport expansion or other policy alternatives should engage with the effects on the balance of the economic, social, and environmental pillars of sustainability and if a shift in the distribution can be justified.

Secondly, actors should work to connect the airport and the region in new ways, both socially and physically. A common perception on airports is that the airport is there for the region and that it is therefore important to connect the airport with the region. The adaptive region perspective (3) and the thriving region with aviation perspective (4), that best recast the ‘for or against’ dichotomy of the deadlock, both have explicit ideas to improve the connection between the airport and the surrounding region. For example, connecting aviation policy-making better with urban planning, operate the airport as energy buffer to facilitate the energy transition, align flight paths and slot coordination with interests of regional inhabitants, or easier access to airport facilities for entrepreneurs, start-ups, and researchers.

Based on the identification of the new governance perspective (5) with many similarities with other perspectives, issues related to sustainable aviation that the different perspectives find relevant do not seem to find their way into the current policy discourse. Thus, institutional governance should be reformed, in which assumptions about the capacity of the Dutch airspace, the veracity of the mainport-concept, and technological developments are regarded as uncertainties rather than fixed assumptions from the past. Policy-making processes, and consultation bodies in particular, should engage with these assumptions as uncertainties. The national government is the actor tasked to organize this reformation.

Fourth, actors should develop knowledge on the capability of technological development in the next fifty years. This would improve the discourse on sustainable aviation. It seems that the variety of the assumptions about the potential of technological developments is bigger than can be reasoned given the information that is available. In fact, the potential of technological developments is actually well researched.

Fifth, a more unified national policy discourse should be initiated, with consultation that spans boundaries of different airports and a more direct connection with the supervising authority, the national government. Different airports in the Netherlands serve overlapping markets, are sometimes owned by the same actors, and operated by the same organizations. Policy-making processes at different airports are therefore interlinked. Airports in close proximity to each other can't be regarded as independently functioning entities in the aviation industry of the Netherlands.

Finally, for the analysis of policy alternatives in research such as Environmental Impact Assessments or Social Cost-Benefit Analysis, setting sustainability as the overarching objective has other implications. Demand for aviation is ever increasing and fulfilling this demand could result in economic benefits, justifying expansion of airport activity. However, a mantra of an ever growing airport lacks to deal with the trade-offs that will have to be made in the light sustainable aviation. Therefore, the analysis of policy alternatives could more engage with the effects on sustainable aviation. To do justice to the ambiguities of sustainability, different ‘sustainable’ scenarios could be analyzed. This also requires that scenario's should take alternatives for international travel, economic activity, and urban planning into account. The supervising authority can use these scenario's to make decisions that align with the national vision for international travel, economic activity, and urban planning.

9

Discussion

Although the application of the methodology was successful to identify a different set of perspectives on aviation, there are several remarks to be made. These are discussed in this chapter. 9.1 discusses the limitations of the research and 9.2 discusses the opportunities for future research.

9.1. Limitations

In the first place, despite the benefits of Q-methodology, there are implications when it is used to allow for reframing of a policy discourse. The sorting of the statements is very much affected by the choice and formulation of the statements. Respondents for example noted that they agreed with a statement, but it would be more fitting with their perspective if the statement would be phrased a little different. Other respondents did find that same phrasing fitting. However, the methodology allows for respondents to explain why they sorted statements as they did and captures this as qualitative data to be used for the interpretation of the perspectives.

Secondly, in this thesis, ‘sustainability’ is used as a boundary object. However, other boundary objects could possibly be used to identify different perspectives. For example resilience, safety, or vulnerability. Research with a similar approach as in this thesis, but instead with another boundary object, could likely result in the identification of other latent perspectives. However, sustainability wasn’t a random pick. It seems to be in line with the developments that more recently take place in the Dutch aviation policy discourse. Ever since the first flight in the Netherlands took place, aviation has had many images, from prestige project, to economic facilitator, to economy versus environment. The next logical step would be to make sustainability the next image.

Thirdly, the aim of the Q-sample was to reflect a complete set of statements about the future of sustainable aviation in the next fifty years. However, the sample is limited to 43 statements. A trade-off between ease of sorting and completeness of the sample had to be made. Most of the respondents didn’t feel anything lacked, but some additional statements were made up by respondents. In the first place a statement about the role of the Dutch national airliner, KLM, on the perception of aviation. It was hypothesized that KLM could strongly influence the perception of aviation by the public. A second statement about the reduction of liberal democratic system in light of environmental goals could be added. For example, if the national government should fulfill a function in which they decide how much air travel Dutch citizens are allowed consume. Furthermore, fairness was often discussed during interviews. Is it fair that nuisance of aviation is always perceived by the same group of people? Or, is it fair that Dutch citizens increasingly fly, while the effects of global warming hit other regions of the world first? These questions are limitedly engaged with in this thesis. The selection of statements on the future of sustainable aviation, which is naturally uncertain, results in increased bias in the research. There is no definitive way to draw a line between issues that are relevant for sustainable aviation and issues that aren’t. However, including sustainable aviation issues that generally do not find its way in the current policy discourse can be an effective strategy to reframe the discourse.

Perspectives on a future system identified by the application of Q-methodology are hard to validate, in this thesis, the perspectives are therefore more of an exploratory than descriptive nature. In light of validation and the exploratory nature of the perspectives, it is useful to triangulate the perspectives on sustainable aviation with research of Van Eeten (2001), who identified five perspectives in deadlocked aviation policy discourse (see chapter 4). The perspectives on sustainable aviation that are identified are more nuanced than the ones found by Van Eeten (2001). Two of the perspectives on sustainable aviation focus on the airport itself too (3 and 4). These perspectives that focus on the airport and the region in proximity of the airport can be best aligned with the B1 and B2 perspectives of Van Eeten. The adaptive region perspective (3) can be best aligned with the unjustified expansion perspective (B2). Both emphasize there should be a justification for activity at an airport. It seems however that the adaptive region perspective (3) can justify aviation activity as long as it can be justified to the region. B2 is stricter on defining expansion of aviation as an unjustified, as expansion of aviation related issues are “not considered real, but rather a self-inflicted difficulty” (Van Eeten, 2001). The thriving airport region perspective (4) can be best aligned with a combination of Van Eeten’s societal integration (A) and expansion necessity (B1) perspectives. Aviation is an important asset for a region to thrive according to perspective 4, emphasizing the ‘expansion as a necessity’ component of perspective B1, as well as the ‘societal integration’ component of perspective A. Perspective 1, 2, and 5 on sustainable aviation can’t easily be aligned with the perspectives identified by Van Eeten (2001).

Most of the respondents felt their Q-sort reflected their perspective on the issues quite well. Actors from national governments, researchers, the relatively bigger aviation organizations, environmental interest groups and regional inhabitant were especially motivated to engage with the issues provided by the Q-methodology. Actors such as municipalities, smaller aviation organizations, and commercial interest groups were less motivated in engaging with the issues. This is also an indication of the tension among actors, which isn’t fully demonstrated in the perspectives. This could also be the result of strategic behaviour of respondents. As some of the respondents indicated, the different actors are very much aware of their position in the policy discourse. Actors can be motivated to achieve congruent goals, but when it eventually comes down to it, actors could still be likely to pursue individual goals, rather than congruent goals. This thesis was also limited to individual interviews with the respondent. It is important to emphasize that resolving deadlock, overcoming controversy, and improving collaborative efforts comes down to, not only describing the deadlock or identifying a way to resolve it, but actually engaging with actors in a collaborative fashion. That is why methods that aim to do just that are essential organize effectiveness collaborative planning arrangement. Many methods, tools, and approaches are developed to aid in arranging collaborative planning, such as the mutual gains and joint fact-finding approaches (Susskind and Cruikshank, 1987), participatory back casting (Sisto et al., 2017), constructive conflict methodology (Cuppen, 2010, 2012), science fiction prototyping (Merrie et al., 2017), multi-criteria mapping (Raven et al., 2017), robust action (Etzion et al., 2017), and assumption based planning (Dewar et al., 1993). Actors should be made aware of how their current perspective and should acknowledge that institutions enforce deadlock. Actors should also be motivated to change the discourse. The methodological approach as proposed in this research with Q-methodology and defining a boundary object is a viable contribution to aid in setting congruent goals for actors in polarized collaborative planning arrangements.

9.2. Recommendations for future research

From the conclusions and limitations of this research, opportunities for further research are developed.

Future research on the topic of developments of aviation in the Netherlands could engage with the best design principles for collaborative planning arrangements. This research combined with evaluations of collaborative arrangements (e.g. evaluation of CROs in the Netherlands (SEO and Twynstra Gudde, 2018)) could be the starting point of designing new and improved arrangements. Secondly, this research could also be used to develop different alternatives of the ticket tax that is planned to be implemented in 2021 (Rijksoverheid, 2018). A ticket tax is regarded as a fair policy by all perspectives, but notions about how it should be implemented differ. Future research could analyze how the money flow that is created by a ticket tax can be used in line with the different perspectives, e.g. investing in aircraft technology, investing in alternative modes of transport, investing in alternative economic areas, investing in circularity at an airport, or investing in experimentation at an airport.

Also future research that aims to reframe problematic policy discourses, could analyze how other boundary objects can be used for reframing. In this research, sustainability was used, but other boundary object could provide new insights. For the Dutch aviation discourse, sustainability was used because it is in line with the current developments. In other areas in the world, resilience, vulnerability, or safety could be more fitting to be used. Future research could also analyze how reframing by means of boundary objects can be applied in other sectors.

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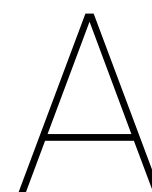
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Concourse demarcation

Table A.1: Concourse demarcation

Type	Source
Article	Van Muijen and Storm (2017): Rotterdam verdient een passende luchthaven
Article	Kilkenny (2017): ICAO: Future of aviation summit
Article	Croon (2018): Nooit meer luchtvaart
Article	RTHA (2018): Wij bouwen aan de toekomst
Article	Sumers (2018): The airport of the future may evolve from transport hub to attraction
Article	Van der Heijden (2017): Verbied vliegen binnen Europa
Article	Terlouw (2017): Uitbreiding Lelystad Airport moet niet doorgaan
Article	NOS (2018b): Onderzoeksraad - veiligheid Schiphol ondergeschikt aan groei
Article	Vivion (2013): 2025 and beyond - Visioning the future of the airport experience
Article	Experience (2013): Think tank
Article	Waijers (2018): Hoe kan Schiphol toch verder groeien? 'Minder zeuren is een optie'
Article	Verhagen (2017) : Laten we niet te vroeg de bij zetten in onze luchtvaart
Article	Don and Van Heel (2017): Dilemma van 't vliegveld: groeien of niet?
Article	Sage (2016) : Uber sees flying commuters in 10 years
Article	Dobbelstein (2007): Van vliegtax wordt alleen schatkist beter
Article	Grove (2018): Bouwen in het groene hart
Article	RTHA: Rotterdam The Hague Innovation Airport
Article	Hosselet (2018): Hoe genees ik van mijn vliegverslaving
Article	Parsons (2017): Heatrow 2.0: a 'sustainable airport' that pretends no one has to choose between planes and pollution
Book	Van Faassen and De Jong (2016): De adaptieve luchthaven
Committee meeting	CRO (2018): Verslag bijeenkomst CRO luchthaven Rotterdam d.d. 9 maart 2018
Committee meeting	Tweede Kamer (2018b): Hoorzitting - Herindeling luchtruim
Committee meeting	Tweede Kamer (2018a): Hoorzitting - Governancestructuur luchtvaart
Report	ICAO (2016): ICAO Environmental Report
Report	IATA (2017): Future of the airline industry 2035
Television broadcast	VPRO (2017): Tegenlicht - Groene vliegtuigpioniers
Television broadcast	VPRO (2018): Tegenlicht - Reizen is het nieuwe roken
Television broadcast	NOS (2018a):Nieuwsuur (April 18, 2018)

B

Q-sample and scores per perspective
(English)

Table B.1: Q-sample and scores per perspective (English)

No.	Statement	Perspective q sort value				
		1	2	3	4	5
1	Air travel should be substituted by other modes of transport (such as high-speed trains) as much as possible	-1	2	3	1	-1
2	By diversifying international transport, the vulnerability of the regional economy will decrease	0	1	-1	0	0
3	For a future larger international share in aviation, an island in the sea with runways is a more feasible alternative than expansion of airports on land	0	-2	1	-4	-3
4	For the analysis of policy alternatives for airports, different methods should be used (such as Social Impact Assessment)	-1	1	1	2	3
5	Because of climate change and the rising sea levels, there is a chance that the airport won't be able to exist at the current location in the polder	-3	-1	-1	-2	-3
6	Because of ICT and robotics innovations, employment opportunities at the airport will eventually decrease	1	2	2	0	-1
7	Because of drones and flying cars, air transport will increasingly take place at other locations than airports	2	-1	2	-2	1
8	The likes of Google, Uber, and SpaceX will redefine international transport	0	-2	3	2	2
9	In the next 50 years, technological development will significantly decrease the nuisance of aviation	4	-4	1	-1	1
10	We shouldn't rely on future innovation in the field of noise and emission too much. Short-term sustainable policy measures should be implemented	0	4	0	-2	2
11	Public attitudes towards aviation will harden	2	1	-1	2	2
12	We shouldn't regard the airport as a detached institute, but as a region	0	-1	4	3	2
13	In the future, the premise about the current mainport concept will change	0	-1	0	0	1
14	Travelling by plane will increasingly be regarded as something to be ashamed of	-4	0	-2	0	-3
15	The aviation industry won't be able to implement technological development at a faster pace	-3	4	0	0	0
16	It is fair that passengers will eventually pay for increased ticket prices when a flight tax is introduced	3	3	2	0	2
17	When the Netherlands introduces a flight tax, other countries will eventually follow along	0	0	-4	-3	-4
18	Local residents should be (financially) compensated for the nuisance of nearby airports. In this way, a fair distribution of benefits and burdens will be achieved	2	1	0	-1	3
19	If the airport can't expand its operations, the economic growth of the region will stay behind with other regions	0	-3	-3	1	-2
20	Pursuing sustainability at the airport will create many opportunities, the spin-off of all initiatives will be huge	-1	-1	0	1	-1
21	The demand for regional products will increase and export increasingly consists of services. As a result, the demand for goods transport over the air will decrease	-3	-1	0	-1	-2
22	By associating with the local environment in a novel way, the airport will be able to profile itself	1	-1	3	3	1

Table B.2: Q-sample and scores per perspective (English) continued

No.	Statement	Perspective q sort value				
		1	2	3	4	5
23	The airport should have more possibilities to select types of flights and passengers that use the airport	1	2	2	-2	0
24	To disrupt the dependency on growth, the revenue model of the airport should change	-2	2	4	0	-1
25	The aviation sector should press to meet its environmental commitments through its own resources, not by measures from other organizations	1	0	-2	-1	0
26	Only limited international environmental policy that has effect on aviation will be made	-1	2	-2	-1	4
27	In the future, the airport should not initiate the procedure to establish an airport operations permit	-2	0	-1	-3	-2
28	It will turn out that there is no response to the increasing tension between urban development and the space that is required for aviation	-2	0	-2	-3	-1
29	Aviation is mainly influenced by economic/technocratic organizations, social/environmental organizations should have more influence	-2	1	1	1	1
30	Distributing environmental improvements evenly between the aviation industry and the local environment (50/50 rule) is an effective stimulus for sustainable improvement	1	3	0	1	0
31	Obligatory compensation of CO2 by the aviation industry is an effective stimulus for sustainable improvement	3	-2	1	-1	-2
32	There is sufficient opportunity for creativity in current consultation structures	-1	-3	-4	-3	-4
33	Because reaching a consensus among different parties is difficult, policy-making should take place at the governmental level	4	1	2	-2	3
34	The airport shouldn't be allowed to grow, this is the only way to achieve sustainability	-4	3	-1	-4	0
35	The airport should be a platform that not only handles aircraft, but all means of transport and from a sustainability point of view thinks about how inter-modal transport is accommodated best	-1	0	-1	4	0
36	Airport regions will use their hub function to establish circularity, by collection, distribution and processing of materials, waste, water, food, energy etc.	-2	0	1	1	-2
37	There should be (environmental) space at the airport that is specifically used for experimentation with innovation	-1	0	0	4	0
38	The aviation legislation should be liberalized to some extent to be able to really change something about the current system	0	-3	0	2	1
39	Connectivity will remain the greatest good of the airport. Not only through the air, but also connecting the (economic) hinterland	3	-2	-1	1	-1
40	In the future, close proximity of the airport will be important for the region	1	0	-3	1	0
41	Air travel will become more expensive in the next 50 years	1	1	1	3	-1
42	The Dutch airspace is big enough to facilitate growth of aviation	2	-4	-2	0	1
43	Consultation bodies should be limited to give advice, that isn't necessarily used for policy making	2	-2	-3	0	4

C

Q-sample and scores per perspective
(Dutch)

Table C.1: Q-sample and scores per perspective (Dutch)

No.	Statement	Perspective q sort value				
		1	2	3	4	5
1	Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidstreinen)	-1	2	3	1	-1
2	Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen	0	1	-1	0	0
3	Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een eiland in zee met start/landingsbanen een reëelere optie dan uitbreiden van luchthavens op land	0	-2	1	-4	-3
4	Er moeten andere methoden voor de analyse van beleidsalternatieven van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)	-1	1	1	2	3
5	Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de polder straks niet meer bestaat	-3	-1	-1	-2	-3
6	Uiteindelijk zal door innovaties op het gebied van ICT en robotica de werkgelegenheid op de luchthaven afnemen	1	2	2	0	-1
7	Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden	2	-1	2	-2	1
8	Bedrijven als Google, Uber en SpaceX zullen internationaal transport met innovaties herdefiniëren	0	-2	3	2	2
9	In de komende 50 jaar zal door technische ontwikkelingen de overlast van luchtvaart significant verminderen	4	-4	1	-1	1
10	Er moet niet te veel vertrouwd worden op toekomstige innovaties op het gebied van geluid en emissies. Er moeten op korte termijn duurzame maatregelen genomen worden	0	4	0	-2	2
11	De publieke houding ten opzichte van de luchtvaart zal verharder	2	1	-1	2	2
12	Voor de toekomst moeten we de luchthaven niet als losstaand instituut beschouwen, maar als regio	0	-1	4	3	2
13	Het huidige mainport-concept zal in de toekomst niet meer het uitgangspunt zijn	0	-1	0	0	1
14	Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen	-4	0	-2	0	-3
15	De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren	-3	4	0	0	0
16	Het is billijk dat reizigers de prijsverhoging bij invoering van een vliegbelasting uiteindelijk zullen betalen	3	3	2	0	2
17	Nadat Nederland een vliegbelasting heeft ingevoerd, zullen andere landen later vanzelf volgen.	0	0	-4	-3	-4
18	Omwonenden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lusten en lasten ontstaan	2	1	0	-1	3
19	Als de luchthaven niet kan uitbreiden zal de economische groei van de regio achterblijven bij andere regio's als Amsterdam en Eindhoven	0	-3	-3	1	-2
20	De keuze voor een duurzame luchthaven zal veel nieuwe mogelijkheden generen, de spin-off van alle initiatieven zal enorm zijn	-1	-1	0	1	-1
21	De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederentransport door de lucht afnemen	-3	-1	0	-1	-2
22	Door op een innovatieve manier met de omgeving om te gaan zal de luchthaven zich beter kunnen profileren	1	-1	3	3	1

Table C.2: Q-sample and scores per perspective (Dutch) continued

No.	Statement	Perspective q sort value				
		1	2	3	4	5
23	De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers	1	2	2	-2	0
24	Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen	-2	2	4	0	-1
25	De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door maatregelen van buitenaf	1	0	-2	-1	0
26	Internationaal zullen er slechts gering afspraken gemaakt worden over het verminderen van uitstoot	-1	2	-2	-1	4
27	In de toekomst zou de luchthaven de procedure om te komen tot een luchthavenbesluit niet moeten leiden	-2	0	-1	-3	-2
28	Het zal blijken, dat er geen antwoord is op de toenemende spanning tussen stedelijke ontwikkeling en de ruimte die de luchtvaart vraagt	-2	0	-2	-3	-1
29	De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties.	-2	1	1	1	1
30	Het verdelen van milieuwinst tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve prikkel voor verduurzaming	1	3	0	1	0
31	Verplichte compensatie van CO2 uitstoot door de luchtvaartsector is een effectieve prikkel voor verduurzaming	3	-2	1	-1	-2
32	In de huidige overlegstructuren is voldoende ruimte voor creativiteit	-1	-3	-4	-3	-4
33	Omdat het bereiken van akkoorden tussen partijen moeizaam is, zullen op overheidsniveau beslissingen moeten worden genomen	4	1	2	-2	3
34	De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen	-4	3	-1	-4	0
35	De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat nadenken hoe dat het beste kan	-1	0	-1	4	0
36	Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door inzameling, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.	-2	0	1	1	-2
37	Op de luchthaven moet (milieu)ruimte beschikbaar zijn die specifiek gebruikt wordt voor het experimenteren met innovaties	-1	0	0	4	0
38	De wet- en regelgeving moet versoepeld worden om aan het huidige systeem echt iets te kunnen veranderen	0	-3	0	2	1
39	De connectieve functie blijft het hoogste goed van de luchthaven. Niet alleen door de lucht, maar ook de verbindingen met het (economisch) achterland	3	-2	-1	1	-1
40	In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio	1	0	-3	1	0
41	Vliegen zal in de komende 50 jaar steeds duurder worden	1	1	1	3	-1
42	Het Nederlandse luchtruim is groot genoeg om de groei van luchtvaart te faciliteren	2	-4	-2	0	1
43	Overlegorganen moeten zich beperken tot het geven van advies, dat niet per se wordt overgenomen	2	-2	-3	0	4

D

Composite Q-sort and crib sheet factor 1

D.1. Composite Q-sort factor 1

Composite Q sort for Factor 1

-4	-3	-2	-1	0	1	2	3	4
34. De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen	31. De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren	36. Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door toezending, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.	38. De wet- en regelgeving moet versoepeld worden om aan het huidige systeem echt iets te kunnen veranderen	17. Het Nederlandse vliegbeleid heeft ingewerkt, zullen andere landen later versneld volgen.	41. Vliegen zal in de komende 50 jaar steeds duurder worden	42. Het Nederlandse luchtruim is groot genoeg om de groei van luchtvaart te faciliteren	32. De connectieve functie blijft het hoogste goed van de luchthaven. Niet alleen door de lucht, maar ook de verbindingen met het (economisch) achterland	37. In de komende 50 jaar zal door technische ontwikkelingen de overlast van luchtvaart significant verminderen
14. Reizen met het vliegtuig zal steeds meer worden gezien als iets om ja voor te schamen	21. De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederentransport door de lucht afnemen	27. In de toekomst zou de luchthaven de procedure om te komen tot een luchtavenbesluit niet moeten leiden	35. De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en resulteert het idee van duurzaamheid gaat nadeligen hoe dat het beste kan	30. Het verdelen van milieuvrijwilligers tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve manier voor verduurzaming	40. In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio	43. Overlegorganen moeten zich beperken tot het geven van advies, dat niet per se wordt overgenomen	31. Verplichte compensatie van CO2 uitstoot door de luchtvaartsector is een effectieve manier voor verduurzaming	33. Omdat het berekenen van afspraken tussen partijen moeizaam is, zullen op overheidsniveau beslissingen moeten worden genomen
5. Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de polder straks niet meer bestaat	24. Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen	19. Als de afhankelijkheid van groei van de economische groei van de regio achterblijft bij andere regio's als Amsterdam en Eindhoven	12. Voor de toekomst moeten we de luchthaven niet als bestaand instituut beschouwen, maar als regio	22. De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers	11. De publieke houping ten opzichte van de luchtvaart zal veranderen	16. Het is belangrijk dat reguleers de prijsverhoging bij invoering van een vliegbelasting uiteindelijk zullen betalen		
	25. De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschuiven worden naar maatschappelijke/duurzame organisaties.	26. Internationaal zullen er slechts geringe afspraken gemaakt worden over het verminderen van uitstoot	2. Door diversifiëren van internationaal transport zal de betaalbaarheid van de regionale economie afnemen	22. Door op een innovatieve manier met de omgeving om te gaan zal de luchtvaart zich beter kunnen profileren	18. Omwonenden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lasten en lasten ontstaan			
	26. Het zal blijven, dat er geen antwoord is op de toenemende spanning tussen stedelijke ontwikkeling en de ruimte die de luchtvaart vraagt	1. Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld: hogesnelheidsreizen)	8. Bedrijven als Google, Uber en SpaceX zullen internationaal transport met innovatieve handelsreizen	25. De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door het aanbod van luchttransport te beperken	7. Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden			
	37. Op de luchthaven moet (milieu)ruimte beschikbaar zijn die specifiek gebruikt wordt voor het experimenteren met innovaties	13. Het huidige mainport-concept zal in de toekomst niet meer het uitgangspunt zijn	3. Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een alliantie in zee met star/landingsbanen een realistische optie dan uitbreiden van luchthavens op land	6. Uiteindelijk zal door innovaties op het gebied van ICT en robotica de werkgelegenheid op de luchthaven afnemen				
	4. Er moeten andere methoden voor de analyse van beleidsalternatieven van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)	10. Er moet niet te veel vertrouwd worden op toekomstige innovaties op het gebied van gebied en emissies. Er moeten op korte termijn duurzame maatregelen genomen worden	11. In de huidige overlegstructuren is voldoende ruimte voor creativiteit	20. De keuze voor een duurzame luchthaven zal veel nieuwe mogelijkheden generen, de spin-off van alle initiatieven zal enorm zijn				

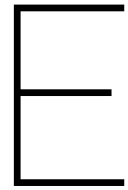
Legend
* Distinguishing statement at P< 0.05
** Distinguishing statement at P< 0.01
▶ z-Score for the statement is higher than in all the other factors
◀ z-Score for the statement is lower than in all the other factors
□ Consensus statement

Figure D.1: Composite Q-sort factor 1

D.2. Crib sheet factor 1

Table D.1: Crib sheet factor 1

Items ranked at +4	
9	In de komende 50 jaar zal door technische ontwikkelingen de overlast van luchtvaart significant verminderen
33	Omdat het bereiken van akkoorden tussen partijen moeizaam is, zullen op overheidsniveau beslissingen moeten worden genomen
Items ranked higher (or equally high) in factor 1 than in other factors	
3	Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een eiland in zee met start/landingsbanen een reëlere optie dan uitbreiden van luchthavens op land
7	Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden
11	De publieke houding ten opzichte van de luchtvaart zal verharderen
16	Het is billijk dat reizigers de prijsverhoging bij invoering van een vliegbelasting uiteindelijk zullen betalen
17	Nadat Nederland een vliegbelasting heeft ingevoerd, zullen andere landen later vanzelf volgen.
25	De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door maatregelen van buitenaf
31	Verplichte compensatie van CO2 uitstoot door de luchtvaartsector is een effectieve prikkel voor verduurzaming
32	In de huidige overlegstructuren is voldoende ruimte voor creativiteit
39	De connectieve functie blijft het hoogste goed van de luchthaven. Niet alleen door de lucht, maar ook de verbindingen met het (economisch) achterland
40	In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio
42	Het Nederlandse luchtruim is groot genoeg om de groei van luchtvaart te faciliteren
Items ranked lower (or equally low) in factor 1 than in other factors	
1	Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidstreinen)
4	Er moeten andere methoden voor de analyse van beleidsopties van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)
5	Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de polder straks niet meer bestaat
15	De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren
21	De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten.
24	Hierdoor zal de vraag naar goederentransport door de lucht afnemen
24	Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen
29	De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties.
35	De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat nadenken hoe dat het beste kan
36	Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door inzameling, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.
37	Op de luchthaven moet (milieu)ruimte beschikbaar zijn die specifiek gebruikt wordt voor het experimenteren met innovaties
2	Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen
30	Het verdelen van milieuwinst tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve prikkel voor verduurzaming
Items ranked at -4	
34	De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen
14	Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen



Composite Q-sort and crib sheet factor 2

E.1. Composite Q-sort factor 2

-4	-3	-2	-1	0	1	2	3	4
42. Het Nederlandse luchtruim is groot genoeg om de groei van luchtvaart te faciliteren	30. De wet- en regelgeving moet versoepeld worden om aan het huidige systeem echt iets te kunnen veranderen	34. Bedrijven als Google, Uber en SpaceX zullen internationaal transport met innovaties herdefiniëren	22. Door op een innovatieve manier met de omgeving om te gaan zal de luchtvaart zich beter kunnen profileren	40. In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio	33. Omdat het beramen van akkoorden tussen partijen moezaam is, zullen op overheidsniveau beslissingen moeten worden genomen	1. Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidstreinen)	32. De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen	31. Er moet niet te veel vertrouwd worden op toekomstige innovaties op het gebied van geluid en emissies. Er moeten op korte termijn duurzame maatregelen genomen worden
38. In de komende 50 jaar zal door technische ontwikkelingen de overmaat van luchtvaart significant verminderen	32. In de huidige overlegstructuren is voldoende ruimte voor creativiteit	39. De connectieve functie blijft het hoogste goed van de luchthaven. Niet alleen door de lucht, maar ook de verbindingen met het (economisch) achterland	12. Voor de toekomst moeten de luchthaven niet als bestaand instituut beschouwen, maar als regio	25. De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door het aanbod van luchttransport te beperken	11. De publieke houding ten opzichte van de luchtvaart zal veranderen	24. Om de afhankelijkheid van groei te doorbreken, zal het verfiensmodel van de luchthaven moeten veranderen	16. Het is belangrijk dat reizigers de privacyverhoging bij invoering van een vliegbelegging uiteindelijk zullen betalen	15. De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwingen in een sneller tempo in te voeren
	19. Als de luchthaven niet kan uitbreiden zal de economische groei van de regio achterblijven bij andere regio's als Amsterdam en Eindhoven	3. Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een efficiënte aanpak met start/landingsbanen een relevante optie dan uitbreiden van luchthavens op land	13. Het huidige mainport-concept zal in de toekomst niet meer het uitgangspunt zijn	27. In de toekomst zou de luchthaven de procedure om te komen tot een luchtvaartbesluit niet moeten leiden	4. Er moeten andere methoden voor de analyse van beleidsalternatieven van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)	6. Uitsluitend zal door innovaties op het gebied van ICT en robotica de werkgelegenheid op de luchthaven afnemen	30. Het verdelven van milieuvet tussen de luchtvaartsector en de omgeving (CO2/NOx) is een effectieve prikkel voor verduurzaming	
		31. Verplichte compensatie van CO2 uitstoot door de luchtvaartsector is een effectieve prikkel voor verduurzaming	7. Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden	28. Het zal blijken, dat er geen antwoord is op de benodende spanning tussen stedelijke ontwikkeling en de ruimte die de luchtvaart vraagt	2. Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen	26. Internationaal zullen er slechts geringe afspraken gemaakt worden over het verminderen van uitstoot		
		43. Overlegorganen moeten zich openstellen tot het geven van advies, dat niet per se wordt overgenomen	0. De keuze voor een duurzame luchthaven zal veel nieuwe mogelijkheden genereren, de spin-off van alle initiatieven zal enorm zijn	17. Nadat Nederland een luchthaven zal veel nieuwe mogelijkheden genereren, de spin-off van alle initiatieven zal enorm zijn	29. De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties	23. De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers		
			21. De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederenvervoer door de lucht afnemen	14. Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen	18. Omstandigheden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lasten en lasten ontstaan			
			5. Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de poster status niet meer bestaat	35. De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en verstuurt het idee van duurzaamheid gaat medeliden hoe dat het beste kan	41. Vliegen zal in de komende 50 jaar steeds duurder worden			
				36. Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door inzet van distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.				
				37. Op de luchthaven moet (milieu)juridische beschikbare zijn die specifiek gebruikt wordt voor het experimenteren met innovatie				

Legend

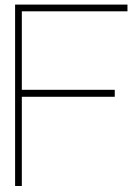
- * Distinguishing statement at P < 0.05
- ** Distinguishing statement at P < 0.01
- ▶ z-Score for the statement is higher than in all the other factors
- ◀ z-Score for the statement is lower than in all the other factors
- Consensus statement

Figure E.1: Composite Q-sort factor 2

E.2. Crib sheet factor 2

Table E.1: Crib sheet factor 2

Items ranked at +4	
9	In de komende 50 jaar zal door technische ontwikkelingen de overlast van luchtvaart significant verminderen
33	Omdat het bereiken van akkoorden tussen partijen moeizaam is, zullen op overheidsniveau beslissingen moeten worden genomen
Items ranked higher (or equally high) in factor 1 than in other factors	
3	Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een eiland in zee met start/landingsbanen een reëlere optie dan uitbreiden van luchthavens op land
7	Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden
11	De publieke houding ten opzichte van de luchtvaart zal verharderen
16	Het is billijk dat reizigers de prijsverhoging bij invoering van een vliegbelasting uiteindelijk zullen betalen
17	Nadat Nederland een vliegbelasting heeft ingevoerd, zullen andere landen later vanzelf volgen.
25	De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door maatregelen van buitenaf
31	Verplichte compensatie van CO2 uitstoot door de luchtvaartsector is een effectieve prikkel voor verduurzaming
32	In de huidige overlegstructuren is voldoende ruimte voor creativiteit
39	De connectieve functie blijft het hoogste goed van de luchthaven. Niet alleen door de lucht, maar ook de verbindingen met het (economisch) achterland
40	In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio
42	Het Nederlandse luchtruim is groot genoeg om de groei van luchtvaart te faciliteren
Items ranked lower in factor 1 than in other factors	
1	Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidstreinen)
4	Er moeten andere methoden voor de analyse van beleidsopties van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)
5	Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de polder straks niet meer bestaat
15	De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren
21	De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten.
24	Hierdoor zal de vraag naar goederentransport door de lucht afnemen
24	Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen
29	De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties.
35	De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat nadenken hoe dat het beste kan
36	Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door inzameling, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.
37	Op de luchthaven moet (milieu)ruimte beschikbaar zijn die specifiek gebruikt wordt voor het experimenteren met innovaties
2	Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen
30	Het verdelen van milieuwinst tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve prikkel voor verduurzaming
Items ranked at -4	
34	De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen
14	Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen



Composite Q-sort and crib sheet factor 3

F.1. Composite Q-sort factor 3

-4	-3	-2	-1	0	1	2	3	4
42. Het Nederlandse luchtruim is groot genoeg om de groei van luchtvaart te faciliteren	30. De wet- en regelgeving moet versoepeld worden om aan het huidige systeem echt iets te kunnen veranderen	34. Bedrijven als Google, Uber en SpaceX zullen internationaal transport met innovaties herdefiniëren	22. Door op een innovatieve manier met de omgeving om te gaan zal de luchtvaart zich beter kunnen profileren	40. In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio	33. Omdat het bereik van vliegtuigen zal toenemen, zullen op oververhitte bestemmingen maatregelen moeten worden genomen	1. Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidstreinen)	37. De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen	32. Er moet niet te veel vertrouwd worden op toekomstige innovaties op het gebied van geluid en emissies. Er moeten op korte termijn duurzame maatregelen genomen worden
38. In de komende 50 jaar zal door technische ontwikkelingen de overmaat van luchtvaart significant verminderen	32. In de huidige overlegstructuren is voldoende ruimte voor creativiteit (economisch) achterland	39. De connectieve functie blijft het hoogste goed van de luchthaven. Niet alleen door de lucht, maar ook de verbindingen met het (economisch) achterland	12. Voor de toekomst moeten we de luchthaven niet als bestaand instituut beschouwen, maar als regio	25. De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door het aanbod van luchttransport te beperken	11. De publieke houding ten opzichte van de luchtvaart zal veranderen	24. Om de afhankelijkheid van groei te doorbreken, zal het verspreiden van de luchthaven moeten veranderen	16. Het is belangrijk dat reizigers de privacyverhoging bij invoering van een vliegbelegging uiteindelijk zullen betalen	15. De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren
	10. Als de luchthaven niet kan uitbreiden zal de economische groei van de regio achterblijven bij andere regio's als Amsterdam en Eindhoven	3. Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een vliegveld in zee met start/landingsbanen een realistische optie dan uitbreiden van luchthavens op land	13. Het huidige mainport-concept zal in de toekomst niet meer het uitgangspunt zijn	27. In de toekomst zou de luchthaven de procedure om te komen tot een luchtbeveiliging niet moeten leiden	4. Er moeten andere methoden voor de analyse van beleidsalternatieven van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)	6. Uiteindelijk zal door ICT en robotica de werkloosheid op de luchthaven afnemen	36. Het verspreiden van milieuwet tussen de luchtvaartsector en de omgeving (CO2/NOx regel) is een effectieve prikkel voor verduurzaming	
		31. Verplichte compensatie van CO2 uitstoot door de luchtvaartsector is een effectieve prikkel voor verduurzaming	7. Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden	28. Het zal blijken, dat er geen antwoord is op de benodende spanning tussen stedelijke ontwikkeling en de ruimte die de luchtvaart vraagt	2. Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen	26. Internationaal zullen er slechts geringe afspraken gemaakt worden over het verminderen van uitstoot		
		43. Overlegorganen moeten zich openstellen tot het geven van advies, dat niet per se wordt overgenomen	0. De keuze voor een duurzame luchtvaart zal veel nieuwe mogelijkheden genereren, de spin-off van alle initiatieven zal enorm zijn	17. Nadat Nederland een vliegveld heeft ingevoerd, zullen andere landen later vanzelf volgen	29. De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschuiven naar maatschappelijke/duurzame organisaties	23. De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers		
			21. De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederenvervoer door de lucht afnemen	14. Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen	18. Omstandigheden moeten (financieel) gecompenseerd worden voor de overstap van luchtvaart, zo zal een eerlijke verdeling van kosten en lasten ontstaan			
			5. Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de poster status niet meer bestaat	35. De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en verstuurt het idee van duurzaamheid gaat medeliden hoe dat het beste kan	41. Vliegen zal in de komende 50 jaar steeds duurder worden			
				36. Luchthavenregio's zullen hun huidige functie gebruiken om in circulariteit te voorzien, door inzet van distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.				
				37. Op de luchthaven moet (milieu)juridische beschikbare zijn die specifiek gebruikt wordt voor het experimenteren met innovatie				

Legend

- * Distinguishing statement at P< 0.05
- ** Distinguishing statement at P< 0.01
- ▶ z-Score for the statement is higher than in all the other factors
- ◀ z-Score for the statement is lower than in all the other factors
- Consensus statement

Figure F.1: Composite Q-sort factor 3

F.2. Crib sheet factor 3

Table E1: Crib sheet factor 3

Items ranked at +4	
1	Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidstreinen)
24	Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen
Items ranked higher (or equally high) in factor 3 than in other factors	
3	Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een eiland in zee met start/landingsbanen een reëlere optie dan uitbreiden van luchthavens op land
6	Uiteindelijk zal door innovaties op het gebied van ICT en robotica de werkgelegenheid op de luchthaven afnemen
7	Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden
8	Bedrijven als Google, Uber en SpaceX zullen internationaal transport met innovaties herdefiniëren
21	De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederentransport door de lucht afnemen
22	Door op een innovatieve manier met de omgeving om te gaan zal de luchthaven zich beter kunnen profileren
23	De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers
29	De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties.
12	Voor de toekomst moeten we de luchthaven niet als losstaand instituut beschouwen, maar als regio
27	In de toekomst zou de luchthaven de procedure om te komen tot een luchthavenbesluit niet moeten leiden
Items ranked lower (or equally low) in factor 3 than in other factors	
2	Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen
11	De publieke houding ten opzichte van de luchtvaart zal verharderen
13	Het huidige mainport-concept zal in de toekomst niet meer het uitgangspunt zijn
18	Omwonenden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lusten en lasten ontstaan.
19	Als de luchthaven niet kan uitbreiden zal de economische groei van de regio achterblijven bij andere regio's als Amsterdam en Eindhoven
25	De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door maatregelen van buitenaf
26	Internationaal zullen er slechts geringe afspraken gemaakt worden over het verminderen van uitstoot
30	Het verdelen van milieuwinst tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve prikkel voor verduurzaming
35	De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat nadenken hoe dat het beste kan
40	In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio
43	Overlegorganen moeten zich beperken tot het geven van advies, dat niet per se wordt overgenomen
Items ranked at -4	
17	Nadat Nederland een vliegbelasting heeft ingevoerd, zullen andere landen later vanzelf volgen.
32	In de huidige overlegstructuren is voldoende ruimte voor creativiteit



Composite Q-sort and crib sheet factor 4

G.1. Composite Q-sort factor 4

Composite Q sort for Factor 5

-4	-3	-2	-1	0	1	2	3	4
34. De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen	27. In de toekomst zou de luchthaven de procedure om te komen tot een luchthavenbesluit niet moeten leiden	22. Omdat het bereiken van akkoorden tussen partijen moeitzaam is, zullen op overheidsniveau beslissingen moeten worden genomen	21. De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederentransport door de lucht afnemen	14. Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen	36. Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door toezetting, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.	8. Bedrijven als Google, Uber en SpaceX zullen internationaal transport met innovatieve methoden	12. Voor de toekomst moeten we de luchthaven niet als lastendragend instituut beschouwen, maar als regio	37. Op de luchthaven moet de specifieke gebruikte werf voor het sportmenere met innovaties
3. Voor een groter internationaal aanbod in de luchtvaart op de lange termijn, is een eiland in zee met start/landingsbaan een realere optie dan uitbreiden van luchthavens op land	32. In de huidige overlegstructuren is voldoende ruimte voor creativiteit	23. De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers	25. De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door het aanbod van luchttransport te beperken	13. Het huidige malport-concept zal in de toekomst niet meer het uitgangspunt zijn	4. De connectieve functie blijft het hoogste goed van de luchthaven. Het elken door de verbindingen met het (economisch) achterland	11. De publieke houding ten opzichte van de luchtvaart zal veranderen	41. Vliegen zal in de komende 50 jaar steeds duurder worden	38. De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat nadenken hoe dat het beste is
28. Het zal blijken, dat er geen antwoord is op de toenemende spanning tussen ecologische ontwikkeling en de ruimte die de luchtvaart vraagt	5. Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de palder straks niet meer bestaat	18. Omrononden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lasten en lasten ontstaan	18. Omrononden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lasten en lasten ontstaan	2. Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen	1. Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidsreizen)	38. De wet- en regelgeving moet verspeeld worden om aan het huidige systeem echt iets te kunnen veranderen	22. Door op een innovatieve manier met de omgeving om te gaan zal de luchthaven zich beter kunnen profileren	
		31. Er moet niet te veel vertrouwd worden op toekomstige innovaties op het gebied van gebied en emissies. Er moeten op korte termijn duurzame maatregelen genomen worden	31. Verplichte compensatie van CO2 uitloot door de luchtvaartsector is een effectieve prikkel voor verduurzaming	42. Het Nederlandse luchtvaart is groot genoeg om de groei van luchtvaart te faciliteren	30. Het verdelen van milieulast tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve prikkel voor verduurzaming	4. Er moeten andere methoden voor de analyse van beleidsalternatieven van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)		
	17. Nadat Nederland een vliegbelegging heeft ingevoerd, zullen andere landen later vanceer volgen.	26. Internationaal zullen er slechts perifeer afspraken gemaakt worden over het verbinden van uitloot	15. De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren	15. De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren	15. Als de luchthaven niet kan uitbreiden zal de economische groei van de regio achterblijven bij andere regio's als Amsterdam en Eindhoven	20. De keuze voor een duurzame luchthaven zal veel nieuwe mogelijkheden genereren, de spin-off van alle initiatieven zal enorm zijn		
		9. In de komende 50 jaar zal door technische ontwikkelingen de overlast van luchtvaart significant verminderen	24. Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen	24. Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen	40. In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio			
		7. Door innovaties zoals drone en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden	16. Het is belangrijk dat reizigers de privacywoning bij invoering van een vliegbelegging uiteindelijk zullen betalen	29. De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties.				
			43. Overlegorganen moeten zich beperken tot het geven van advies, dat niet per se wordt overgenomen	6. Uiteindelijk zal door innovaties op het gebied van ICT en robotica de werkplegeleghed op de luchthaven afnemen				

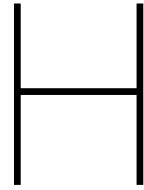
Legend
* Distinguishing statement at P< 0.05
** Distinguishing statement at P< 0.01
▶ z-Score for the statement is higher than in all the other factors
◀ z-Score for the statement is lower than in all the other factors
□ Consensus statement

Figure G.1: Composite Q-sort factor 4

G.2. Crib sheet factor 4

Table G.1: Crib sheet factor 4

Items ranked at +4	
35	De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat nadenken hoe dat het beste kan
37	Op de luchthaven moet (milieu)ruimte beschikbaar zijn die specifiek gebruikt wordt voor het experimenteren met innovaties
Items ranked higher (or equally high) in factor 4 than in other factors	
11	De publieke houding ten opzichte van de luchtvaart zal verharderen
14	Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen
19	Als de luchthaven niet kan uitbreiden zal de economische groei van de regio achterblijven bij andere regio's als Amsterdam en Eindhoven
20	De keuze voor een duurzame luchthaven zal veel nieuwe mogelijkheden genereren, de spin-off van alle initiatieven zal enorm zijn
22	Door op een innovatieve manier met de omgeving om te gaan zal de luchthaven zich beter kunnen profileren
29	De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties.
36	Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door inzameling, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.
38	De wet- en regelgeving moet versoepeld worden om aan het huidige systeem echt iets te kunnen veranderen
40	In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio
41	Vliegen zal in de komende 50 jaar steeds duurder worden
12	Voor de toekomst moeten we de luchthaven niet als losstaand instituut beschouwen, maar als regio
14	Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen
21	De vraag naar regionale producten neemt toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederentransport door de lucht afnemen
35	De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat nadenken hoe dat het beste kan
Items ranked lower (or equally low) in factor 4 than in other factors	
7	Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden
10	Er moet niet te veel vertrouwd worden op toekomstige innovaties op het gebied van geluid en emissies. Er moeten op korte termijn duurzame maatregelen genomen worden
16	Het is billijk dat reizigers de prijsverhoging bij invoering van een vliegbelasting uiteindelijk zullen betalen
18	Omwonenden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lusten en lasten ontstaan
23	De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers
27	In de toekomst zou de luchthaven de procedure om te komen tot een luchthavenbesluit niet moeten leiden
28	Het zal blijken, dat er geen antwoord is op de toenemende spanning tussen stedelijke ontwikkeling en de ruimte die de luchtvaart vraagt
33	Omdat het bereiken van akkoorden tussen partijen moeizaam is, zullen op overheidsniveau beslissingen moeten worden genomen
2	Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen
Items ranked at -4	
3	Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een eiland in zee met start/landingsbanen een reëelere optie dan uitbreiden van luchthavens op land
34	De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen



Composite Q-sort and crib sheet factor 5

H.1. Composite Q-sort factor 5

Composite Q sort for Factor 5

-4	-3	-2	-1	0	1	2	3	4
34. De luchthaven zou niet verder moeten groeien, dit is de enige mogelijkheid om duurzaamheid te bewerkstelligen	27. In de toekomst zou de luchthaven de procedure om te komen tot een luchthavenbesluit niet moeten leiden	30. Om het bereik van akkoorden tussen partijen maximaal te maken op overheidsniveau beslissingen moeten worden genomen	21. De vraag naar regionale producten moet toe en export bestaat steeds meer uit diensten. Hierdoor zal de vraag naar goederenvervoer door de lucht afnemen	14. Reizen met het vliegtuig zal steeds meer worden gezien als iets om je voor te schamen	36. Luchthavenregio's zullen hun huidige functie gebruiken om in de toekomst te worden, door inzameling, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.	8. Bedrijven als Google, Uber en SpaceX zullen internationaal transport met innovaties herdefiniëren	12. Voor de toekomst moeten we de luchthaven niet als bestaand hebben beschouwen, maar als regio	37. De luchthaven moet (milieu)juiste beschikbaar zijn die specifiek gebruikt wordt voor het experimenteren met innovaties
3. Voor een groter internationaal aandeel in de luchtvaart op de lange termijn, is een eiland in zee met start/landingsbanen een realistische optie dan uitbreiden van luchthavens op land	32. In de huidige overlegstructuren is voldoende ruimte voor creativiteit	23. De luchthaven moet meer mogelijkheden hebben om te selecteren op soorten vluchten en passagiers	25. De luchtvaartsector moet met eigen middelen duurzaamheid bewerkstelligen, niet door het aanbod van luchttransport te beperken	13. Het huidige matroport-concept zal in de toekomst niet meer het uitgangspunt zijn	9. De connectieve functie blijft het hoogste goed van de luchthaven. Niet alleen door de lucht, maar ook de verbindingen met het (economisch) achterland	11. De publieke houding ten opzichte van de luchtvaart zal veranderen	41. Vliegen zal in de komende 50 jaar steeds duurder worden	33. De luchthaven zal een platform worden dat niet alleen over vliegtuigtransport gaat, maar over alle vormen van transport en vanuit het idee van duurzaamheid gaat raden hoe dat het beste is
28. Het zal blijken, dat er geen antwoord is op de toenemende spanning tussen stedelijke ontwikkeling en de ruimte die de luchtvaart vraagt	5. Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de toekomst straks niet meer bestaat	18. Omwonenden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lasten en lasten ontstaan	18. Omwonenden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lasten en lasten ontstaan	2. Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen	1. Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidsreizen)	38. De wet- en regelgeving moet versimpeld worden om aan te sluiten met de omgeving om te gaan met de luchthaven zich beter kunnen profileren	22. Door op een innovatieve manier met de omgeving om te gaan zal de luchthaven zich beter kunnen profileren	
	16. Er moet niet te veel vertrouwd worden op toekomstige innovaties op het gebied van gebied en emissies. Er moeten op korte termijn duurzame maatregelen genomen worden	31. Verplichte compensatie van CO2 uitloot door de luchtvaartsector is een effectieve prikkel voor verduurzaming	42. Het Nederlandse luchtruim is groot genoeg om de groei van luchtvaart te faciliteren	30. Het verdelen van milieukosten tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve prikkel voor verduurzaming	4. Er moeten andere methoden voor de analyse van beleidsalternatieven van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)			
	17. Niet Nederland een vliegbasis heeft. Ingevoerd, zullen andere landen later succes volgen.	26. Internationaal zullen er slechts periferie afspraken gemaakt worden over het verbinden van uitloot	15. De luchtvaartsector zal in de toekomst niet in staat zijn om technologische vernieuwing in een sneller tempo in te voeren	13. Als de luchthaven niet kan uitbreiden zal de economische groei van de regio achterblijven bij andere regio's als Amsterdam en Eindhoven	20. De keuze voor een duurzame luchthaven zal veel nieuwe mogelijkheden genereren, de spin-off van alle initiatieven zal enorm zijn			
		9. In de komende 50 jaar zal door technische ontwikkelingen de overlast van luchtvaart significant verminderen	24. Om de afhankelijkheid van groei te doorbreken, zal het verdienmodel van de luchthaven moeten veranderen	40. In de toekomst zal de nabijheid van een luchthaven belangrijk zijn voor de regio				
		7. Door innovaties zoals drones en vliegende auto's zal luchttransport steeds vaker op andere locaties dan luchthavens plaatsvinden	16. Het is belangrijk dat reizigers de privacyverhoging bij invoering van een vliegbelasting uiteindelijk zullen betalen	29. De besturing van de luchtvaart wordt te veel vormgegeven door economische/technische organisaties, dit zal moeten verschuiven naar maatschappelijke/duurzame organisaties.				
			43. Overlegorganen moeten zich beperken tot het geven van advies, dat niet per se wordt overgenomen	6. Uiteindelijk zal door innovaties op het gebied van ICT en robotica de werkgelegenheid op de luchthaven afnemen				

Legend

- * Distinguishing statement at P< 0.05
- ** Distinguishing statement at P< 0.01
- ▶ z-Score for the statement is higher than in all the other factors
- ◀ z-Score for the statement is lower than in all the other factors
- Consensus statement

Figure H.1: Composite Q-sort factor 5

H.2. Crib sheet factor 5

Table H.1: Crib sheet factor 5

Items ranked at +4	
26	Internationaal zullen er slechts gering afspraken gemaakt worden over het verminderen van uitstoot
43	Overlegorganen moeten zich beperken tot het geven van advies, dat niet per se wordt overgenomen
Items ranked higher (or equally high) in factor 5 than in other factors	
4	Er moeten andere methoden voor de analyse van beleidsalternatieven van de luchthaven gebruikt worden (bijvoorbeeld Social Impact Assessment)
11	De publieke houding ten opzichte van de luchtvaart zal verharderen
13	Het huidige mainport-concept zal in de toekomst niet meer het uitgangspunt zijn
18	Omwonenden moeten (financieel) gecompenseerd worden voor de overlast van luchtvaart, zo zal een eerlijke verdeling van lusten en lasten ontstaan
29	De besturing van de luchtvaart wordt te veel vormgegeven door economische/technocratische organisaties, dit zal moeten verschoven worden naar maatschappelijke/duurzame organisaties.
26	Internationaal zullen er slechts gering afspraken gemaakt worden over het verminderen van uitstoot
Items ranked lower (or equally low) in factor 5 than in other factors	
1	Luchttransport zal zo veel mogelijk door andere vormen van transport moeten worden vervangen (bijvoorbeeld hogesnelheidstreinen)
5	Door klimaatverandering en het stijgen van de zeespiegel bestaat de kans dat de luchthaven op de huidige plek in de polder straks niet meer bestaat
6	Uiteindelijk zal door innovaties op het gebied van ICT en robotica de werkgelegenheid op de luchthaven afnemen
20	De keuze voor een duurzame luchthaven zal veel nieuwe mogelijkheden genereren, de spin-off van alle initiatieven zal enorm zijn
30	Het verdelen van milieuwinst tussen de luchtvaartsector en de omgeving (50/50 regel) is een effectieve prikkel voor verduurzaming
31	Verplichte compensatie van CO2 uitstoot door de luchtvaartsector is een effectieve prikkel voor verduurzaming
36	Luchthavenregio's zullen hun hub functie gebruiken om in circulariteit te voorzien, door inzameling, distributie en verwerking van grondstoffen, afval, water, voedsel, energie etc.
41	Vliegen zal in de komende 50 jaar steeds duurder worden
2	Door diversifiëren van internationaal transport zal de kwetsbaarheid van de regionale economie afnemen
Items ranked at -4	
32	In de huidige overlegstructuren is voldoende ruimte voor creativiteit
17	Nadat Nederland een vliegbelasting heeft ingevoerd, zullen andere landen later vanzelf volgen.