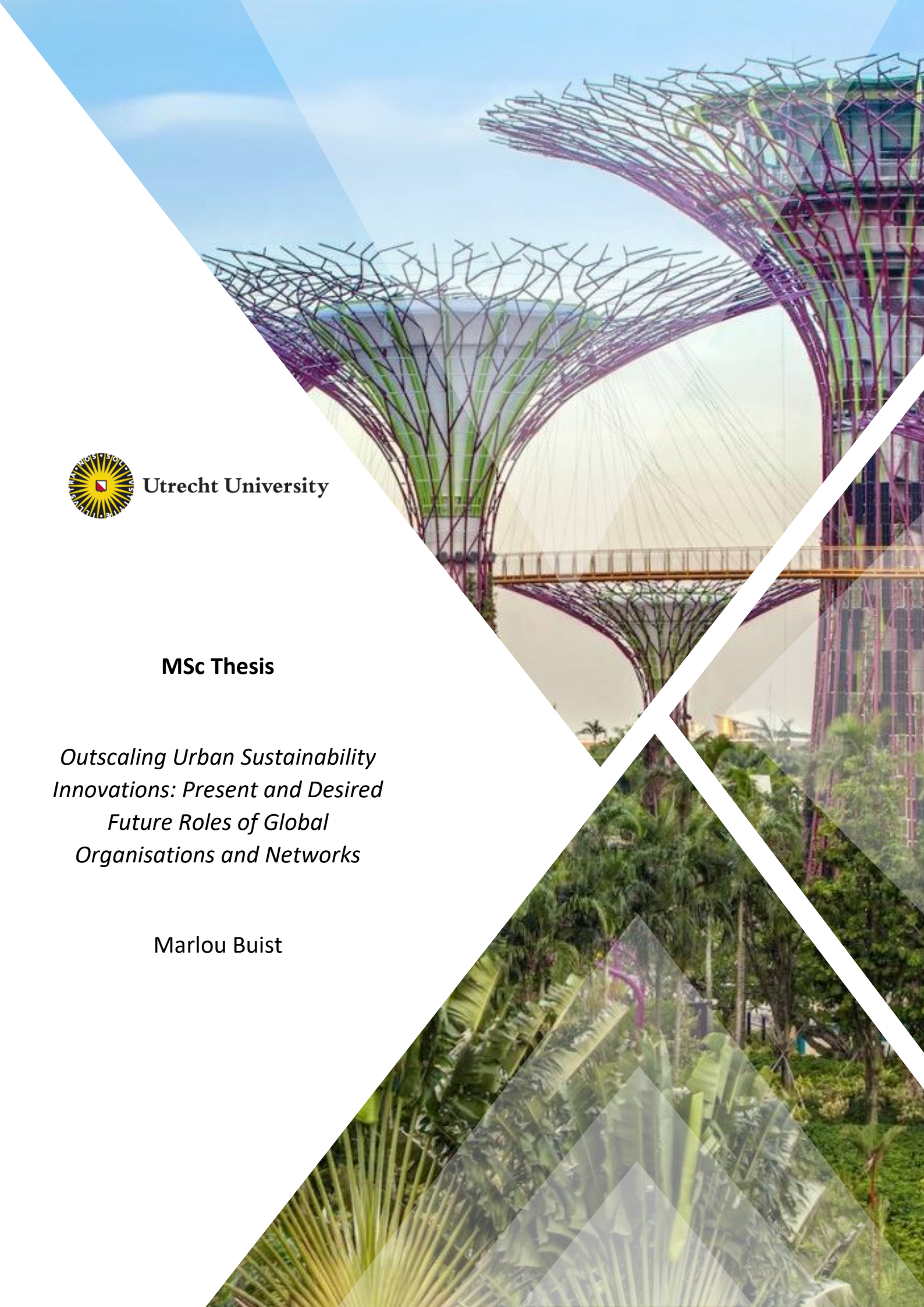

Utrecht University

MSc Thesis

Outscaling Urban Sustainability Innovations: Present and Desired Future Roles of Global Organisations and Networks

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Summary

In order to take on the sustainability challenges of the Anthropocene, transformative innovations need to be scaled along different pathways. While global organisations and networks operate at a scale and with a mandate which can contribute to generating sustainability transitions at large, the roles they fulfil and the limitations of these roles are not well understood. Notably, existing research has been confined to the study of (particular) roles of organisations or networks in scaling processes within local or regional contexts, leaving the global context mostly out of scope. To fill this gap, this thesis contributes a pragmatic understanding of the present roles and desired future roles of global organisations and networks involved in the outscaling of innovations. This is applied to the urban setting.

To analyse current shortcomings and future desired roles, this thesis first develops a theoretical and conceptual framework of the different types of roles and global organisations and networks involved in outscaling urban sustainability innovations, based on existing transitions literature and extended with findings of an empirical inquiry into existing organisations and networks operative in this field. Using the findings of the empirical inquiry, barriers to outscaling innovations as well as desired future roles of global are outlined, and contextualized within the current state of understanding of these topics.

The thesis' main findings are threefold. First, it is found that there are many different roles at play in outscaling urban innovations, fulfilled by a myriad of different type of global organisations and networks. Moreover, global organisations and networks involved in scaling urban innovations are highly dependent on each other when it comes to successfully scaling out innovations. The barriers to success around present roles on the one hand and desired future roles on the other are therefore closely connected, and mostly hinge around topics of (a lack of) pro-activity and (financial) cooperation. This thesis ends with practical recommendations for actors involved in outscaling innovations, as well as recommendations for further research.

Key words: outscaling; global organisations and networks; roles; desired future roles; urban sustainability

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1. Introduction

The onset of the Anthropocene has brought with it a myriad of complex issues. Climate change, biodiversity loss, and rising sea levels are amongst some of the big problems related to the Anthropocene. Scientists have warned for the dire consequences of a continuance of humans' harmful behaviour; society is close to reaching tipping points that, once passed, threaten the well-being of current and future generations. It is apparent that global transformative change is needed to overcome present issues.

In order to achieve transformative change, social, economic, technological and social-ecological innovations need to be scaled along different pathways. Transformation research offers useful insights as to how such scaling may take place, as it concerns itself with the study of why, how and where transformations occur - of which scaling forms an inherent part (Patterson et al., 2017; Lam et al., 2019).

It has been recognized that scaling results from the interaction of many different types of actors (Farla, Markard, Raven, & Coenen, 2012). Remarkably, existing research has largely remained confined to the study of (particular) roles of organisations or networks in scaling processes within local or regional contexts. Thereby, the global context is mostly left out of scope.

By leaving the global context out of scope, the roles that many types of actors fulfil in outscaling innovations are not fully understood. Applying a global lens to the study of the roles of actors in outscaling innovations allows for the incorporation of different types of organisations and networks involved in scaling processes that only become visible at the global level. Thereby, the current knowledge of the roles of actors in scaling processes can be expanded.

Understanding the roles fulfilled by global organisations and networks is furthermore important, as global organisations and networks operate at a scale and with a mandate of large impact. Creating a deeper understanding of the roles and the factors influencing how global organisations and networks support outscaling processes is important in guiding them to contribute more successfully to a good Anthropocene.

This thesis therefore aims to contribute a pragmatic understanding of the present roles as well as desired future roles of global organisations and networks involved in outscaling innovative practices. To do this, it will firstly address the previously outlined research gaps in the field of transformation research by synthesizing knowledge on actor typologies and roles of actors involved in outscaling sustainability innovations. Secondly, it will apply that knowledge to global organisations and networks involved in scaling innovations, to validate, revise and extend current framing.

To focus the scope of the thesis, it will mainly consider global organisations and networks involved in the urban context. As the world is urbanizing, the percentage of the global population living in cities will rise from 55% in 2018 to 68% by 2050 (United Nations, 2018). As such, the urban context is recognized to provide an increasingly important stage in contributing towards sustainable development (Peng, Wei, & Bai, 2019).

However, by no means this is a *fait accompli*. The city is a perfect dichotomy of the challenges of sustainable development (Goff, n.d.). While on the one hand cities are a source of innovation and change, they also bring about many of the (interlinked) social, economic and environmental challenges related to sustainability (McPhearson, Iwaniec, & Bai, 2016). Global organisations and networks are well equipped to address the challenges of outscaling sustainability innovations across the globe.

While urban sustainability transformations have generated the interest of many scholars in the field of transition studies (see for example McCormick, Anderberg, Coenen, & Neija (2013), McPhearson et al. (2016), and Peng, Wei, & Bai (2019)), none of these contributions have attempted to operationalize the different roles of scaling agents in a global urban innovation context, which is the third literature gap this thesis wishes to address.

The topics of urban food security and climate change adaptation have been chosen as particular focus areas for this research. Both (related) topics deal with the interlinked set of social, economic and environmental dimensions of sustainable development, and can be mutually reinforcing in leading the transition to resilient, low-carbon cities. Furthermore, these issues have been enshrined under Sustainable Development Goal 2 (SDG 2- zero hunger) and SDG 13 (take urgent action to combat climate change and its impacts) as pivotal focal points towards sustainability. Therefore, they make an important research focus.

As there are many global organisations and networks involved in these areas, both the research community as well as those organisations involved have much to gain from a deeper understanding in the (desired future) roles that these organisations play. Following Olsson, Moore, Westley, and McCarthy (2017) it is important not only to consider scaling the numbers, but also that the innovations in question address the "scales that matter". This in turn is of the highest interest for society.

1.1 Research objective and research questions

The objective of this thesis is to understand the present roles and desired future roles of global organisations and networks involved in the outscaling of urban sustainability innovations. I will do this by (1) analysing and (cross) comparing the capacities of various global networks and organisations involved in outscaling practices in the field of urban sustainability, and by (2) exploring the drivers and barriers in these global organisations' and networks' abilities to outscale these innovations successfully to (3) understand how these organisations can overcome such barriers to successfully co-create lasting socio-ecological change.

The main research question derived from these research objectives is as follows:

- What present and desired future roles and factors influence how global organisations and networks support the outscaling of urban sustainability innovations?

This research question ties into various important aspects. First, a focus on both global organisations as well as networks allows the research to focus on a more diverse set of actors involved in outscaling urban sustainability innovations. Furthermore, the focus on the factors influencing the scaling processes of global organisations and networks allows for a deeper understanding and exploration of effective transformation mechanisms. Combined with the thesis' future outlook, this is also useful to the researched community.

The sub-questions supporting the main research question are:

1. Which types of global organisations and networks exist that are focused on outscaling urban sustainability innovations?
2. What functions do these global organisations and networks fulfil in outscaling urban sustainability innovations?
3. Which factors influence the ability of these global organisations and networks to contribute to the successful outscaling of urban sustainability innovations?
4. What would be the desired future roles of global organisations and networks that are focused on outscaling urban sustainability innovations?

All these sub-questions support the main research question. Sub-question 1 allows for an exploration of the different actors involved in outscaling practices. As stated, by including both organisations and networks, a wider consideration can be given to the different type of actors involved in outscaling practices. That is beneficial for the wider findings of the research, as it allows for a more comprehensive review. Sub-question 2 requires both a conceptualisation of outscaling practices, as well as an integrated operationalization of the exercise thereof. Combined, sub-question 1 and 2 serve as the groundwork for the empirical part of this research – semi-structured interviews with a selection of organisations and networks that are operative in the field of scaling urban food security or urban climate adaptation innovations.

Sub-question 3 intends to consider both quantitative and qualitative barriers in the organisations' and networks' ability to outscale innovative practices. Sub-question 4 finally, intends to outline the needs to overcome the barriers found with the help of sub-question 3 by providing an outlook in future desired roles of global organisations and networks involved in scaling urban sustainability innovations.

1.2 Report structure

The structure of the remainder of this thesis is set up as follows. Chapter 2 will delve into the theoretical components of actor typology and functions, giving rise to the analytical framework presented in section 2.7. The empirical application thereof, as well as other methodological concerns of this thesis are explained in chapter 3. The results of the interviews conducted for this research are presented in chapter 4, structured according to three different topics: functions, barriers and desired future roles – conforming to the topics of sub-question 2, 3 and 4. The results are considered in a wider academic and societal context in the discussion, in chapter 5. This flows to the conclusion presented in chapter 6.

Figure 1 illustrates this set-up.

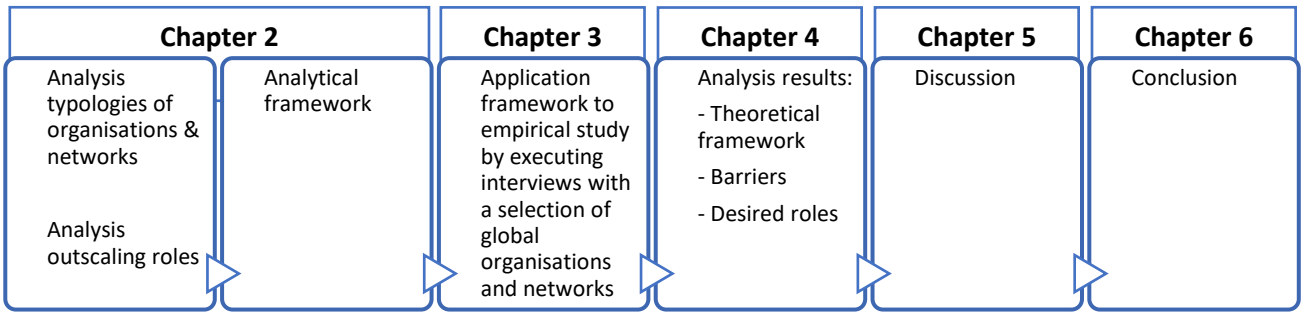

Figure 1: Research framework

2. Theoretical and conceptual framework

In order to fully understand the roles of global organisations and networks involved in outscaling urban sustainability innovations, there is a need to contextualize this topic in the broader setting it engages with. Furthermore, it is important to define the key concepts used in this thesis, in order to create a clear understanding of its main findings. Therefore, this chapter provides a theoretical background with clarifications on the concepts used in this thesis. Additionally, the concepts are operationalized in the form of an analytical framework, in order to prepare for the empirical part of this thesis.

This chapter starts with a short consideration of transformation studies and the Multi-level Perspective (section 2.1), and will zoom in further on topics of scaling (section 2.2), and agency of scaling agents (section 2.3), before integrating this knowledge into a typology of global organisations and networks (section 2.4). Furthermore, this chapter reflects on the different functions fulfilled by outscaling agents based on the analytical framework presented in table 2 in this chapter (section 2.5 - 2.7). The chapter ends with a short consideration of the application of the analytical framework (section 2.8).

2.1 Transformation studies and the Multi-level Perspective

Outscaling is a topic that is researched within the field of transformation studies. As the name already implies, the field of transformation studies concerns itself with understanding how and why transformations occur (Patterson et al., 2017). A general understanding of sustainability transformations is that the concept refers to structural changes in social(-technical)-ecological systems, giving rise to new dynamics of interaction and outcomes towards greater sustainability (Lam et al., 2019; Patterson et al., 2017).

Transformation studies harbours many different conceptual approaches that account for how transformations are generated. One particular such an approach is transitions thinking (Feola, 2015). Transitions scholars concern themselves with the study of specific shifts in societal sub-systems, such as cities (Hölscher, Wittmayer & Loorbach, 2018).

Within transitions theory, the Multi-Level Perspective (MLP) is a well-established framework that has been developed to analyse transitions (Geels, 2011). The MLP provides a good starting point from which to conceptualize some of the concepts used in this thesis.[1]

According to the MLP, transitions occur as the result of the interplay between established societal structures with disruptive innovations. This interplay is shaped by a non-linear, multi-level process, visualized in figure 2 on the next page (Geels, 2002, 2011).

The three levels that are outlined in the MLP are:

- The socio-technical landscape
- The socio-technical regime
- The niche-innovations

Each level resembles a different degree of stability with a congruent depth of network of actors re-iterating the practices related to it (Geels, 2011). The landscape makes up the deepest level of alignments in society. It is thought to be rigid and long-lasting (van den Bergh, Truffer, & Kallis, 2011). The regime reflects society's established rules and traditions, and thereby reflects the predominant

[1] While the MLP is used as departing point from which to introduce some of the concepts throughout this thesis, the results presented in this thesis are not dependent on the MLP for their validity. At the same time, some of the criticism on the MLP is specifically used to strengthen the understanding of the roles of scaling actors in scaling processes, such as is done with the debate over agency in the MLP in section 2.3 of this thesis.

relation between logic and direction of a society (Geels, 2011; van den Bergh et al., 2011). Because of its relative rigidity, most changes to society are predetermined to develop incrementally within the regime. However, within the niche, "the locus for radical innovations" (Geels, 2011, p. 26), disruptive ideas and concepts develop. These disruptive ideas and concepts are known as innovations.

Innovations embody an assortment of worldviews, principles and regions that differ from conventional ways of thinking and doing, but are not (yet) leading in the world (Bennett et al., 2016). Innovations can be tangible, coming in the shape of an actual product, but can also be non-tangible. For example, an innovation may transform the processes through which products or services are developed and distributed, or change the context within which they are produced (Bessant & Tidd, 2007). When referring to 'innovations' as is done in this thesis, it is to this description that is being referred to.

According to the MLP, niche-innovations have the ability to transform the regime when they 'take-off' from the niche and start to interact with the regime. If they breakthrough and stabilize into the regime, transformation is completed (Kemp & Loorbach, 2006). While the visualization of the MLP reflected in figure 2 gives the impression as though the niche is situated explicitly outside of the regime, niches may originate from within the regime as well (Wigboldus et al., 2016).

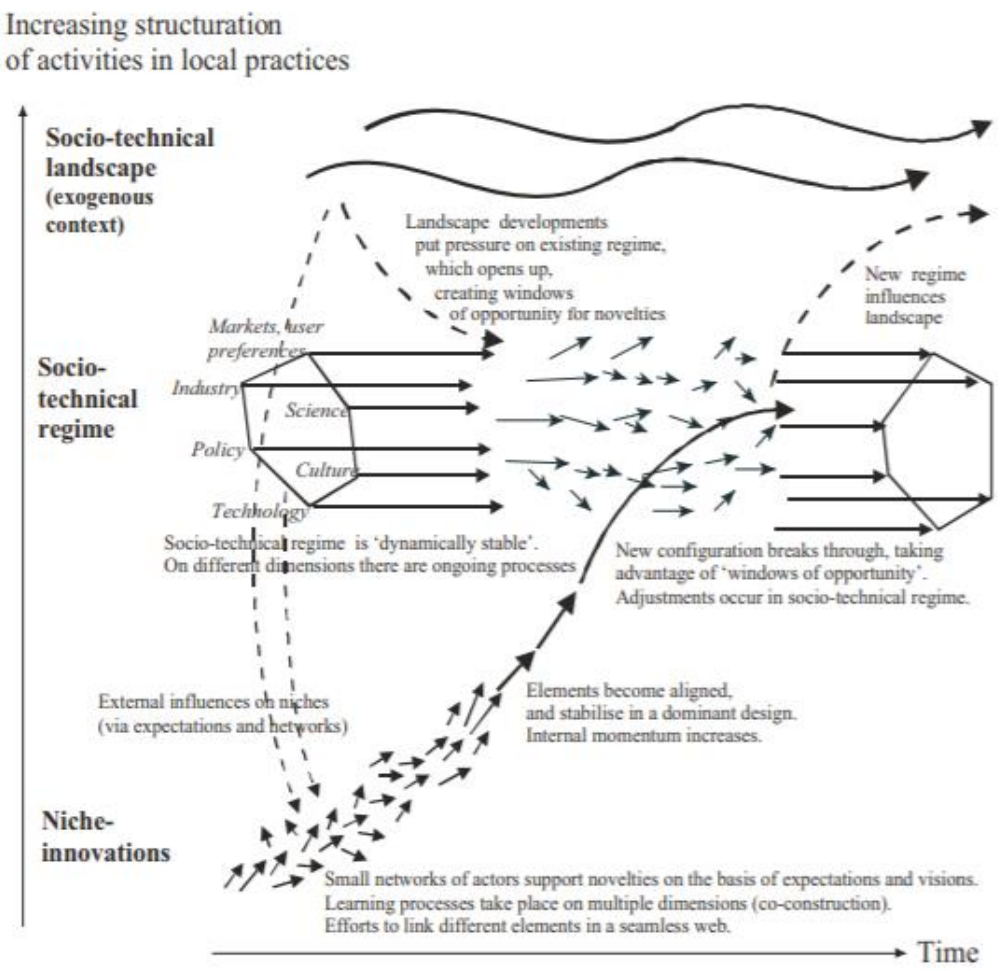

Figure 2: The different levels of transitions (Geels, 2011, p. 28)

2.2 Scaling

The process through which innovations are diffused from the niche to the regime is called scaling. Scaling implies the generation of greater impact of an innovation (Lam et al., 2019).

In recent years, the process of scaling sustainability innovations has been receiving increasing attention by scholars, politicians, and practitioners alike, with the intent of achieving impact at scale, and thereby attaining large systems change (Moore, Riddell, & Vocisano, 2015; Wigboldus et al., 2016). In particular, scholars from different theoretical backgrounds have been studying the underlying processes and the congruent mechanisms through which innovations are scaled in cooperation with a variety of actors - with the goal of increasing the transformative impact of innovations (Lam et al., 2019).

The problem runs amok where scholars from different theoretical backgrounds refer to similar scaling mechanisms with different interpretations of the meaning behind them, inhibiting a shared understanding of their findings (Lam et al., 2019).

For example, scholars from the social-ecological approach refer to scaling up as the process through which innovations are embedded within institutional such as law and policy, scaling out as the process through which innovations impact greater numbers and places, and scaling deep as the process through which innovations impact culture (Hermans, Roep, & Klerkx, 2016; Moore et al., 2015). Wigboldus et al. (2016) on the other hand, refer to scaling up as the process through which innovations impact greater numbers, and refer to scaling out as the process through which innovations are spread over a larger geographical area.

In an attempt to harmonize the understanding of amplification (scaling) mechanisms across the field, Lam et al. (2019) have recently attempted to integrate scaling terminologies by conducting a cross-literature study. They have defined the scaling mechanisms as follows:

- *Scaling within*: mechanisms affecting the capacities to speed up the scaling process.
- *Scaling out*: mechanisms that aim to involve more people and places through a larger amount of initiatives.
- *Scaling beyond*: mechanisms seeking to institutionalize and/or changing the (cultural) rules and values to make way for diffusion.

Lam et al.'s definitions of scaling mechanisms resemble that of other scholars, but aggregate scaling deep and up within their subcategory of scaling beyond, which in the socio-ecological approach is separated. Furthermore, they have added the mechanism of scaling within, which closely resembles the mechanism of 'deepening' described by van den Bosch and Rotmans (2008).

From these descriptions it becomes apparent that while roughly four scaling mechanisms are recognized across the literature, there is no shared understanding as to what they imply exactly. However, most scholars seem to agree that outscaling implies a process that leads to the expansion of an innovation in terms of numbers as well as across places. Therefore, this thesis supports that definition and uses it as the starting point for its research on organisations and networks involved in outscaling practices.

However, this is stated with some caution. While in theory it is easy to distinguish between the different scaling mechanisms, practice may be more indistinct. First of all, actors involved in scaling practices may simultaneously employ different scaling processes to diffuse innovations (Hermans, Roep, & Klerkx, 2016). For example, an innovation may be simultaneously scaled out as well as scaled deep (Moore et al., 2015). Furthermore, often one scaling process follows another (Lam et al., 2019).

For example, the widespread adoption of an innovation (scaling out) may lead for the innovation to be supported by policy (scaling up). Vice versa, the backing of an innovation by political instruments (scaling up) may lead for the innovation to reach new places or numbers (scaling out). As such, hybrid combinations of scaling processes may be employed in the scaling of innovations simultaneously (International Development Innovation Alliance, 2017b).

Recognizing the difficulties in distinguishing between the different scaling mechanisms in practice, the preceding definition of outscaling is thus used more as a starting point to explore the role of global organisations and networks in this thesis than as an exact definition.

2.3 Transformative agency

The preceding sections contextualized the meaning of the concepts of innovations and outscaling against their theoretical background. The next sections focus on establishing a typology of global organisations and networks engaged in outscaling urban sustainability innovations.

In order to establish that typology, its key concepts first need to be demarcated. Firstly, as any discussion on actor typologies within the transition literature is closely linked to the discussion on agency in general, it is important to discuss both issues – the latter before the former. Secondly, it is important to establish what 'global' is understood to mean within the topic of 'global organisations and networks'. Following that order, the subsequent section discusses transformative agency.

Agency is a contested topic within the transitions literature. Scholars have argued that the MLP framework does not fully grasp the shifting dynamics and contexts in which actors play a transformative role in the scaling processes, cutting short both actors and their agency in explaining transformative change (de Haan & Rotmans, 2018; Fischer & Newig, 2016).

Geels (2011) has defended his MLP framework to be "shot through with agency because the trajectories and multi-level alignments are always enacted by social groups" (Geels, 2011, p. 29). However, it is partially due to this debate that the transition literature has generated a deeper understanding of transformative actors and agency, as scholars have attempted to clarify the meaning of these concepts.

Moreover, de Haan and Rotmans (2018) have developed a definition for actors in transformative change. According to their conceptualization, in order to classify as a 'transformative agent', actors need to possess two characteristics. Firstly, actors must have the intention to contribute towards transitions. Secondly, actors must follow up on their intention with action to achieve their goal. Combined, these two qualities – "the ability to act with intention" (de Haan & Rotmans, 2018, p. 278) - define transformative agency.

Following this definition, transformative agency is not restricted to only those who interact with innovations directly. As transitions take place because of the interaction between different actors, it also extends to those helping others to scale their innovation - as long as the intention to contribute to transformative change is present (De Haan & Rotmans, 2018). As such, transformative agents include actors that fulfil supporting services that help co-evolve innovations (Kivimaa, Boon, Hyysalo, & Klerkx, 2018).

Considering the broadly supported finding in transitions literature that outscaling results from the interaction of many different type of actors (De Haan & Rotmans, 2018; Fischer & Newig, 2016; Kivimaa et al., 2018), this thesis uses the definition of transformative agents of de Haan and Rotmans (2018) as a first indicator of which actors to include in its typology for global organisations and networks involved in outscaling urban sustainability innovations.

2.4 Typology of actors

As transitions depend on the interaction between different actors, it has been posited that all actors in transitions have limited agency (Fischer & Newig, 2016). Because of this understanding of 'distributed agency' across actors in transition processes, scholars have tried to conceptualize which type of actors engage with each other in generating transitions, and how they relate to each other. Towards that end, Avelino and Wittmayer (2016) have proposed their Multi-actor Perspective (MaP).

The MaP is a framework which conceptualizes "actors at different levels of aggregation" (Avelino & Wittmayer, 2016, p. 631), namely at sectoral, individual, and organisational levels of aggregation, across different sectors; the state, market, community, and third sector (Avelino & Wittmayer, 2016). The MaP is a practical instrument with which to conceptualize actors engaged with transformative change. As this thesis is concerned with global organisations and networks engaged in outscaling practices, it will only focus on the organisational and sectoral level of analysis of the MaP, as is depicted in figure 3.

Figure 3 shows how the MaP has exemplified the different type of organisational actors across the four different sectors. According to Avelino and Wittmayer (2016) sectors may be seen as actors themselves, but can also be the context or field in which other actors operate. Actors are accorded to a specific sector based on their behavioural logic: each sector in the MaP is distinguished by "inherent institutional boundaries in terms of formal vs. informal, public vs. private, for-profit vs. non-profit" (Avelino & Wittmayer, 2016, p. 635), as indicated by the permeable lines in figure 3.

Figure 3: Avelino & Wittmayer's conceptualization of organisational actors in transformative change (Avelino & Wittmayer, 2016, p. 637)

To illustrate, "the state is characterized as non-profit, formal and public; the market as also formal, but private and for-profit; and the community as private, informal and non-profit" (Avelino & Wittmayer, 2016, p. 634). The third sector is somewhat of a go-between the three other sectors, as it is characterized both by the civil society sector which is formal and private, but also by intermediary organisations which cut across borders "between profit and non-profit, private and public, formal and informal" (Avelino & Wittmayer, 2016, p. 634).

Accordingly, transitions may occur due to the interaction of actors across sectors, but also from the interaction of different actors within one sector. As such, the MaP is a useful mapping tool which allows for the categorization of different types of organisations and networks in societal systems or specific transition networks. Depending on the unit of analysis, actors can be allocated to the MaP's different sectors (Avelino & Wittmayer, 2016). Therefore the MaP serves as a good starting point from which to conceptualize the different type of global organisations and networks involved in outscaling practices.

2.5 Defining 'the global'

Before conceptualizing the different type of global organisations and networks involved in outscaling urban innovations, it is imperative to understand how 'the global' is defined within the context of this research. This conceptualization of 'the global' affects both which organisations and networks are included in the units of analysis, but also the amount of agency these actors are perceived to have (Fischer & Newig, 2016).

Different understandings of 'global' exist within the literature of transition studies. For example, in the 'governance typology' – which distinguishes between local, regional, national, and global actors - 'global' actors refer to only those actors partaking in supra-, trans- or international regimes. In this understanding of 'global', global organisations are dependent on the sovereignty transferred to them by national governments, and therefore these global organisations only enjoy limited agency to act (Fischer & Newig, 2016). In contrast, Howells (2006) and Kivimaa et al. (2018) argue for a broader understanding of the meaning of 'global'.

According to these authors, the 'global level' can best be understood as a hybrid arena for different type of "vertical and horizontal relationships in increasingly distributed innovation networks" (Howells, 2006, p. 724), in which "aggregate learning from individual projects" (Kivimaa et al., 2018, p. 6) are translated into outscaling practices. 'Global' in this understanding thus refers more to the aggregated level of innovation activity, rather than the geographical scale – as the latter runs the risk of confusing scale with power (Kivimaa et al., 2018).

This thesis adopts the latter understanding of 'the global' based on Kivimaa's (2018) and Howells' (2006) understanding of 'the global', as it allows for a much broader and realistic consideration of global actors across the different sectors of the MaP.

2.6 Actor typology

Summarising the preceding sections, what constitutes an organisation or network to be a global outscaling actor, is for the organisation or network to intentionally (be that directly or indirectly) diffuse innovations at an aggravated post-regional level of activity, in order to achieve scale at impact.

Applying that definition to the MaP results in table 1, which reads as a preliminary typology of the organisations and networks involved with outscaling urban innovation practices. The typology of organisations found in table 1 is based on the examples found in the MaP model of Avelino and Wittmayer (2016), and is extended with other findings from literature research (Davies, 2013; Hermans, Stuiver, Beers, & Kok, 2013; Howells, 2006; Klerkx & Leeuwis, 2009; Polzin, von Flotow, & Klerkx, 2016) to fit the scope of this thesis.

As can be deducted from table 1, the outlined typology has extended the MaP with the sector 'mixed'. The 'mixed' sector encompasses meta-organisations and networks, which are constituted by actors from two or more sectors in the MaP. For example, a meta-network may be comprised of an actor in the public sector and the private sector, the private sector and the third sector and so forth.

The mixed sector bears similarities to the third sector, in the sense that these organisations may too trespass the boundaries between public/private, profit/non-profit, and formal/informal. As these type of meta-organisations consist of an explicit mix of actors from different sectors from the MaP rather than to 'fall in between' sectors, they are accorded their own category. This adds both conceptual as well as visual clarification.

Aggregated organisational category	Subcategories
State	Inter-regional networks of: Government(al bodies), ministries, municipalities, cities, provinces International organisations Supranational organisations
Market	Businesses: MNO's, SMEs, start-ups Banks Consultancies Incubator Accelerator Venture Builder Procurement organisation Clusters Venture Capitalist
Community	Community groups Online networks User groups Innovation hub
Third sector	Research Institutes: - Universities - Research institutes - Think Tanks NGO's Unions and other advocacy organisations Donors
Mixed	Meta-organisations & networks: - Public-private consortiums - Public-private-third sector consortiums - Private-third sector consortiums - Public-third sector consortiums

Table 1: Preliminary typology of global organisations and networks linked to outscaling processes

Table 1 contains examples of both organisations and networks involved in outscaling processes. Networks are defined according to the definition of Schroeder, Burch and Rayner (2013, p. 761) as "somewhat formalized, stable, and ongoing relationships among smaller and larger numbers of actors with the purpose of mobilizing resources (financial, technical, human, knowledge, etc.) to achieve a collective goal".

2.7 Functions

Having provided an understanding of the different type of global organisations and networks involved in urban outscaling processes, the consecutive sections outline the different type of roles fulfilled by these actors.

As the understanding of the roles that actors fulfil in scaling and transition processes is fragmented across the literature, a thorough literature review was carried out to disperse the various functions fulfilled by outscaling actors into one framework. These findings are summarized in table 2.

Table 2 reads as follows. Column 1 describes the aggregated functions of actors in outscaling practices, based on the terminology of de Haan and Rotmans (2018). This categorization provides an initial orientation towards the type of roles performed by actors. Column 2 refers to specific sub-functions actors may fulfil under these roles. As the literature distinguishes many different names for similar functions, for clarification purposes functions have been aggregated under one name. However, the literature mentioned in column 7 may refer to these same functions under different names.

Column 4 and 5 delineate the normative position and interest of a function performing actor respectively. This provides interesting information as each actor engages with different facets of the outscaling process, out of "different competences, remits and operational models" (Kivimaa et al., 2018, p. 2), and therefore sheds insight into the question 'which roles are taken on and why?'

Column 6 provides specific examples of the type of global organisations and networks engaging in the functions with reference to the scope of this research: global organisations and networks engaged in outscaling urban sustainability innovations. These examples are taken from the preliminary typology of global organisations and networks involved in outscaling urban sustainability innovations reflected in table 1.

Aggregated roles	**Sub-function**	**Description**	**Position to the niche**	**Affinity/ objective**	**Example of type of global organisation or network engaging in this function**	**Literature**
Frontrunner	Entrepreneurial activity	Actors developing and actively attempting to outscale innovations. Strategies include: growing, transferring, replicating and spreading.	Niche level	Vested interest in outscaling innovation	Start-up/ Business; Seed builder; Innovation Hub; (Meta-)networks	Lam et al., (2019); Moore et al., (2015)
Enhancer	Capacity building	Actors providing individual or organisational training and support in order to enhance the capacity of innovators to outscale their innovations successfully.	Outsiders to the niche	Supportive interest	Research organisation; Incubator; Consultant; NGO; City network; International organisation; Supranational organisation; Community groups	Mathé et al. (2016)
	Process intermediation	Actors engaged with intermediating with experimental projects or specific processes contributing to transitions. These actors help to realize specific projects, for example by giving	Outsiders to the niche	Neutral/ normative interest	Consultant**;** Incubator; City network; NGO; International/ supranational organization; Meta-networks/ consortiums	Gliedt, Hoicka, & Jackson (2018); Kivimaa et al. (2018); Klewitz, Zeyen, Holloway, & Hansen (2012); Polzin et al. (2016); Sapsed, Grantham, & Defillippi (2007); Turner, Klerkx,

		legal, financial or business advice.				Rijswijk, Williams, & Barnar (2016)
	Educative support	Actors developing new knowledge; R&D.	Outsiders to the niche	Normative interest in innovative development; science	Research organisations; NGO	Hauschildt & Kirchman (2001); Kivimaa et al., (2018); Mathé et al. (2016); Yusuf 2008)
	Financial support	Actors providing financial support to frontrunners for outscaling activities.	Outsiders to the niche	Interest in returning to scale	Donor; Bank; Venture Capitalist/ Incubator; Innovation Funds; NGO; Meta-networks/ consortiums; City-network; International/ Supranational organisation	Polzin et al. (2016)
Connector	Resource intermediation	Actors that intermediate between frontrunners and third parties in order to attract (financial) resources.	Outsiders to the niche	Network propagation	Incubator; City network; International/ Supranational organisation; Donor	Mathé et al. (2016); Polzin et al. (2016); Turner et al. (2016)
	Relational intermediation	Actors connecting other actors, seeking to disseminate knowledge and values between different types of organisations.	Outsiders to the niche	Normative propagation	City network; International organisation; Supranational organisation; Innovation Hub; Meta-networks /consortiums; Procurement organisations;	Gliedt et al. (2018); Hamann & April (2013); Hodson & Marvin (2010); Laurens Klerkx & Leeuwis (2009); Sapsed et al. (2007); Yusuf (2008)

					Business; Community groups; Donors; Research organisation	
Toppler	Systemic intermediation	Actors "who connect the different components of international, national, sectoral and/or regional innovation systems" (Klerkx & Leeuwis, 2008, p. 850). These actors typically operate across all levels of landscape, regime and niche and seek to accelerate the spreading of innovations by improving the innovation ecosystem.	Outsiders to the niche, operating on the regime level	Interested in achieving deep, long-lasting change	Governmental organisations; Businesses; Donors; Meta-networks /consortiums; City-network; Research organisation	Kivimaa et al. (2018); Klerkx & Leeuwis (2008)

Table 2: Summary of outscaling roles and sub-functions (table modelled on Kivimaa et al. (2018) and Klerkx and Leeuwis (2009), extended with other findings).

2.7.1 Aggregated roles

As stated, column 1 describes the aggregated functions of actors in outscaling practices, based on the terminology of actors in transformative change of de Haan and Rotmans (2018). These scholars summarize four different categories or roles in their framework on actors in transformative change: frontrunners, connectors, topplers and supporters. These are defined by de Haan and Rotmans (2018) as follows.

Frontrunners are innovators. Frontrunners are solution-driven and attempt to make their innovations available to the mainstream. They promote different-think, and do not adhere to prevailing organising principles of society. When successful in their pursuit, frontrunners restructure the way in which systems[2] (regimes) approach problems.

Connectors, as their name already implies, are actors who wish to connect the solutions developed by frontrunners to 'the system', or to connect actors to other actors in order to stimulate shared learning. In doing so, connectors fulfil a facilitative role in the development of alliances (networks, organisations and movements).

Topplers are actors who make way for systemic innovation through the change or demolition of 'old' institutions or alter the status quo by creating new ones. While topplers' functionality is similar to that of connectors, the toppler has a more crafting or destructive prowess to create systemic change. According to de Haan and Rotmans, what defines the toppler is its ability "to articulate values that connect their alliances to a stream[3]" (De Haan & Rotmans, 2018, p. 5). Topplers therefore harbour advocacy power.

Supporters endorse innovations and thereby legitimize innovations. While the endorsement of innovations provides a crucial step in the transformation process, de Haan and Rotmans argue "supporters are not themselves considered to be transformative" (De Haan & Rotmans, 2018, p. 5). While de Haan and Rotmans do not provide further explanation on this statement, the exclusion of supporters does seem to fit de Haan's and Rotmans' definition of transformative agents. As discussed previously, transformative agency is defined as "the ability to act with intention" (De Haan & Rotmans, 2018, p. 278). Supporters are therefore rendered to be more reactive than pre-active. Following de Haan and Rotmans (2018), this thesis also excludes supporters from its framework.

While de Haan's and Rotmans' (2018) typology covers a wide range of functions, this research extended their framework with an additional category: the enhancer. During the literature review it became apparent that certain subfunctions that are associated to outscaling processes elsewhere in the literature could not be encompassed under de Haan's and Rotmans' typology. As this thesis seeks to synthesize knowledge on the roles of actors involved in outscaling sustainability innovations, the framework was extended with the additional category of the enhancer.

The enhancer is described as a process-oriented actor that aids frontrunners (1) to improve their solutions through the development of new knowledge and (2) to enhance their ability to outscale their innovations by improving the organisational apparatus. Similar to the connector and the toppler, the enhancer fulfils a supporting function to the frontrunner. However, whereas connectors and topplers are focused on aligning innovative concepts with the regime[4], the enhancer is focused on the emancipation of the frontrunner. As such, enhancers provide emancipation to frontrunners.

[2] The dominant way of societal organisation, with the purpose of meeting "human needs," generally or specifically geared towards a certain sector (de Haan & Rotmans, 2018). Comparable to regimes in the MLP.
[3] A stream refers to the set of societal values endorsed in systems (regimes, see footnote 2) (de Haan & Rotmans, 2018).
[4] Systems in de Haan's and Rotmans' framework

Table 3 summarizes these roles and the key function they fulfil.

Category	Key function
Frontrunner	Diversity
Enhancer	Emancipation, support
Connector	Connectivity
Toppler	Coherence, change
Supporter	Legitimization

Table 3: The main categorizations of de Haan and Rotmans and the key function identified to be fulfilled by these actors (De Haan & Rotmans, 2018). The framework is extended with the category of the enhancer.

2.7.2 Sub-functions

As stated, each function of frontrunner, enhancer, connector and toppler is devised of a subcategory (or subcategories) of functions.

Frontrunner

The frontrunner category presupposes innovations to be 'scale-ready'. The frontrunner role therefore fulfils one function: getting their innovations to scale. In table 2 this function is coined as entrepreneurial activity.

Entrepreneurial activity

Following Lam et al. (2019), frontrunners may obtain the goal of making their solutions available to the mainstream through various strategies: growing, spreading, transferring and replicating. While similar in their goal, these strategies differ slightly in their approach. Growing entails actors to do more of the same innovation without changing the innovation itself. Replicating means doing more of the same, but adapting the sustainability innovation to the context it is spread to. Transferring is similar to growing, in the sense that a sustainability initiative is copied to a new location, however, it is managed independently of the former initiative. Spreading finally, entails the dispersion of the core principles of a sustainability innovations and copying them independently of the former initiative to a new context (Lam et al., 2019).

Frontrunners are located at the niche level. Examples of organisations which may fulfil entrepreneurial activity may come from different sectors and include start-ups, businesses, NGO's, co-operatives and seed builders.

Enhancer

As stated, enhancers provide emancipation to frontrunners. This can be done by fulfilling four different functions: capacity building, educative support, financial support, and process intermediation.

Capacity building

Capacity building is conducted by actors seeking to increase a frontrunner's capacity to scale. This comprises both training at the individual level, through for example personal leadership trainings, but may also extend to leadership training at the organisational level. Furthermore, capacity building includes the training of the ability of entrepreneurs to set clear production or innovation objectives, and articulating their needs and demands to third parties, such as R&D developers or donors. This increases the capacity of individuals and the organisation as a whole to scale their innovation (Mathé et al., 2016).

Capacity building can be done by various actors, such as research organisations, incubators, consultancies, NGO's or more broadly via support of city networks or international organisations.

These actors are located outside of the niche and are presumed to have supportive interest in getting innovations to scale at impact.

Process intermediation

Process intermediaries fulfil a supportive function to the frontrunner, by directly engaging with the frontrunner to overcome certain obstacles identified in the transition process (Kivimaa et al., 2018; Mathé et al., 2016). Process intermediaries may offer financial, legal or business advice to frontrunners, in order to bring deeper understanding to the field which is being operated in and thereby improve their position.

By bringing in this new knowledge, process intermediaries can "raise the ambition level" (Matschoss & Heiskanen, 2017, p. 89) of an innovation. Indeed, research has found the impact of such advice on the improvement of individual businesses to be substantial (Sapsed et al., 2007).

For example, legally, process intermediaries may assists in working out industry accreditation or standards. They may also help to obtain intellectual property for an innovation through patents and/or regulation, in order to outscale innovations in a leaner manner (Klewitz et al., 2012; Turner et al., 2016).

However, services of process intermediaries may also be aimed more broadly at business advice, by designing and implementing business plans and/or evaluating the efficiency of scaling pathways (Gliedt et al., 2018; Mathé et al., 2016). This enables frontrunners to compete in the market more strategically. For these purposes, various methods can be used such as "vision building, diagnosis, foresight or improving the outlook of products" (Mathé et al., 2016, p. 10).

Process intermediaries hold a close position to the niche, though they are often an outsider to the niche itself (Kivimaa et al., 2018). Examples of process intermediaries include NGO's, incubators, city networks and consultancies.

Educative support

Educative support is conducted through the provision of knowledge, scientific findings and (the development of) new technologies to frontrunners (Yusuf, 2008). The incorporation of new knowledge into innovations may lead to improved functioning of innovations, and in turn helps frontrunners' potential to reach impact at scale. Knowledge can be communicated through information distribution, trainings or demonstrations of technology (Mathé et al., 2016). Universities and other research agencies form the core of knowledge development as well as knowledge exchange across networks. These actors are located outside the niche.

The success with which research agencies are able to communicate their knowledge is dependent on the connections of the agency, its reputation vis-à-vis the quality of its research but also the extent to which the research agency participates in interdisciplinary collaboration (Yusuf, 2008). As either one of these factors may at times be limited, research agencies may not always be able to communicate the results of their research to businesses successfully. As such, third parties might play an important role in communicating the knowledge which would otherwise remain behind closed doors (Yusuf, 2008), indicating an interaction between enhancers, connectors and frontrunners.

As new knowledge may lead to improved functioning of innovations, the role of educative support may not be underestimated also vis-à-vis other actors in the framework. For example, improved functionality of an innovation is interesting for donors, as it may reduce return costs hugely which allows "the payoff from investment (…) quicker and larger" (Yusuf, 2008, p. 1168).

Financial support

Financial assistance is of critical importance to the scaling process (Polzin et al., 2016). Every phase of scaling requires a different form of financial support to assure market access for frontrunners.

For outscaling, two phases seem especially relevant: the commercialisation phase, during which innovations are first invested in, and the post-commercial phases, which refer to the stages during which innovations are scaled on a large scale, for which a large amount of financial capital is required as well (Polzin et al., 2016).

The biggest challenge for entrepreneurs in the commercialisation phase is to attract enough investors to stay afloat, as financial aid is difficult to come by. The risk associated with financing frontrunners is often too high for traditional financiers such as banks, which is one of the reasons 'alternate financiers' such as Angels, Venture Capitalists (VCs) or public-private subsidies play an important role in bridging the gap (Polzin et al., 2016). Even so, the difficulties for entrepreneurs to attract finance during the commercialisation phase is so notorious that the phase has received a specific nickname, colloquially known as the 'valley of death'. This term refers to the period between which an innovation receives its first investment and when it becomes profitable, and during which most start-ups have issues staying afloat (Kenton, 2017).

The different stages of the development of an innovation in relation to the required financial support therein is illustrated in figure 4.

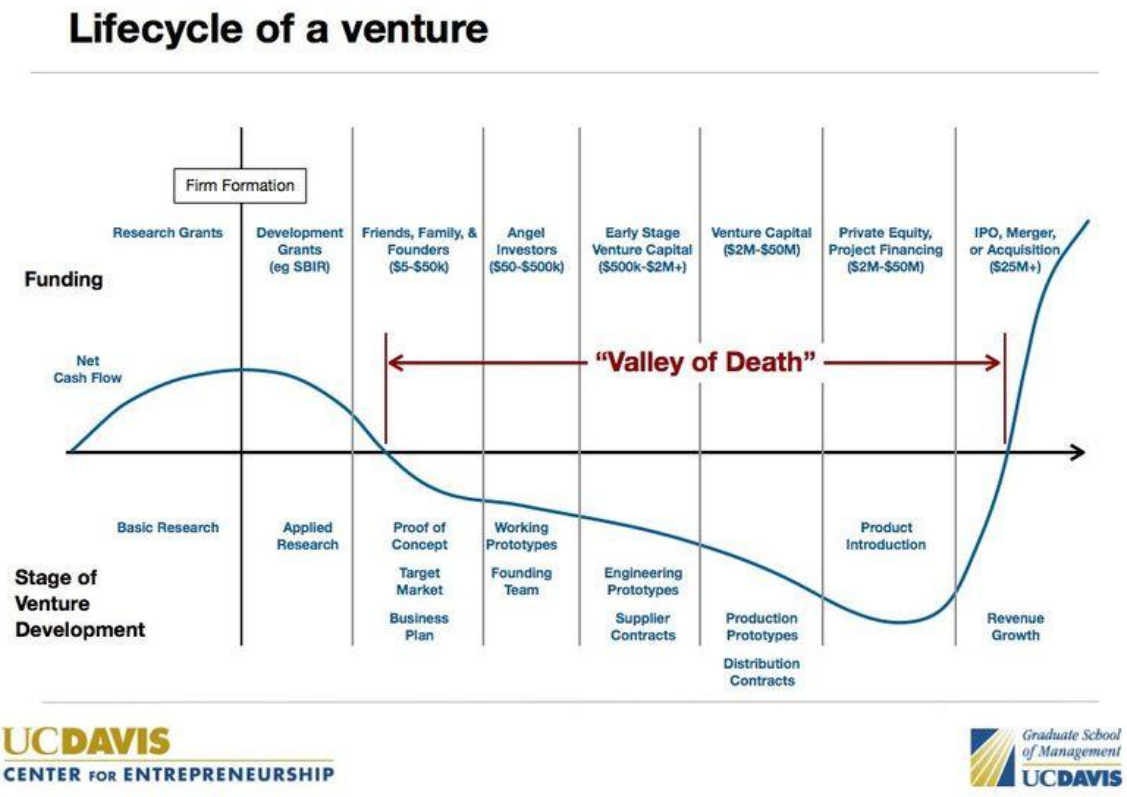

Figure 4: Stages of innovation development and related funding actors (Hargadon, 2010)

Even if commercial viability is more secure during post-commercialisation phases, large amounts of financial capital are still needed to scale out innovations and financial support remains an important factor throughout the entire scaling process (Polzin et al., 2016).

As such, throughout the scaling process, public as well as private investments are of utter importance "to thicken up thin financial markets" (Polzin et al., 2016, p. 37) for innovators. Examples of financial contributors are donors, banks, philanthropies, venture capitalists and (inter)state actors such as city networks or international organisations. These organisations have a position outside the niche, and have the objective of returning to scale.

Connector

Connectors aid the scaling process through linking actors, knowledge, skills and/or resources between two or more parties, and thereby help the entrepreneur overcome high transaction costs (Howells, 2006; Kivimaa et al., 2018). The connector role is subdivided into two functions: resource mobilisation and relational intermediation.

Resource intermediation

An important function articulated by connectors is that of resource intermediation. This includes the mobilisation of both financial and material (inputs, facilities, equipment) capital geared towards furthering the outscaling of innovations (Mathé et al., 2016; Turner et al., 2016). Resource intermediaries may specifically aid frontrunners in the mobilization of resources by connecting them with investors and other market participants. Resource intermediaries may reduce information asymmetries which leads to lower investment risks, and thereby lower transaction costs between parties (Polzin et al., 2016).

Examples of resource intermediaries include incubators and (meta-)networks. These are positioned outside the niche.

Relational intermediation

Relational intermediaries are actors seeking to disseminate knowledge and values between different type of organisations, by connecting actors in their network to one another (Klerkx & Leeuwis, 2009). As such, relational brokers function as a mediator between two or more parties that wish to, or are already cooperating, and is furthermore focused on all activities further strengthening these type of collaborations (Howells, 2006; Mathé et al., 2016).

Through their position, relational brokers have the unique opportunity to create new collaborations for innovation by "understanding and then easing the bottlenecks" (Yusuf, 2008, p. 1172) between different types of actors. This process requires relational intermediaries to bridge different value frames of stakeholders in order to help them to see each other on eye level (Hamann & April, 2013; Hodson & Marvin, 2010).

Networks and international organisations make good examples for actors fulfilling this type of function. Furthermore, procurement organisations also fulfil a good example of relational intermediaries, as they induce cooperation between frontrunners and state actors. Such actors are located outside the niche.

Toppler

Systemic intermediation

Topplers aim to achieve systemic change by changing the architecture of the innovation ecosystem in order to speed up processes of outscaling in general (Klerkx, Hall, & Leeuwis, 2009). More than merely connecting niches to each other, systemic intermediaries are focused on brokering vertical cooperation across the value chain, which involves hybrid networks of actors such as governments, businesses and other organisations (Klerkx et al., 2009).

As systemic intermediaries are focused on creating radical and lasting change by targeting complex issues, the time scale on which systemic intermediaries operate is focused on the long-term (Kivimaa et al., 2018; Klerkx et al., 2009). Systemic intermediaries often belong to the third or mixed sector, and are positioned outside the niche (Kivimaa et al., 2018; Klerkx et al., 2009).

2.8 Synergy of functions

While the analytical framework reflected in table 2 describes all the roles and sub-functions fulfilled by global organisations and networks fulfilled in outscaling practices, it is apparent that these functions are not performed exclusively by any one organisation or network. Indeed, any organisation may perform multiple functions at the same time, as well as attain new functions over time (de Haan & Rotmans, 2018; Klerkx & Leeuwis, 2009).

Furthermore, it is certainly not always the case that frontrunner activity precedes interaction with any other actors or roles. For example, sometimes innovative activity may be instigated by a "complex intermediary" (Gliedt et al., 2018, p. 1255), which combines both public as well as private agency within the regime to stimulate the development of innovation experiments, through which innovations may follow. As stated before, examples of regime to niche functions exist, in which established (political) bodies instigate innovation networks (Gliedt et al., 2018; Wigboldus et al., 2016).

2.9 Summary

This chapter operationalized many of the concepts related to the topic of this thesis. The key take-aways from this chapter are:

- The topic of this thesis falls in the wider background of transformations studies, and transitions literature in particular. Outscaling is one of the processes through which innovations can generate higher impact, ultimately contributing to transitions.
- Global organisations and networks involved in outscaling urban sustainability innovations stem from different backgrounds: state, market, community, third sector, and 'mixed' backgrounds. Table 1 (on p. 16) exemplifies specific global organisations and networks belonging to each of these sectors.
- As agency is distributed over these different types of actors, global organisations and networks fulfil different functions in supporting the processes of outscaling urban sustainability innovations. Frontrunners, enhancers, connectors and topplers provide the main categories of roles fulfilled by these actors, to which many sub-functions are ascribed. The analytical framework in table 2 (p. 18-20) shows the overview of all these functions.

The operationalization of these concepts through the analytical framework was used for the selection of global organisations and networks that were interviewed for this research, as will be further expanded upon in the next chapter.

3. Methodology

This chapter elaborates on the methodology of this thesis. It will first consider the research design (section 3.1), before discussing the research methods (section 3.2), and more specifically the interview process (section 3.3).

3.1 Explorative case study design

This research was designed as an exploratory case study. The exploratory case study is well suited for the inquiry into new scientific areas of which limited preliminary knowledge exists, and in which neither hypotheses nor the data required for the exploration of the research questions are clearly determined. As such, the exploratory research design allows for the development of hypotheses for continuous research (Streb, 2010).

As there is limited understanding of the role of global organisations and networks in outscaling urban sustainability innovations at the time of writing this thesis, the explorative case study design was deemed most suitable for developing an integrative understanding of present and future desired roles fulfilled by global organisations and networks supporting outscaling practices.

When comparing the exploratory case study design to other research methods used in research on scaling, such as network analysis (as is done for example by Hermans et al. (2013)), the explorative case study design has an explicit advantage. Rather than having to focus the scope of this thesis to a particular innovation, within a particular region - as would have been the case with a network analysis design, the explorative case study design allowed for a more comprehensive account of present roles and desired future roles of organisations and networks involved in outscaling urban sustainability innovations on a global scale. For these reasons the explorative case study was chosen as this thesis' research design.

In an exploratory case study design, data collection and analysis are an iterative process (Streb, 2010). Figure 5 shows how this process relates to the design of this thesis: after developing the analytical framework (outlined in the previous chapter), interviews were held to collect additional data, feeding back into the preliminary analytical framework and the remaining research topics of this thesis.

3.2 Data methods and collection

This thesis combined elements of desk research with empirical research.

The sources relied upon in this thesis include (1) literature on transformation studies, (out)scaling and urban innovation (2) documents/media published of identified organisations and networks and (3) inquiry into the organisations through interviews with employees. Table 4 specifies the research methods used per sub-question of this thesis.

As indicated in table 4, all sub-questions were subject to a literature review. The literature was drawn mostly from academic accounts in the field of transformation studies, but were extended with referred studies by interviewees where applicable. The literature review for sub-question 1 focused on a review of agency and actor typologies in transition studies. The literature review for sub-question 2 included a review and integration of both theoretical as well as empirical accounts of actor roles in transition and scaling literature. Sub-question 3 required a literature review on barriers to scale, but also included referred documents by interviewees. The literature review conducted for sub-question 4 extended on this process.

As stated, additional to literature research, empirical research was conducted by interviewing various global organisations and networks that are representative of the different types of organisations and networks outlined in the analytical framework in table 2. The next section expands on this method.

What present and desired future roles and factors influence how global organisations and networks support the outscaling of urban sustainability innovations?

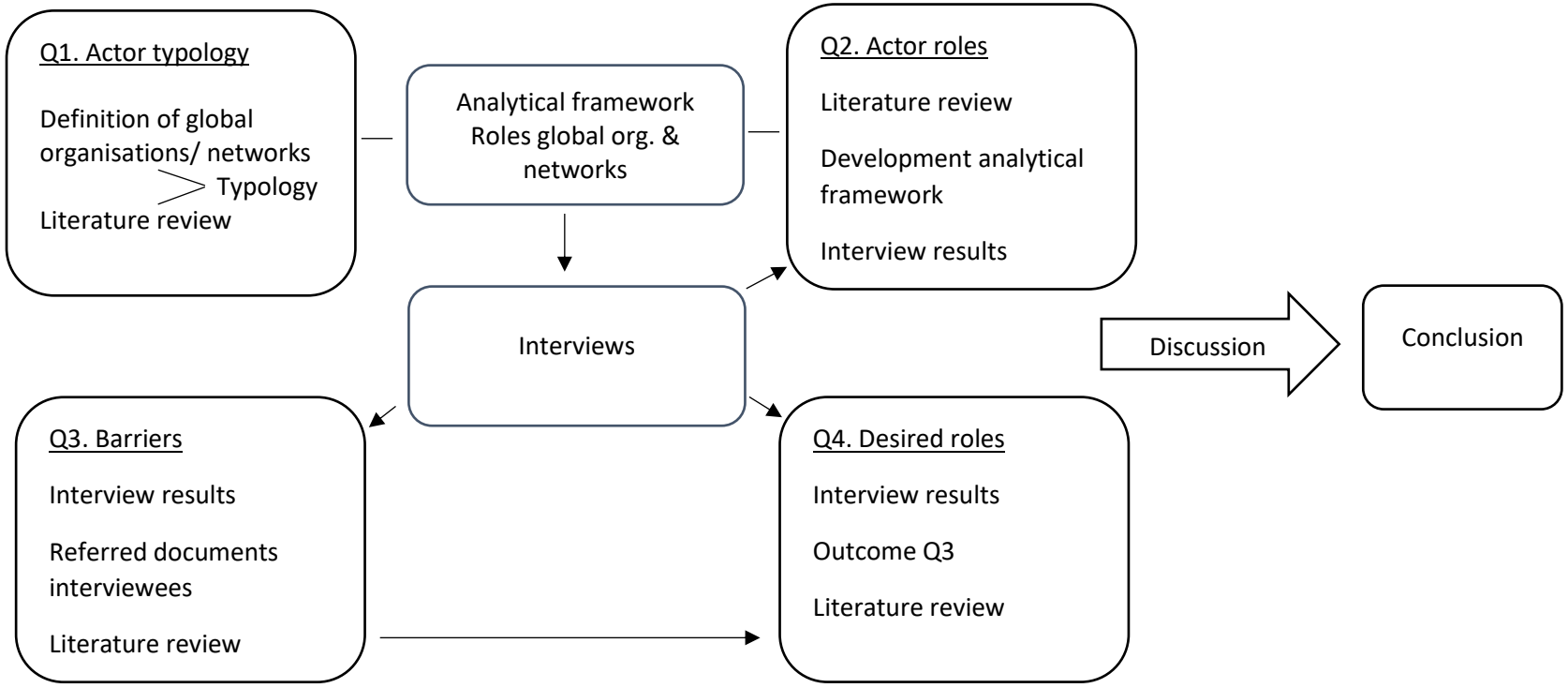

Figure 5: Research design

Research sub-question	Research method	Specification
1. Which types of global organisations and networks exist that are focused on outscaling urban sustainability innovations?	Desk study	Literature/media review
2. What functions do these global organisations and networks fulfil in outscaling urban sustainability innovations?	Desk study Empirical research	Literature review Interviews
3. Which factors influence the ability of these global organisations and networks to contribute to the successful outscaling of urban sustainability innovations?	Empirical research Desk study	Interviews Literature review
4. What would be the desired future roles of global organisations and networks that are focused on outscaling urban sustainability innovations?	Empirical research Desk study	Interviews Literature review

Table 4: A specification of the research methods used per sub-question

3.3 Interviews

To collect additional data for sub-question 2, 3, and 4, interviews were held with employees of exemplary global organisations and networks active in outscaling urban food security or urban climate change adaptation innovations. A total of 26 interviews were held, as reflected in table 5. It was ascertained that minimal 1 organisation or network per 'category' (i.e. meta-network, company, think tank etc.) was interviewed conforming with the analytical framework in table 2. Evidently, with reference to the scope of this research, further selection criteria included the need for the organisation or network to be global in operation and to be operative in the field of urban climate adaptation and/or urban food security. Table 5 maps interviewees' organisations and networks onto the conceptual framework.

Organisations were 'found' through online research, through the partners of the organisations found through the online research, and from word to mouth tips from colleagues in the field. These organisations were subsequently contacted for an interview, of which 26 accepted an invitation for an interview. Out of the 26 organisations and networks interviewed, 4 explicitly deal with food security topics as their main focus,[5] while others are implicitly linked to food topics through various operations of their organisation.

Rather than reflecting an imbalance within this research, it is believed this that this proportion is a rough reflection of 'reality', with a higher proportion of global organisations or networks existing focused on urban climate change adaptation in general than on food security. Furthermore, the division of interviews over both topics is not seen as problematic, as the data collection was not seen as a zero-sum game between both topics. Rather, it is believed that the data collected through interviewing organisations and networks related to either topic offered complementary data due to the intertwined nature of both topics.

The interviews were semi-structured. This method of interviewing was chosen as it allows for the for flexibility of both the interviewer and the interviewee to go more into depth on discussed topics, and suited the explorative nature of this research.

[5] Of which 2 (Int. 15 & 16) focus more explicitly on agricultural food security in general > urban food security

The interviews were centred around four different topics: an exploration of interviewees organisations' and networks' work and views on scaling, a discussion on the theoretical framework modelled on de Haan and Rotmans' actor typology, an inquiry into the barriers to scaling, and finally opinions on the future desired role of organisations in the field of outscaling urban innovative practices. For additional information on the type of questions asked, the interview script can be found in Appendix A.

Code:	Name:	Organisation:	Organisational background:	Interviewed on:
Int. 1	Trude Rauken	Carbon Neutral City Alliance (CNCA)	City alliance	22-03-2019
Int. 2	Femke Gubbels	100 Resilient Cities (100RC)	City network	10-05-2019
Int. 3	Irene Oostveen	VNG International	Municipal network	22-03-2019
Int. 4	George Stiff	International Urban Cooperation (IUC)	City network/platform	01-04-2019
Int. 5	Victor Mulas	World Bank	Multilateral bank	14-03-2019 & 25-03-2019
Int. 6	Jia Ni	FAO Food for Cities Program	Multilateral organisation	15-03-2019
Int. 7	Erik Faassen	Climate-Launchpad (Climate-KIC)	International pre-acceleration program	25-04-2019
Int. 8	Sascha Haselmayer	Citymart	Procurement organisation	12-03-2019
Int. 9	Rich Lechner	Urban Leap	Procurement organisation	03-04-2019
Int. 10	Chris Monaghan	Metabolic	Consultancy/ think tank/ venture builder	03-04-2019
Int. 11	Denis Karema	Enviu	Venture builder	19-03-2019
Int. 12	Vince Meens,	Katapult Accelerator	Accelerator	25-03-2019
Int. 13	Gratian Mihailescu,	UrbanizeHub	Community Innovation Hub	15-03-2019
Int. 14	Aditya Barve	MIT Urban Risk Lab	Action-research	29-04-2019
Int. 15	Jana Korner	Climate Change, Agriculture and Food Security (CCAFS) South-East Asia	Participatory Research Organisation	10-04-2019
Int. 16	Philip Thornton	CCAFS (CGIAR)	Participatory Research Organisation	07-05-2019
Int. 17	Harriet Bulkeley	Naturvation	Research organisation	09-05-2019
Int. 18	René van Veenhuizen	RUAF	NGO	14-03-2019
Int. 19	Felia Boerwinkel	Hivos	NGO	08-04-2019
Int. 20	Erik Verkerke	CIV-LAB	NGO/Innovation Hub	18-03-2019
Int. 21	Chuckwudi Onike	Rockefeller Foundation	Philanthropy organisation	19-04-2019
Int. 22	Monika Zurek	Former employee at the Bill & Melinda Gates Foundation	Philanthropy organisation	15-04-2019
Int. 23	Gerben Mol	AMS Institute	Research/ policy organisation	12-04-2019

Int. 24	Thomas Feeny	International Development Innovation Alliance (IDIA)	Meta Innovation Network (Public-third sector consortium)	05-04-2019
Int. 25	Lukas Ertl	United Smart Cities	Multistakeholder platform (public-private consortium)	15-04-2019
Int. 26	Nicholas You	Guangzhou Institute for Urban Sustainability	Meta-partnership	04-04-2019

Table 5: List of interviewees

Each interview lasted approximately 30-60 minutes, depending on the interviewee. All interviews were recorded and entirely transcribed into separate text documents. Subsequently, the transcriptions were coded inductively: after reading through the transcripts, commonalities and contrasts were marked. Other than the feedback on the theoretical framework, the concepts that were derived from this inductive process were coded axially on an Excel sheet using the conceptual framework as its base mark, according to three different topics: barriers to scaling, desired future roles for interviewees' own organisations, and desired future roles for other organisations and networks in the field.

Concepts were accorded a position on the conceptual framework based on interviewees' organisations sectoral background and the sub-function the interviewees' comments spoke to. For example, if an interviewee working for a philanthropy spoke about funding activities, it would be mapped on the conceptual framework under financial support in the third sector. This process of mapping the concepts on the framework allowed for a cross comparison of the results across the actor typologies and roles, in addition to deducting the larger categories of the results.

While the next chapter only shows the dispersed versions of these maps for clarifications sake, the tables still demonstrate the relation of the results across sectors and roles. For the full list of barriers and maps, I refer to appendix B.

Finally, it is important to note that all interviews were coded as reflected in column 1 of table 5. These codes were used for referencing the interviews throughout this thesis.

Function	*Sub-function*	State	Market	Community	Third sector	Mixed
Frontrunner	*Entrepreneurial activity*		UrbanLeap Metabolic; Enviu	UrbanizeHub	MIT Urban Risk Lab; Hivos; RUAF; CCAFS; Bill & Melinda Gates Foundation	AMS-Institute; Guangzhou Institute for Urban Innovation
Enhancer	*Capacity building*	CNCA; 100RC; VNG International; World Bank; FAO Food for Cities ClimateLaunchpad	Katapult Accelerator; Metabolic; UrbanLeap; Enviu;	UrbanizeHub	MIT Urban Risk Lab; CCAFS (CGIAR); Hivos; RUAF; CIV-LAB	IDIA; United Smart Cities; AMS Institute; Guangzhou Institute for Urban Innovation;
	Process intermediation	ClimateLaunchpad; VNG International	Metabolic; Citymart; UrbanLeap; Katapult Accelerator	UrbanizeHub	RUAF	AMS Institute; IDIA
	Educative support		Metabolic		MIT Urban Risk Lab; Naturvation; RUAF	Guangzhou Institute for Urban Innovation; IDIA; AMS Institute; United Smart Cities
	Financial support	CNCA; 100RC; VNG International; World Bank; FAO Food for Cities	Katapult Accelerator		Rockefeller Foundation; Bill & Melinda Gates Foundation; Hivos;	Guangzhou Institute for Urban Innovation
Connector	*Resource mobilization*	CNCA; 100RC; World Bank; FAO Food for Cities	Katapult Accelerator		Rockefeller Foundation; Bill & Melinda Gates Foundation; Hivos	United Smart Cities; IDIA
	Relational intermediation	CNCA; 100RC; VNG International; World Bank; FAO Food for Cities ClimateLaunchpad	CityMart; UrbanLeap	UrbanizeHub	Naturvation; RUAF; CIV-LAB; Hivos; Rockefeller Foundation; Bill & Melinda Gates Foundation MIT Urban Risk Lab; CCAFS (CGIAR)	United Smart Cities; IDIA; AMS Institute; Guangzhou Institute for Urban Innovation;

Toppler	*Systemic intermediation*	CNCA; 100RC; VNG International; World Bank; FAO Food for Cities ClimateLaunchpad	Metabolic	UrbanizeHub	Rockefeller Foundation; Bill & Melinda Gates Foundation CCAFS (CGIAR); RUAF; Hivos	United Smart Cities; IDIA; AMS Institute; Guangzhou Institute for Urban Innovation

Table 6: Interviewees' organisations and networks according to role and function

4. Results

This chapter discusses the results from the interviews with the 26 global organisations and networks interviewed for this thesis. Firstly, it will expand on the feedback given by interviewees on the theoretical framework (section 4.1). Secondly, it will go into barriers to scaling (section 4.2). Finally, it will present interviewees' account of the desired future roles of organisations active in the field of scaling urban sustainability innovations (section 4.3).

4.1 Feedback theoretical framework

The first set of results relates to the feedback given by interviewees on the analytical framework. Interviewees were introduced to the aggregated roles of global organisations and networks stipulated in chapter 2, section 2.7.1. They were then asked to provide feedback on the framework; whether they recognized the roles, and how they saw these functions with reference to their own organisation or network, or to other organisations in their field. Furthermore, interviewees were asked to extend the framework with missing roles if they felt it did not cover the full range of roles that are fulfilled in outscaling processes.

4.1.1 Recognition of the roles in general

Out of all interviewees, all but one agreed with the framework in general. While the interviewee that disagreed with the framework acknowledged that the elements of agency are present in scaling, she believed scaling more to be a result of regime change, rather than agents of change (Int. 17). All other interviewees recognized the roles in practice, and agreed that organisations could fulfil multiple roles at the same time. Interestingly, in response to the question how interviewees would describe their organisations to fit into the framework, some interviewees clearly distinguished between various facets of their organisations and the associated roles of those facets in their answer.

For example, both procurement organisations interviewed for this thesis each separately described how they were operating as frontrunner in the system they were changing, whilst they were operating as connectors through the actual exercise of their work by connecting parties to one another for innovations. One interviewee stated: *"So the system we are changing is procurement, we are frontrunner there, but every procurement transition is an innovation project, and there we are connectors"* (Int. 8). Such a description reconciled with the findings of other interviews as well. One interviewee from a city network described its secretariat as a connector, its members as frontrunners, and the impact of their overall network as a toppler (Int. 1).

Furthermore, interviewees described how the roles their organisations or networks fulfil change over time. For example, one interviewee described how his organisation had been a frontrunner in 'operations' at the outset of its foundation – as it was amongst the first to be operative in the field of urban agriculture – but gradually grew into the role of connector and toppler as the issue of urban agriculture gained more resonance over the last decades (Int. 18). Another interviewee described how her organisation had evolved its role from its preceding network, to include an institutional anchor, which has been attributed to its newfound success (Int. 2).

4.1.2 Role specific feedback

When discussing the specific roles of the framework, most extensive feedback by the interviewees was geared at the role of frontrunner. Many interviewees wished to extend the role of frontrunner with additional functions that in their opinion belong to the category of frontrunner, and to further define the meaning of frontrunner.

First of all, one of the interviewees mentioned that frontrunners generally fulfil an agenda-setting function, which in her opinion is often overlooked in transitions literature (Int. 17). This agenda-setting

function reconciles with the earlier description of the interviewee who described his organization's activities to be pioneering at the outset of its foundation, drawing attention to the topic of urban agriculture in an international setting.

Furthermore, multiple interviewees questioned when an organisation successfully classifies as a frontrunner. In their opinion, the attempt to scale out is not enough to classify as a frontrunner, as *"99% of the innovations do not make it"* (Int. 22). According to these interviewees, a distinction should be made in the framework between succeeding frontrunners and those who just innovate for the sake of innovating.

Finally, a pertinent opinion amongst interviewees was that the frontrunner role should include followers as well. In the opinion of one interviewee, the frontrunner is defined as too narrow a role as it excludes "*the majority of people out there who want to contribute to change"* (Int. 4). As another interviewee stated: *"You do not have actual scaling unless somebody uses it [an innovation]"* (Int. 22).

However, there was discrepancy in the results whether or not the frontrunner role should include all or only the first users of an innovation. One interviewee had a clear opinion that if outscaling implies scaling the numbers, then you need to include all users, why the user would or would not use an innovation, and what potential barriers a user faces (Int. 22). Others merely mentioned the first followers to be important: "*There is a role for those who want to be second, they want someone else to go first and prove it, and then they want to be the very next in line*" (Int. 9). Such first followers blaze the trail for other actors, showing best practice examples for others to go and adopt those innovations as well.

In distinguishing between which followers would classify as frontrunners, and which would not, one interviewee differentiated between 'active' followers and 'passive' followers. Active followers were described as a group of actors able to act on innovations, whereas passive followers were described as a group of actors not able to act on innovations out of limiting constraint. According to this interviewee, active followers should classify as frontrunners (Int. 4).

Finding those first followers was not necessarily considered a task for the frontrunner itself. It was argued by one interviewee that connectors may fulfil an important role in finding the first customers for a frontrunner (Int. 12).

Whereas the role of frontrunner 'received' the most feedback by interviewees, several other noteworthy comments were made on the other roles as well. First of all, it was mentioned that the connector role best be dubbed as 'synthesizer' due to the normative engagement in the exercise of this function: *"I feel like synthesizer is the better term for it, because with the connector there is no active agency, whereas with a synthesizer you actually connect different silos and fields and then add your own layer onto this sort of framework"* (Int. 14). The toppler role was described by one interviewee as the "mediator of innovation" (Int. 23).

Additionally, interviewees proposed to incorporate additional roles into the framework. First of all, one interviewee recommended that the framework ought to incorporate the role of 'opposer', as opposition directly influences the ability of other actors in the framework to fulfil their function, and thereby influences the(ir) ability to outscale innovations (Int. 3). According to this interviewee, connectors have an important role in overcoming those challenges. Second of all, it was thought by one interviewee that there is also a role for 'maintainers' in the framework: as *"innovations disrupt - the new paradigm then has to be maintained by someone or someone has to take over some roles"* in order for an innovation to reach sustainable scale (Int. 14).

4.1.3 Synergy of the framework

Multiple interviewees stated that more than the individual sum of the different roles of the framework, it is the presence and interaction of the different type of roles of the framework as a whole which is important in leveraging successful scaling. The context within which these roles interact with one another was described as the innovation ecosystem.

"For a long time people thought that to get an innovation to scale you just need to give it money, and then maybe a bit more money, and then a bit more money again, and it didn't really work" (Int. 24). The ecosystem is therefore recognized to be of high importance in levering scale of innovations. However, the ability of the ecosystem to facilitate outscaling largely depends on the maturity of the ecosystem, according to multiple interviewees.

For example, one interviewee recalled from personal experience that in emerging markets [ecosystems] 'skills' are not as developed as opposed to in developed ecosystems. Accordingly, in emerging ecosystems communities are not as connected as in developed ecosystems, and actors tend to work in siloes next to each other. This was observed to make it much more difficult to leverage the scaling of innovations (Int. 11).

Another interviewee, experienced in catalysing and supporting innovation start-ups, emphasized the importance of the distribution of the roles in an innovation ecosystem: *"I think frontrunners you have all the time, and they are there. The problems is that these guys cannot go anywhere when they do not have an umbrella, a political umbrella that helps them"* (Int. 5).

To illustrate the working of an innovation ecosystem, the latter interviewee used the metaphor of the 'panini effect': in which a political leader [toppler] puts pressure for innovation support at the 'top', and frontrunners apply pressure from the 'bottom'. Support is passed to frontrunners through enhancers and connectors, who 'glue' both sides of the sandwich together. According to the interviewee, in emerging markets the challenge lies in institutionalizing political support for innovation, by embedding enhancers and connectors into the ecosystem. If this does not happen, innovation will be 'wiped out' with electoral turnover. In fact, the interviewee believed that: "*If there are good enhancers and connectors, they will actually change the ecosystem completely"* (Int. 5).

Furthermore, the interviewee added that when the different roles are aligned with one another, "*the ecosystem as a whole gains critical mass"* (Int. 5). Alternatively, when asked the question what happens to frontrunners without a political umbrella, the interviewee replied swiftly*: "They get frustrated and they leave"* (Int. 5). In stressing the importance of all roles in scaling innovations, another interviewee quoted his organisation's unofficial motto: *"It takes a village to raise a child – it takes an ecosystem to scale an innovation"* (Int. 24).

4.1.4 Summary

The previous section described the results on the analytical framework. The main findings that came to the fore are that, first, the framework and congruent roles should be seen as a dynamic whole. Second, interviewees made various suggestions for the further improvement and specification of the framework. These mainly included suggestions to specify the role of frontrunner and connector, and to incorporate a role for opposition and maintainers into the framework. Section 5.1 will discuss these results.

4.2 Barriers to outscaling

The second set of results relates to barriers to outscaling. All interviewees were asked what barriers to outscaling urban sustainability they encountered in their line of work. The answers could either refer to their experience with other organisations in the field, or to their experience with the global

organisation or network they were working for. After a meta-analysis of the topics and an additional review of the interviews, the results have been categorized in the following topics: financial barriers, risk-taking barriers, political barriers, cooperation barriers, social barriers, crowding out barriers and scaling approach barriers, which will now be discussed accordingly.

4.2.1 Financial barriers

- *"There's definitely not by trillions of euros enough finance to meet the needs of a sustainability transition (…) maybe only solar energy has enough finance behind it because it's kind of proven itself, and beaten the economies of scale issue - but a lot of other things need to be treated like solar energy"* (Int. 10).

The first set of barriers to scaling relates to financial issues. Table 7 reflects the financial barriers that were outlined per role, according to interviewees of which sector.

Category	**Subfunction**	**Key issues**	**Associated problems**	**Mentioned by interviewee belonging to sector:**				
				S	M	C	TS	M
Frontrunner	Entrepreneurial activity	Financial support	Friction between the moment ready to scale and opportunity to do so		X	X	X	X
		Restrictive rules around funds	Disincentives innovation		X	X		
		Mismatch (financial) inertia academia and public actors	Counterproductive to initial reason to fund actors		X			X
Enhancer	Capacity building							
	Process intermediation							
	Educative support							
	Financial support	Not enough funds for 'risky' innovations	Risky innovations do not get scaled	X				
		Funding splintered across issues	Impact at scale not reached				X	
Connector	Resource mobilization	Funding not divided across (sectoral) partners	Disincentivizes risk-taking behaviour				X	
		Sustainability of scale	Longer term perspective lost out of sight; impact may stave off				X	

	Relational intermediation	Public-private cooperation lagging	Disincentivizes risk-taking behaviour; impact of scale not reached	X				
Toppler	Systemic intermediation	Lack of economic incentives	"Cultural" risk-averse behaviour	X				
		Imbalance innovation ecosystem	Innovations do not get scaled without proper funds across multi-levels	X				

Table 7: Financial barriers to outscaling

Frontrunners outlined three types of financial barriers: a lack of financial support to scale innovations, restrictive rules around the spending of funds, and finally a mismatch between the financial inertia of academia researching innovations, and the underlying goals with which funding is granted thereto.

Issues around a lack of financial support were reported by multiple interviewees stemming from different backgrounds. According to these interviewees, the disruptive nature of innovations makes it difficult for frontrunners to attract investments from funders, as "*it's not like investors will lend you the money to solve a problem they've never heard about. A lot of this relies on people taking crazy risks that make not much sense"* (Int. 8). On the struggle to attract investment from risk-averse organisations, one interviewee commented: *"You end up replicating your business when money is available, and not when the opportunity is ripe – because sometimes there is a discrepancy between those two"* (Int. 11).

The second type of barrier described by frontrunners revolved around the restrictive rules that are tied to the spending of funds. Firstly, this problem was described in relation to the application procedure for funds. As one interviewee stated: *"You cannot have an innovation when you have a sheet of excel with some indicators of the problem which entice you to do specific things"* (Int. 13).

Yet, the problem of stringent regulation was also linked to the reporting required to spend a fund once received. One interviewee explained how the EU requires funded organisations to communicate "*on the dime*" how money will be spent upon receiving funding (Int. 7). The interviewee explained how that runs counterintuitive to the nature of innovations, which requires a much more adaptive approach.

Similar issues were also described by other interviewees in relation to donors: one interviewee (wishing to remain anonymous) reported that while most donors appear to stimulate iterative scaling and prototyping of innovations on paper, the amount of work tied to reporting on the spending of funds is so extensive, that scaling falls back into a cumbersome trend. Accordingly, extensive reporting is experienced to gravely impede the speed with which a frontrunner can scale an innovation.

The final barrier that was outlined by frontrunners is that there appears to exist a 'mismatch' between the financial inertia of academia researching innovations, and the underlying goals with which funding is awarded by public institutions thereto. This problem was reported by two interviewees.

One of these interviewees, working for a joint public-academic urban innovation research institute in which various stakeholders come together to stimulate urban innovation, explained the discrepancy with which innovative approaches to research are sometimes met with 'old-fashioned' responses by academics. Upon being approached for cooperation, some academics were observed to view funding

in terms of the academic benefits they could receive (i.e. amount of PHD's they can finance with funds), rather than what joint results may come out of such a collaboration (Int. 23).

Coming from another perspective, another interviewee also expressed his distress with the fact that scientific publications remain monetized, while they are of detrimental importance for the development of innovations (Int. 10). Accordingly, streamlining the financial reward system of academia with public goals more closely would greatly benefit society.

Enhancers and connectors mostly discussed financial barriers in terms of a lack of availability, diversity and sustainability of funds.

With regard to the former, one interviewee, whose organisation itself commits part of its funds explicitly to scaling risky innovations, was of the opinion that there are generally not enough funds available for 'risky' innovations. While risky innovations do not match a traditional economically rational model yet, they are recognized to have large potential impact.

According to this interviewee, it is difficult for cities to fund risky innovations with transformative impact on a city budget. Therefore, she issued that more cooperation is needed with the private sector to overcome funding shortages (Int. 1). Other interviewees also commented on the importance of increasing the amount of public-private partnerships in outscaling urban innovations.

Two barriers that were outlined by interviewees in relation to the diversity of funds are that "*a lot of the funding organisations have very specific agendas as to what problems to solve"* (Int. 8), and additionally, that risk is not divided equally across partners (Int. 16).

These issues were illustrated by one interviewee as follows: "*Donors, or funders, can have a massive role to play. Unfortunately they all tend to have their own agendas, (…) - different donors [are] funding pieces of the problems, (…) [and] we end up with a fragmented funding environment. This only encourages for organisations not to collaborate. But encourage them to join up more, that would make a huge difference… but politically that may not be so easy to bring around"* (Int. 16).

Multiple interviewees shared the opinion that as organisations do not work on the same issues, risk-taking is not encouraged*. "It would be ill advised for any single organisation to be a sole funder, or be the sole stakeholder involved in executing all the work",* explained an interviewee working for a foundation. Reflecting on the new direction of the 100 Resilient Cities network (100RC), whose funding has recently been cut by the Rockefeller Foundation, the interviewee stated:

"100 RC for example (…) the foundation was the sole funder for the 100RC for a long time. That's just not sustainable, you know, because things are sustainable when partnerships are involved – when we have partnerships with the public sector, partnerships with other foundations, and partnerships with the private sector. Because that way you diversify and distribute the risk amongst partners that have the best of interest in seeing things happen. And that is necessary for innovation as well, because topplers need to integrate with other actors in the system to make sure that innovations are sustainable and become the new normal" (Int. 21).

From a systemic point of view, interviewees thought the lack of economic incentives to support the outscaling of innovations to form a significant barrier to scaling innovations. However, one interviewee argued that the availability of finance itself is not a particular problem. Instead, he argued that issues of funding arise because of a lack of access or connection across the innovation ecosystem, which has previously been discussed under section 4.1.3.

4.2.2 Risk-taking barriers

- *"In my view, there's two ways of doing things. One of them is to solve an obvious problem or optimizing the way we're doing things already. The second category makes people do somethings that is very counterintuitive. Something no one really wants to do" (Int. 8).*

The second set of barriers relates to risk-averse behaviour. Risk-taking barriers centre around 'a lack of action'. Multiple interviewees commented on the issue of risk-taking from different perspectives. Table 8 sums up the barriers that were outlined by interviewees.

Category	**Subfunction**	**Key issues**	**Associated problems**	**Mentioned by sector:**				
				S	M	C	TS	M
Frontrunner	Entrepreneurial activity	Restrictive legislation	Disincentivize innovation to scale		X			X
		Restrictive rules around funds	Disincentivizes innovation to scale		X	X		
		Conservative mindset regime actors	Slows down the outscaling process					
Enhancer	Capacity building	Inexperience dealing with risk	Risk-averse behavior		X			
	Process intermediation							
	Educative support							
	Financial support							
Connector	Resource mobilization	Funding not divided across (sectoral) partners	Risks not taken, or not a sustainable scaling model used					X
	Relational intermediation	Political support	Risks not taken; innovations not scaled					X
		Fear/value of failure	Risk not taken; risk-taking (and failing lessons) not valued				X	
		Metrics of evaluation	Normative limitations				X	
		Greenwashing	Action not taken	X		X		X
Toppler	Systemic intermediation	Risk-averse climate	Inhibits risk to be taken; to be first	X				

Table 8: Risk-taking barriers to outscaling

Frontrunners outlined three types of risk-taking barriers: restrictive legislation, restrictive rules around funds and a conservative mindset of regime actors. As the restrictive rules around funds has been discussed in the previous section, it will not be discussed in this section.

Firstly, frontrunners described how risk-taking is inhibited by restrictive regulation. Whilst *"new ideas come from anywhere when you allow them to"* (Int. 8), legislation is regarded too restrictive to allow this to happen.

One interviewee illustrated this problem from first-hand experience. Having engaged in a co-innovation project around construction in the city of Amsterdam, the interviewee explained that the most innovative approaches to construction would come from construction workers themselves, when regulation would allow and/or stimulate them thereto.

Moreover, if regulation would stimulate construction workers to build more sustainably, the interviewee was of the opinion that innovations would scale out quickly as the result from the interplay between knowledgeable craftsmen and market competition. However, the regulatory sandbox is more often than not an exception to a rule in urban contexts. According to this interviewee, far too often, legislation still 'rewards' unsustainable construction styles (Int. 23), which can be taken as an example of the issues associated with restrictive regulation.

Another barrier frontrunners encountered, was that it can be difficult to show the benefit of their disruptive innovations to policy-makers or funders. Reflecting on his company's path towards innovating urban procurement systems, one interviewee stated: *"How do we convince governments to open up to recognize a problem? We had a huge problem in creating urgency when thinking about procurement"* (Int. 8).

According to an interviewee working as a mentor for frontrunners, risk-averse behaviour is not only observed in funders, but in frontrunners as well. In his experience, an 'inexperience in dealing with risk' for frontrunners is counter effective to the scaling process. Rather than waiting for the right moment to scale, which accordingly will never come, he mentors an iterative 'just do it' approach in entrepreneurs, to stimulate them to scale out sooner rather than later (Int. 12).

By connectors, risk-taking barriers were mostly observed in the lack of interaction of different actors with one another as well as value-driven issues.

For the mobilization of resources, it was considered counterproductive by interviewees for funding not to be spread across different partners - as discussed in the foregoing section.

Additionally, political partners were recognized as an important partner in scaling out innovations (Int. 21). As one interviewee explained, sometimes the knowledge and finance to scale out an innovation is there, yet it is the absence of political support that slows down the outscaling process. According to one interviewee, while some city governments jump at the chance to implement innovations, others lack the political will to do so (Int. 26). He illustrated this statement with the example of congestion charging. Accordingly, knowledge on congestion charging existed for a long time, yet it took the city of London twenty years to implement this innovation, after Singapore first installed an effective congestion charging scheme (Int. 26).

Even if partnerships help to spread risk across partners, interviewees still perceived it important to accept that failure might be part of the innovative processes. According to multiple interviewees, a fear of failure is an important value-driven barrier in transitioning towards more resilient cities. Accordingly, such values stem in part from a risk-averse climate, in which leaders do not wish to make mistakes and get 'paralyzed' by searching onwards and outwards for the 'perfect' innovations. Instead, it was thought better to focus on scaling out only those innovations with high transformative potential (Int. 2; Int. 7).

However, it was recognized by interviewees that shaming failure is a waste of opportunity: *"If we only create on the successes, we are only learning half the lessons. It's only the right hand of the distribution. There may be all kind of useful things to be learned from failures. But right now we are not incentivized to learn from them, we kind of brush them under the carpet"* (Int. 16).

Another value-driven barrier mentioned by a different interviewee, is that the metrics of evaluation we use to organize and run cities are too much based on our current understanding of the world. According to this interviewee, this becomes problematic when trying to think in new innovative directions. For example, the word "concrete" is often used in policies and legislation for nature-based solutions, as concrete refers to both the [unsustainable] material, as well as the adjective to indicate the sternness of something. However, such double normative conceptualizations may limit our thinking when considering nature-based solutions to issue a true transition to more sustainable cities (Int. 17).

A final barrier that was described by connectors is greenwashing. As reported by interviewees, in undertaking action, it is important to execute on goals. Yet, it was observed that organisations tend to greenwash their involvement in innovation processes, playing lip services, while most of these organisations do not really engage in 'risky' action (Int. 15).

From a systemic point of view, a risk-averse climate was observed to thread through the working and decision-making culture of all global organisations and networks (Int. 20).

4.2.3 Cooperation barriers

- *"If we take 100% of the cooperation's, only 5% truly collaborate"* (Int. 25)

The third set of barriers relates to cooperation issues. In part this ties into some of the barriers mentioned in the previous two sections. Table 9 shows an oversight of the different cooperation barriers.

Category	**Subfunction**	**Key issues**	**Associated problems**	**Mentioned by sector:**				
				S	M	C	TS	M
Frontrunner	Entrepreneurial activity	Risk-averse behaviour other actors	Slows down scaling process		X			
		Burden of proof	Harder to find a willing partner		X			
Enhancer	Capacity building							
	Process intermediation	Undefined innovation goals cities	Success not recognized		X			X
	Educative support							
	Financial support							
Connector	Resource mobilization							
	Relational intermediation	Unsynchronized goals partners	Cooperation falters	X				X
		Language barriers	Communication barriers; knowledge dissemination hampered	X				
		'Arrogance'	Knowledge exchange/	X				

			cooperation hampered					
		Cultural barriers in cooperation	Difficulties to cooperate	X			X	
		Metrics of evaluation individual sectors vs. societal goals	Societal goals not aligned; work in silos					X
		Mismatch (financial) reward systems	Work in silos; not towards the same goals					X
Toppler	Systemic intermediation	Public-private cooperation	Impact at scale not reached	X				
		Cross-departmental cooperation	Impact at scale not reached		X			
		Public-/private-academic cooperation	Innovation process slowed down or trespassed	X	X			

Table 94: Cooperation barriers to outscaling

Frontrunners stipulated that they mostly have to deal with the consequences of a level playing field in which other actors are risk-averse, as has been discussed in the previous section. Accordingly, this makes it difficult to find partners who are willing to cooperate or invest in the outscaling of innovations, and congruently, to get access to the right people (Int. 8). While interviewees recognized that it is important to be able to communicate the importance of their innovations to the 'right' actors, they stated that it can be difficult to prove their effectivity. As mentioned by one interviewee, it is difficult to show or produce data on the effectivity of an innovation considering the renewing nature of an innovation (Int. 3).

Congruently, from the enhancer perspective, it was observed that funders may not always know what they are looking for in innovations themselves. Both procurement organisations interviewed for this thesis found that most cities they work with (initially) do not have well-defined innovation goals. According to these interviewees, it is important for cities to know which issues they want to work on, as well as the outcomes they wish to achieve through the outscaling of an innovation for otherwise *"how will you know success when you see it?"* (Int. 9).

Yet, these interviewees recognized that this may sound easier in theory than it is to apply in practice. While "*processes used for city procurement are geared towards well defined problems, with well-defined solutions, (…) the nature of the challenges are more complex than that. It's nothing like fixing potholes in the road – you need many different city departments on board"* (Int. 9). A lack of cross-departmental cooperation is therefore outlined as a systemic barrier to cooperation.

Connectors mentioned the following cooperation barriers: unsynchronized goals, language barriers, 'arrogance', cultural differences, and different metrics of evaluation.

Unsynchronized goals are understood to complicate effective cooperation: *"If the government has a goal, the private sector has a goal, and the citizens has a goal, everybody is trying to get their objectives*

as high as possible" (Int. 25). At the same time, each of these actors may evaluate success differently: "*everyone scores high according to their own evaluations, but who is really doing well on what fronts?"* To move out of this paradigm, one interviewee recommended that "*you need a common understanding in sharing information between stakeholders, and you have to create an understanding how these stakeholders deal with different topics (…) - you need to have clarity*" (Int. 25).

'Arrogance' was a barrier to cooperation that was mentioned by multiple interviewees involved in city networks. According to these interviewees, 'developed cities' tend to have somewhat of a superior attitude towards less advanced partner cities they are matched to in knowledge exchange programs (Int. 2; Int. 4). Knowledge exchange thus becomes a one way street, instead of a two-way process. One interviewee sharply observed that while developed cities often have technical expertise and know-how regarding urban sustainability innovations, less developed cities often have a better way to involve citizens into the decision-making process, which belongs to a different set of barriers discussed under section 4.2.5 (Int. 2).

According to multiple interviewees, cultural differences can be an obstacle to cooperation if partners are unable to overcome differences in working styles (Int. 7; Int. 14). In addition, for partners working with city governments, it is considered important to understand the position of a city in the political structure of the country it belongs to, as some countries have a stronger top-down approach than others. This is observed especially in Africa and Asia. In such countries, connectors ought to address national governments rather than city governments if they wish to influence urban innovation processes (Int. 2; Int. 18).

From a systemic perspective, a lack of cooperation between different types of sectors was regarded as a pertinent barrier to the urban sustainability transition by multiple interviewees, and this issue was mentioned with reference to multiple compositions. Firstly, public-private partnerships were mentioned as a form of cooperation requiring improvement. Explaining the importance of public-private cooperation, one interviewee stated: "*We are not going to get to carbon neutrality through policies, we will only get there when the private sector is on board" (..) So how do you create products that are interesting to investors? That is one of the big barriers that we are facing. That is not to say that we do not have cooperation with the private sector, but we would like to see more"* (Int. 1).

Another sector which was repeatedly mentioned to be in need of closer alignment to other sectors, was the academic sector. As mentioned under section 4.2.1, the monetization of scientific data is considered an obstacle to frontrunners' innovation processes and was considered a point of improvement. Additionally, one interviewee also mentioned how policy development could greatly benefit from deeper academic integration. According to this interviewee, deeper cooperation between academia and the public sector is difficult to achieve due to the different speed and cultures within which public officials and academics operate (Int. 1). The topic of academic cooperation is further elaborated on in section 4.3.1.

4.2.4 Political barriers

- *"If you look at cities that have achieved really positive impacts and change, they are the ones that for some reason or another, did not throw out the baby with the bathwater every time there was a change of political leadership of party"* (Int. 26).

Political barriers make up the fourth set of barriers, as reflected in table 10.

Category	**Subfunction**	**Key issues**	**Associated problems**	**Mentioned by sector:**				
				S	M	C	TS	M
Frontrunner	Entrepreneurial activity	Government support	Inability to carry out functions without government support				X	
Enhancer	Capacity building							
	Process intermediation							
	Educative support							
	Financial support							
Connector	Resource mobilization	Political will	Slowing down outscaling process					X
	Relational intermediation	(Un)understanding pace of the city	Windows of opportunity lost	X				
		Political turnover	Innovation ecosystem out of balance; hard to connect different actors to one another	X				X
Toppler	Systemic intermediation	Lack of institutionalization	Innovation ecosystem (model to scale) not embedded		X			
		Short mindedness politicians	Long-term goals remain undefined; agenda scattered (policy discontinuity hampers innovation to come through)			X		

Table 10: Political barriers to outscaling

Frontrunners outlined a lack of government support as a potential barrier to the fulfilment of their activities. One interviewee indicated that the withdrawal of government support to their projects in an undemocratic developing country literally and figuratively endangered the projects her organisation was carrying out (anonymous). Depending on the context, a lack of governmental support was observed to form a complication to the ability of frontrunners to outscale their innovations.

Connectors outlined three types of political barriers: a lack of political support, political turnover, and finally an (un)understanding of the pace of the city.

A lack of political support was viewed as a pertinent barrier to scale, as (city) governments are considered an important partner in scaling out urban sustainability innovations. State actors are recognized to have the financial and regulatory means to institutionalize support for innovations. Without the support of these instruments, innovation and outscaling processes may be slowed down

(Int. 7; Int. 26). The earlier discussed example of the introduction of congestion charging in Singapore and London in section 4.2.2 serves as an illustration thereof.

Another barrier that was issued by connectors is political turnover. Multiple interviewees observed that with a change of mayor, policy is often changed into new directions. When a progressive mayor is replaced by a conservative one, support for urban innovation processes is lost, unless the previous mayor is able to institutionalize support during his political term. The former mayor of New York, Bloomberg, was mentioned as an example of a mayor who was able to successfully institutionalize support for urban innovation during his term (Int. 5).

Finally, connectors considered a lack of understanding of the pace of a city as an important barrier for other connectors to successfully fulfil their function. As one interviewee explained, each city has different moments of consultation - moments of opportunity for a connector to push for an innovative urban agenda. Such moments of consultation may differ per country.

It was explained that whilst in most European cities planning is an inherent part of urban innovation strategies, in Asia and Africa most of such decisions are made on an ad hoc basis. Furthermore, urban innovation decisions may not necessarily be made by city departments, but by national governments as well (Int. 2). Therefore, it is considered important to know 'the pace of a city', in order for stakeholders to be able to engage with politicians in the crucial moments of consultation.

From a systemic point of view, two barriers were outlined: lack of institutionalization and short mindedness of politicians. Both barriers are related. According to interviewees, as most political leaders think in electoral terms, it can be difficult to achieve a long-term innovation agenda for cities (Int. 5; Int. 13). In addition, when innovation processes are not embedded into the system, innovation cycles have to be re-established with every electoral turnover. One interviewee thereby explained the success of 100RC's Chief Resilience Officers, who explicitly work to bridge urban innovation agendas within and across cities (Int. 2).

4.2.5 Social barriers

- *"For innovations to flourish, you need to have a match between the characteristics of an innovation around certain issues and the wants the users have in terms of taking up an innovation"* (Int. 22).

The fifth set of barriers revolves around social issues, reflected in table 11. As can be deducted from the table, it is remarkable that most of the barriers were mentioned by interviewees stemming from a third sector background. Furthermore, it is observed that the essence of all these barriers point to issues around the social license to operate.

The social license to operate is described as the acceptance of a frontrunner and its innovation by the (local) people interacting with the innovation. Two things are considered important to 'receive' a social license to operate: the innovation needs to be contextualized in every region it is introduced, and the frontrunner introducing the innovation must receive social approval by the communities it is interacting with.

Category	**Subfunction**	**Key issues**	**Associated problems**	**Mentioned by sector:**				
				S	M	C	TS	M
Frontrunner	Entrepreneurial activity	Cultural barriers	Innovations not used due to mismatch innovation				X	

			characteristics & user					
		Social disapproval	Innovations not used due to dislike frontrunner				X	
		(not) Matching needs locals	Disruptive effect				X	
Enhancer	Capacity building							
	Process intermediation							
	Educative support	Attribution instead of contribution	Loss of results/contribution				X	
	Financial support	Listening to needs locals	Disruption local community				X	
		Inclusivity & social equity	Disruptive to local community				X	
Connector	Resource mobilization							
	Relational intermediation	Contextualization of innovation	Lasting effects	X				
		Inclusivity	Disruptive	X				
		Partnering with local organisations	Inclusiveness; lasting effects				X	
		Matching innovations to local context	Lasting effect; lean models to scale				X	
Toppler	Systemic intermediation	Weak enabling environment	Innovation encounters barriers to scale that are embedded in ecosystem				X	X
		Inclusivity	Disruptive				X	X

Table 5: Social barriers to outscaling

Frontrunners described three types of social barriers: cultural barriers, a mismatch between the innovation and the needs of its intended user, and social disapproval of the frontrunner.

Cultural barriers are considered an important constraint in outscaling innovations. One interviewee explained that no matter how 'scientifically proven' an innovation is, innovations may still meet resistance when they clash with cultural or social norms and values the innovations interact with (Int. 18). Interviewees therefore considered it of high importance that cultural characteristics are taken into account when designing an innovation (Int. 22).

Additionally, it was mentioned that the characteristics of the innovation need to meet the needs of the communities that are intended to use it. According to one interviewee, while sounding straightforward, this issue is often overlooked (Int. 22).

The final barrier for frontrunners is that not only the innovation itself, but also the frontrunner introducing innovations must receive social approval by the communities it interacts with, in order for innovations to scale. When issues of *"social justice and equity are ignored (…) that will work against you, no matter how big you are"* (Int. 20).

Illustrating the consequences of neglecting questions of social equity and justice, the latter interviewee added: *"A lot of the community engagement issues are plaguing companies like Amazon and Google. Google is trying to do this big smart community project and is having a lot of pushback on it. Amazon is trying to come into NY and trying to do a lot of meaningful community engagement and got a huge political blowback. I think there are a lot of tech companies that underestimate authentic community engagement as a part of their innovation and economic development"* (Int. 20).

Questions of social equity were also mentioned as important issues for investors of urban innovations, in order for money not to become a divisive instrument. One interviewee stated: "*Positive inclusive development is needed in urban areas where everything is concentrated"* (Int. 21).

For connectors it was mentioned to be important to realize that the context of every city is different. While an innovation may work in some cities, it might not in others: "*It is very important in every conversation to realize that the context of each city is different. Even if you have similar problems, you always have to think about the context, the political relationships and so on. I truly believe that there are technical solutions for everything, yet, if people do not believe in them, or politicians do not back them, it is a pointless endeavour"* (Int. 2).

In the endeavour to contextualize innovations, it was furthermore mentioned to be important to include local partners in the scaling process. According to one interviewee, this is not only important from an equity perspective, but partnering with local partners also allows the 'mothership' of an innovation to focus on the bigger picture, whilst local partners embed the innovation and carry it to a sustainable scale (Int. 14).

From a systemic point of view, it was mentioned that the contextualization of innovations might be compromised when the environment is not able to support the innovation (Int. 22; Int. 24). Accordingly, these issues may be of technical or structural nature. Technical issues are considered to be easily overcome. Illustrating this with an example, one interviewee explained that when introducing a new technology, such as a computer, the enabling structure (for this example; electricity and Wi-Fi) needs to be installed alongside the innovation (Int. 22). When the enabling structure is not there yet, all that is required to overcome this issue is to install it; a financial-technical fix.

However, structural issues may require more work. Therefore, one interviewee mentioned the importance of "*strengthening the relationships and assets countries have at their disposal for innovation rather than just focus[ing] on individual innovations and shoot them into countries and hope for the best*" (Int. 24). According to this interviewee, global organisations have an important supporting role to play in that regard.

The issue of inclusivity can be viewed from different perspectives, as became clear from the depictions of multiple interviewees from different backgrounds in this section. From a systemic point of view, it was considered important to address ethics of innovations as a general focus point on the urban innovation agenda. Particularly technological innovations were mentioned to be an important

innovation to follow closely, as technological innovations can carry biases into the systems that run them. Accordingly, global organisations are thought to have an important role in making sure that innovations are inclusive and do not become divisive instruments (Int. 21; Int. 24).

4.2.6 Crowding out barriers

- *"Start-ups are very important in developing new knowledge and innovation. Yet, they are often too small, or do not have enough time to respond to tenders. (…) Simplifying these tendering procedures would give them a chance to contribute to innovation*" (Int.2).

The sixth set of barriers relates to a crowding out effect, as reflected in table 12. The crowding out effect refers to the inability of actors to connect to other (global) organisations and networks involved in outscaling urban sustainability innovations, as a result of exclusivity of scale, standard, or attitude. These conform to the barriers outlined in table 12. As 'arrogance' was discussed under section 4.2.3, it will not be further expanded upon in this section.

Category	**Subfunction**	**Key issues**	**Associated problems**	**Mentioned by sector:**				
				S	M	C	TS	M
Frontrunner	Entrepreneurial activity							
Enhancer	Capacity building	Participatory standard	Exclusion those willing to innovate/scale	X				
	Process intermediation							
	Educative support							
	Financial support							
Connector	Resource mobilization							
	Relational intermediation	Participatory standard	Exclusion those willing to innovate/scale	X				
		Participation barrier	Small actors are excluded by virtue of size/credibility	X			X	
		"Arrogance"	Not listened to those with knowledge/ideas	X				
Toppler	Systemic intermediation							

Table 12: Crowding out barriers to scaling urban innovations

The issue of the participatory standard refers to the inability of actors to participate in innovation programs due to the entry-level standard that is set by the program. This issue was illustrated by an interviewee employed for an organisation pairing cities in a city matching program. To be eligible for a city pairing in the interviewee's organisation's city network program, a city needs to meet a certain level of 'innovativeness', otherwise it cannot be matched with another city. *"For our purposes we can't pair a completely inexperienced city with another one in another region, because the pairings won't work,"* explained the interviewee, "*cities need to understand the reasons and needs for bringing other stakeholders in and tie them to specific strategies"* in order to generate successful partnerships.

Yet, as the interviewee explained, this leaves behind those willing to innovate but not up to par: "*We recognize that this is a vicious cycle, supporting those who have been supported before, and we need to support also those that haven't gotten a chance to be supported by us."* (Int. 4).

The participation barrier summarizes observations by interviewees that small actors are sometimes crowded out from the global scene of organisations and networks involved in outscaling urban innovations by virtue of their size. This issue was exemplified both with reference to the inability of frontrunners to connect to city procurements without the sponsorship of larger organisations or businesses, as well as the inability of small cities to engage in innovation pairing programs. Moreover, small cities do not always have the same means at their disposal to engage and invest in innovation processes as big cities have (Int. 2; Int. 20). It was therefore suggested by one interviewee that it might be rewarding for small cities to bundle powers with other small cities in order to engage in innovation programs nonetheless (Int. 9). However, this would require a more flexible approach in city collaborations.

4.2.7 Scaling approach barriers

- *"A lot of time is spend on creating a lot of good ideas, but not enough time is dedicated to thinking through which ones we can really take forward seriously"* (Int. 2)

The final set of barriers relates to approaches to scaling, as reflected in table 13.

Category	**Subfunction**	**Key issues**	**Associated problems**	**Mentioned by sector:**				
				S	M	C	TS	M
Frontrunner	Entrepreneurial activity							
Enhancer	Capacity building							
	Process intermediation							
	Educative support							
	Financial support	Selection paralysis	Quantity over quality	X				
		Scaling too early	Unnecessary mistakes made				X	
		Scaling too big	No space for iterative approach; influences risk-aversity		X			
Connector	Resource mobilization							
	Relational intermediation	Selection paralysis		X				
		Scaling too early						X
Toppler	Systemic intermediation	Future orientation	Short-term only seen, not long-term thinking					
		Focus on low-hanging fruits	Incremental vs. large/deep changes	X			X	

Table 6: Scaling approach barriers to outscaling

Scaling approach barriers summarize the issues reported by interviewees around poorly designed pathways for scale. When decisions for scale are made on considerations of short-term successes instead of long-term impact, the ultimate results that are booked with outscaling processes are compromised.

A first barrier that was described in relation to scaling approaches, is the 'selection paralysis'. Multiple interviewees noted that often too much time and effort is lost on trying to keep an open mind to all innovations: *"A lot of time is spend on creating a lot of good ideas, but not enough time is dedicated to thinking through which ones we can really take forward seriously*" (Int. 2) This 'selection paralysis' was mostly ascribed to the risk-averse culture, a systemic barrier discussed under section 4.2.2.

Interviewees believed that more can be achieved by carefully weighing options: *"Instead of thinking through a lot of ideas, it would be better to take, say, the three most transformative ones, and creating a project around them instead of keeping them all on a list and trying to do everything at the same time. Focus on the ones you can create impact with*" (Int. 2; Int. 7).

Two other barriers that were mentioned in relation to scaling approaches, are scaling too early, and scaling too big. With reference to the former, one interviewee emphasized the importance of prototyping as a stepping stone in the process of outscaling innovations (Int. 19). Scaling too big is considered to become a barrier when investing in "*huge pieces of infrastructure*", as *"these (…) are not only so expensive that you cannot just move away from them when a better solution comes along, but it also makes you very wary of any good idea that could pressure you to go in a new direction in terms of infrastructure"* (Int. 10). Both these issues were considered to play into a risk-averse culture.

From a systemic perspective, a first barrier that was mentioned by one interviewee is that currently not enough attention is being paid to future issues in scaling decisions. According to the interviewee, it is important to consider the future demographics an innovation is to interact with in designing scaling pathways, in order for sustainability innovations to truly transform systems and have a lasting effect (Int. 6).

Secondly, reflecting on the path most travelled by global organisations and networks involved in outscaling innovations, multiple interviewees observed that there is a tendency amongst these organisations involved to choose for the 'quickest results' (Int. 2; Int. 15). One interviewee remarked: "O*ften, we choose for the low hanging fruits, because you want to show impact, but I believe we can improve that balanc*e" (Int. 2).

4.2.8 Summary

The previous sections described the results on the barriers to scale. These centred around seven different topics: financial barriers, risk-taking barriers, cooperation barriers, political barriers, social barriers, crowding out barriers, and scaling approach barriers. Table 14 summarizes the key issues that came to the fore for each of these topics.

For financial barriers, key issues hinge around access to financial investment, stringent regulation, and a lack of public-private-third-sector cooperation in spreading financial risks amongst actors. Risk-taking barriers revolve around a risk-averse climate, in which failing is feared. This is reflected in restrictive regulations. Cooperation barriers centre around issues of communication, and undefined joint goals for urban innovations and urban transitions, which disincentivize global organisations and networks to cooperate. Political barriers stem mostly from a disbalance between the inertia of politicians and the long-term requirements for scaling processes, resulting in a focus on short-term goals over following a long-term vision. Social barriers revolve around the social disapproval of innovations and frontrunners and a lack of contextualization of innovations. The results showed that social approval is

a key to outscaling innovations, the importance of which is often underestimated by global organisations. Crowding out barriers revolve around the inability of small organisations to connect to the global scene of organisations and networks involved in outscaling urban innovations, by virtue of size, standard or attitude. Finally, barriers in the scaling approach centre around decisions for scaling design. It was observed that when organisations make scaling decisions based on considerations of short-term successes, their long-term impact is jeopardized.

Barrier	Key issues
Financial	(Access to) financial investment; stringent regulation funds; public-private-third sector cooperation
Risk-taking	Fear of failure; restrictive regulations/ mindset actors
Cooperation	Communication issues; undefined common goals
Political	Disbalance political inertia and long-term goals of ecosystem
Social	Social disapproval of innovation or frontrunner; lack of contextualization
Crowding out	Inability of global organisations to connect with 'smaller' ones
Scaling-approach	Overstretching; lack of careful consideration best options

Table 14: Summary of the results on the barriers for global organisations and networks supporting the outscaling of urban sustainability innovations

It is apparent that many of these topics are interrelated when considered in their broader context: the overall ability of global organisations and networks to successfully support the outscaling of urban sustainability innovations. First of all, cooperation barriers largely tie in with risk-taking barriers and financial barriers. Second of all, crowding out barriers and scaling approach barriers tie into scaling design as overarching topic. Additionally, certain recurrent themes in the results can be outlined. Specifically, a certain level of 'conservatism' is observed to thread through the different barriers, expressed explicitly in terms such as short-mindedness and singularity.

Thereby, the seven categories of barriers described in the foregoing sections are summarized in four main topics: conservatism, cooperation and cooperation for finance, the social license to operate and scaling design. Section 5.2 will discuss the implications of these findings according to these four main topics.

4.3 Future desired roles

- *"A barrier is a specific term, that stops us from doing our work, but I think challenges is a better way to describe the issues we are encountering in our work." (Int. 14)*

The final set of results relates to the future desired roles for global organisations and networks involved in the outscaling of urban sustainability innovations. Interviewees were asked to reflect on what could maximize the potential of their own organisation to outscale urban sustainability innovations, should they receive the opportunity to do so. Similarly, interviewees were also asked to reflect on how other (types of) organisations and networks should change, to maximize their potential to outscale urban sustainability initiatives. Finally, interviewees were asked if a new type of organisation or network ought to be created, to increase the potential of the 'field' to outscale urban sustainability innovations. The results will be discussed accordingly.

4.3.1 Future desired roles 'own' organisations

The answers to the first question, how interviewees' organisations' or networks' could maximize their capacity to outscale urban sustainability innovations, generally evolved around three different topics: improved forms of cooperation, financial changes, and a change in the organisation's mandate.

Cooperation

The vast majority of interviewees mentioned improved forms of cooperation as a key to maximize their organisation's and networks' ability to outscale innovations. This was stated both with reference to improving internal (inter-organisational) forms of cooperation, as well as external forms of cooperation. With regard to the former, multiple interviewees, especially those working for large organisations with multiple offices and departments, expressed the desire to improve internal communication across departments, across offices, to streamline approaches to scaling urban sustainability initiatives in order to generate higher impact. For example, in order to improve the UN's ability to address issues of urban food security, it was believed that the FAO (Food for Cities program) should align (even) more closely with UN-Habitat (Int. 6).

As for the desire to improve external forms of cooperation, many interviewees believed cooperating with other stakeholders more closely would yield higher impact. Most pertinently, interviewees believed cooperation should become more inclusive: allowing every relevant actor willing to work on urban sustainability issues to participate, regardless of their 'entry level' (see the discussion on participation barriers in section 4.2.7) (Int. 4). As an example, it was mentioned that the discussion on urban food security should include "*farmers, consumers, academics, NGOs, and international organisations*", and so forth (Int. 6).

Remarkably, many interviewees expressed the explicit desire to cooperate with academia more closely to achieve a co-production of knowledge, by creating an ongoing dialogue with scientists on their scientific findings. Yet, the cycles of peer-reviewed literature, as well as the earlier discussed monetization of scientific findings (section 4.2.1), were mentioned as specific barriers to achieving such forms of cooperation (Int. 10; Int. 1).

Interestingly, the research organisations interviewed for this thesis that are focused on result-based management, actively cooperating with stakeholders to discuss and disperse their scientific findings, commented not to desire to change their approach to stakeholder cooperation, as their approach to research is already innovative for a research organisation (Int. 23; Int. 15; Int. 16). Yet, it was recognized by one interviewee, that "*sometimes it does not sit well with colleagues*", that research includes elements of co-production, as this is still a sensitive topic within the academic world (Int. 17).

Yet, other research organisations did express the need for more transdisciplinary cooperation within academia in working on urban sustainability innovations as this strengthens the approaches to innovations. The word 'transdisciplinarity' was used explicitly over 'cross-disciplenarity', as transdisciplinarity allows scientists to connect across academic disciplines, while keeping their 'academic goggles' on to study urban innovations from different angles (Int. 14).

Finally, multiple interviewees stressed the added value of international meetings with different stakeholders in addressing urban innovation topics, and expressed the desire for their organisation to be able to organize more of those meetings, with more regional meetings complementing global ones.

Finance

Financial changes were the second most mentioned topic for improvement amongst interviewees reflections on how to maximize their organisations' potential to scale urban innovations. Addressing earlier outlined financial barriers, one frontrunner expressed the wish to create a fund solely dedicated

to replicating successful ventures (Int. 11). Another frontrunner described the desire to create investment model with smaller returns on investment (Int. 10).

Reflecting from a city perspective, one interviewee expressed the need for cities to focus more on investing in only the most transformative ideas, as described under section 4.2.7 (Int. 2).

Increase in mandate

Multiple interviewees expressed the desire to expand their organisations' scope or mandate to increase the impact of their work.

4.3.2 Desired future role other organisations/ networks

The set of answers to the second question, focused on the desired future roles of other organisations and network, can broadly be categorized around four topics: financial changes, cooperation, legislative leeway and the level of pro-activeness.

Financial changes

The first set of desired changes evolved around financial changes, discussed from multiple different perspectives.

In line with the earlier discussed financial barriers (discussed under section 4.2.1), themes such as the spending of the funds, risk-taking and economic incentives resurfaced in discussing the desired changes to the funding system. Particular suggestions were made how to ease the strain on the frontrunner: one interviewee suggested the introduction of a guaranteed first buyer principle by (city) governments, which would immediately reward innovations that have proven themselves to work (Int. 10). Another interviewee suggested that donors should explicitly invest a set percentage of their funding in risky innovations (Int. 11).

From a systemic perspective, two changes were suggested by interviewees that could de-risk innovations: the decentralization of innovation portfolio management, and adaptive management of innovations.

The decentralization of the innovation portfolio would require governments to roll back the decision-making power for the management of the innovation portfolio to 'the smallest' actor. Rather than adopting urban innovations on a national level, governments ought to let city departments choose which innovations they wish to support. The premise of decentralizing innovation portfolios is that technological lock-ins are prevented, while successful innovations, proving themselves to work, will scale further (as discussed under section 4.2.7) (Int. 10). One interviewee even suggested that portfolio management could further be rolled out to citizens with an allocated budget (Int. 18).

Adaptive management was the second suggestion to allow for a more flexible approach to scaling innovations, decreasing the risk to failure. "*Adaptive management changes the way that development agencies manage projects so that many of them agree to invest in an organisation. Instead of saying 'this is what we expect you to achieve in 5 years, and we want you to provide this many benefits to many this people and so on, and they predict all five grants' - adaptive management changes all that and says, 'okay, lets agree on a goal, we'll not restrict you in terms of "it has to be this number of people, it has to be done in this way."' [With adaptive management] you have the flexibility to change and adapt and iterate on your approach as you go along"* (Int. 24).

Cooperation

The topic of cooperation also generated a lot of discussion for future desired roles of organisations involved in scaling urban sustainability innovations. Cooperation was regarded by interviewees as one of the most impactful instruments to leverage urban transformations: *"When cross-pollination across*

sectors or academic practices happens, that's when you really start to find out transformative change" (Int. 21).

Yet, organisations are observed to work in siloes. One interviewee stated: *"When we are trying to make partnerships with other organisations, they tend to be stuck in their ways, or paradigms, or ways of thinking"* (Int. 21). This was considered problematic by the interviewee as *"prevailing knowledge in the field can actually be a hindrance to innovation",* when people disregard innovation from less established actors. Adding to that, the interviewee observed: *"Innovation doesn't always come out of the MIT's or Stanford's of this world, innovation can take place in the communities we are trying to help, if only we listened"* (Int. 21).

It was noted by multiple interviewees that many sectors require deeper forms of cooperation to leverage more successful urban innovation scaling: from city-departments, to banks, to the private sector, all the way up to international organisations. The problem of a lack of cooperation was pointed out across all sectors.

To explain the importance of cross-sectoral cooperation, one of the interviewees who teaches classes at a university, recalled an anecdote he uses in one of the classes he teaches. The case he describes to his students is as follows: in a city like San Francisco, people make less use of public transport and more use of personal cars on days it rains. As a result, congestion and accidents go up. As most organisations work in silos, focused on achieving their own objectives it is hard to generate a change in this phenomenon.

"I try to get my students to think about, well, what would the public policies need to be, and what would cooperation between agencies need to look like, to facilitate an environment where you could offset the shift in riders, you could influence people's choice towards public transit - even in the rain, to void this natural phenomenon? What is the elasticity there etc.? (…) but there is no mechanism, in most cities, to say 'Okay, our desire is to decrease congestion, so transit authority you are going to make these trade-offs, in order to support this initiative'- but that's not how success is measured, that's not how I am paid." (Int. 9)

However, the tendency of organisations to focus solely on their own objectives was also observed in other types of organisations by other interviewees. One interviewee pondered: "*In philanthropy we have a tendency of thinking we have the solutions, and we are going to fix people's problems and we have less of an appetite of listening to the people we are actually trying to help, so I wish, foundations in general would spend more time listening to people, instead of trying to fix their problems"* (Int. 21). The interviewee concluded his statement with stressing the importance of cooperation for reaching sustainable scale.

The desire for more cross cooperation was finally also mentioned with reference to other types of global organisation: multiple interviewees stated that international organisations such as the EU and UN-organisations could and should cooperate much more closely on issues of urban sustainability innovations. While these organisations are recognized to have the potential to trigger massive impact, they are often regarded as 'conservative' in their approach.

Multiple interviewees shared their vision for stronger forms of cooperation. According to one of these interviewees, a key to creating lasting relationships is a *"common vision, and a bit of money: collaboration has big overhead costs, transaction costs – everyone involved needs to see the benefits. Those are not necessarily money or funding. It's an incentive: you need to see strong incentives of the benefits for working together. CCAFS is a good example of organisational collaboration at one level (…) without these sort of incentive structures, it makes it difficult to influence behaviour"* (Int. 16).

Another interviewee explained how funders can induce more cooperation, by requiring applicants to apply for funds in consortiums, as is currently done in the EU. Accordingly, this directly incentivizes organisations to work together on a common vision (Int. 10).

In order to create stronger forms of cooperation, it was observed by multiple interviewees that this refers to the inclusion of more actors in the scaling process as well. Other than deepening cooperation with the private sector and academia, it was also mentioned multiple times that citizens should be engaged as agents of change, much more than is done already. Accordingly, whilst citizens are recognized to be important agents of change in urban scaling processes, they are as of yet vastly disconnected from other actors on the global scene. However, interviewees did not generate specific ways in which community organisations could become closer aligned to the global scene of outscaling innovations.

Legislative leeway

Thirdly, multiple interviewees expressed the desire for state actors to adopt more liberal approaches to regulating innovations. The question what is needed to reach that, was met with a simple answer: "*Pure policy change*" (Int. 7). Interviewees expressed the need for state actors to make 'freeway' to outscale urban innovations. This implies the stimulation of the development and use of sustainable innovations over unsustainable products or processes, as it is observed that regulation often supports 'conservative' ways of organizing cities.

One method that was suggested to stimulate more urban sustainable innovation, is the creation of more regulatory sandboxes. Regulatory sandboxes allow for the testing of small scale experiments in designated zones, where innovations can be re-iteratively improved before going to scale. Accordingly, this also allows for a leaner model to scale (Int. 24).

Additionally, one interviewee believed that in stimulating global-local, and radical change, city diplomacy has an (even more) important role to play in the future, (Int. 1).

However, while interviewees argued for more legislative freeway and stronger forms of cooperation, interviewees also cautioned for the increasing importance of accountability and control in the outscaling process (Int. 21; Int. 24). Moreover, as more actors take the stage in scaling processes, accountability and control of innovation processes become dispersed over many different players. Therefore, it was deemed important by interviewees that the topic accountability is also addressed by global organisations and networks, in order to ensure that urban innovations "*advance societies but also make them more inclusive as well*" (Int. 24). One interviewee stated this to be the responsibility of state actors (Int. 24).

Pro-activeness

A final desired future role of organisations and networks is an increased level of pro-activeness.

Many interviewees shared the desire for the global field of organisations and networks involved in outscaling urban innovations to move to a more proactive approach of scaling innovations: instead of talking about innovations, executing on them as well. One interviewee observed: "*There are a lot of great ideas, but executing them is difficult. A lot of organisations are great in thinking through strategies and plans, but to implement them, I see the biggest gap* (Int. 2). Accordingly, the more capacity transformative ideas generate, the more resilient cities become.

4.3.3 New organisations

While most interviewees did not see the need for the creation of new organisations or networks, to fulfil additional roles in outscaling urban sustainability innovations, some suggestions were made as to the new creation of certain functions. These were:

- Creating special committees within standing organisations to pitch ideas and innovations. In the city of Haarlem a citizen committee exists where weekly people may pitch their ideas to a panel (Int. 3).
- Create special ambassadors for urban sustainability innovation within (city) governments, who have an interministerial or departmental mandate to bring together people on this topic (Int. 3).
- Let city government install the principle of guaranteed first buyers (Int. 10).
- Create a new platform for urban agriculture, including all different stakeholders (Int. 6).
- Expand city resilience officers with regional resilience officers, working on the sustainability of city *and* hinterland (Int. 9).
- Create more city-academic innovation research institutes, as is currently being done in a handful cities around the world (including AMS Institute) (Int. 23).
- An organisational focus on future foresight in innovations, studying the trends in innovation: *"If you have a bit more information of what's likely to seed in these massive trends, then are there ways in which we can hook agriculture to some of those trends to make change a reality?"* (Int. 16).

Finally, one interviewee suggested that rather than merely creating more regulatory sandboxes, a regulatory sandbox-city ought to be created. This "innovation city" would be entirely designed to test new models of technology and economy and so forth. As the interviewee explained in his own words:

"I would like to build a new city that is entirely designed to test these new models of technology, and economy, like for example If you had a research city, where a bunch of existing institutes, and governments and then academics or companies have some satellite offices, and they design of the research city where you can say like over the next year and a half we're going to try 10 different forms of universal basic income, or we are going to try six different forms of democracy, and we're going to utilize technology and empower people to have the decisions, or 4 different types of infrastructure, and 3 different types of currencies and so on and so on. And you would create a true living lab, not some kind of cute little project in the city somewhere, but a true place where you can try out these things and get a general sense of how do they work?" (Int. 10)

4.3.4 Summary

The previous section described the results on the future desired roles of global organisations and networks. From these results it becomes apparent that the future desired roles of global organisations and networks largely hinge around evolving existing roles, rather than creating new roles or organisations. The main themes global organisations and networks are desired to improve revolve around cooperation, financial investment and regulations. Furthermore, an overarching theme that strongly came to the fore, is the desire for global organisations and networks involved in outscaling urban innovations to become more pro-active.

Specific actors that are desired to evolve their role in the system of global organisations and networks involved in outscaling urban innovations include the private sector, community organisations and research organisations. The latter is desired to evolve its function from creating results for academia, towards co-creating impact. Section 5.2 will discuss these findings.

5. Discussion

- *"I think everyone is now in this space that they recognize the importance of innovation, and that argument has kind of been won, and so the biggest challenge is now how to operationalize that, to scale it for impact"* (Int. 24).

This chapter discusses and contextualizes the findings of this thesis. First, it will address the theoretical findings and implications of this research (section 5.1). Then, it will discuss and contextualize the findings on barriers to outscaling, and future desired roles of global organisations and networks involved in outscaling innovations (section 5.2). Thereafter, the research limitations of this thesis are addressed (section 5.3), before outlining avenues for future research (section 5.4). Finally, this chapter ends with recommendations for global organisations and networks involved in outscaling innovations (section 5.5).

5.1 Theoretical framework

Building on the theoretical framework of de Haan and Rotmans (2018), as well as other relevant literature, an analytical framework on the roles of global organisations and networks was drafted to analyse and cross compare the capacities of various global networks and organisations involved in outscaling practices in the field of urban sustainability. This preliminary framework was used and tested against an empirical inquiry into the operations of 26 global organisations and networks involved in outscaling urban sustainability innovations. As one of the goals of this thesis was to develop and test an integrated framework for the different type of roles and actors in outscaling urban sustainability innovations, I will reflect on its usefulness, limitations, and need to be extended here.

In general, the framework proved a useful tool to capture and describe the different roles that are enacted by global organisations and networks involved in outscaling urban innovations, as well as a good starting point from which to conceptualize barriers and future desired roles. Congruently, all but one interviewee agreed on the basic premises of the framework as a useful tool from which to conceptualize the different roles of organisations and networks involved in scaling sustainability innovations. Nevertheless, it is important to address some of the feedback provided by interviewees.

Extension of roles

Upon reflection of some of the comments described in section 4.1, the following alterations are proposed to the framework.

First of all, with reference to the application of the different roles of the framework to organisations and networks, it is confirmed that roles are indeed not mutually exclusive, as was already posited in chapter 2. Any organisation may fulfil multiple roles at the same time, and/or over time – as was observed with reference to all interviewees. Moreover, the enactment of roles by organisations is dependent on the context or unit of analysis against which the organisation is analysed. The enactment of roles should therefore not be regarded as a static process, but as a dynamic, non-linear process, corresponding to the realities of scaling processes.

Second of all, the framework is proposed to be extended with the following roles: role model, trailblazing first followers and institutionalization as a sub-function of topplers. Additionally, the role of enhancer is altered.

The first proposed extension to the framework is to add the role of 'role model'. It was observed that some organisations can be distinguished by their innovative approach in fulfilling their day-to-day functions. Indeed, multiple interviewees indicated to have generated interest from third parties in the way their organisations are set-up, as it differs much from the prevailing models of organizing

principles in their disciplines. Whilst the role-model role has not yet been recognized by literature, the data generated from the empirical research does show support for its addition.

Role models are described as actors that fulfil an exemplary function for other actors in their discipline by (1) embodying an alternate, innovative set of organizing principles, thereby (2) generating higher impact than their peers. These approaches are believed to revitalize the system as a whole, as they will lead to higher impact in their main fulfilled functions, no matter what roles they fulfil.

Although role models and frontrunners may appear to be similar categories, role models are awarded their own categorization. Recalling the definition of frontrunners in chapter 2.7.1, frontrunners are defined as a set of solution-driven actors which actively attempt to outscale their innovations by means of entrepreneurial activity. Role-models are solution-driven actors that do not promote different-think (which is a defining feature of frontrunners), but show different-think through their organizing principles – and therefore require their own categorization.

The second proposed extension to the framework is to add the role of 'trailblazing first followers'. While initially the role of followers was classified to be outside the scope of this research - as followers do not possess transformative agency - the results from the interviews contradicted this position. Many interviews urged to include users of innovation in some shape or form. Upon reconsidering the position of followers *vis-à-vis* the framework, it was decided to include the trailblazing first followers; the first adopters of innovations.

Not every follower fulfils the same function in diffusing an innovation. This is something that was well-understood by Everett Rogers, developer of the Theory of Diffusion. The Theory of Diffusion is a theory that explains how and why innovations get scaled over time. According to Rogers, the adoption of an innovation follows an S-shaped curve when plotted over time, corresponding to the adoption rate of different group of adopters over time (Rogers, 1962). This is illustrated in figure 6.

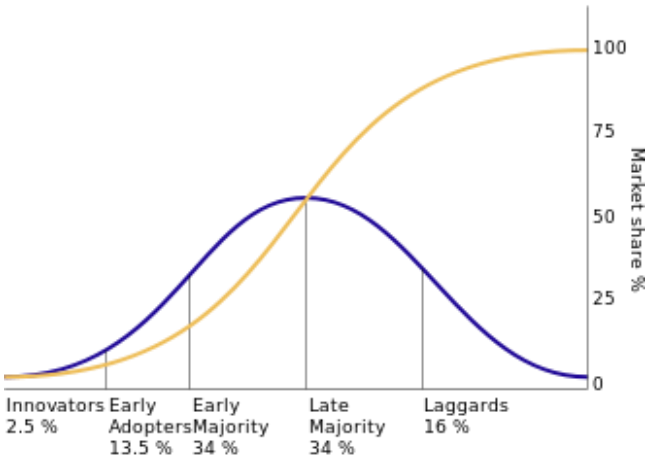

Figure 6: The diffusion of innovations (Matinaro & Liu, 2015, p. 139)

Rogers distinguished five categories of adopters in his Theory of Diffusion: innovators, early adopters, early majority, late majority and laggards – corresponding to the quickness and willingness with which these groups are willing to grab onto an innovation. Innovators are the first to adopt innovations, and are described as a group with high risk tolerance, willing to adopt innovations that might fail (Rogers, 1962). The group of innovators corresponds largely to the description of trailblazing first followers.

Trailblazing first followers are defined as renewing actors who are the first to take the risk to adopt innovations with transformative potential in order to contribute to or support the sustainability

transition. Trailblazing first followers add validation to innovations, and pave the way for other less risk-inclined users to adopt innovations as well.

Another proposed alteration to the framework is to extend the understanding of the role of enhancer. Initially the enhancer was described as "a process-oriented actor that aids frontrunners (1) to improve their solutions through the development of new knowledge and (2) to enhance their ability to outscale their innovations by improving the organisational apparatus" (section 2.7.1). However, considering interviewees' descriptions of the type of work their organisations fulfil, it is believed to be more fitting to define the enhancer more broadly as a process-oriented actors that aids any of the other actors in the framework (1) to improve their efficacy through the development of new knowledge and/or (2) to enhance their ability to (help others) outscale innovations by improving the organisational apparatus. It is thereby explicitly recognised that enhancers do not only aid frontrunners, but may also support other actors in the framework to improve the fulfilment of their role.

As mentioned in section 4.1.2, it was stated by one interviewee that the role of connector could better be named 'synthesizer' due to the normative engagement of connectors in the exercise of their function. However, as the literature is divided whether or not intermediaries[6] fulfil merely a facilitative or a more shaping function in the scaling process (Kivimaa et al., 2018), and it is difficult to determine what the normative engagement of interviewees is – *a posteriori* – the connector role is commended to remain named 'connector' until further clarity on the topic emanates. Furthermore, it is important to note that the framework does address the normative position, but as a secondary factor to the main roles. Separating the normative position of actors from the main functions in the framework, foregoes a generalization of the degree of normative engagement of different actors, as these are not assumed to be the same for all actors.

Either way, as all roles in the framework are presupposed to be purposeful activities, it is important to generate a deeper understanding of the normative position of different types of actors, and to what extent this influences the scaling process itself. Future research could contribute in this direction.

Fourthly, following the suggestion to incorporate 'maintainers' into the framework, it is proposed to extend the role of toppler with the subfunction of 'institutionalization'. As it is agreed that institutionalization forms an unneglectable function in carrying innovations to a sustainable scale, it is important to reflect this role in the framework if it is to resemble all the different roles and sub-functions fulfilled in an outscaling process.

The institutionalization function is proposed to be gathered under the role of toppler, as topplers are actors who are focused on creating systemic change. In addition to the understanding that topplers create or change institutions to make way for innovations to get scaled (see section 2.7.1), I argue that topplers would also be the actors who wished to make sure that these innovations are maintained by the systems that create them.

Finally, in response to the suggestion that the framework should somehow incorporate 'opposition' as a role into the framework, as it was argued that such actors may influence the overall impact of scaling agents or the speed with which actors can outscale innovations - it is recommended that this question is taken up by future research. While it is recognized that opposers may indeed exercise a distinct form of 'negative' transformative agency as opposed to other roles in the framework, it is difficult to

[6] A collective term used in transitions literature to describe a set of actors (largely corresponding with connectors and topplers in context of this research) that function as a go-between the demand for and supply of material and non-material factors in the transformation process (Klerkx & Leeuwis, 2009).

conceptualize how and where this role could be incorporated into the framework based on the preliminary research and empirical work of this thesis.

Furthermore, as standing literature does not shed further insight into opposition to innovation on a 'global' or organisational level, but is predominantly focused on conceptualizing the influence of opposition to innovation on a consumer level - it is difficult to draw conclusions. For these reasons it is recommended that future research should take up on this question.

Ecosystem perspective

In agreement with the ecosystem perspective introduced by interviewees, it is argued that more than the sum of individual roles in the framework, it is the interaction of all actors and roles together which determine the success of scaling an innovation. The concept of the innovation ecosystem successfully ties in multiple important aspects with reference to the framework. It is useful to expand on the concept, as it is newly introduced.

An innovation ecosystem is broadly described as the complex of the diverse, yet interdependent actors involved with value co-creation in innovation processes (Pigford, Hickey, & Klerkx, 2018). The innovation ecosystem perspective is based on three premises: (1) the innovation ecosystem consists of a multitude of different types of actors, relationships and resources, which all fulfil a role in scaling an innovation, (2) these actors are interdependent, meaning that one actor depends on the other in successfully fulfilling their role, and finally (3) these actors are interconnected – meaning that a change generated in one part of the ecosystem, affects the ability of other actors/parts in the ecosystem to meaningfully contribute towards scaling innovations (International Development Innovation Alliance, n.d.; Pigford et al., 2018).

While the innovation ecosystem approach has been mainly applied on a national, regional and sectoral (technological, agricultural, business) scale within academic literature (Gomes, Facin, Salerno, & Ikenami, 2018; Oksanen & Hautamäki, 2015; Pigford et al., 2018), it may well be applied within the scope of this research as well. In fact, doing so has inherent benefits.

First of all, the innovation ecosystem approach could offer complementary insights to the framework. The framework outlines individual roles in outscaling processes, whereas the ecosystem perspective explicitly points towards the interdependence of those roles. The findings of the empirical research confirms the existence thereof (section 4.1.3). Yet, the benefits of adopting the innovation ecosystem extend beyond theoretical considerations, towards societal benefits.

First of all, adopting an innovation ecosystems approach can help organisations outline new opportunities for growth for their own organisations, as well as others in the ecosystem. As the innovation ecosystem approach is based on the premise of value co-creation, "understanding who else must succeed for you can grow can help pinpoint opportunities for fruitful collaborations" (Gobble, 2014, p. 57). As such, adopting an innovation ecosystem approach and helping other actors in the ecosystem get ahead is a precondition for the success of organisations themselves, as well as the ecosystem as a whole (Gobble, 2014).

Furthermore, adopting an innovation ecosystems approach can help overcome crises ahead of time, as the innovations ecosystem perspective extends thinking beyond organisational boundaries, into a consideration of the 'whole'. Potential bottlenecks may be singled out and addressed pre-emptively (Gobble, 2014). Towards this end, this thesis will make specific recommendations later in this chapter.

In conclusion, adopting an innovation ecosystems perspective to the global scaling framework is useful and recommended.

Summarizing framework extensions

The following can be concluded on the implications of the theoretical framework:

- After conducting empirical research, the framework is extended with the role of:
  - Enhancer
  - Trailblazing first followers
  - Role models
  - Institutionalization as a sub-function of topplers
- The framework should be approached from an ecosystem perspective: meaning that the presence and interaction of different roles determine the ability of global organisations and networks to scale innovations together successfully.
- A lack of clarity exists around the influence of the normative engagement of actors on the different roles in the framework, as well as which role opposition could take in the framework. These topics are avenues for future research, which will further be discussed in section 5.4.

5.2 Implications barriers and enablers

Having reflected on the implications of the theoretical framework, it is important to reflect on the implications of the barriers and desired future roles as well. The next sections will contextualize the findings on these topics within existing literature, and the broader innovation ecosystem with which they interact. The ecosystem perspective is explicitly adopted, as it appears that many issues are interrelated: both in terms of existing barriers, as well as between barriers and future desired roles.

5.2.1 Barriers

The results of the barriers were summarized around the following topics: conservatism, cooperation and cooperation for finance, social license to operate and scaling design.

Conservatism

First of all, the underlying tone of many of the barriers speak to a high level of conservatism in the global innovation ecosystem.

Conservatism is observed for the ecosystem as a whole, as well as with reference to individual counterparts of the ecosystem. With reference to the former, many of the overarching themes of barriers outlined in section 4.2 are linked to questions of conservatism, such as risk-averseness, financial underinvestment, political will, and cooperation. Additionally, conservatism appears to 'run through' individual counterparts of the ecosystem. Rather than cooperating for impact, global organisations and networks are mainly observed to work in siloes next to each other. Each sector is driven by their own inertia, and actors are observed to make trade-offs in formulating their approach towards scaling innovations based on their inertia.

For example, state actors were observed to balance the interests in their constituencies in deciding their approach to scaling innovations; foundations balance investment opportunities against their (intended) legacy and research organisations are observed to be mostly driven by questions of attribution, rather than contribution. Whilst this forms a gross generalization which certainly does not apply to all actors involved in outscaling innovations (nor those interviewed for the purposes of this research), it does stipulate the issue that as long as different type of actors do not join around the same targets (as outlined as one of the other barriers in this research), and evaluate their successes on similar terms (yet another barrier), sustainable transitions are hard to accomplish.

At the same time, it must be acknowledged that different actors are to an extent limited by their inherent characteristics. For example, state actors do have the responsibility to represent the interests of their constituencies; and foundations, whilst having the freedom and opportunity to invest in

(perceived) underappreciated yet risky issues, are limited by the relative insignificance of their investment *vis-à-vis* that of market and public finance and therefore need to make strategic choices.

As one of the interviewees singled out, it is important that actors become more aware of the inherent instrumental value and limitations each actor brings with them – and to cooperate to overcome these issues.

Cooperation

Many of the barriers outlined in the results have already previously been identified in the transitions literature. For example, a paper by Loorbach (2010), prescribing an agenda for governing transitions towards sustainable development, specifically addresses topics that are similar to those described by interviewees. In his paper, Loorbach prescribes the importance of interaction between different stakeholders in reframing problems and solutions, adaptivity and flexibility of objectives, understanding other actors' perspectives', as well as reviewing all options in transitions governance. Whilst his paper outlines a general agenda for transition management, many of the issues appear to be applicable across scales as well.

Whereas the examples outlined here refer to issues with the 'depth' of cooperation, issues with the 'breadth' of cooperation were also outlined. More specifically, two sectors were at present observed to be side-lined: the community and the private sector.

Community engagement

While the community was recognized to be an important agent of change in the scaling process, as of yet, they are thought to be disengaged from it. However, other than a lack of political-citizen engagement, specific barriers to engagement on a global level were not outlined by interviewees, neither could a literature review reveal much more.

Indeed, academics are grappling with the question themselves how community organisations can best be engaged in transition processes. Whilst the added value of engaging communities in transition processes is recognized (Davies, Simon, Patrick, & Norman, 2012; von Bergmann, 2018), strategies towards scaling up replicable models for citizen engagement - let alone to a global level - have yet to be discovered.

An international review of citizen-engagement approaches, concluded that there is a limited scope of strategies available for scaling up existing approaches to citizen engagement (Devaney, 2017). Main barriers to this process revolve around questions of finance. Moreover, it is difficult to find funds and make them available for the structural engagement of communities, rather than involving communities in one-off engagements. Relatedly, the means by which the impact of community engagement is often evaluated - through a cost-benefit analysis - is questioned to be able to capture the full impact of community engagement (Devaney, 2017).

Yet, there are some examples of existing projects that are intended to draw on community movements to disperse learning, such as the "Seeds of the Good Anthropocene" project, colleting examples of 'seeds' (innovations) that offer viable alternatives to current trajectories of the Anthropocene (Bennett et al., 2016). Such projects are believed to signal the expansion of community innovations on the one hand, and the demand for aggregate learning to support scaling of those processes and initiatives on the other (von Bergmann, 2018).

As such, the issue of community engagement is recognized to be a pertinent question on the research agenda, and one for the global ecosystem of actors involved in outscaling innovations as well.

Specifically, addressing this issue is recognized to be important for the global innovation ecosystem for two reasons.

First of all, community engagement is considered especially meaningful with an eye on overcoming issues around the 'social license to operate'. Engaging with communities is believed to add legitimacy to scaling processes (Davies et al., 2012), and was recognized as a critical factor in getting innovations to reach a sustainable scale by multiple interviewees. As global organisations and networks involved in scaling innovations need to shift between the global scale on which they operate, and the local scale in which they implement innovations, engaging with communities is believed to be particularly valuable for the global scaling ecosystem.

Second of all, community engagement is believed to add strength to the innovation ecosystem, as a diversification of actors generates a stronger ecosystem (Davies et al., 2012). Engaging with communities may further prove interesting, as grassroots innovations are recognized to be inherently designed as environmentally just and equitable (Davies et al., 2012; von Bergmann, 2018). Aggregating such lessons on a global scale is thus deemed to generate more diverse innovations, which is beneficial to the innovation ecosystem as well.

Private sector engagement

Furthermore, the results revealed that the private sector is perceived to be relatively underrepresented in the global system of outscaling innovations. Their perceived absence relates to bigger questions around private investments and public-private cooperation. Yet, the responses of the interviewees did not assent whether these financial barriers are relative, indicating issues of a lack of access to financial investments due to connectivity issues in the ecosystem, or absolute - indicating an overall lack of available funds.

Comparing these findings to those of other studies, it becomes apparent that both relative and absolute issues are at stake. On the one hand, it is recognized that existing information asymmetries between the public-private helix result in underinvestment, due to perceptions of risk (Polzin et al., 2016). On the other hand, it has been acknowledged that the private sector has yet to fulfil its full potential in value creation for sustainable development: from investing in innovations to getting them to scale (Kharas, 2013).

A policy brief by the Brookings Institute stipulated that structural issues (spanning the ecosystem) are the root cause for the lack of private sector engagement: a lack of coherence in international policies, and congruently a lack of incentives for private sector engagement, prevent a closer alignment of the private sector with other actors in the global innovation ecosystem (Kharas, 2013). As such, it is recognized that financial barriers to scaling are not solved without simultaneously addressing political and regulatory barriers (Polzin et al., 2016): private sector engagement will not increase unless the incentives (tax, subsidy, regulatory or otherwise) change thereto (Kharas, 2013). Indeed, such studies confirm the findings of this thesis.

Moreover, a research paper on the barriers to eco-innovation, stipulated that another barrier to private financial investment concerns information asymmetries between the public-private-frontrunner helix: due to a lack of informational clarity, high risks associated to investment in scaling result in underinvestment (Polzin et al., 2016). The issue appears to be twofold. First, there is lack of upfront clarity on the commitment expected from different actors (Kharas, 2013). Relatedly, there is a lack of clarity on the roles different type of financiers can, and expect one another to, fulfil in different stages of the scaling process, resulting in investment scarcity in various stages and transitions between

stages of scaling (Polzin et al., 2016). Information intermediaries have been identified as useful actors to help overcome such issues (Polzin et al., 2016).

These studies contextualize the findings of this thesis, and confirm that both issues of relative and absolute investment are at stake. Furthermore, they confirm the interrelatedness of the barriers to scale.

Social license to operate

Indeed, the path towards deeper private sector engagement does not end at questions around public-private cooperation. In fact, deeper engagement from the private sector also calls to attention questions around their social license to operate. The results showed that one of the barriers around the private sector's social license to operate concerned social disapproval: multinationals are observed to be viewed with scepticism by communities, which may result in blowback to their intentions. It is thus an important challenge for the market sector to overcome (mis)perceptions in the contribution they can make towards sustainable transition processes. This is confirmed by another study (Kharas, 2013).

Yet, as the results showed, considering the social license to operate is pertinent for all actors in the global scaling ecosystem. As previously discussed, community engagement is contingent upon this process.

Scaling design

Other than barriers around the social license to operate, the results showed that other barriers in 'preparing for scaling at impact' include a lack of considerations of feasibility, adaptivity and anticipation of future developments.

Feasibility refers to the observation by interviewees that global organisations often do not consider which innovations have the highest transformative impact before going to scale, and often try to scale everything at once. In fact, research has confirmed that this is a systemic problem for global organisations, as "there are few large-scale facilities available to do feasibility studies" (Kharas, 2013, p. 5).

At the same time, the results of this research revealed that crowding out barriers may limit the ability of global organisations and networks to consider all viable options, as the ability of 'smaller' actors to connect to tendering procedures globally is limited. This indicates the limitations of existing feasibility studies. Aggregating community innovations, as previously discussed, may also prove fruitful in this regard.

Other barriers mentioned by interviewees include a lack of adaptivity and anticipation. Often, innovations are managed rigidly, bypassing the inherent goal of scaling an innovation. Instead of scaling blueprints, scaling processes should be designed to be managed adaptively. Furthermore, it was indicated that global organisations often do not anticipate which external factors may influence the impact of innovations in the future, or alternately what innovations are needed for emerging futures.

The importance of considering such factors is confirmed by other research. For example, Wigboldus et al. (2016) discuss the concept of "responsible innovation". Responsible innovators consider the same factors outlined by this research; they are "anticipatory, responsive, inclusive and reflexive"(Wigboldus et al., 2016, p. 46). Reflexivity indicates that scaling partners continuously evaluate the progress of the scaling process against its purpose (Wigboldus et al., 2016). As such, not considering questions of

feasibility, adaptivity, anticipation, and reflexivity is thought to impede the impact of scaling processes pre-emptively.

5.2.2 Future desired roles

Having reflected on the barriers to scale, the next sections will discuss and contextualize the future desired roles for the ecosystem of global organisations and networks involved in outscaling innovations. These follow closely on the previous discussion.

Cooperating for impact

Following the observation that global organisations and networks are presently recognized to work in siloes next to each other, it is not surprising that one of the most mentioned 'desired' structural changes to the ecosystem of global organisations and networks involved in outscaling innovation concerned improving cooperation.

The results revealed several factors to be of importance in moving towards that direction: the need for partners to single around joint targets, spreading financial risks across partners, the use of joint evaluation mechanisms, a high degree of inclusivity, accessibility, and adaptivity, in addition to deepening and broadening already existing partnerships. The importance of such factors in forging stronger cooperation are confirmed by other studies as well (i.e. Loorbach 2010; Watizer & Paul, 2011).

For example, Waitzer and Paul (2011) introduced the concept of a 'smart network' to describe how a strong cooperation for scaling social impact looks like. A smart scaling network is characterized by a focus on joint targets ('mission-centred networking'), rather than the network centring around single organisations, as is illustrated in figure 7. The authors stress the importance of partnering for scale: as organisations are facing increasingly complex issues in achieving impact at scale, it is neither desirable nor advisable for organisations to 'scale alone' (Waitzer & Paul, 2011). This conforms to the observations of interviewees of this research as well.

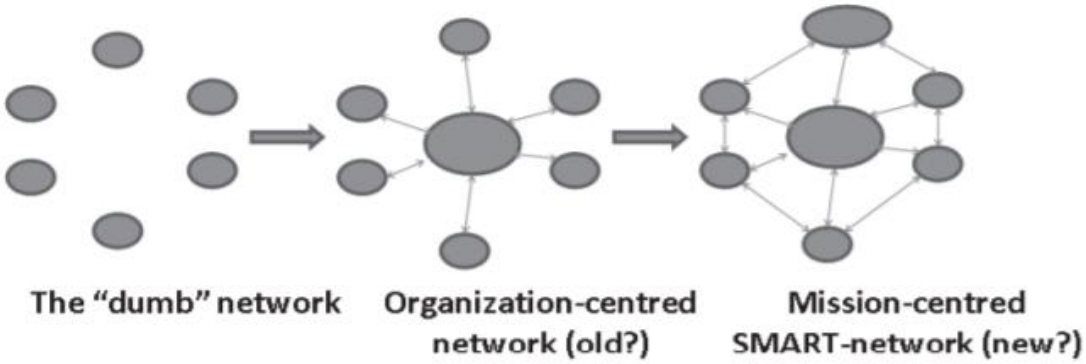

Figure 7: The evolution of the smart network (McPhedran Waitzer & Paul, 2011, p. 153)

Moreover, the characteristics that define these 'smart networks' also correspond to the needs outlined by interviewees. For example, corresponding to a desired inclusive approach and the ecosystem understanding, smart networks are characterized by 'diversity at the core', as this strengthens innovations and expands pathways to scale (Waitzer & Paul, 2011). Furthermore, corresponding to the need for contextualization, 'smart networks' are characterized by thinking 'glocally'; whilst operating and setting the stage globally, actors recognize that change happens locally. Additionally, a cornerstone of the 'smart network approach' is that actors "give to get" (Waitzer & Paul, 2011, p. 152); considering how other actors need to get ahead before an organisation can succeed itself. This is a basic premise of the innovation ecosystem approach, as discussed previously.

A mission-centred network is characterized by thinking beyond the boundaries of individual organisations, towards creating impact as an ecosystem. In order to create lasting impact as an ecosystem, interviewees described the need for the global scaling ecosystem to single around a long-term agenda for change. In addition to this recognition that short-term policy decisions ought to be aligned to longer-term thinking (as confirmed by Loorbach (2010)), the importance of joint evaluation mechanisms to evaluate impact therein were also described. Whilst interviewees did not describe the requirements for such evaluation standards, requirements may be deducted from existing standards developed by practitioners in the field.

For example, the International Development Innovation Alliance committed a special working group on creating an architecture for measuring impacts of innovations, in order to align different types of partners in scaling innovations closer together. Based on common desired impact levels for innovations, this report suggested to analyse the impact of innovations based on three domains: impact on beneficiaries, scale and sustainability (International Development Innovation Alliance, 2017a).

Impact on beneficiaries refers to direct and indirect impact of an innovation on communities. Scale refers to the replicability and geographic outreach of an innovation. Sustainability finally, refers to the ability of an innovation to reach sustainable scale; financially, politically and/or institutionally. All three indicators can be used to describe both the potential impact of innovations ('leading indicators') in considering feasibility of an innovation, as well as to evaluate 'actual' impact ('outcome indicators') (International Development Innovation Alliance, 2017a). [7]

Additionally, UNICEF's "Principles for Digital Innovation" also specifically prescribe scaling partners to "adopt and expand existing open standards", and to be data driven in measuring the impact of innovations across the scaling journey (UNICEF, n.d.).

Moreover, a precondition for stronger cooperation also includes diversification of actors included in partnerships. In the previous section, it was already discussed how community organisations and the private sector are desired to become more closely engaged to the rest of the innovation ecosystem. Additionally, interviewees described the desire to cooperate more closely with research organisations. While the results of this research did not specify what closer cooperation with each of these respective actors could or should look like, external literature does give pointers for their basic requirements.

With reference to community engagement, it has been singled out that "the development of exchange platforms (offline and online) that enable collaborative innovation networks in cooperation" (von Bergmann, 2018, p. 9) is a requirement for meaningful community engagement (Devaney, 2017). While there is of yet no evidence for a successful participatory approach that can be scaled up to the global level, research has pointed out that critical perquisites for institutionalized citizen engagement are for the engagement to be geographically inclusive and financially sustainable – as these are pitfalls to current approaches to participatory engagement (Devaney, 2017).

As for private sector engagement, it was already discussed that financial barriers to scaling ought to be addressed simultaneously to regulatory and political barriers. It was also singled out that this should be done by streamlining international policies and regulations around scaling innovations (Kharas, 2013; Polzin et al., 2016). Furthermore, it was stipulated that there is a need for increased clarity around expectations of and for financial partners along the scaling journey.

[7] The report outlines specific indicators for each domain (IDIA, 2017).

In line with these findings, research has further stipulated the need for the public sector to include 'more creative' ways of risk-mitigation through 'contingent' financing measures in order to incentivize the private sector to engage (Kharas, 2013). Vice versa, to stimulate the public sector to entice the private sector, research has recommended for (inter)national organisations to set a target for the ratio of public sector investment *vis-à-vis* private sector investment in innovations and scaling. A ratio of 5:1 has been suggested (Kharas, 2013).

As the question of finance cuts through many other barriers to scale, future research can further distinguish synergistic measures that can help overcome barriers to public-private cooperation on a global level.

Finally, with reference to closer public-academic engagement, research has suggested that the path towards closer scientific integration requires research organisations to shift their focus from attribution to contribution. The theory of change, applied by CCAFS, one of the organisations interviewed for this research, conceptualizes such a shift. It describes a method for researchers to balance the development of new knowledge with the needs of intended beneficiaries of research results in mind (Thornton et al., 2017).

The theory of change prescribes transdisciplinarity across research fields, and collaboration with non-research partners along all the stages of conducting a research (Thornton et al., 2017). It therefore may prove valuable for other research organisations to look into this approach, as a way to balance quality of research with reaching impact.

Preparing to scale for impact

The foregoing section discussed desired changes to cooperation in the global innovation ecosystem: considerations that are to be made by scaling partners along the scaling pathway. Yet, the results of this thesis also distinguished several factors that are desired to be considered more extensively before going to scale.

First of all, with reference to the previously mentioned factors of feasibility, reflexivity, adaptivity and anticipation, a couple of additional remarks can be made.

Firstly, the results of this thesis indicate that the ecosystem of global organisations and networks are desired to maximize their capacity in all four directions, in order to increase scale at impact.

Secondly, the need to deepen feasibility studies prior to scaling, could be addressed simultaneously to the need for global organisations and networks to develop joint evaluation mechanisms. The previously discussed 'architecture for measuring impact' developed by the International Development Innovation Alliance, offers a useful tool in bridging the two issues, as the architecture uses the same domains for 'leading' as well as 'outcome' indicators. The 'leading' indicators could be used to deepen the understanding which innovations have the highest transformative potential prior to going to scale, whereas the 'outcome' indicators help to assess the real impact of the innovations after going to scale.

Thirdly, with reference to the topic of anticipating, the results of this thesis showed the prospect for global organisations and networks to also use anticipation as a tool for advancing the scaling of innovations, rather than only using anticipation as a tool for evaluating the feasibility of an innovation in future developments. To use anticipation as a tool for advancing the scaling of innovations, organisations should pre-actively research which emerging trends innovations could be coupled to. A successful example of 'coupled scaling' is how agricultural innovations were able to advance together with the introduction of the mobile phone in Africa (Int. 16). This is a promising insight which should be further investigated.

Second of all, the results of this thesis also revealed that accountability is an important factor to address in the scaling process. While it was suggested that state actors have an increasingly important role to play in this regard, research has found that 'downward accountability' is equally important in increasing the overall accountability of actors involved in a scaling process (Hartmann & Linn, 2007).

Downward accountability implies responsibilities to be handled as closely to intended beneficiaries as possible, rather than monopolizing accountability at 'the top', as often happens in scaling processes. Downward accountability creates a systemic check on the politicization of interests (Hartmann & Linn, 2007), and is thereby recognized to be a suitable method to increase accountability of the innovation process alongside addressing questions of social equity and justice with reference to the findings of this research.

Implications barriers and enablers: summary

The foregoing sections showed how barriers to scaling and desired future roles for global organisations and networks involved in outscaling innovations are intertwined. Conforming to the ecosystem perspective, they can neither be separated, nor solved individually: it is apparent that conservative organisations will not shift towards desired levels of pro-activity, unless the basic roots of their problems are addressed.

In order for global organisations and networks to increase their ability to successfully scale for impact, section 5.5 makes specific recommendations for improvements based on the foregoing discussion.

5.3 Limitations

Before diverging on recommendations, this thesis wishes to address the following conceptual, theoretical and methodological limitations.

First, the findings of this thesis may be compromised by diverging understandings of the meaning of outscaling. While this thesis' main focus went out to understanding the role of global organisations and networks in outscaling urban innovations, it may have included perspectives or findings which according to some branches of theoretical understanding would fall under the category of deep- or upscaling. Yet, as mentioned earlier, it is difficult to distinguish between up- and outscaling in practice, as many of these processes are intertwined: for example, outscaling may be reached via upscaling. It was intended by this thesis to use outscaling as its point of departure, rather than as an exact definition.

Secondly, in the process of integrating existing knowledge on the different roles of global organisations and networks into one theoretical framework, this thesis had to synthesize and connect many different, fragmented academic findings. As became apparent during this thesis, this preliminary framework is not complete and remains to be further refined and expanded upon, based on the suggestions made in section 5.4, and beyond.

Thirdly, it is recognized that the results of this thesis are largely depended upon the testimony of interviewees for this thesis. While this thesis attempted to broaden its base as much as possible, by interviewing a minimum of one organisation per 'category' of the analytical framework (table 2), it is recognized that by including more interviewees in the research, a more in depth review of the role of global organisations and networks in outscaling urban sustainability innovations could be generated. However, this thesis was restricted both in terms of the amount of time within which the research needed to be conducted, as well as the availability of potential interviewees to conduct an interview. By comparing and contextualizing the results of this thesis within a wider academic setting, this thesis hoped to minimize this issue.

Furthermore, it is recognized that the division of interviewees engaged in urban climate change adaptation and (urban) food security is slightly more skewed towards climate change adaptation rather than food security. Nonetheless, the two topics are believed to be synergistic and complementary to each other. Both topics were chosen to broaden the respondent base rather than to compare the two different fields with reference to the results - the objective of this thesis was more geared toward understanding present and future desired roles of global organisations and networks in general, rather than on their role *vis-à-vis* these topics generally and comparatively.

Whilst understanding these limitations, it should be noted that this thesis was designed to be exploratory in nature. In this regard, it generated and synthesized knowledge on the role of global organisations and networks in outscaling urban sustainability innovations – providing an inquiry into a new scientific area in which limited preliminary knowledge existed. Future research can built off these findings as per the suggestions made in section 5.4 to further define and refine the understanding of the (desired future) role(s) of global organisations and networks in outscaling sustainability innovations.

5.4 Recommendations for future research

Following the implications of this research, there are many avenues for future research.

First of all, future research can further develop and validate the theoretical framework developed for this thesis. While the framework was developed to capture and describe the different roles enacted by global organisations and networks involved in outscaling urban innovations, it is hypothesized that it can be used and applied to different contexts as well.

Furthermore, as touched upon earlier, two elements of the theoretical framework require specific attention. First, this research ran into the question if and to what extent the normative engagement of different types of actors influences the execution and meaning of their roles. Secondly, this research also ran into the question whether there is a role for 'opposition' in the framework or not. Future research must look into the question how to conceptualize the role of organisational opposition (on a global level), whether it enacts transformative agency, and whether or not it should be incorporated into the framework.

Following the ecosystem approach, future research could also look into deepening the understanding of the interconnectedness of global organisations and networks involved in scaling urban innovations by conducting a network analysis, to see how roles are connected across time and space.

A second branch of avenues for future research follows the societal implications of this research. Many of the topics that were discussed in this thesis could benefit from further follow-up and specifications.

First of all, this research revealed the limited understanding of how to structurally engage citizens or community organisations at the global level of scaling activities. Yet, it also pointed at the importance thereof. Future research could look into the question how to increase the capacity of the global innovation ecosystem to incorporate community engagement, based on the prerequisites outlined in the recommendation section.

As for the topic of financial investment, future research could look deeper into questions that were implicitly and explicitly generated by the discussion, such as which policies are specifically harmful for the scaling of innovations (at a global scale); which financial measures are most suitable to induce more public-private cooperation for the scaling innovations; and finally, what would be a desirable, yet feasible, target ratio for the amount of investment of the private sector vis-à-vis the public sector in scaling innovations, at which stages of the scaling process.

Furthermore, this thesis revealed the need for the assessment of joint, unilateral evaluation mechanisms for measuring scale at impact, as the academic understanding is limited thereof. Future research could benefit from increasing the academic understanding of existing global evaluation metrics for measuring impact, such as those illustrated in this research, to improve such metrics.

Finally, this thesis generated a list of specific measures for new desired future roles or functions of global organisations and networks involved in outscaling urban sustainability. This list was outlined in section 4.3.3. While this research could not engage with each of these suggestions individually, they do provide merit for future research on their usability and applicability.

5.5 Recommendations for scaling organisations

Based on a consideration of the findings of this thesis, three recommendations are made for scaling organisations: (1) adopt an innovation ecosystem approach, (2) improve the architecture of the innovation system, and (3) address financial barriers to scale simultaneous to political and regulatory barriers.

NB:

- ✓ Indicates a good practice
- • Indicates a specific recommendation

Recommendation 1: Adopt an innovation ecosystem approach

One of the main barriers to reach impact at scale, is that global organisations and networks involved in scaling innovations work in siloes. To overcome issues of singularity, it is recommended that global organisations and innovations adopt an 'innovation ecosystem approach', based on a recognition of the interconnectedness and interdependence of the diverse set of actors and roles that are necessary to successfully scale an innovation. As such, it is recommended that:

- Global organisations and networks adopt an innovation ecosystem approach towards understanding the issues and opportunities for scaling.
- Global organisations and networks define their own role within the innovation ecosystem *vis-à-vis* other global organisations and networks.
- Based on such considerations, global organisations and networks define where their organisation needs to 'give to get', and where they can help alleviate any pressure points in the innovation ecosystem in order to generate new opportunities for growth.

The framework outlined in this thesis can help organisations understand and define their own role, as well as that of others.

Recommendation 2: Improve the architecture of the innovation ecosystem

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Departing from the innovation ecosystem perspective, there are certain key issues the entirety of global organisations and networks involved in the outscaling of urban sustainability innovations are recommended to address if they are to improve their functioning as a system together. These broadly

revolve around issues of preparing for scaling at impact and improving the breadth and depth of cooperation.

RECOMMENDATION 2.1: PREPARE FOR SCALING AT IMPACT

In order to prepare for scaling at impact, global organisations and networks need to consider the potential impact of innovations before deciding which they want to take to scale. Alternately, any inequalities inherent to an innovation may create or exacerbate disparities within communities.

As such, the following issues need to be addressed before going to scale:

1. Feasibility
2. Lean scaling design
3. Anticipatory scaling design
4. Social license to operate

Point 1-4 are to be considered by funders. Point 2-4 by frontrunners.

1) Feasibility

Feasibility implies a careful considerations of all innovations, taking only the innovations with the highest transformative potential to scale. As such, global organisations and networks are recommended to:

- ✓ Invest only in the most 'promising' innovations with the highest transformative potential, rather than trying to scale all at once.
- Increase the organisational capacity to conduct feasibility studies.
- Increase the capacity to review innovations, i.e. by improving the accessibility of tendering procedures.
    - For more information, see p. 50-51, 65.

2) Lean scaling design

A lean scaling design implies the innovation pathway is inherently reflexive, can be managed adaptively, and has a sustainable financial base. As such, global organisations and networks are recommended to:

- ✓ Design the scaling pathway according to the principles of reflexivity, adaptivity and sustainability.
- To become more reflexive: agree on joint evaluation targets with frontrunner and scaling partners against which progress is continuously monitored. Evaluation targets are recommended to be based on multiple considerations.
    - For more information, see p. 68-69.
- To become more adaptive: agree with the innovator on end goals, but do not restrict how this end goal is to be reached along the way.
- To reach a sustainable financial base: spread financial risks across partners, across the various scaling stages (from pre-commercial to sustainable scale).
    - For more information see p. 64-65, 67-68.

3) Anticipatory scaling design

An anticipatory scaling design implies that frontrunners and investors consider external factors and trends which an innovation may interact with. External factors beyond the establishing conditions of

an innovation are clearly communicated and incorporated into the decision making process. As such, global organisations and networks are recommended to:

- ✓ Anticipate future trends an innovation may interact with.
- Communicate and include (factors of) uncertainties in models of predicted outcomes of an innovation in decision-making process.

Anticipation can also be approached more pro-actively:

- Study which future trends an innovation may be coupled to. This requires organisations to look beyond the specific niche within which an innovation operates, towards other fields.

4) Social license to operate

A social license to operate implies the social acceptance of the actor introducing an innovation, and the uptake of the innovation itself by the (local) communities interacting with the innovation. The social license to operate is based on meeting the following prerequisites:

- ✓ The characteristics of the innovation meets the needs of its intended users.
- ✓ The innovation levels with the broader socio-cultural and political context in which it is to go to scale.
- ✓ The innovation is inclusive in scope, process and benefits.
- ✓ The actor introducing the innovation extends further ethical considerations of the innovation where applicable.
- ✓ The actor introducing the innovation is 'socially accepted' by the communities exposed to the innovation.

The following factors increase the likelihood of social acceptance:

- Partnering with local actors.
- Improving perceived image. This applies especially to the private sector: show how profit-oriented organisations can (also) solve for social, economic and environmental problems.
- Downgrading accountability along the cooperation chain, to be managed as closely to the communities as possible.

RECOMMENDATION 2.2: IMPROVE DEPTH AND BREADTH OF COOPERATION

To overcome barriers around risk-averseness and conservatism, and to move towards desired levels of pro-activity, issues around cooperation need to be addressed.

The prerequisites for strong cooperation are:

- ✓ Partners single around a joint target.
- ✓ On the long term: partners work together towards resolving specific issues.
- ✓ Partners agree on using the same measure for evaluating (intermittent) outcomes.
- ✓ The (financial) risk of the cooperation is divided over multiple partners from different sectors
- ✓ All relevant stakeholders are involved throughout the entire scaling process.
- ✓ All stakeholders communicate clearly on their expectations of one another prior to, and throughout the scaling process.

To improve the strength of cooperation, global organisations and networks are specifically recommended to:

- Become mission centred.
- Adopt unilateral evaluation standards for measuring impact.
    - See for an example the report "Insights on Measuring the Impact of an Innovation" by the International Development Innovation Alliance (2017a).
- Improve the financial sustainability of scale by spreading risks.
- In addressing issues of 'depth' of cooperation, simultaneously increase the 'breadth' of cooperation. Specific attention is to be paid to engaging community (organisations), research organisations as well as the private sector more closely.

Community

To engage with communities more closely, global organisations and networks are recommended to:

- Develop new capacities to engage communities on a global scale.

Whilst this research cannot make specific recommendations as to how this is to be fulfilled, requirements for successful community engagement are:

- ✓ Structural incorporation of community engagement into scaling processes, not as a one-off element in certain partnerships. Structural incorporation requires the ecosystem to address questions of financial sustainability of such engagement – as this is a current barrier to scaling up existing approaches.
- ✓ The community engagement is geographically representative of the global population to ensure questions of equity, justice, and inclusivity.

Research organisations

To align research organisations closer to the innovation ecosystem of global organisations and networks involved in outscaling innovations, research organisations are recommended to:

- Develop a theory of change: focusing on contribution over attribution. This implies collaborating transdisciplinary as well as collaborating with non-research partners for leveraging impact from research results across the various research phases.
    - For more information see p. 68 and Thornton et al. (2017).

Private Sector

To engage with the private sector more closely, global organisations and networks are recommended to:

- Increase the capacity for the private sector to engage with public organisations, and *vice versa*.
    - For more information, see recommendation 3

Recommendation 3: Address financial barriers to scale simultaneously to political and regulatory barriers

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The public and private sector are stuck in a deadlock; neither party is currently incentivized to move for deeper public-private partnerships. Yet, the private sector is recognized to be a key player in scaling

processes. To move forward, financial barriers cannot be considered separately from political and regulatory barriers. As such it is recommended to:

- Align global political and regulatory instruments for aiding the scaling of innovations. Remove any counter-effective policies.
- Increase informational clarity across partners. Increase clarity on bite-size investment for every phase of scaling to induce more partners to invest.
- Mitigate risks for the private sector or other investors by introducing more contingent financial measures.
- Set realistic, achievable targets for public-private investment ratios for cooperation to incentivize political organisations to move towards the private sector.

6. Conclusion

This thesis set out to understand the present and desired future roles of global organisations and networks focused on outscaling innovative practices in urban sustainability.

The main research question that was derived from the research objectives was as follows:

- What present and desired future roles and factors influence how global organisations and networks support the outscaling of urban sustainability innovations?

At the time of writing this thesis, the understanding of the roles of global organisations and networks in a context of scaling innovations was fragmented across existing literature. Therefore, this thesis has contributed towards a pragmatic understanding of the present roles and desired future roles of global organisations and networks involved in the outscaling of urban sustainability innovations. It synthesized and deepened knowledge of actor typologies and roles of actors involved in outscaling sustainability innovations, and applied that knowledge to global organisations and networks involved in outscaling urban innovations.

Building on the existing framework of de Haan and Rotmans (2018), this thesis revealed that in addition to the roles of frontrunners, connectors and topplers, global organisations and networks also enact transformative agency through the fulfilment of the roles of enhancers, trailblazers and role models. Additionally, it proved that such roles are fulfilled by a myriad of different global organisations and networks ranging from a state, market, community, third sector and/or mixed background.

Based on the findings of this research, it is concluded that while the many different roles of the framework are recognised to be present in the ecosystem of global organisations and networks involved in outscaling urban sustainability innovations, at present they are operating in too much isolation of each other. Desired changes to the innovation ecosystem includes the need to forge stronger and broader cooperation across the innovation ecosystem. Another desired change to the global innovation ecosystem, is for global organisations to give deeper considerations to the (intended) effects of outscaling prior to going to scale.

Operating in a field of which the effects are felt by many people, services and organisations, and on a scale which only further magnifies this impact, global organisations and networks involved in outscaling urban sustainability innovations have a responsibility to address the most pertinent issues revolving their combined efforts.

Therefore, it is recommended that global organisations and networks involved in scaling innovations organize around a joint agenda for change. In doing so, it is useful to adopt an innovation ecosystem approach, to consider and improve both the holistic, as well as the individual contributions global organisations and networks can make to outscaling innovations. Following these recommendations would allow global organisations and networks to contribute more successfully to the urban sustainability transition at large.

Following the theoretical and societal implications of this research, multiple avenues for future research were stipulated. These include the further development and application of the theoretical framework developed for this research, as well as deepening the understanding of favourable measures to increase the capacity of the global innovation ecosystem to outscale innovations. Pursuing these avenues for future research will further strengthen the theoretical understanding of present and desired future roles of global organisations and networks in outscaling innovations, and will contribute to guiding these organisations on their path to a more significant impact.

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Appendix A: Interview script

A. Introduction to the interview

- Explanation set-up interview
- Request of permission for recording of interview and using their name and organisation in the report

B. Introduction to the organisation

1) Could you explain what your organisation does?
2) How do you view scaling?
3) How does your organisation contribute to scaling innovations?

C. Introduction to the research

- Explanation of the research and the framework

D. Introduction to the organisation

4) Do you recognize these roles as though being apparent in your field? Would you add any role?
5) Could you try to apply these categorizations to your own organisation in explaining what role your organisation fulfils in outscaling urban innovations? To repeat, the roles are frontrunner, enhancer, connector and toppler. You may also add an extra role if you feel that your organisation's work is not addressed by these categories.

E. Outlining barriers

6) Do you, and if so, with what type of other organisations do you work together in outscaling urban innovations? For example, organisations or networks functioning in the public sphere, the private sector, communities or perhaps a mix of these sectors?
7) In your work, or interaction with other organisations, what barriers have you encountered (or overcome) with reference to outscaling urban sustainability innovations? Examples of barriers include:
    a. Governance
    b. Financial
    c. Economic/ market
    d. Political
    e. Social
    f. Other….

F. Futuring

8) Based on your experience, and with the knowledge you have of outscaling innovations, how would you (re)shape your organisation if you were to maximize your organisations' potential to outscale (urban) innovations?
9) Alternatively, how would you change (other) existing organisations? What functional gaps would you try to overcome? These organisations may or may not necessarily have to fulfil similar functions as yours.
10) What type of organisations would you shape that are yet to be created?

G. Other

11) Do you have anything you would like to add; any thoughts, tips, remarks that haven't been addressed in this interview?

Appendix B: Overview barriers

List of barriers

No.	Barrier	Interviewee background	
		Role	*Category*
1	Not enough funds available for 'risky' innovation	Frontrunner	State
2	(Friction) financial support	Frontrunner	Market
3	Financial support/availability	Frontrunner	Community
4	Financial support/availability	Frontrunner	Third sector
5	Financial support/availability	Frontrunner	Third sector
6	Financial support/availability	Frontrunner	Third sector
7	Financial availability	Frontrunner	Third sector
8	(Future) Financial support/availability	Frontrunner	Mixed
9	Restrictive rules around funds	Frontrunner	Community
10	Restrictive rules around funds	Frontrunner	Third sector
11	Mismatch financial reward systems	Frontrunner	Mixed
12	Funding splinted across issues	Enhancer	Third sector
13	Funding not divided across (sectoral) partners	Connector	Third sector
14	Public-private cooperation lagging	Connector	State
15	Sustainability of scale	Connector	Third sector
16	Lack of economic incentives to fund (risky) innovation	Toppler	State
17	Imbalance innovation ecosystem	Toppler	State
18	Restrictive legislation	Frontrunner	Market
19	Restrictive legislation	Frontrunner	Mixed
20	Metrics of evaluation	Connector	Third sector
21	Inexperience dealing with risk	Enhancer	Market
22	Political will	Connector	Mixed
23	Risk-averse climate	Toppler	State
24	Risk-averse climate	Toppler	State
25	Fear/value of failing	Connector	Third sector
26	Greenwashing	Toppler	Mixed
27	Greenwashing	Toppler	Community
28	Greenwashing	Toppler	Mixed
29	Risk-averse behaviour of other actors	Frontrunner	Market
30	Burden of proof	Frontrunner	Market
31	Undefined innovation goals cities	Enhancer	Market
32	Undefined innovation goals cities	Enhancer	Mixed
33	Unsynchronized goals partners	Connector	State
34	Language barriers	Connector	State
35	"Arrogance"	Connector	State
36	"Arrogance"	Connector	State
37	Limited access to the right people	Connector	State
38	Cultural barriers in cooperation	Connector	State
39	Unsynchronized goals partners	Connector	Mixed
40	Metrics of evaluation	Connector	Mixed
41	Cross-departmental cooperation	Toppler	Market
42	Private-academic cooperation	Toppler	Market
43	(Un)understanding pace of the city	Connector	State

44	Political turnover	Connector	State
45	Political will	Connector	Mixed
46	Government support	Frontrunner	Third sector
47	Lack of institutionalization	Toppler	State
48	Softmindedness politicians	Toppler	Community
49	Cultural barriers	Frontrunner	Third sector
50	Social acceptance	Frontrunner	Market
51	Matching needs locals	Frontrunner	Third sector
52	Matching needs locals	Connector	Third sector
53	Attribution instead of contribution	Enhancer	Third sector
54	Listening to needs locals	Enhancer	Third sector
55	Inclusivity & social equity	Enhancer	Third sector
56	Partnering with local organisations	Connector	Third sector
57	Matching innovation to local context	Connector	Third sector
58	Weak enabling environment	Toppler	Third sector
59	Weak enabling environment	Toppler	Mixed
60	Contextualization of innovation	Connector	State
61	Inclusivity	Connector	State
62	Inclusivity	Toppler	Mixed
63	Participatory standard	Enhancer/Connector	State
64	Participation barrier	Connector	State
65	Participation barrier	Connector	Third sector
66	Selection paralysis	Enhancer/ Connector	State
67	Scaling too big	Enhancer	Market
68	Scaling too early	Enhancer	Third sector
69	Scaling too early	Connector	Third sector
70	Future orientation	Toppler	State
71	Focus on low-hanging fruits	Toppler	Third sector
72	Conservative mindset	Frontrunner	Market
73	Public-academic cooperation	Toppler	Market

Financial barriers

		State	Market	Community	Third Sector	Mixed
Frontrunner	Entrepreneurial activity		(2) Friction financial availability	(3) Financial support (9) Restrictive rules around funds	(4) Financial support/available (5) Financial support/availability (6) Financial support/availability (7) Financial availability (10) Restrictive rules around funds	(8) (Future) Financial support (11) Mismatch (financial) reward systems individual sectors v. societal goals
Enhancer	Capacity building					
	Process intermediation					
	Educative support					
	Financial Support	(1) Not enough funds for 'risky' innovations			(12) Funding splintered across issues	
Connector	Resource mobilization				(13) Funding not divided across (sectoral) partners (15) Sustainability of scale	
	Relational intermediation	(14) Public-private cooperation lagging				
Toppler	Systemic intermediation	(16) Lack of economic incentives (17) Imbalance innovation ecosystem				

Risk-taking barriers

		State	Market	Community	Third Sector	Mixed
Frontrunner	Entrepreneurial activity		(18) Restrictive legislation (72) Restrictive mindset regime actors	(9) Restrictive rules around funds	(10) Restrictive rules around funds	(19) Restrictive legislation
Enhancer	Capacity building		(21) Inexperience dealing with risk			
	Process intermediation					
	Educative support					
	Financial Support					
Connector	Resource mobilization				(13) Funding not divided across (sectoral) partners	(22) Political will
	Relational intermediation	(26) Greenwashing			(20) Metrics of evaluation (25) Fear/value of failure	
Toppler	Systemic intermediation	(23) Risk-averse climate (24) Risk averse climate				(28) Greenwashing

Cooperation barriers

		State	Market	Community	Third Sector	Mixed
Frontrunner	Entrepreneurial activity		(29) Risk-averse behaviour other actors (30) Burden of proof			
Enhancer	Capacity building					
	Process intermediation		(31) Undefined innovation goals cities			(32) Undefined innovation goal cities
	Educative support					
	Financial Support					
Connector	Resource mobilization					
	Relational intermediation	(33) Unsynchronized goals partners (34) Language barriers (35) "Arrogance" (35) "Arrogance" (38) Cultural barriers in cooperation (37) Limited access to the right people				(39) Unsynchronized goals partners (40) Metrics of evaluation (11) Mismatch (financial) reward systems individual sectors v. societal goals
Toppler	Systemic intermediation	(14) Public-private cooperation (73) Public-academic cooperation	(41) Cross-departmental cooperation (42) Private-academic cooperation			

Political barriers

		State	Market	Community	Third Sector	Mixed
Frontrunner	Entrepreneurial activity				(46) Government support	
Enhancer	Capacity building					
	Process intermediation					
	Educative support					
	Financial Support					
Connector	Resource mobilization					
	Relational intermediation	(43) (Un)understanding pace of the city (44) Political turnover				(22) Political will (45) Political turnover
Toppler	Systemic intermediation	(47) Lack of institutionalization		(48) Short mindedness politicians		

Social barriers

		State	Market	Community	Third Sector	Mixed
Frontrunner	Entrepreneurial activity				(49) Cultural barriers (50) Social acceptance (51) Matching needs locals	
Enhancer	Capacity building					
	Process intermediation					
	Educative support				(53) Attribution instead of contribution	
	Financial Support				(54) Listening to needs locals (55) Inclusivity & social equity	
Connector	Resource mobilization					
	Relational intermediation	(60) Contextualization of innovation (61) Inclusivity			(52) Matching needs locals (56) Partnering with local organisations (57) Matching innovations to local context	
Toppler	Systemic intermediation				(58) Weak enabling environment (61) Inclusivity	(59) Weak enabling environment (62) Inclusivity

Crowding out barriers

		State	Market	Community	Third Sector	Mixed
Frontrunner	Entrepreneurial activity					
Enhancer	Capacity building	(63) Participatory standard				
	Process intermediation					
	Educative support					
	Financial Support					
Connector	Resource mobilization					
	Relational intermediation	(63) Participatory standard (64) Participation barrier (35) 'Arrogance' (36) 'Arrogance'			(65) Participation barrier	
Toppler	Systemic intermediation					

Scaling approach barriers

		State	Market	Community	Third Sector	Mixed
Frontrunner	Entrepreneurial activity					
Enhancer	Capacity building					
	Process intermediation					
	Educative support					
	Financial Support	(66) Selection paralysis	(67) Scaling too big		(68) Scaling too early	
Connector	Resource mobilization					
	Relational intermediation	(66) Selection paralysis				(69) Scaling too early
Toppler	Systemic intermediation	(70) Future orientation			(71) Focus on low-hanging fruits	