Working Paper "Transition Support for Food Secure Metropolitan Regions"

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Contents

1. Introduction

The growth and expansion of metropolitan regions is a worldwide increasing phenomenon (Chattopadhyay, 2016). Today 54% of the world's population lives in urban areas. By 2050 the world's urban population is expected to surpass 6 billion people. Mega-cities with more than 10 million people are increasing in number. Sustainable urbanization is the key to successful development (United Nations, 2015). In developing countries the linkage between urban and rural areas will be prone under future urbanization where combining cheap calories and food quality (health) is of major challenge (IFAD, 2013)[1]. In 2016 at the HABITAT III meeting, the US Department of State, C40 Cities Climate Leadership Group, the Milan Urban Food Policy pact, Prince of Wales Foundation, FAO have put food insecurity and climate change in cities on the agenda. They propose an integrated approach to meet the Sustainable Development Goals to achieve sustainable improvements in global food security and nutrition. With the adoption in 2016 of the New Urban Agenda of the UN, a new global standard for sustainable urban development have been set. This agenda commits national governments and local authorities to provide nutritious food to all its citizens, and to promote safe, accessible and green public spaces. This will require new rules and regulations, improved planning and design (United Nations, 2016). The Milan 'Urban Food Policy Pact' agreed and signed by more than 100 cities and metropolises in the world, recognized the need to coordinate all policies dealing with food from different perspectives. All participating cities and metropolises have committed themselves to develop sustainable and resilient food systems that provide healthy and affordable food to all people in a human rights-based framework that minimize waste and conserve biodiversity while adapting to and mitigating impacts of climate change (Milan Food Policy Pact, 2015). These developments encourage transitions towards sustainable development of metropolitan regions, with access to green spaces, healthy life, and to sufficient, safe and nutritious food. Notwithstanding, the transition towards sustainability will fully depend on how decision making processes take place in practice; in terms of what kind of knowledge is used and ways of inclusiveness and interaction.

Against this background the aim of this note is to get insight in metropolitan challenges and to identify possible solutions in decision making that can contribute to establishing sustainable food security in metropolitan regions. For this purpose we conducted a first literature review that consists mainly of articles published in the years 2014-2017. To deal with these challenges we present a framework for a Metropolitan Transition Support System in which quantitative approaches will be integrated in a collaborative governance approach involving stakeholders moving towards food security in metropolitan regions worldwide. Our transition support framework consists of two main building blocks; (1) process support and (2) decision support. These intertwined blocks inseparably belong together in decision support for urban stakeholders.

[1] https://www.ifad.org/documents/10180/666cac24-14b6-43c2-876d-9c2d1f01d5dd

2. Current challenges with respect to metropolitan development

In this section we introduce a selection of core challenges identified in the literature for future developments towards increased sustainability in metropolitan areas, in terms of access to green spaces, healthy life, and to sufficient, safe and nutritious food..

First, institutional shortcomings to involve stakeholders is challenging. Most of today's cities are faced with many institutional and managerial problems, including lack of integration of administrative and regulatory agencies dealing with metropolitan issues (Moazeni, 2016). Even when metropolitan governance succeeds in cooperation among existing governmental institutions, they are not necessarily successful in including other relevant stakeholders throughout decision making processes. For metropolitan governance to be effective in spatial planning it requires the involvement of non-institutional stakeholders (Patti, D., 2016). Moreover, the need for strategic urban planning is barely recognized and acknowledged in European countries. Current institutional settings limit the possibilities for strategic urban planning (Graaf and Dewulf, 2010). This implies that institutional change is needed. One of the problems is that in many European countries it is broadly accepted and legitimate that governments have a chief coordinating role and develop for the stakeholders instead of with the stakeholders (Graaf and Dewulf, 2010). Another problem identified in the literature is lack of coordination and responsiveness to multiple stakeholders, and overcomplicated administrative processes causing long time periods for sustainable land use planning and management, such as in the high-density city of Hong Kong (Wang et al., 2015). Further, lack of data often prevents the use of data-driven impact assessment methods of land use scenarios, and hence there is need for research tools, such as participatory impact assessment methods (König et al., 2013).

Second, regional constraints, local-specific characteristics and fragmentation are relevant dilemmas. In the literature it is emphasised that it is important to realize that each city has its own context and situation which is unique (Huston, S., and Darchen, S., 2014). For instance, in order to improve urban growth management in Australia, it is argued that not only the unique mix of regional growth drivers and constraints, but also specific local precinct characteristics must be considered. Also, in the literature, a key attribute of the spatial structure of large cities has been identified as fragmentation of urban landscapes (Angel et al, 2012). This implies that internally, cities are spatially fragmented, for instance, when living areas and industrial zones are spread over a large area instead of in more concentrated zones of a city landscape (Huston, S., and Darchen, S., 2014). It appears from the literature that there is a correlation between high income and fragmentation; for instance, in the US higher-income cities which represent cities that have the capacities to constrain urban development, also get less fragmented (Angel et al, 2012). Not only the landscape is fragmented, but the literature also refers to fragmentation of the local government systems which shape political representation (Wilson, R.H., 2012).

Third, lack of a multi-level governance is seen a problem. Hurtado (2017) refers to lack of collaboration across the three relevant levels of government (Central Government, regions, and cities), which is needed to overcome sectorial demotivation leading to urban decline, to integrate innovative measures, and to deal with the obstacles hampering participative processes in urban policies. Spanish cities, for example, are facing such limitations when developing strategies for urban regeneration due to the lack of a multi-level framework for urban regeneration. Moreover, participation of the relevant authority across governance levels was shown essential also in the case of urban mobility strategy and policy development (Franceschini & Marletto, 2015).

Fourth, a core problem refers to lack of capacities to balance competing claims and mutual interests. This refers particularly to the way of dealing with conflicting interest throughout a decision-support process. In the literature it is claimed that decision-making in urban supply chain management, often face challenges for balancing the varying needs and claims of multiple stakeholders when negotiating an acceptable trade-off between their competing claims (Graham et al., 2015). Another challenge identified in the literature refers to the importance of developing mutual interest and goals, for instance, in management of urban goods transport (Gammelgaard, 2015).

Fifth, another challenge refers to needs for more articulated approaches. Sacco and Crociata (2013) argue that when culture becomes a main development driver for urban systems, it is necessary to abandon simple mono-causal development schemes, and look for more articulated approaches. For example, a systems-based conceptual framework that captures the complexity of the interdependences among policy and state variables has been recommended for policy design professionals and local stakeholders who want to take part in collective decision-making processes (Sacco and Crociata, 2013).

Sixth, identifying relevant values and specifying sustainable aspects are core difficulties. Far too little attention has been paid to policy-relevant knowledge on the urgency and complexity of triggering transition towards sustainable cities (Dassen et al., 2013). In such developments, when citizens and civic and private organizations explicitly can show how they value different aspects of an urban design, this can contribute to enhancing a sustainable quality of life (Soma et al., 2016). This implies that, making issues crucial to urban sustainable development more specific and concrete will influence transition (Dassen et al., 2013).

3. From challenge to transition support

3.1 Possible solutions

In this section we present possibilities that may deal with the identified challenges addressed in the previous section, as solutions for future developments towards increased sustainability in metropolitan areas, in terms of access to green spaces, healthy life, and to sufficient, safe and nutritious food. Our intention is to give insight in the broad range of options.

First, there is a need to steer social transformation. Governments increasingly need to see their role as to seed or drive (directly or via incentives) substantive social transformation (Huston and Darchen, 2014). For instance, they show that projects supported by credible community social development are less risky, although in competing for investment funds, there is still a risk that local government can rush approve unsuitable projects.

Second, careful mapping and identification of stakeholders can be helpful to increase representation. In the literature it is widely recognized that stakeholder interaction and dialogue is essential to improve decisions about and awareness of major societal issues such as climate change, although there are contrasting views about who is a stakeholder (André et al., 2012). It is recommended to carefully map the stakeholder landscape and identification of relevant actors at different levels (André et al., 2012). Particular attention must be given to what to do with people that are not familiar with sustainability principles or do not subscribe to sustainability values: people who are "sustainability illiterate" (Cohen et al., 2015). For instance, tools recommended for future public engagements can be developed and applied to align public participation with the sustainability literacy of stakeholders, which actually was done in Arizona.

Third, facilitation of multi-stakeholder processes is seen critically important for successful engagement. In many places urban agriculture continues to operate in the absence of local or regional legitimization due to its mobile and dynamic nature (Halloran and Magid, 2013). Municipal recognition and institutional support for urban agriculture is therefore an important component in increasing the sustainability of related initiatives. Through the facilitation of multi-stakeholder processes, policy development and the conservation and allocation of land, local and central government can play a role in improving legitimate institutionalization of urban agriculture (Halloran and Magid, 2013).

Fourth, establishment of new networks will increase capacities. In the literature, it is argued that bringing together different stakeholders who jointly develop strategies for the implementation of innovative building related urban agriculture can be successful, such as in Berlin metropolitan region where they stimulated this by means of establishing networks that established new alliances and a common understanding of urban agriculture(Specht et al., 2016). Virtual reality simulation is a specific example of an effective platform for stakeholder participation that can facilitate better cooperation in urban development (Stauskis, 2014). It is also referred to information and technology systems such as online discussion papers and forum discussions, which can reveal concerns of citizens of a metropolitan region and serve important mechanisms for participation and consultation (Martin et al., 2014).

Fifth, joint arrangements for political leadership, knowledge exchange, and community-wide engagement can enhance developments towards transition. Individual political leadership, knowledge exchange, and community-wide collaborative engagement are key elements for successful urban food policy regime that is formed by local government actors, businesses, NGOs (Shey and Belis,

2013). Dialogues during stakeholder participation to developing scenario's is another arrangement enhanced in the literature, focusing on long-term regional sustainability. For instance, in the Washington Metropolitan region, this was applied early in a strategic engagement strategy with stakeholders. (Chakraborty, 2011).

Sixth, deliberative processes for community engagement can enhance legitimate decision making. Local and global forums and deliberative processes for community engagement are important in order to incorporate stakeholders' perception of future options for e.g. low-carbon living, travelling and consuming services and products (Larsen et al., 2011).

Seventh, develop and broadly assess indicators for valuing can provide important information. When engaging urban citizens in developing more sustainable cities, indicators can help for valuing the benefits of the contribution of community activities to the development of socially and environmentally sustainable local communities. The sustainability indicators can be of use to local governments and wider community stakeholders (Beilin and Hunter, 2011). Besides the scientific community, the community of elected officials, the community of engaged publics, the communities of cultural difference, and professional communities benefit from sustainability indicators (Holden, 2009).

3.2 Transition support

A combination of qualitative and quantitative approaches can be useful to complement with different types of knowledges as decision support. The literature refers to multiple tools combining qualitative and quantitative approaches. For instance, tools for assessing the implications of changes of agro-food systems can be determined through scenario analysis and different combined usages of linear programming to assess possible scenarios for the agro-food system (see Sali et al., 2016) for the metropolitan region Milan. According to Rich et al. (2016), system dynamics models combined with participatory approaches as support to sustainable urban agriculture can ensure resilient decision-support tools. Such system dynamics models can be used in overlaying quantitative models of urban food value chains (Rich et al., 2016).

Moreover, a variety of methods based on non-equilibrium and non-linear systems have been introduced and exploited to simulate urban dynamics. For instance, in order to link human and environmental systems, agent-based modeling has been applied that provides a multi-agent system (MAS) context (e.g. Tian et al., 2016). Although many applications of MAS models to urban phenomena have been applied, yet several challenges are facing MAS in modeling complex interactions between human diverse behaviour and heterogeneous landscape.

Based on the literature search, we have noticed that quantitative models in the evaluation of strategic scenarios for sustainable urban distribution mostly are being used, such as in the Brussels-Capital Region (Janjevic et al., 2016). Still, the use of qualitative approaches have been applied, for instance, in the study of potentials and limitations of regional organic food supply in the Berlin metropolitan regions where interviews and workshops with regional stakeholders have been held (Doernberg et al., 2016). According to Vollmer et al. (2015) there is still a lack of research validating the coupling of GIS with multi-criteria analytical methods to real world problem solving, which is an approach that potentially can combine qualitative and quantitative information. Another example is the case of the metropolitan region of Mexico City, in which the impacts of sustainable city logistics measures in that region were assessed based on qualitative (focus groups, interviews, survey) and quantitative analyses (Jaller et al., 2016). Moreover, to characterize strategies that peri-urban farmers can adopt to contribute to food provision through local food supply chains for the urban region of Pisa in Italy, researchers combine qualitative and quantitative analysis of on-farm surveys (Filippini et al., 2016). Also Tryba (2015) used qualitative and quantitative analysis to

establish triangulation to investigate the contribution of urban farms and community gardens to food security.

Considering the challenges and possible solutions identified, an explicit integral approach where process and decision support are intertwined is missing. In this paper, we argue that to improve transparency of policy making, research approaches combining qualitative and quantitative information as decision support can lead to more sustainable transitions. Our framework presented in the next section provides decision support that is embedded in a transition support system combining impact assessment and stakeholder participation as contribution to metropolitan food security solutions.

4. Framework for (metropolitan) transitions; combining process and decision support

From our literature review it follows that decision support concentrates on either qualitative or quantitative approaches. We believe that integrating both is necessary to sustainability development goals in metropolitan regions. The literature does not explicitly include decision support comprehending processes support combined with quantitative approaches. In this section we introduce some novel directions that can be useful in developing such combined approaches.

The quantitative parts of the decision support tool can consist of; 1) scenario analyses, 2) quantitative scaling tools, such as Metropolitan Global Detector and Magnet, 3) impact assessment and 4) big data analytics. These quantitative components may be used separately or in combination, depending on the actual context and policy decision which is at stake. First, the scenario analyses can be provided in the forms of maps (combination with scaling tools), especially when interacting with stakeholders, because of the transparent form of knowledge which is easier to communicate with people than, for instance, numbers and tables. An example of such a knowledge-based GIS that can simulate relevant scenarios about how food production, food demand, prices and trade will likely develop in the future (simulations run up to 2050), but also opportunities for urban and rural recreation, etc., is called Metropolitan Global Detector (Hennen et al., 2016). In order to illustrate different development in food consumptions patterns and food availability across metropolitan areas around the world with this tool, metropolitan areas are defined within a specific distance from the centre of metropolitan areas. Different scenarios in any metropolitan region can be considered with the detector, such as the growth of the population of a metropolitan region over a certain period of time. For each scenario the available areas for agricultural production, the food demand (based on the food metres) and the surplus can be calculated. Not only effects on urbanisation of non-flooded regions due to flooding of land caused by increased sea level is calculated and visualised, but also the lost area for arable crops or grazing area for livestock. The Metropolitan Global Detector approach can be supported by other quantitative scaling tools, such as general equilibrium models (e.g. MAGNET) (Woltjer et al., 2013), which can calculate food supply and demand at a global or national level, inputs in which Global Detector can downscale to much smaller geographic maps covering a metropolitan region or a city.

Second, impact assessments can be combined with the scenario analyses. The link can be set by for instance conducting multicriteria analyses that can handle social, environmental and economic indicators with quantitative as well as qualitative impact scores (Soma, 2010). When appropriate, cost-benefit analysis can be used for the assessment e.g. Jongeneel et al., 2012). Also, in order to include context specific preferences that may differ across different stakeholders, they can be included in the MCA by means of weights (Soma et al 2013).

The third quantitative part of the transition support system are big data analytics (Bogaardt et al., 2017). Big data increasingly plays a role in the society and it is impossible to ignore as a future source for metropolitan decision making. Big data has great potentials in support of sustainability. Big Data Analytics can contribute to evidence-based policy making by advanced predictive analytics methodologies and scenario techniques. One example of this would be the use of Big Data Analytics to analyse and prevent the spread of disease. The implementation can be influenced by big data in several ways. For instance, the ability to pinpoint problem zones can be a way to implement different levels of policy intensity, and also, new policies will almost immediately produce new data, which can then be used to evaluate the

effectiveness of these policies and enhance future implementation processes by identifying problems with previous ones. Online stakeholder participation can be facilitated by big data. A distinctive feature of big data is the possibility of real-time processing. One advantage of instantaneous (or near-instantaneous) data processing is that evaluation results become available the very moment data arrives.

The quantitative components of the decision-support is thus to be combined with the qualitative ones. This is illustrated in Figure 1. A Metropolitan Transition Support System actually implies an interactive process with dialogues and discussions (illustrated by tables) in which stakeholders are involved in multiple ways within and outside the scope of the particular research approach. This is an ongoing circular process which at different stages during transition contribute with small steps at the time, which eventually, after a longer period of time, ideally reach a state of sustainable food secure metropolitan solutions.

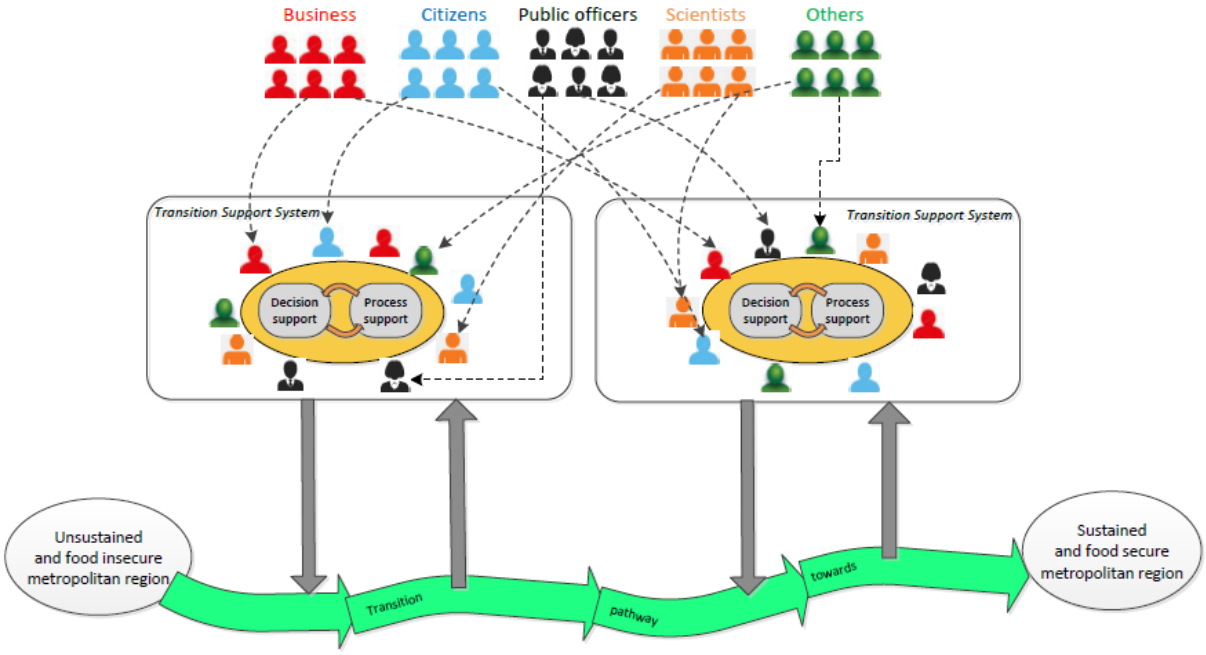

Figure 1. The (Metropolitan) Transition Support System.

Stakeholder participation approaches thus play an important role in this framework in different ways, for instance, in terms of judging on context specific and scenario oriented conditions. With the aim to ensure green and food secure metropolitan regions, legitimate stakeholder participation through transition periods are necessarily, and their qualities depend on levels of responsibility, accountability and transparency. Three main categories of stakeholder participation can be applied; stakeholder based, government based and science based (Soma et al., 2017). For direct stakeholder involvement several methods or tools can be used such as visioning approach, step-by-step participatory process design, and workshop. The second category focuses on the role of public administration and policy makers at different levels. The third category refers to methods for stakeholder participation as contributions to science such as participatory transdisciplinary research, stakeholders' integration in sustainability assessment, participatory foresight analysis and participatory multi-criteria approaches. These three different stakeholder approaches may operate side by side, or may be integrated, depending on the actual purpose and the context in which they are implemented.

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