

URBAN ROOFTOP FARMING IN BERLIN AND BARCELONA: WHAT RISKS AND UNCERTAINTIES DO KEY STAKEHOLDERS PERCEIVE?

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Abstract: Urban rooftop farming (URF) projects have been set up or planned by non-profit initiatives or business entrepreneurs in the cities of Berlin (Germany) and Barcelona (Spain) over the last few years. Beyond the already-established types of urban agriculture (UA) (such as allotments or school gardens), these “new forms” of UA are attracting increasing interest that can be observed in both cities. According to their proponents, they are supposed to provide potential benefits in the urban setting. At the same time, they are connected to a number of associated problems, uncertainties and risks, which constrain their social acceptability.

This paper aims to identify what risks key stakeholders perceive around URF in case studies of Berlin and Barcelona. To explore this objective, we analyzed 56 qualitative interviews conducted with key stakeholders (e.g., activists, lobby groups, planning experts, policy and administration officials, and sales representatives) in both cities.

The results provide an overview of the perceived risks associated with URF on different scales (from the single project level to the larger metropolitan region). We illustrate how certain groups are affected differently by those risks according to their respective roles in the system.

In conclusion, stakeholders associate a number of potential risks and problems with URF, which should be known, considered and addressed by those who want to develop, finance or implement URF in the cities of Europe and beyond.

1. Introduction

As in many other cities worldwide, urban agriculture (UA) has been progressively expanding in the cities of Berlin (Germany) and Barcelona (Spain) in the last few years. Beyond the already-established types of UA, such as family-home gardens, school gardens and garden plots, these “new forms” of urban agriculture are attracting increasing interest that can be observed in both cities. These new types of urban food producers focus on urban farming activities that take place around urban buildings. In recent years, rooftop gardens and rooftop greenhouses have been set up or planned by activists, non-profit associations, private initiatives or business entrepreneurs for social as well as commercial purposes.

1.1 Urban rooftop farming research

Notwithstanding the increasing interest in urban rooftop farming (URF), the existing literature in the field is limited to certain topics. Diverse studies have attempted to define the concepts behind URF, such as Vertical Farming (Despommier 2008; Despommier 2009; Despommier 2010) or Skyfarming (Germer et al. 2011), and highlighted the potential contribution of URF to food security and

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sustainable development. The opportunities and barriers associated with URF systems have been identified from a technical perspective (Cerón-Palma et al. 2012; Freisinger et al. 2015) and from the perspective of current literature and practices (Specht et al. 2014; Thomaier et al. 2015). Both approaches outlined the multiple contributions to sustainability (considering the effects on the environment, the economy and society).

In quantitative terms, rooftop farming has been assessed in terms of agronomic performance, potential area of implementation and eco-efficiency. Different studies have analyzed the varying production efficiency of rooftop gardens to identify optimal crops and techniques (Proksch 2011; Whittinghill et al. 2013; Pennisi 2014; Orsini et al. 2014). Attention has been also paid to the use of urban wastes as crop substrates (Grard et al. 2015). The quantification of the potential implementation of URF has been the focus of studies in New York, Bologna and Barcelona (Berger 2013; Orsini et al. 2014; Sanyé-Mengual et al. 2015a). Finally, among the three dimensions of sustainability, the environmental aspects and economic costs have been quantified for rooftop greenhouses (Sanyé-Mengual et al. 2015b) and community rooftop gardens (Sanyé-Mengual et al. 2015c) in a Mediterranean context.

Regarding the social aspects of URF, Sanyé-Mengual et al. (2015a) and Specht et al. (2015a,b) compiled the perceptions of stakeholders in relation to the potential implementation of URF forms in Barcelona and Berlin, respectively. Approaching stakeholders is essential in understanding the implementation of such a complex system, where multiple stakeholders play a key role (e.g., as consumers, policymakers, technicians or practitioners). The studies highlighted the several opportunities related to the environmental, economic and social advantages of developing local food systems through URF projects. However, stakeholders also perceived certain barriers to short-term implementation, mostly related to the novelty and complexity of URF. Among these barriers, some perceived risks were identified, such as risks attached to soilless growing techniques or health risks related to URF products. Notwithstanding these results, the studies did not delve into the multiple risks that stakeholders perceived.

In this context, the goal of this study is to identify the risks that stakeholders perceive concerning the implementation of URF in European cities. This contribution also focuses on classifying the risks, particularly in terms of spatial distribution and risk recipients. To do so, Barcelona and Berlin are used as case studies.

2. Research method

The results are based on the analysis of 56 qualitative interviews. Between 2011 and 2013, 25 guided interviews were conducted in Barcelona and 31 in Berlin as independent studies (Sanyé-Mengual et al. 2015a; Specht et al. 2015a). In both cities, key stakeholders (e.g., activists, lobby groups, planning experts, policy and administration officials, sales representatives, etc.) were approached and asked about perceived risks, problems and uncertainties related to rooftop farming, as one part of a broader interview on the topic. The interviews were transcribed, coded and analyzed applying the principles of qualitative content analysis (Kuckartz 2014; Weiss 1995).

3. Results: Perceived risks of URF implementation

The following results provide an overview of the identified risks associated with URF. First, we present the perceived risks along three different scales, from the single-project level to the city level to the larger metropolitan region. Second, we illustrate which particular risks might be relevant for different stakeholder groups, pursuant to their respective roles in the food system.

3.1 Perceived risks linked to URF on different scales

The interviewed stakeholders had different roles and came from different disciplines and backgrounds. Some stakeholders were concerned with a specific URF system on the single-project level (e.g., gardeners or technicians) or with the city as a whole (e.g., urban planners or architects), while some were more strongly associated with the urban fringe (e.g., peri-urban farmers or representatives of farmers' associations). Risks were perceived on different spatial scales and can be related to them accordingly. Some of the risks perceived by stakeholders are connected to the single-project level and relate to production technology, system or potential products. Other concerns or uncertainties affect the city as a whole or encompass even a larger spatial area. Table 1 distributes the identified risks among the three spatial areas.

Table 1. Perceived risks of URF on different scales.

Micro level (URF project, production system or products)	City level	Larger metropolitan and peri-urban area
Logistics and management constrains for food products	Conflicts with images of “urbanity”	Conflicts with images of “agriculture”
Associated technology is perceived as too complex	Projects are exclusive and act as a driver for gentrification	Competition with peri-urban and rural farmers
Risk that projects are overtaken by large enterprises	Few or no aesthetic benefits are perceived	
Risk that the projects are set up too fast	Competition with other rooftop uses	
Risk of unsustainable management	Conflicts with potential urban animal production	
Soilless growing techniques are “unnatural”	Increase in noise and smell	
Quality of products expected to be low	Uncertainty about the overall environmental impact	
Health risks	Operators are not trained (professional) enough	
Soilless techniques cannot be organic		
Perceived little or no economic benefits		

On the micro level, those particular stakeholders who are closely related to URF systems identified specific risks associated with the management of URF projects (e.g., logistics, type of projects), the resulting products (e.g., quality) and the performance of the system (e.g., environmental impact,

costs). They perceived some of the applied rooftop farming technologies as too complex and expensive. Furthermore, stakeholders were concerned about potential health risks (due to contaminated air, soil or water). They further brought up general acceptance problems for the application of soilless growing techniques, which cannot be certified as “organic” and are perceived as an “unnatural” way of producing.

On the larger city level, stakeholders expressed concerns regarding the integration of the new system with the urban environment, including conflicts with prevailing images of “urbanity”. Urban stakeholders were concerned about the impacts of integrating agricultural activities in the city (e.g., aesthetics, noise, smell), the impacts of the implementation process on society (e.g., gentrification) and competition with current sustainability strategies and alternative rooftop uses (e.g., photovoltaics). In particular, stakeholders are aware of the lack of agricultural training and expertise in the current job market in urban areas.

With regard to the larger metropolitan and peri-urban areas, stakeholders outlined global risks associated with the concept of URF and the economic competition with current activities. Some stakeholders even refused to define these types of projects as “agriculture” (Sanyé-Mengual et al. 2015a).

3.2 Who are the recipients of the identified risks?

In considering the identified risks, it turned out that they are not likewise relevant for those varied stakeholders who are associated with the introduction or implementation of URF. While some of the risks affect the general public or society as a whole, others are more relevant for specific groups, such as producers or potential consumers. As presented in table 2, we grouped the previously identified risks according to their relevance for the four societal groups of general citizens, promoters, users/producers and consumers.

Table 2. Identification of different groups as potential recipients of the acknowledged risks.

Citizens (General public)	Promoters	Consumers	Producers
Conflicts with images of “agriculture”	Risk that projects are overtaken by large enterprises	Soilless growing techniques are “unnatural”	Risk of unsustainable management
Conflicts with images of “urbanity”	Risk that the projects are set up too fast	Quality of products expected to be low	Logistics and management constraints for food products
Conflicts with potential urban animal production	Competition with other rooftop uses	Health risks	Associated technology is perceived as too complex
Increase in noise and smell	Competition with peri-urban and rural farmers	Soilless techniques cannot be organic	Operators are not trained (professional) enough
Projects are exclusive and act as a driver for gentrification	Uncertainty about the overall environmental impact		Perceived little or no economic benefits
Few or no aesthetic benefits are perceived			

The various identified risks can affect different recipients in a different manner.

Risks related to the general conceptualization of urban agriculture, the impacts of production (e.g., noise) and impacts of the URF project itself (e.g., aesthetics) affect the general public and all citizens can become recipients of them. These types of risks must be addressed and handled by the administration and the project managers. The establishment of a legal framework that avoids certain impacts (e.g., smell), the dissemination of information and communication campaigns can each contribute to minimize these risks.

Promoters of URF initiatives are affected by risks related to the implementation of the project, such as competition with other activities and the environmental and economic performance of the project. These types of risks can be minimized by establishing an alternative local food sector structure, building cooperative networks with rural farmers and providing data on the economic and environmental performance of URF projects.

Risks associated with the quality of and concerns related to the products provided by URF particularly affect the potential consumers of URF products. Strict quality control along with communication and campaigns on the quality of local food products as well as quantitative studies on potential health risks might minimize the negative perceptions related to URF products that otherwise lead to low social acceptance.

The producers of the URF system are directly affected by risks related to management. The complexity of management in URF systems depends on the level of knowledge of the respective user or producer. The promotion of specific education on urban agriculture and rooftop farming, such as in New York (e.g., training programs in the Eagle Street Rooftop farm) (<http://rooftopfarms.org/education/>), would improve the curricula of new urban farmers in European cities while reducing management risks.

4. Conclusions

We conclude that there are a number of potential risks and problems associated with URF that should be known, considered and addressed by those who want to develop, finance or implement URF in the cities of Europe and beyond. The perception of risks has a spatial component. Stakeholders identified risks on different scales from the project to the larger city context. Among them, the risks associated with the system are the most numerous and encompass concerns related to the integration of the system with the urban environment; the use, access and complexity of the system; and the aesthetical impact of URF. The number of risks closely related to the URF system is larger than the number that is perceived for the entire city or the peri-urban area.

Notwithstanding that risks are perceived by multiple stakeholders, each risk affects a specific group of recipients. The general public can be affected by negative impacts from the implementation of URF projects, which can be handled by normative schemes. The low acceptance of URF among potential consumers can only be minimized through communication campaigns.

The perceived risks cause several implementation barriers, such as problems with the social acceptance of URF products. To overcome such barriers, pilot projects and the dissemination of current knowledge and practices are fundamental in improving the current understanding of local food systems among the multiple stakeholders. Furthermore, URF may focus on sustainable technologies (e.g., local resources, energy efficiency), integrating social aspects (e.g., education) and

establishing new market structures (e.g., short supply-chains) to ensure a socially accepted development of this new form of urban agriculture.

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