Architecture for a Sustainable & Resilient Regional Food System

Mixing Intergenerational Living & Food in South Holland

AR3A010 | Research Plan

P2 | Research Plan

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1.0 Problem Statement & Research Questions

Food has played an important role in shaping our metropolitan regions. Since the World Wars, the industrialized global *food system* has prioritized economy and efficiency, at the expense of the environment and society (Food & Agriculture Organization 21, 27; Shepon et al. 4; Ellen MacArthur Foundation 8). The environmental and social issues related to the food system have been perceived as rural concerns and therefore *food infrastructure* is absent in conventional urbanism (Wiskerke & Verhoeven 43; Waldheim).

Much has been written about the agricultural, logistical, sociological, policy, economic, environmental, and cultural consequences of food production in urban areas (Pothukuchi et al.; Jarosz; Dubbeling; Lovell; Brown & Jameton; Waldheim). Surprisingly, little has been written on how the food system can influence the urban form, its development, and the architect's role in these matters.

The discussion is no longer purely rural as many urban issues are food-related and affect urban areas globally, such as the region of South Holland in the Netherlands that has been shaped by the agri-food sector and is currently experiencing the largest housing shortage in the Netherlands (Capital Value). Literature identifies these issues as population growth, self-sufficiency, health, social inequality, urbanization and sprawl, biodiversity and environmental degradation, climate change, energy and resource use, and waste.

Food-related issues are spatial matters that architects can address. To gain a fuller understanding of how the integration of the food system with architecture can shape urban areas, extensive architectural research is required. Focusing on different synergies that can be created spatially between the food system and different fields at multiple scales can inform the development of sustainable and resilient cities.

The aim of this research is to better understand the influence of the integration of food system processes and architecture on sustainable and resilient development of the urban form and its food system. Quantitative and qualitative research methods will be used to gain a deeper insight into the possible multi-sectoral and multi-scalar synergies that can be created between the two. The findings will be contextualized in a design proposal that integrates the food system with intergenerational living in South Holland (Fig. 1).

Primary Research Question

How can integrating food system processes and intergenerational living through architecture contribute to the sustainable and resilient urban development of the South Holland region and its food system?

Aspect / Scale	Subsidiary Questions	Objectives
Scope Building / City / Region	SUB-Q1 **What are the matters that architects can have an impact on in the food system?**	(a) Develop understanding of past work and strategies that aimed to integrate architecture with the food system (b) Define the architect's role and influential scope in the food system
Design Approach Building / City	SUB-Q2 **What are the factors that contribute to creating a catalytic architecture that can lead towards a sustainable and resilient development of a city and its food system?**	Identify attributes that contribute to the catalytic quality of an architectural project
Context Site / City	SUB-Q3 **What beneficial and problematic spatial qualities has the food system shaped in the selected site?**	Analyze the selected site and inform the actor interview questions
Context Site	SUB-Q4 **What are the needs of the actors affiliated with the selected site?**	Identify site-specific needs of local actors
Architectural Strategy Building	SUB-Q5 **What synergies can be created by hybridizing intergenerational living with food system processes?**	Identify benefits and possibilities created by combining various functions in one space
Design Proposal Building / City / Region	SUB-Q6 **How can an architectural design, part of a network of interventions, integrate food processes within a specific urban site while addressing the needs of various actors?**	Create, analyze, and visualize a design that proposes alternative ways of merging food system processes & architecture in cities.

Fig. 1. Research questions and methods. Source: Author.

	Primary Methods	Secondary Methods	Outcomes
	Research & Theoretical Framing Literature review of (a) past projects that integrated the food system with architecture (b) the role of spatial designers in the food system	Theoretical Framing Review of relevant conference proceedings	Position paper reviewing past projects integrating architecture and the food system, key concepts, and the architect's role
	Theoretical & Analytical Framing Literature review of theories and attributes of catalytic architecture.	Analytical Framing Precedent studies of successful urban catalysts	Conclusion of importance of specific factors on the catalytic effect of an architectural project.
	Analytical Framing Field research, observations, cartography, GIS and Data analysis, and literature review	Analytical Framing Review of literature on the site, and actor interviews	Collection of maps, drawings, photographs, and video of past and current spatial conditions of the site.
	Analytical Framing Actor interviews	Analytical Framing Review of relevant survey data and literature	Prioritized list of needs of various local actors comparing similarities and differences.
	Architectural Strategies Literature and precedent studies	Architectural Strategies Research by design	Toolbox of design strategies and spatial relationships to inform the design
	Architectural Design Proposal Research by design.	Scenario Evaluation Jury evaluation of designs based on key design strategies and factors from the Theoretical and analytical frameworks	Architectural design intervention proposal and recommendations for future research and development

2.0 Definition of Theoretical Framework

The food system connects many sectors and scales. Many architects and urbanists have developed visions that integrated agriculture with architecture in urban areas (Howard; Revisiting Frank Lloyd; Hilberseimer; Branzi). These visions have been explored in the position paper written as part of this research and six key concepts that are important in the integration of the food system with architecture have been identified (Fig. 2).

2.1 Regional Perspective

Many architects believe that the solution of urban food-related issues can only occur when rural and urban areas are seen as interconnected in a region, not separate. For example, Wiskerke and Verhoeven define the relationship between food, the environment, and people as “foodscapes” (30, 31). Foodscapes are nested within household, community, regional, and global scales. The city-region is defined not only by geography or politics but by all systems related to the food system.

2.2 Network Thinking

Important to the survivability and resilience of the food system, Baran’s Network Theory examines three network types: centralized, decentralized, and distributed (Fig. 3). Baran stated that distributed networks are the most resilient and depend on redundancy to ensure that there is a connection between two specific nodes, even if a direct connection is broken (1). Network thinking is important in creating resilience and adding value through synergies between different types of systems where one’s strength supports the other’s weakness.

2.3 Urban Metabolism

“Urban metabolism”, a term coined by Wolman, is important to the development of sustainable cities. It is defined as “the sum total of the technical and socio-economic processes that occur in cities, resulting in growth, production of energy, and elimination of waste” (Kennedy et al.). Its study involves the overall quantification of inputs and outputs of material and immaterial flows in urban regions. The city is seen as an ecosystem striving for self-sufficiency, where the food system plays an important role. However, contemporary cities have linear metabolisms with a high consumption and wastage of resources.

2.4 Self-Sufficiency

Self-sufficiency is a common aspect in the visions integrating food systems and architecture. The increasing relevance of urban resilience and metabolism has brought focus to the environmental footprint of food consumption and regional self-sufficiency as a way of shortening food supply chains (Zasada et al. 25).

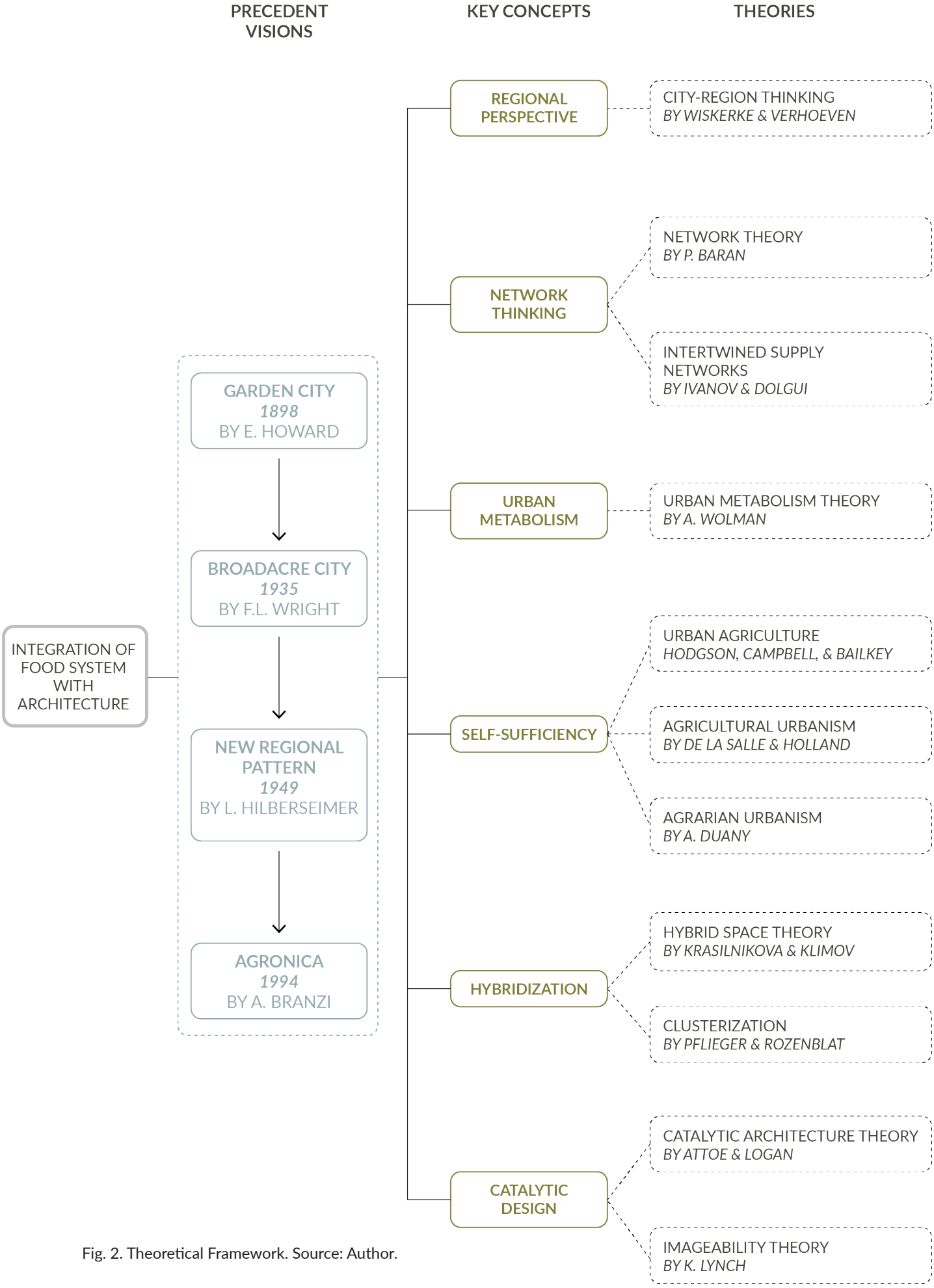

Fig. 2. Theoretical Framework. Source: Author.

2.5 Hybridization

The hybridization of food system processes with different functions, land-uses, and systems is important to its integration in the city. Krasilnikova and Klimov define hybridization as combining multiple functions, programs, and services into buildings and space (63). Hybridization adds value, flexibility, creates synergies, and future-proofs spaces and buildings; it can be enhanced by clusterization of different functions or land uses in spatial proximity to increase diversity and create symbiotic relationships between programmatic elements and actors, which can have a radiating influence outside of the cluster (Pflieger and Rozenblat 2723).

2.6 Catalytic Design

Catalytic architecture theory describes how buildings can disrupt processes and conditions in cities (Fig. 4). Architecture can be a tool to disrupt the food system in small, but realistic reactions that also sparks a series of small changes in the social, environmental, and economic layers of a city on multiple scales (Attoe and Logan 48).

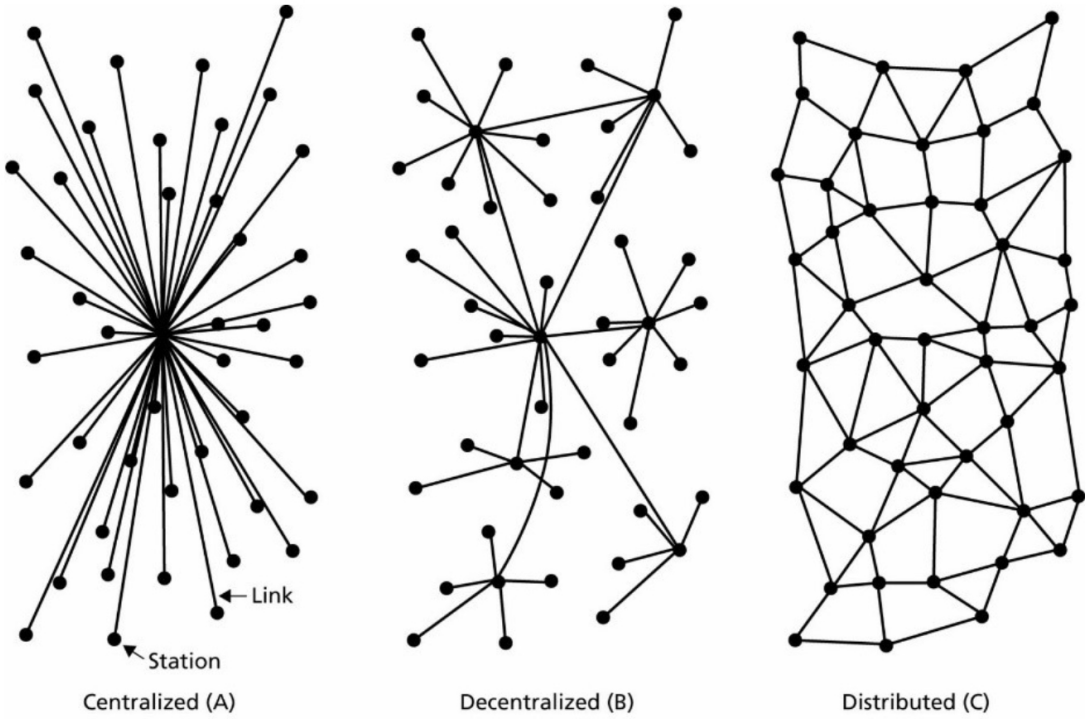

Fig. 3. Three possible network architectures. Baran, Paul. “On distributed communications networks.” IEEE transactions on Communications Systems 12.1 (1964): 1.

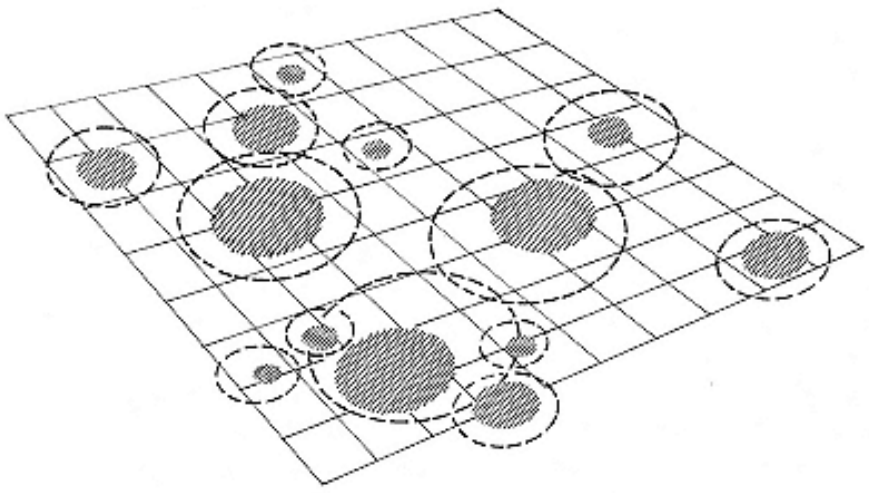

Fig. 4. Diagram representing the catalytic process. Actions (hatched areas) catalyze chains of other actions. Each action is constrained, so that it does not harm its context. The moderating aspect is represented by dashed lines. Attoe, Wayne, and Donn Logan. American urban architecture: Catalysts in the design of cities. Univ of California Press, 1989: 29.

3.0 Methodological Positioning and Description of Research Methods

Blessing's Design Research Methodology is used to structure the methodological framework, consisting of four phases (Fig. 5).

3.1 Research Clarification (RC)

RC provides an introduction to the food system and an explanation of current problems. Recent studies on integrating food processes and architecture in cities, and the relevance of this research is examined. Research objectives, questions, and methods are explained.

3.2 Descriptive Study I (DS-I)

DS-I informs the design proposal through a development of a theoretical and analytical framework. A position paper will define the role of the architect in the food system by exploring the history of the food system, key concepts, and past projects that strived to integrate the food system with architecture in cities. Key design strategies will be defined.

Thematic research of South Holland and its food system will be conducted to understand the existing situation and challenges. This will be accomplished through a literature review, interviews, and personal observations.

Catalytic factors contributing to sustainable and resilient development of urban areas and their food systems will be identified to inform the design proposal through a review of relevant literature, theories, and precedents. A site analysis will be carried out to understand how the food system has shaped the selected site and inform the interview questions. This will involve GIS and historical mapping, spatial explorations of socio-economic and environmental layers, field research, and a literature review to gather a collection of maps, drawings, photographs, videos of the past and current site conditions. To understand the needs of the actors affiliated with the selected site, interviews with the support of survey data will be conducted.

3.3 Prescriptive Study (PS)

PS aims to develop support for improving the current situation. Possible synergies created by hybridizing intergenerational living with food system processes will be identified through literature and precedent studies, and explored through research by design.

Several design scenarios integrating food with intergenerational living will be developed through research by design. Using the Delphi method, a jury panel will evaluate the scenarios based on the key design strategies and factors, defined in DS-I, contributing to a successful integration of the food system with architecture as a catalyst for sustainable and resilient urban development.

3.4 Descriptive Study II (DS-II)

DS-II will review whether the architectural proposal can achieve the desired improvements and define future recommendations. It will include a critical reflection on the design proposal, research methodology, scientific and social relevance, limitations, areas of improvement, contributions to the architectural discourse, and a personal introspection.

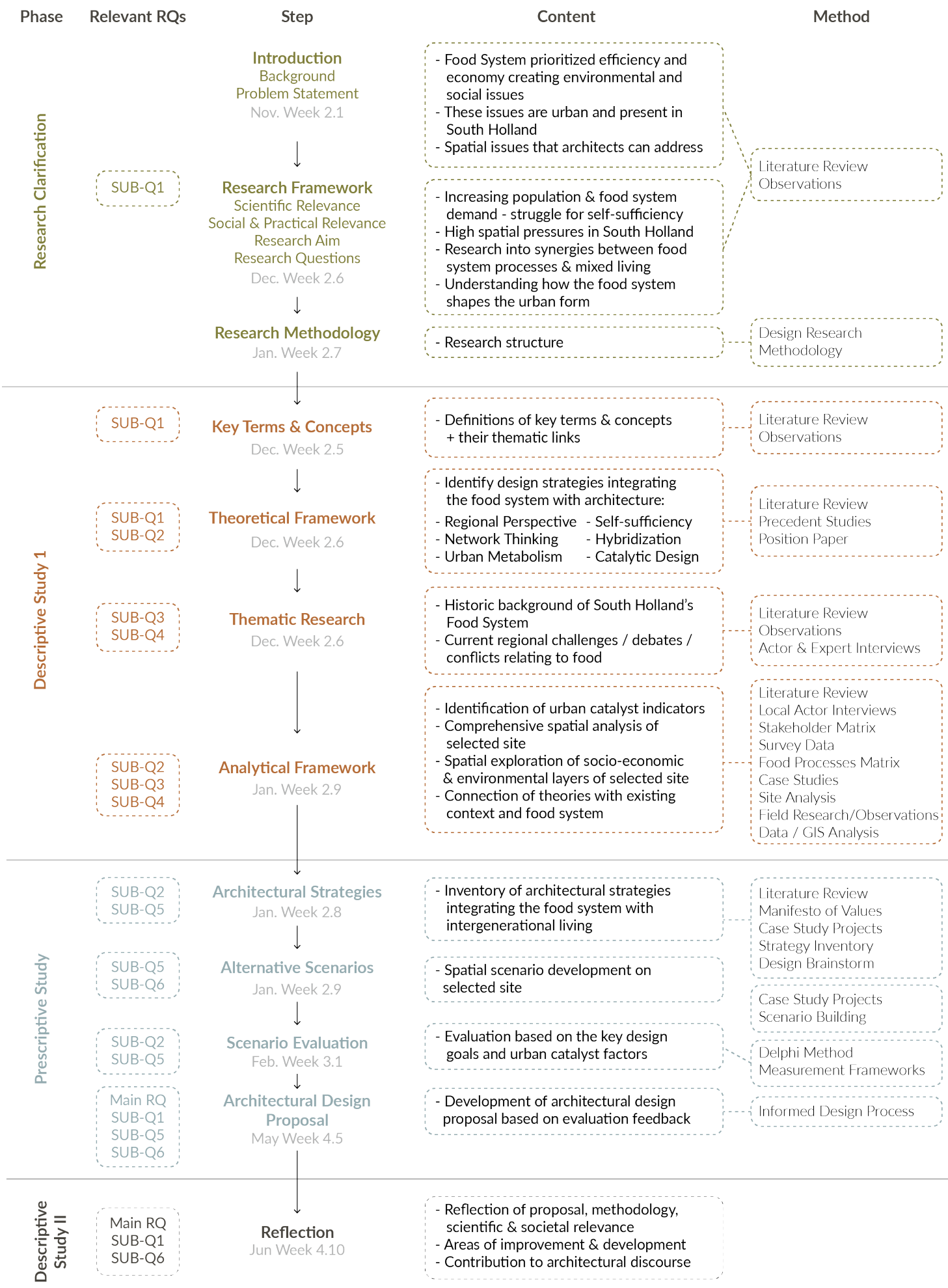

Fig. 5. Methodological Framework. Source: Author.

4.0 Argument on Relevance

4.1 Scientific Relevance

The current food system serves a fast-growing global population and nourishes economic development and urbanization. The globalized industrial food system has created many challenges hindering sustainable development. The Ellen MacArthur Foundation states that the current food system's "productivity gains have come at a cost, and the model is no longer fit to meet longer term needs" (8). These challenges include the depletion of finite resources, high water consumption, waste, environmental degradation, climate change, poor public health, and social inequalities (Ellen MacArthur Foundation; AQUASTAT; Edenhofer 9; Wiskerke & Verhoeven 25; De Schutter).

By 2050, the world's population is expected to increase by 2 billion people, 68% of which will be living in urban areas (DESA, World Population Prospects 2019 1; DESA, World Urbanization Prospects 2018 1). This will create a heavier dependence on the food system and amplify its existing problems; urban sprawl will continue to decrease ecological and agricultural areas around cities replacing them with higher-value land-uses such as distribution centers and offices (Barendse 15). This is especially relevant to The Netherlands, which has been the fastest urban sprawler in Europe for the last 20 years and is struggling with self-sufficiency (Evers and Schie; Hennig 57). Despite 60% of South Holland being utilized for food production (Fig. 6), the region only supplies 25% of its dietary needs (Zasada et al. 29, 31).

The increasing relevance of urban resilience and metabolism has brought focus to the environmental footprint of food consumption and regional self-sufficiency as a way of shortening food supply chains (Zasada et al. 25). Recent research and design of urban agriculture has focused solely on food production within cities (Barrs 15). Many studies proposed to decentralize the industrial food system by creating local mini-farms on the mistaken assumption that local food systems are sustainable but these prove to be infeasible with limited influence on a community (Kennard & Bamford 10; McClintock; Eliades; Born & Purcell; O'Donnell; White; Zahner). Barrs recommends further research into the synergies resulting from the integration of food production with other food system processes (15). This graduation thesis aims to take Barrs' recommendations further to identify synergies between food processes and intergenerational living, and to propose strategies for integrating the food system with architecture in cities.

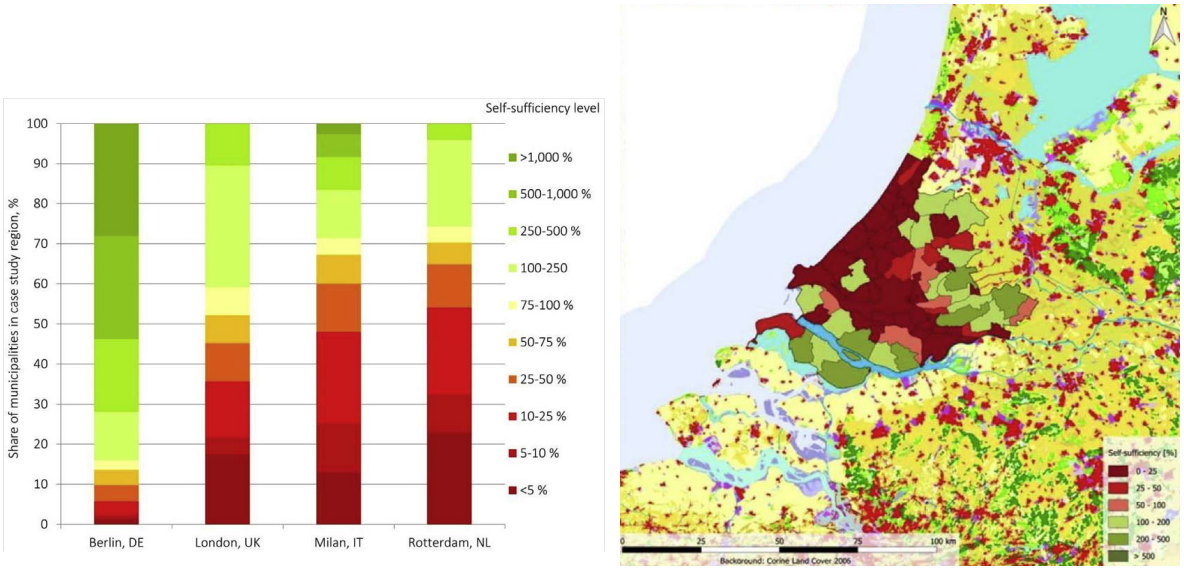

Fig. 6. Self-sufficiency levels of municipalities of the South Holland Region. Zasada, Ingo, et al. "Food beyond the city–Analysing foodsheds and self-sufficiency for different food system scenarios in European metropolitan regions." *City, Culture and Society 16* (2019): 32.

4.2 Social and Practical Relevance

With the increasing global urban population, food-related issues have gained increasing attention. For centuries, they were perceived as rural matters, separate from urban (Wiskerke & Verhoeven 43; Waldheim). While previous research saw urbanization and agriculture as two competitors for the same space (Wiskerke & Verhoeven 44; Howard 28, 136), current interest is in the symbiosis between agriculture and urban development as researchers, policy makers, and designers have realized that food-related issues are urban-rural issues (Wiskerke & Verhoeven 41). Consequently, the public is increasingly conscious of these issues, as evident by the increased interest in urban agriculture and the environmental, slow-food, local-food, and community food-security movements (Martinez V, 5, 12; Waldheim; Wiskerke & Verhoeven 32).

Research and design of urban agriculture has focused on food production on underused and isolated brownfield sites, adapted existing buildings, and green fields, but has not considered its potential effect on the city's form on a larger scale (Waldheim). Understanding the food system's effects on the urban form and exploring the possibilities of spatial relationships is crucial to the sustainable development of metropolitan regions, especially those under immense spatial pressures like South Holland, which has the highest housing shortages in the country, high demand for public green space, and a need for more agricultural land and business-parks (Capital Value; de Zeeuw; Batenburg).

5.0 Bibliographical References

Allen, Stan. “Infrastructural urbanism.” *Points+ lines: diagrams and projects for the city* (1999): 48-57.

Allen states that infrastructure plays a secondary role in conventional urbanism, even though architects incorporate infrastructure in every project. He introduces the concept of “Infrastructural Urbanism”, which understands infrastructure as a design element that can give places the ability to adapt over time and provide the resources that allow for various uses. Allen suggests seven propositions to the role of infrastructure in urban design. This perception of infrastructure as a tool that allows for flexibility and adaptability is key in developing strategies for integrating food system processes within architecture in urban areas.

Apaiah, R. K. *Designing food supply chains-a structured methodology: A case on novel protein foods*. 2006.

AQUASTAT, FAO. “Aquastat.” (2014).

FAO’s global water information system.

Attoe, Wayne, and Donn Logan. *American urban architecture: Catalysts in the design of cities*. Univ of California Press, 1989.

In this article, Attoe and Logan introduce the catalytic architecture theory to describe how buildings can disrupt processes and conditions in cities. Architectural catalysts guide urban development by contributing to the implementation of eight values that are critical for good urban design. These values can be realized by means of a sequence of small and achievable catalytic reactions. Catalytic architecture theory is important in developing the design strategies and informing the design proposal in this research as it can be a tool to disrupt the food system in small, but realistic reactions that also spark a series of changes in the social, environmental, and economic layers of a city, affecting actors on multiple scales. This article will help me identify the factors that contribute to the catalytic qualities of architectural projects that guide urban development.

Sources

Bailkey, Martin, and Joe Nasr. “From brownfields to greenfields: Producing food in North American cities.” Community Food Security News, Fall 2000 (1999): 6.

In this book, Bailkey and Nasr introduce the concept of Urban Agriculture to help reform the way that the food system is integrated within cities. Urban Agriculture is an idea that aims to retrofit existing cities to produce food. It recognizes that industrial agriculture is unsustainable and there needs to be a reformation of our landscapes to local food production. Bailkey and Nasr’s work is important in my understanding of the architect’s role in the food system, and the possibilities of new relationships between the food system and architecture in the city.

Baran, Paul. “On distributed communications networks.” *IEEE transactions on Communications Systems* 12.1 (1964): 1-9.

In this article Paul Baran introduces the Network Theory, which aimed at improving the survivability of the American communications network during the Cold War. His primary means of doing so was through redundancy. Baran, identifies three possible network architectures: a centralized network, a decentralized network, and a distributed network. While this was limited to studies of communication networks, the concepts of network thinking can be applied to the food system to ensure survivability and resilience.

Barendse, Martijn. The Multiple Dimensions of Greenhouse Clusters in The Netherlands. 2017. Wageningen University. Master’s Thesis. edepot.wur.nl/459825

Barrs, Robert. “Southeast False Creek Urban Agriculture Strategy.” report prepared for the City of Vancouver, *http://www. cityfarmer. org/SEFalseCreekFinal.html* (2002).

Batenburg. “A Major Shortage of Business Parks in Westland until 2030!” Batenburg Bedrijfshuisvesting, 21 Dec. 2018, batenburg-bhv.nl/tot-2030-een-groot-tekort-aan-bedrijventerreinen-in-westland/.

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Bieleman, Jan. Five centuries of farming: a short history of Dutch agriculture 1500-2000. Vol. 8. Wageningen Academic Publishers, 2010.

Blessing, Lucienne TM, and Amaresh Chakrabarti. *DRM: A design reseach methodology*. Springer London, 2009.

Blessing’s Design Research Methodology (DRM) is used in this thesis to structure the methodological framework. The framework consists of four phases: Research Clarification, Descriptive Study I, Prescriptive Study, and Descriptive Study II.

Born, Branden, and Mark Purcell. “Avoiding the local trap: Scale and food systems in planning research.” *Journal of planning education and research* 26.2 (2006): 195-207.

Brantz, Dorothee, and Sonja Dümpelmann, eds. Greening the city: urban landscapes in the twentieth century. University of Virginia Press, 2012.

Branzi, Andrea. “Eindhoven, un modello di urbanizzazione debole”. architettura.it. DADA Architetti Associati, 19 Feb. 2002. Web. 18 Dec. 2020.

This project by Branzi, proposes a new urbanism that takes the shape of an agricultural park and sees the city as a continuously changing system of interrelated forces and flows, instead of a collection of objects. It involves aspects of urban metabolism, regional thinking, self-sufficiency, hybridization, networks, and infrastructure as important aspects to integrating the food system with the city. This work will inform my understanding of the architect’s role in the food system, a historical understanding of the relationship between food and architecture, and influence my theoretical framework and design strategies of the integration of food process within architecture in urban areas.

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Brinkley, Catherine. “The small world of the alternative food network.” *Sustainability* 10.8 (2018): 2921.

Brown, Kate H., and Andrew L. Jameton. “Public health implications of urban agriculture.” Journal of public health policy 21.1 (2000): 20-39.

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Clancy, Kate, and Kathryn Ruhf. “Is local enough? Some arguments for regional food systems.” *Choices* 25.316-2016-7158 (2010): 1-5.

Coelho, Fábio Cunha, Enilce Maria Coelho, and Monika Egerer. “Local food: benefits and failings due to modern agriculture.” *Scientia Agricola* 75.1 (2018): 84-94.

Contin, Antonella, ed. Questo: Metropolitan Architecture. Maggioli Editore, 2015.

de Boer, I. J. M. “Re-rooting the Dutch food system–from more to better.” (2020).

De La Salle, Janine M., and Mark Holland. *Agricultural Urbanism*. Green Frigate Books, 2010.

In this book, De La Salle and Holland introduce the concept of Agricultural Urbanism to help reform the way that the food system is integrated within cities. They introduce the theory and practice of Agricultural Urbanism, “a planning, policy, and design framework for developing a wide range of sustainable food and agriculture system elements into multiple community scales”. Agricultural Urbanism focuses on developing planned communities that are affiliated with farms. De La Salle and Holland’s work is important in my understanding of the architect’s role in the food system, and the possibilities of new relationships between the food system and architecture in the city.

DESA, U. N. “World Population Prospects 2019: Highlights.” *New York (US): United Nations Department for Economic and Social Affairs* (2019): 1.

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DESA, UN. "World Urbanization Prospects 2018." *United Nations Department for Economic and Social Affairs* (2018): 1.

De Schutter, Olivier. "The transformative potential of the right to food." *United Nations General Assembly* (2014).

de Zeeuw, Rianne. "Call for More Nature in the Least Green Municipality." AD, 6 Aug. 2017, www.ad.nl/westland/roep-om-meer-natuur-in-minst-groene-gemeente~a4cceaf3/.

Duany, Andres. Garden cities: Theory & practice of agrarian urbanism. Duany Plater-Zyberk & Company, 2011.

In this book, Duany introduces the concept of Agrarian Urbanism to help reform the way that the food system is integrated within cities. Agrarian Urbanism aims to create communities of committed food growing residents. Architecture and urbanism would therefore contribute to creating lifestyles that enable food production at different scales within cities. Duany's work is important in my understanding of the architect's role in the food system, and the possibilities of new relationships between the food system and architecture in the city.

Dubbeling, Mariëlle. "Urban agriculture as a climate change and disaster risk reduction strategy." Urban Agriculture Magazine 27 (2014): 3-7.

Edenhofer, Ottmar. "Technical Summary In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Technical Report." (2014).

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This project by Hilberseimer, proposes a new urbanism that decentralizes the food system and the urban form. It involves aspects of regional thinking, self-sufficiency, hybridization, networks, and infrastructure as important aspects to integrating the food system with the city. This work will inform my understanding of the architect’s role in the food system, a historical understanding of the relationship between food and architecture, and influence my theoretical framework and design strategies of the integration of food process within architecture in urban areas.

Hennig, E. Ireneusz, et al. “Urban Sprawl in Europe Joint EEA-FOEN Report.” *EEA Report* 11 (2016): 57.

Hodgson, Kimberley, Marcia Caton Campbell, and Martin Bailkey. *Urban agriculture: Growing healthy, sustainable places*. American Planning Association, 2011.

In this book, Hodgson et al. explain the concept of Urban Agriculture to help reform the way that the food system is integrated within cities. Urban Agriculture is an idea that aims to retrofit existing cities to produce food. It recognizes that industrial agriculture is unsustainable and there needs to be a reformation of our landscapes to local food production. Hodgson et al.’s work is important in my understanding of the architect’s role in the food system, and the possibilities of new relationships between the food system and architecture in the city.

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Howard, Ebenezer. Garden Cities of Tomorrow. London: Faber, 1946.

This project by Howard, originally created in 1898, proposes a new urbanism that integrates agriculture closer to the city. It involves aspects of self-sufficiency, networks, and infrastructure as important aspects to integrating the food system with the city. This work will inform my understanding of the architect’s role in the food system, a historical understanding of the relationship between food and architecture, and influence my theoretical framework and design strategies of the integration of food process within architecture in urban areas.

Howard, Ebenezer. “To-morrow: A peaceful path to real reform.” London: Swan Sonnenschein (1898).

Hueston, Will. “Overview of the global food system: changes over time/space and lessons for future food safety.” *Improving Food Safety Through a One Health Approach: Workshop Summary.* National Academies Press, 2012: 191.

Ivanov, Dmitry, and Alexandre Dolgui. “Viability of intertwined supply networks: extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak.” *International Journal of Production Research* 58.10 (2020): 2904-2915.

In this article, Ivanov and Dolgui introduce their model of the “Intertwined Supply Network”, which is a network of interconnected supply chains. Ivanov and Dolgui state that resilience is a disruption-driven property of SCs caused by discrete, single, and unique events. However, viability is a property driven by behaviour of a system with a dynamic structure that is continuously changing in the long-term scale. To ensure viability in a system, actors in ISNs can exhibit multiple roles in buyer-supplier relations. For example, intersecting SCs between the food system and other industries can create a symbiosis where waste of one SC process can be used as the input for another. They introduce a framework for measuring the viability of a

Sources

system based on three main elements: resilience, adaptability, and sustainability. The concepts and measurement frameworks introduced in this article heavily influences the development of design strategies, the design proposal, and their evaluation in my research.

Jarosz, Lucy. “The city in the country: Growing alternative food networks in Metropolitan areas.” Journal of rural studies 24.3 (2008): 231-244.

Kellert, Stephen R., Judith Heerwagen, and Martin Mador. *Biophilic design: the theory, science and practice of bringing buildings to life*. John Wiley & Sons, 2011.

According to Kellert et al., the development of contemporary cities has alienated city dwellers from nature and has creates a growing sense of place-lessness. They introduce the term “biophilic urbanism and design” as the incorporation of the inherent human desire to affiliate with natural systems and processes, termed as biophilia, into the design of the built environment. Kellert et al. describe six biophilic principles that are linked to over 70 biophilic design attributes, and stress the importance of incorporating greens spaces into cities not just for their aesthetic value but also for their environmental, social, and economic benefits. This study will inform my design strategies for incorporating food system processes into the city with focus on using greenery as a tool for creating a sense of place and benefiting the city in many different sectors.

Kennard, Nicole Josiane, and Robert Hugh Bamford. “Urban Agriculture: Opportunities and Challenges for Sustainable Development.” *Zero Hunger* (2019).

Kennedy, Christopher, John Cuddihy, and Joshua Engel-Yan. “The changing metabolism of cities.” Journal of industrial ecology 11.2 (2007): 43-59.

Krasilnikova, E., and D. Klimov. “The main design principles of hybrid spaces in terms of the urban planning regeneration.” *Вестник Российского университета дружбы народов. Серия: Агрономия и животноводство* 4 (2016).

In this paper, Krasilnikova and Klimov state that hybridization is significant in the process of urban development and regeneration. They define hybridization

Sources

as combining multiple functions, programs, and services into buildings and urban public space. Through a thorough literature review, Krasilnikova and Klimov, state the different ways that hybridization affects urban development and regeneration, examining the possibilities of knowledge exchange and collaboration between industries, conditions for innovation, future-proofing, and value creation. By combining land uses of lower value, such as food infrastructure, with functions that are high in demand, like residential or commercial, a symbiosis occurs where the lower-value land use gains appreciation because of the new integrated function, and the users of the function are now closer to a resource, service, or infrastructure. The concepts and strategies introduced in this article will inform the development of my design strategies of integrating food system processes with other urban functions.

Lovell, Sarah Taylor. "Multifunctional urban agriculture for sustainable land use planning in the United States." Sustainability 2.8 (2010): 2499-2522.

Lynch, Kevin. *The image of the city*. Vol. 11. MIT press, 1960.

This book is about Lynch's theory of Imageability introduces the concept of place legibility. Place legibility is the process of how people understand a place. Lynch found that mental maps were a crucial part of how people understand the urban environment. A mental map is an individual's mental representation of elements that the urban environment contains. Using this concept, Lynch was able to isolate distinct elements of a city, and identify what made a place attractive to people. These distinct elements are: paths, edges, districts, nodes, and landmarks. The aspects of placemaking introduced in this theory will be important in the creation of my design strategies and proposal for integrating food system processes in a meaningful way with the selected site.

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McClintock, Nathan. “Radical, reformist, and garden-variety neoliberal: coming to terms with urban agriculture’s contradictions.” *Local Environment* 19.2 (2014): 147-171.

Metabolic. Gemeente Rotterdam, 2018, *Phase 1: The Current State of the Circular Economy in Rotterdam*, rotterdamcirculair.nl/wp-content/uploads/2018/11/GemeenteRotterdam_Report_English_15-11-18.pdf.

Minnesota Food Charter. “Food Infrastructure.” *Minnesota Food Charter*, 19 Oct. 2014, https://mnfoodcharter.com/the-charter/food-infrastructure/

Monaco, Federica, et al. “Food production and consumption: City regions between localism, agricultural land displacement, and economic competitiveness.” *Sustainability* 9.1 (2017): 96.

O’Donnell, Calaa. *Architecture for a Regional Food System: A Food Hub for the Beacon Hill Neighborhood.* Diss. 2016.

Pflieger, Geraldine, and Céline Rozenblat. “Introduction. Urban networks and network theory: the city as the connector of multiple networks.” (2010): 2723-2735.

In this article, Pflieger and Rozenblat state the importance of clusterization of different functions, land-uses and systems in cities. They state that various city systems and networks come together in clusters. Through an extensive literature review, they examine the city as an organization of various networks at local and global scales. According to Pflieger and Rozenblat, cities should include a diversity of networks (economic, social, infrastructural, technical, political) which enrich the urban environment, instead of lose their diversity by expelling them. Spatial proximity favours economies of location that create co-operation and/or competition. Business clusters, for instance, bring together various programs and industries. This diversity in the clusters, and between interconnected clusters, creates a system where interaction between networks and programmatic elements has a multiplying effect and serves to renew the city. While the paper does describe various urban networks and states that synergies between networks are possible, their article does not elaborate upon

Sources

this. Pflieger and Rozenblat's view of a city as an organization of various networks will influence my design strategies and help understand what kind of synergies can be created between the food system and other urban functions and networks.

Pothukuchi, Kameshwari, and Jerome L. Kaufman. "Placing the food system on the urban agenda: The role of municipal institutions in food systems planning." Agriculture and human values 16.2 (1999): 213-224.

"Revisiting Frank Lloyd Wright's Vision for 'Broadacre City'." franklloydwright.org. Frank Lloyd Wright Foundation, 8 Sep. 2017. Web. 18 Dec. 2020.

This project by Wright, proposes a new urbanism that decentralizes the food system and the urban form with the use of modern technology and infrastructure. It involves aspects of regional thinking, self-sufficiency, catalytic design, hybridization, networks, and infrastructure as important aspects to integrating the food system with the city. This work will inform my understanding of the architect's role in the food system, a historical understanding of the relationship between food and architecture, and influence my theoretical framework and design strategies of the integration of food process within architecture in urban areas.

Shepon, Alon, Patrik John Gustav Henriksson, and Tong Wu. "Conceptualizing a Sustainable Food System in an Automated World: Toward a "Eudaimonian" Future." *Frontiers in nutrition* 5 (2018): 1-13.

Toth, Attila, Stacy Rendall, and Femke Reitsma. "Resilient food systems: a qualitative tool for measuring food resilience." *Urban ecosystems* 19.1 (2016): 19-43.

United Nations General Assembly. "Report of the World Commission on Environment and Development: Our common future." *United Nations General Assembly, Development and International Co-operation: Environment*. (1987): 43.

van der Heide, Martijn M., Huib Silvis, and Wim JM Heijman. "Agriculture in the Netherlands: its recent past, current state and perspectives." APSTRACT: Applied Studies in Agribusiness and Commerce 5.1033-2016-84131 (2011): 23-28.

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Vology, 2015. *Redundancy And Resiliency In Your Network | Vology.* [online] Vology. Available at: <https://www.vology.com/resource/redundancy-vs-resiliency/#:~:text=Redundancy%20defines%20the%20deployment%20or,operations%20after%20a%20disruptive%20event.> [Accessed 19 October 2020].

Waldheim, Charles. "Notes toward a history of Agrarian urbanism." Places Journal (2010).

In this article, Waldheim does a historical overview of three projects important to the historical roots of Agrarian Urbanism. The three projects he covers are: Wright's Broadacre City, Hilberseimer's New Regional Pattern, and Branzi's Agronica. Waldheim's overview of these projects gives a brief historical background on agrarian urbanism and analyzes the economic, cultural, environmental, social, and political implications of these projects. This is important in developing my comprehension of the evolution of the discourse between architecture and the food system, and understanding the role of the architect within it.

Wageningen University & Research. "Circular Agrofood System." *WUR*, 2018, www.wur.nl/en/Dossiers/file/Circular-agrofood-system.htm.

Wascher, D. M., et al. "Metropolitan foodsheds as spatial references for a landscape-based assessment of regional food supply." *Agriculture in an Urbanizing Society Volume One*: Cambridge Scholars Publishing, 2016.

White, Erin. *The Architect and the Local Food System: A Proposal for North East Central Durham.* Diss. North Carolina State University, 2011.

Sources

Wiskerke, Johannes SC, and Saline Verhoeven. Flourishing Foodscapes: Designing City-region Food Systems. 2018.

In this book, Wiskerke & Verhoeven introduce the concept of “Foodscapes”, as the relationship between food, environment, and people. The authors approach the topic of the food system and its social & physical environment through a social science and spatial design perspective. They introduce five socio-spatial design principles for designing new food environments that tackle contemporary food problems. These principles are supported by recent architectural and landscape projects from around the world. The data and strategies introduced in this book help formulate my position in defining the role of the architect and the food system, and in developing design strategies for a more sustainable and resilient urban development of a city and its food system. This research presents many great strategies for integrating the food system with the city, however some strategies are supported only by projects in developing countries and are lacking precedents that have integrated those strategies in urban areas that are already industrialized. My research can serve as an example of further developing the strategies mentioned in this book, and applying them to a unique industrialized context like that of South Holland.

Wolman, Abel. “The metabolism of cities.” Scientific American 213.3 (1965): 178-193.

Zahner, Thomas. “Architecture and Urban Agriculture: Merging architecture and a local food system in Wellington, New Zealand.” (2017).

Zasada, Ingo, et al. “Food beyond the city–Analysing foodsheds and self-sufficiency for different food system scenarios in European metropolitan regions.” City, Culture and Society 16 (2019): 25-35.

6.0 Personal Glossary of Key Terms

Architectural Design Intervention
An architectural project that is inserted into a specific situation in order to disrupt a process and steer it towards a desired outcome.

Flow
This is the ratio of mass per time that flows through a conductor, such as a oil consumption given in units of t/yr. (Brunner & Helmut 39).

Flux
The same flow through capita, such as oil consumption per inhabitant in units of t/yr. (Brunner & Helmut 39).

Food Infrastructure
“the underlying physical, policy, and organizational structures needed for our food supply’s operation, services, and facilities” (Minnesota Food Charter). Additionally, it is composed of links, such as transportation systems, and nodes, such as food markets (Brinkley 1).

Food Supply Chain
A sequence, usually linear, of connected actors or events that enable food to get from farm to fork. This includes processes that include sourcing, making, and delivering food to consumers (Apaiah 4).

Food System
Encompasses all processes and infrastructure associated with feeding a population. This include the supply, production, processing, distribution, sale, consumption, disposal of food, and their inputs and outputs (Ellen MacArthur Foundation 6). The existing Dutch food system is based on individual linear supply chains. (Wageningen University & Research).

Global Agro-Food System (GAS)
Food systems in which components are spread across several countries (Wascher et al. 33).

Intertwined Food Supply Network
An “entirety of interconnected (food) supply chains (SC) which, in their integrity secure the provision of society and markets with goods and services” (Ivanov and Dolgui 2904).

Local Agro-Food System (LAS)
System that grows, produces, and processes food in the locality or region where they are marketed (Wascher et al. 35).

Metropolitan Agro-Food System (MAS)
System of “agricultural activities that take place in a metropolitan environment, meeting consumer demands, making use of urban (and rural) landscape (Synergy)” (van der Lans et al. 9). This encompasses the entire metropolitan region including one or a cluster of urban centers (polycentric urban structures) (Wascher et al. 35).

Key Terms

Redundancy
Deployment or provisioning of duplicate devices or systems in critical areas to take over active operation if the primary device or system fails (Vology).

Regional Agro-Food System (RAS)
A regional food system includes multiple "locals" within a state, and those that cross state boundaries. Regional food systems operate in relation to other regions as well as to the national and global food systems (Clancy et al. 1).

Resilience
Ability to withstand a disruption (or a series of disruptions) and recover the performance (Ivanov and Dolgui 2906).

Self-Sufficiency
"the capacity of a territorial unit to meet the local populations' own food requirements within its physical boundaries" (Zasada et al. 29).

Sustainable Development
"development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations General Assembly 43).

Symbiosis
A mutually beneficial relationship where both parties are dependent on one another.

Synergy
The interaction between multiple elements or parties to produce a combined effect greater than the sum of their individual effects.

Viability
Ability to meet demands of surviving in a changing environment (Ivanov and Dolgui 2906).

Research Plan:
Self-Assessment

AR3A010 | Research Plan
P2 | Self-Assessment
Dan Sobieraj | 5088917
January 4, 2021

The AR3A010 Research Plan course was the first time in my academic career that I encountered having to put together a research plan. Similar to a design project, the development of the research plan and even its learning process was iterative. Initially, I felt it was counterintuitive that students had to develop a research plan while doing the research to inform their design proposals for the P2. However, designing the research plan while doing the research proved to be an effective way of narrowing focus on the selected topic, sharpening the relevance of the research, and refining the research questions.

What I noticed was that I collected many of my most relevant pieces of information early on, however it was difficult to formulate a fluid narrative that connected the most important information in a clear and meaningful way. The research in the City of the Future graduation studio began with students selecting interests and reducing them to themes that would help direct their research (Fig. 1). As I, and other students, had many different interests and no research structure, my research scope became too ambitious to be feasible (Fig. 2). Fortunately, the online lectures and how-to-sessions hosted by Methods, History, and Theory helped guide my research with several strategies.

Theory

The first strategy was related to narrowing down the scope and sharpening the focus of the research. At the Theory lecture, Klaske commented on Stavros's presentation,

"To formulate precisely your problems, to think not only what is this kind of thing but also the whole list [what happened, how, when, where, why, with whom, what was the goal?] if you are able to pin that down … and which method could possibly help you to address that problem then you get much closer to what you can do and what you can contribute as an architect" [1:32:34].

I realized that my scope of research was not narrowing down because I was asking "what?" and I was trying to describe rather than understand my topic and the relevant issues. By looking at recent research on my topic and their recommendations, and asking questions other than "what?" I was able to find a specific research niche and the relevance to my project.

History

The second strategy was related to developing my theoretical framework. At the History lecture, Aleksandar elaborates on Carola's lecture,

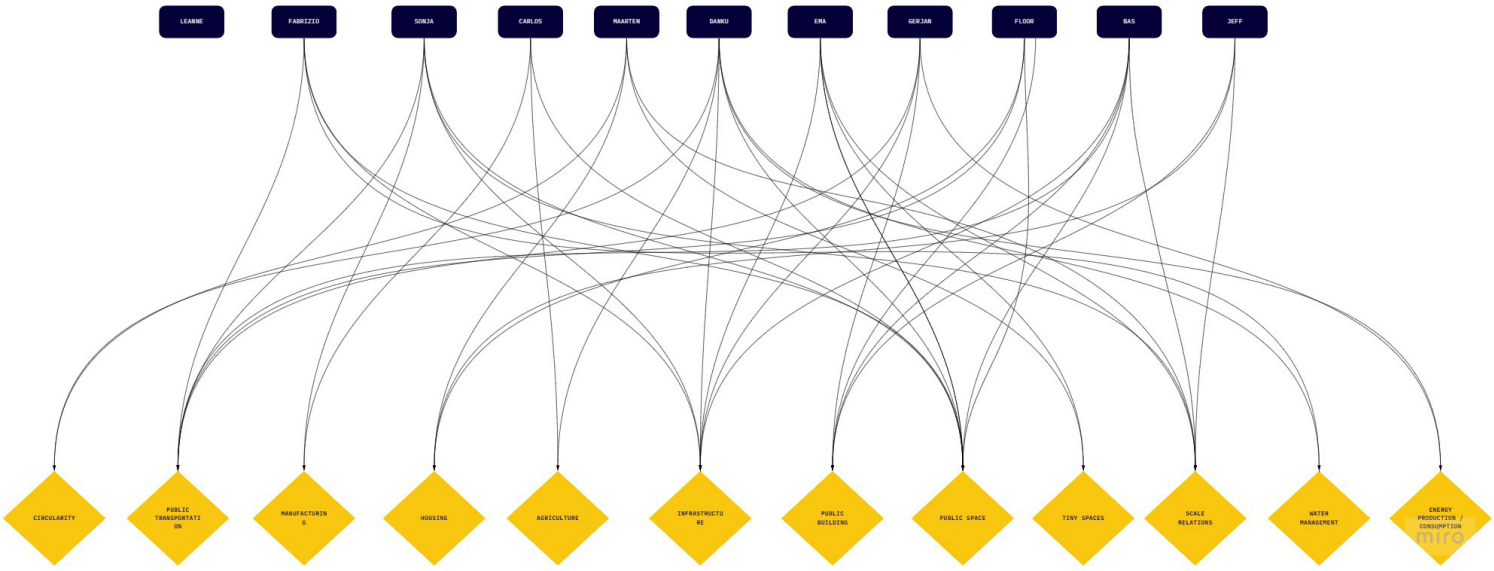
"Any kind of novelty or innovation in architecture or in ideas is rarely, in no case comes as something that is like lighting coming from the sky, it is always something that is deeply rooted in existing theories and existing previous work" [1:32:22].

I initially thought that creating a theoretical framework came from merging different theories in a way that has not been done before. After hearing the discussion at Carola's lecture, it was clear that the theoretical framework should not be reinventing the wheel, but building upon it. I therefore examined the past projects and theories of architects that are related to my topic and how their understanding and positioning can influence my research and design.

Methods

The third strategy was related to the means of merging theory and design. In her introductory lecture, Klaske states, "Design is in a way speculative research that imagines possible new situations and can somehow describe and explain alternative realities" [17:21].

In my research structure, I was struggling to comprehend how I can make the integration of theory into my design a part of my research process. This lecture helped me understand scenario building as a research method where I can develop multiple spatial scenarios using various theories explored in my research, and then evaluate them.



INTERESTS:

BAS - Systems, context, (city-building) relations, hyperloop, station, public building

CARLOS (Urban Manufacturing)

FABRIZIO Resilient infrastructure, water management, city planning, climate change

FLOOR - changing mobility, infrastructure, public space, people, future living, urban densification

JEFF - Affordable housing. Amsterdam.

LEANNE - Infrastructure, mobility, public transport, public space, mixed traffic

MAARTEN - symbiotic cities, (parasite) housing, usage of tiny spaces developing / regulations

DANKU (URBAN AGRICULTURAL INFRASTRUCTURE)

EMA - Playful cities/ playful infrastructure (for both children or adults), installations, playgrounds etc

SONJA - Infrastructure in the Extreme

GERJAN - Infrastructure, planning, public building, dense urban environments

miro

Fig. 1. City of the Future studio interests displayed on the studio's online Miro board. Source: Author.

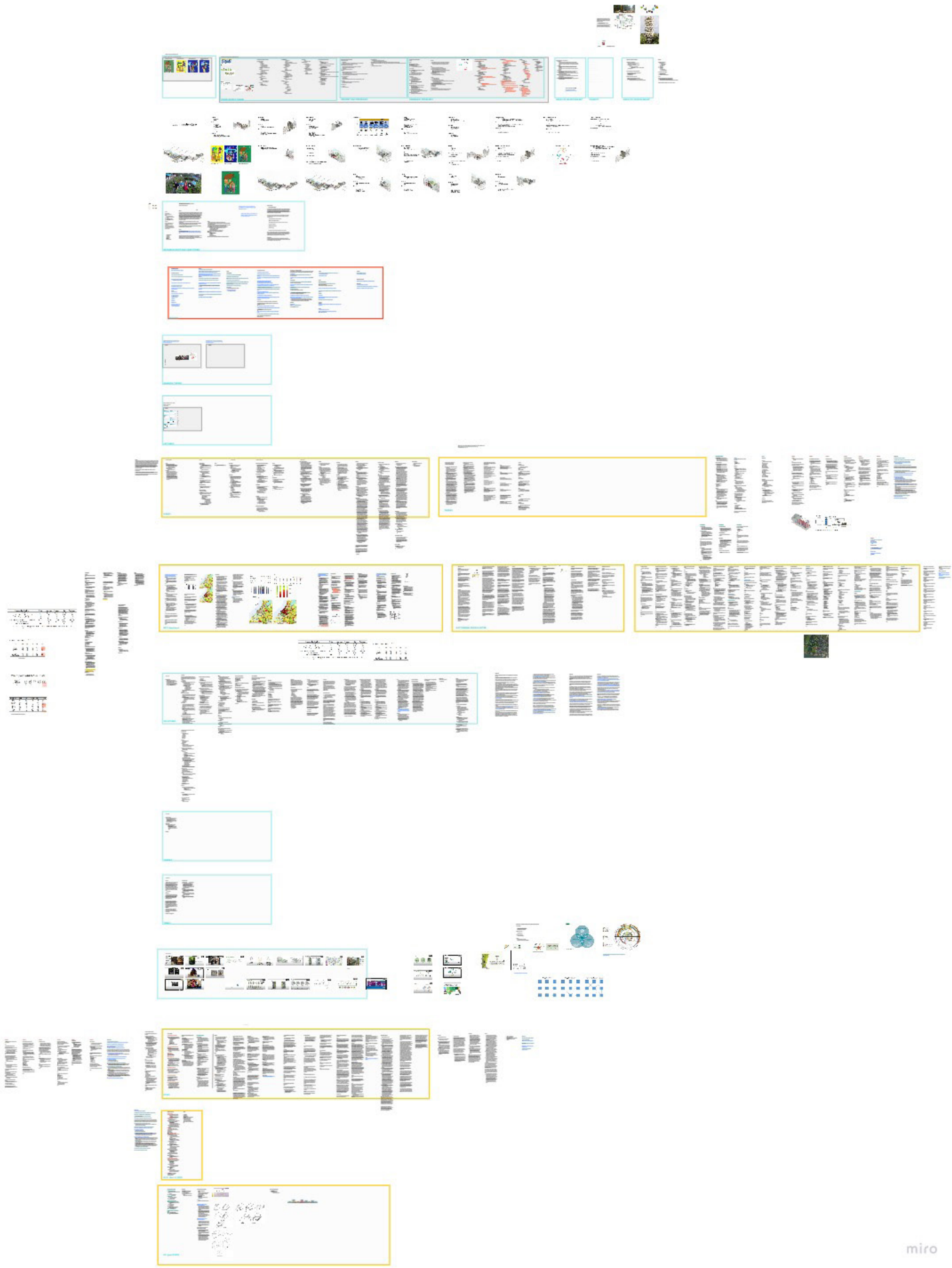


Fig. 2. My personal Miro board collecting research findings and getting out of hand. Source: Author.

Sources

Aleksandar Stanicic at Lecture 2: Creating the Past to Design the Future (Carola Hein) 17 sept 2020 - History.

Klaske Havik at Lecture 1: Methods of Analysis (Klaske Havik) 3 sept 2020.

Klaske Havik at Lecture 3: Theory (Heidi Sohn, Stavros Kousoulas, Andrej Radman) 01 Oct 2020.