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Bertie Dockerill, Department of Geography and Planning, University of Liverpool.

For All Correspondence

transactionsaesop@gmail.com

CONTENTS

EDITORIAL

This issue (5.1) of Transactions of AESOP brings together a selection of papers submitted to recent rounds of the Best AESOP Congress Paper Award and an invited paper by Tuna Taşan-Kok the Chair of the AESOP Congress Paper Award Committee. They provide original and insightful contributions addressing key themes in contemporary planning research and practice.

The first paper by Tuna Taşan-Kok explores new relational understandings of city building and argues that reading dynamic landscapes of spatial governance requires an understanding of regulatory efforts as they refer to the relational behaviour of state, market, and community actors. This linking of regulatory efforts to relational behaviour, is seen as providing new opportunities to provide comprehensive understandings of city development under market-driven conditions.

The second paper by Susa Eräranta and Miloš N. Mladenović considers the impact of actor-relational dynamics on integrated planning practice. The latter is understood to involve an increasing number of actors with the aim of creating synergy between multiple knowledges in communicative settings. The paper explores actor-relational dynamics through social network analysis and qualitative methods, focussing on a four-year strategic spatial planning process in Finland. The paper concludes that attention to actor-relational dynamics opens up promising avenues for new research and requires new methods for bridging research and practice.

The third paper by Wei-Ju Huang investigates city-county consolidation and the (re)conceptualisation of urban-rural planning in the context of Taiwan. City-county consolidation is seen as an effective method to strengthen national competitiveness and to balance regional development. The paper proposes a typology of regional planning concepts to capture how consolidated governments (re)construct their urban-rural planning concepts and presents a comparative study of Taichung City and Tainan City. It concludes that an overemphasis on competitive city regionalism to balance regional development at the national level may lead to a widening of rural-urban disparities at regional and local levels.

The fourth paper by Nicolas Lavoie, Christophe Abrassart, and Franck Scherrer considers how the city of tomorrow might be imagined through foresight and innovative design that regenerates urban planning routines. The paper reports on how new planning options were developed for an urban district in Montreal, Canada, using the so-called Definition-Knowledge-Concept-Proposition (DKCP) process. It is argued that innovative routines should include the scope of possible innovations, the search for intriguing knowledge, and disruptive design activities, and that the desire to tackle the complex challenges of 21st century cities can lead to a new professional identity: the 'innovative urban planner'.

The fifth paper from Nicholas Ardill and Fabiano Lemes de Oliveira considers emerging Places of Social Innovation (POSI) as a conceptual framework for socio-spatial innovation in cities. The paper identifies four major processes of socio-spatial innovation in the co-production of space: identification of human needs or societal challenges to sustainable development; development of social relations in systems or structures; provision of opportunity for social empowerment; and, reflection of socio-spatial development practice. It then considers six cases of urban green infrastructure as emerging 'POSI' across two cities Brighton & Hove and Portsmouth (UK).

The sixth, and final, paper by Federica Appendino, Charlotte Roux, Myriam Saadé, and Bruno Peuportier examines the circular economy (CE) in urban projects through case studies of current practices and tools. It notes that research has tended to focus primarily on the macro-scale (cities or eco-parks) and the micro-scale (manufactured products or construction materials), but that the meso-scale of the built environment

is also expected to play a crucial role in the transition towards a CE. The paper reviews four cases of 'circular neighbourhood' projects across Europe in the Netherlands, Finland, and France. The results demonstrate a diverse representation of the CE paradigm and the growing role played by assessment tools in such projects.

Collectively the papers reflect the current dynamism of planning research and its constant engagement with new concepts and practices including, relationality, innovation, rescaling, green infrastructure, and circular economies. This is particularly welcome at this time (July 2021) when normal academic life and exchanges are still being disrupted by the COVID-19 pandemic. It is also encouraging to note more generally that the academic life of the planning academy and AESOP community continues. This is well-illustrated by the ongoing series of events being organised by AESOP Thematic Groups; the heavily subscribed AESOP 2021 Online Conference on the theme of *Adapting Planning: Rethinking planning practices* (12-14 July 2021) organised in partnership with the Faculty of Architecture, Gdańsk University of Technology, Poland; the AESOP 2021 PhD Workshop on the theme of *Post COVID-19 recovery as a part of transformation to industry 4.0* (22-25, June 2021) hosted by the Slovak University of Technology in Bratislava, Slovakia; and, collaborative ventures with the International Planning History Society (IPHS), ACSP, Regional Studies Association (RSA), and the International Society of City and Regional Planners (ISOCARP), which have fostered opportunities for international exchange. The Editorial Board of Transactions of AESOP look forward to future contributions to the journal arising from all these activities! We would also like to remind readers that the journal is open to submissions from all those who would like to share their research and practice in the planning discipline.

Finally, we would like to thank the authors, reviewers, Transactions Editorial Board members, design team, and proof reader who have worked on the production of Transactions issue 5.1.

Olivier Sykes

Editor in Chief of Transactions of AESOP

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NEW RELATIONAL UNDERSTANDINGS OF CITY BUILDING:

READING THE CITY THROUGH DYNAMIC LANDSCAPES OF SPATIAL GOVERNANCE

Tuna Taşan-Kok[a]

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Abstract

In this think piece I will take you on a journey to share my approach to reading contemporary city building, which is increasingly chaotic, fragmented, and complex. Spatial governance, in my understanding, refers to the collective efforts to coordinate and structure the dynamic institutional activities of a variety of actors that aim to organise the built environment. Urban planning is one of these efforts, though not the only one. Therefore, in this article, I will visualise spatial governance as a dynamic landscape which accommodates multi-actor, multi-scalar, multi-loci and multi-temporal regulatory activities related to the uncertainties, opportunities, and crises of the market. Reading dynamic landscapes of spatial governance requires an understanding of regulatory efforts as they refer to the relational behaviour of state, market, and community actors. This approach, to linking regulatory efforts to relational behaviour, in my view, gives us new opportunities to provide comprehensive understandings of how cities develop under market-driven conditions.

a University of Amsterdam, Faculty of Social and Behavioural Sciences, Department of Human Geography, Planning and International Development Planning Studies, Amsterdam, The Netherlands. E-Mail: M.T.TasanKok@uva.nl

1. Introduction

> *"Although government agencies play an important role in affecting the physical environment, the main progenitor of changes in physical form within London and New York is the private real-estate development industry. Examination of real-estate investment decisions reveals the ways in which urban redevelopment is channelled at the same time by broad political and economic imperatives and by the industry's own specific modus operandi"* (Fainstein, 2001, p.4).

Seeing urban planning as spatial governance provides an understanding of urban development as a product of the collaborative efforts of state, market, and community actors. Susan Fainstein's influential book *The City Builders* provided a new window in the mid 1990s through which to view the roles of the property industry in spatial governance. In my understanding, spatial governance refers to the collective efforts to coordinate and structure the chaotic and complex institutional activities of a variety of actors that aim to organise the built environment. Urban planning is one of those institutional efforts, though not the only one. Ever since the publication of *The City Builders*, numerous planning, geography and urban studies scholars have researched and published on the conditions and challenges of neoliberal city building, and its consequences for the urban built environment, urban communities, and spatial governance institutions. Entrepreneurial governance, opportunity-driven urban development, and property-led planning have been utilized in academic scholarship to explain this complex multi-actor planning process, which is influenced by the neoliberal political economic ideology (Harvey, 1989; Turok, 1992; Taşan-Kok, 2004, 2010; Baeten, 2012; Allmendinger and Haughton, 2013; Van Loon et al., 2019).

In this article I share my views on new, relational approaches, to reading the city through dynamic landscapes of spatial governance and to comprehend their underlying institutional infrastructures. I have argued in my work that spatial governance practices have moved away from trying to rigidly define and control spatial development, to become flexible and strategic mechanisms that enable the collection of spatial developments in cities within the framework of hybrid neoliberal institutional transformations (Taşan-Kok and Baeten, 2011; Taşan-Kok, 2015; Taşan-Kok et al., 2019). These cityscapes, which emerged in different time frames, were realised by variegated actor networks, and structured by institutions that encompassed specific policy and planning practices at various scales of public administration, contained multi-actor, multi-scalar, multi-loci and multi-temporal activities, and formed pockets of micro-regulation practices (Taşan-Kok et al., 2018, p.373). Urban development is exercised and institutionalised through these multiple regulation practices, which are scattered throughout cities in diverse forms of urban development projects. Recent work, has shown that these uncoordinated and contradictory institutional relations link public and private actors in city building, forming a complex and chaotic landscape of regulations, actors, and relations (Taşan-Kok and Özogul, 2021). Within this framework, the dynamic landscape of governance refers to specific urban policies and planning environments which accumulate and structure these pockets of micro-regulation practices that contain multiple institutional landscapes within multiple spheres in terms of involved actors, scales of institutional hierarchy, locus, and time.

The dynamic practice of governance contains complexifying and diversifying relationships between public and private sector actors and urban society, and is regulated through bundles of decisions institutionalized over different time frames and in diverse forms. These practices are performed as joint activities by decentralized municipal authorities, semi-public agencies, private sector actors, citizens, and community groups. Understanding these evolving spatial governance dynamics requires new approaches, not only because of the difficulties involved in comprehending these increasingly complexifying relations, but also because their financialization blurs the responsibilities of those diverse actors that are involved in city building and the consequences of their actions (Weber, 2002; Robinson and Attuyer, 2021), making the city a fiscal derivative (Pacewicz, 2016, p.264) and services like housing yet another asset class (van Loon and Aalbers, 2017, p.221).

Taking an actor-oriented perspective, it is possible to understand that the diversity and dynamism of multiple actors makes it difficult to create a comprehensive, consistent, and continuous strategy in cities at a macro level. The increasing complexity of these disjointed modes of governance exacerbated existing uneven power dynamics and created equally complex societal responses (Jessop, 1997). This diversity and dynamism in governance can be observed, comprehended and better controlled if we read the underlying institutional infrastructure of city building through relational understandings of the actors and regulations. This requires understanding the diversity of actors and decoding the bundles of relations.

What are the outcomes of hybrid neoliberal institutional transformations for city building? How can we read contemporary cities through dynamic landscapes of spatial governance? and How do relational approaches help to disentangle dynamic landscapes of spatial governance? In my recent research and publications, I have sought answers to these questions, which I share in this reflective article.

2. What are the Outcomes of Hybrid Neoliberal Institutional Transformations for City Building?

The neoliberalisation of social, economic and political processes during the late capitalist era pervades urban development, planning, and governance discourses and practices, and has pushed them in a market-oriented direction. Supporting the accumulation process of global capital flows, neoliberal political economic ideology manifests itself as a prevailing pattern of market-oriented regulatory restructuring (Peck et al., 2009, p.51). During this era, entrepreneurial decisions and the actions of a wide range of actors have replaced managerial public-sector decisions in the production of the built environment. Two major dynamics have taken place that influence the governance of cities. First, increasingly footloose and mobile capital, which seeks and settles in profitable locations, has become more hyperactive (Swyngedouw, 1989; Sassen, 2011). The results of this hyperactivity have been acknowledged as financialisation in recent years, and describe the penetration and increasing influence of financial markets into new areas of the state, economy and society (Ryan-Collins, 2019; Ryan-Collins et al., 2017). Secondly, and due to the regulatory restructurings enabled by neoliberalisation, welfare states have changed through massive *decentralization and rescaling* attempts. I see these two trends as the main reason behind the major institutional transformations that have taken place in the governance and planning of cities today (Taşan-Kok and Baeten, 2011). However, neoliberalism does not produce identical (economic, political or spatial) top-down transformations at once, but impose hybrid neoliberal institutional transformations, which are place-, territory- and scale-specific institutional transformations (Taşan-Kok, 2015).

During the late capitalist era these fragmented regulatory efforts became more dynamic than ever as they were driven by opportunities which emerge at scattered locations throughout the city, over different time frames, negotiated through diverse actors, and regulated at a variety of scales of public administration. The piecemeal spatial developments, which are produced as an outcome of these opportunities, are containers of pockets of micro regulation practices. Spatial governance, is thus not, just a static administrative activity. Behind every cityscape there are a set of regulations and actors scattered through time and space. Therefore, I envision spatial governance as a dynamic landscape, which accommodates these multi-actor, multi-scalar, multi-loci and multi-temporal regulatory pockets that also contain the uncertainties, opportunities and crises of the market. This dynamic landscape of governance is also quite fragmented, but before talking about that I want to linger a little longer on why this market dependency emerged. Hybrid neoliberal transformations, thus, refer to the complex and localised processes associated with trajectories of change and intertwined contingent events initiated by the circulation and accumulation of capital in contemporary cities (Taşan-Kok, 2015). As Peck et al. (2009) argue, they lead to the fragmented spread of neoliberal economic policies.

Following variegated paths, traditional welfare states have been radically transformed since the end of the 1980s, when governments began to withdraw from service provision and increasingly implemented market-friendly policies. The changing role of the state in urban development resulted in the decentralisation of public service responsibilities and finance to local governments. The state selectively became involved in urban development through the financing of infrastructure, or mega projects within the framework of a competitiveness agenda (Raco, 2013). Local governments today, even in stronger welfarist countries like The Netherlands, are in a position to seek new fiscal channels to provide public services; especially by involving private sector finance. Moreover, state-market-citizen relations are reconfigured within this framework, changing the roles and responsibilities of public and private sector actors and residents in urban development, and decentralizing service provisions (Taşan-Kok and Korthals Altes, 2012; Eraydin and Taşan-Kok, 2014).

Competition to accommodate the unprecedented mobility of global capital on the one hand and rescaling state responsibilities and capacities on the other, has resulted in market dependency, power sharing and a fragmentation of authority in urban governance systems. These dynamics suggest that the dominant governance style in cities today is entrepreneurial, or close to what Pierre (1999) defines as pro-growth

governance, which is characterised by close public-private sector interactions. Entrepreneurial governance refers to the deregulation of state control to enable close interactions to emerge through the dismantling of welfare programs, downsizing public services, and the privatisation and promotion of international capital investment in cities. In this market oriented system, both individuals and bottom-up community initiatives have also begun to establish more direct relationships with decision-makers; confirming what Swyngedouw (2005) defined as participatory, inclusive, and horizontally networked relations between socio-cultural, political, and business elites. These entrepreneurial governance dynamics cause distortions in local processes of urban development, and they motivate and accommodate piecemeal spatial developments throughout the city.

The market dependency of urban development took a new turn following the 2008 financial crisis as more global institutional investment actors and financial sectors began to dominate actor landscapes in spatial governance. The 2019 Covid 19 crisis showed that, as a consequence of financialisation and market dependency, even health-related transformations in cities have consequences for urban development trends, and that they are influenced by the changing preferences of market actors. For example, during the Covid 19 crisis large residential transactions took place, and residential investments weredefined by the market parties as the most resilient asset classes or safe heaven of investments, while sectors that required face to face interaction (like retail) were hit hardest. New trends such as repositioning retail and office spaces as residential property projects are highlighted by property investors in relation to this shift of interest[1]. Based on these estimations and trends, market actors will define new investment strategies, which have a direct impact on urban development. It may also be seen that, from a Marxisian point of view, these developments are part of the capital accumulation processes in cities. If we look at the development of large cities in Europe today from this point of view, we can see how capital accumulation processes are scattered in urban space in the form of large-scale development projects following diverse crises periods (Taşan-Kok et al., 2021). I now turn my attention to the outcomes of these hybrid neoliberal institutional formations in cities by focusing on the dynamic landscapes of spatial governance that they display.

3. How Can We Read Contemporary Cities Through Dynamic Landscapes of Spatial Governance?

Taking an actor-oriented perspective, I observe that institutionalized relations, whether formed by formal or informal regimes of private sector networks, bottom-up social initiatives, or uninstitutional social movements, create new ways of policy and plan making that shape cities. They shape the dynamic landscapes of spatial governance through the complex institutional processes that they accommodate. It follows, that governance of the diversity of regulatory activities that exist is a key challenge. Spatial governance today contains various instruments which regulate the relationships which exist between an increasing number of actors, making the governance process a patch-work. Fragmented governance dynamics and spatial activities shape the spatial organisation of cities by untangling dynamic mini regimes which contain complex and diverse actor relationships. Cities, thus, are shaped by collections of fragmented decisions, and operationalized through micro-regulation practices which involve a diversity of actors in complex and dynamic governance arrangements. Within this framework I turn my attention to the scattered landscapes of actors that form pockets of micro regulation practices.

The roots of trying to understand these practices go back to the theoretical discussions framed by regime theory (Stone, 1993), in which power is argued to be fragmented through collaborative arrangements between local governments and private actors (Mossberger and Stoker, 2001). Institutional efforts to deal with the fragmentation of spatial governance and the consequences of the same, are not only critically reflected upon by existent scholarly literature, but also require further study (Healey, 1997; Le Galès, 1998; Blokland et al., 2015; Pessoa et al., 2015; Özogul, 2019; Taşan-Kok and Özogul, 2021). Despite increasing flexibility to accommodate these developments in the planning of cities, there is also a very concrete (and even rigid) dimension in plan making and governance, which accommodates the contractual, legal and regulatory instruments (Raco, 2013; Janssen-Jansen and van der Veen, 2016; Taşan-Kok et al., 2018). This form of governance is multi-actor and takes place at multiple scales, in reflective and pragmatic forms.

1 REFI Europe Webinar, 23-04-2020 (https://welcome.refi.global/events)

These scattered regulatory environments are difficult to comprehensively regulate, and attempts to synchronize them have been disparaged by critical scholars as neoliberal instrumentalisations that lead to exclusionary practices (Bengs, 2005; Swyngedouw, 2005; Purcell, 2009). The universal norms and values that set the fundamental goal of urban planning (namely, safeguarding the public interest), have splintered into more measurable, concrete and fragmented sets of accountability mechanisms which are defined (and redefined) by each project. These mechanisms fall into the definition of technologies of governing, and have been criticised as being rationalities and tactics of governance within the framework of the Foucaldian notion of governmentality (Swyngedouw, 2005). This adds to the complexity of governance and makes overall accountability of the public sector vague as there are multiple concrete instruments to hold involved parties accountable.

This form of institutionalisation is usually dependent on one-to-one deals, as well as negotiation and consensus building between actors, regulated through a set of legal documents and instruments. These context-dependent activities take place in highly opportunity driven contexts in which public and private sector actors as well as interest groups interactively produce a diversity of instruments to ensure their performance, responsibilities and accountability mechanisms (Taşan-Kok et al., 2018). Contracts are the most common form of these instruments. Critical scholarly work on the new forms of welfare and service provision that have arisen through privatisation and contractualism argue that, in this form of urban development, the public sector's accountability to citizens decreases due to private sector involvement (Swyngedouw et al., 2002; Raco, 2013; Bracci et al., 2015; Healey, 2015; Mazzucato, 2015). Operationalizing this idea based on comparative research conducted in Brazil, the UK, and The Netherlands provided empirical evidence that the boundaries of the roles and responsibilities are blurred due to the complexity and multi-scalar diversity of fragmented instruments used in this form of regulation (Taşan-Kok et al., 2018).

The consequences of hybrid neoliberal institutional transformations include flexible macro strategies, constantly changing visions, and reflective planning strategies that are not capable of controlling, forming, or shaping scattered city building activities by several actors. While market-dependency creates or adds to systematic problems such as affordable housing crises at the macro level, the solutions produced by local development policies, spatial planning instruments, and agencies are increasingly ineffective in dealing with the problems. Therefore, in my opinion, we need to look deeper into the dynamics that cause institutional fragmentation and better understand the diverse actors and regulatory frameworks involved. A research project (WHIG-What is Governed in Cities: Residential Investment Landscapes and the Governance and Regulation of Housing Production[2]) that has been running in Amsterdam, London, and Paris, has conceptualized these scattered institutional infrastructures as fragmented governance architectures (Taşan-Kok and Özogul, 2021). The findings suggest that they illuminate divergent public sector regulation of market activities, intra-organisational discrepancies, and fuzzy narratives in policy interventions that are tied to specific spatial interventions in cities (ibid.). Reading these fragmented governance architectures requires recognition of diverse public, private and community actors, their relational positions to each other, and their behaviour in relation to spatial regulations.

4. How Do Relational Approaches Help to Disentangle Dynamic Landscapes of Spatial Governance?

If we turn our attention back to the scattered landscape of actors, we can see that larger governance dynamics are performed through the actions and decisions of a diversity of actors. Understanding this complexity, both in terms of institutional dynamics and actor landscapes, would enable linkages to be created between disconnected pockets of micro-regulation practices. Relational approaches provide new tools, and ways to comprehend dynamically changing actor landscapes. They can also be seen as a way to move beyond fixed and static theorizations of place, space, and scale (Ward, 2010). In sociology, a relational approach entails dynamic networks of social relationships and interactions between actors (Crossley, 2010). Relational approaches can be seen as very important tools for disentangling the dynamic actor landscapes that exist in spatial governance. Institutions differently influence the identities, perceptions, and preferences of actors; in exchange, actors shape institutions to better suit their interests (Geels, 2005, 2020).

2 www.whatisgovernedincities.eu

While urban planning and governance dynamics have incorporated new actors into the arena of governing, new social relationships between city governments and new sets of local and international actors have also begun to be involved in the production and management of cities. In many cases, municipal governments are among a multitude of actors competing for access to resources and control of agendas. Urban land and property markets are the number one source of these fiscal channels, although, this form of market-dependent development also makes cities prone to the crises of the capitalist economy. However, as argued by emerging literature (Adams and Tiesdell, 2010, 2012; Campbell et al., 2013; Özogul and Taşan-Kok, 2020), the diversity within the property industry, as well as the roles of, and relationships between actors, and their identities and knowledge, are largely unknown within planning and governance literature.

Exploring and disentangling these actors and their relationships requires new, multidimensional approaches and research methods to read actor landscapes through a more comprehensive understanding (Özogul and Taşan-Kok, 2020). It nevertheless remains the case that this field, at the intersectionalities of planning and property market dynamics, actors, and institutions requires more research, new cases, and comparative study if it is to be further understood.

5. Concluding Remarks

Looking at dynamic actor landscapes, this paper has argued that it is not enough to know which actors are involved in complex networks of governance relationships. We need to see actors' changing positions and behaviours in relation to the institutions (regulatory instruments, norms, formal or informal rules, and so on) that regulate these relations. Emerging scholarly work calls for a more sophisticated understanding of the diversity of actors and their changing institutional positions and relationships if we are to comprehend the pressures and priorities of property industry actors (Campbell et al., 2013; Özogul and Taşan-Kok, 2020). Moreover, there is an increasing recognition brought by neoinstitutional approaches as to the need to further develop understandings of regulations in relation to actor behaviour (Scott, 1995). However, and especially in planning scholarship, there are only a limited number of studies linking these spheres of action in order to understand the roles of regulations in relation to actor behaviour in creating disconnected pockets of micro-regulation practices in city building. Local learning practices and accumulated knowledge in both spheres only partly reflect literature. We therefore need more studies to utilize this line of neoinstitutional thinking in spatial governance if we are to understand the relationship between actors' behavior and urban regulation.

My work, especially during the last decade, has focused on understanding the way we regulate, govern and produce cities by disentangling actor landscapes. There is still a lot of work to do in this field. Recent experiences with large data sets that contain market transactions have added a new layer of knowledge to existent understanding. We need new ways to combine qualitative and quantitative research, new approaches to map actor landscapes, more interdisciplinary understandings of regulations and property markets, and new ways to read cities through relative positions of actors. This could respond to the suggestion of Campbell et al. (2013, p.53) : *"... to step aside from standard analysis, to probe more deeply into the lessons that can be drawn from the case study, not about the dominance of neoliberal discourses but about the choices that were overlooked and the questions that were not asked or perceived would not be heard"*. To respond to overlooked choices and questions, we need to disentangle the dynamic landscapes of spatial governance from a fresh viewpoint that is supported by new research methods which enable us to comprehend actor landscapes through new relational, temporal, multi-scalar, and multi-dimensional lenses.

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THE IMPACT OF ACTOR-RELATIONAL DYNAMICS ON INTEGRATED PLANNING PRACTICE

Susa Eräranta[a], Miloš N. Mladenović[b]

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Abstract

Integrated planning processes involve an increasing number of actors and aim to create synergy between multiple knowledges in communicative settings. Planning research has acknowledged that the actor-relational aspects of planning processes are not yet adequately understood, and that methods to reveal the often-invisible dynamics and their possible effects over time require development. This research aims at developing a methodological contribution for revealing the socio-communicative complexities of integrated planning processes, by focusing on the aspects of knowledge co-creation and process memory development. Actor-relational dynamics are explored through social network analysis and qualitative methods, using longitudinal data from a four-year strategic spatial planning process in the Finnish context. The findings indicate that a range of actor-relational dynamics affect the level of sectoral and scalar integration over time, and that social complexities have an essential role in enabling knowledge co-creation and process memory development. Unveiling actor-relational dynamics is a promising research direction, requiring new methods for bridging research and practice, and re-centring the need for understanding planning practice on the actor-relational level.

Keywords

Planning practice, organisational learning, strategic spatial planning, integrated planning, process memory

a (Corresponding author) City of Helsinki, Urban Environment and Aalto University, Department of Built Environment, Otakaari 4, 02150 Espoo, Finland. E-Mail: susa.eraranta@aalto.fi

b Aalto University, Department of Built Environment, Otakaari 4, 02150 Espoo, Finland. E-Mail: milos.mladenovic@aalto.fi

1. Introduction

The growing complexity of cities is a widely discussed theme (Batty, 2005; de Roo and Silva, 2010; Portugali, 2012; Boonstra, 2015; Sengupta et al., 2016). The nonlinear complexities of urban development are claimed to be incomprehensible to any one individual due to the often-invisible interrelations between various subsystems (Innes and Booher, 2010). In order to support the understanding of nonlinear urban complexities, more actors are entering planning processes to share and integrate their expertise. Thus, responding to the growing complexities and the need for more holistic planning practices, the concept of *integrated planning* has been discussed (Stead and Meijers, 2009; Holden, 2012; Yigitcanlar and Teriman, 2015; Bertolini, 2017; Kaiser, Gaasch and Weith, 2017; Ferreira, 2018). Here, integration may be understood as a hierarchy from cooperation (functional relationships to avoiding duplicating work) to coordination (adjusting functions not to leave gaps) and integration (joining efforts to create a policy owned by multiple actors) (Stead and Meijers, 2009), which all have different actor-relational network structures (Curtis and James, 2004). Even though the exact definition of integration is not fixed, sectoral and scalar aspects of integration are typically included in all the proposed frameworks (Healey, 2006; Vigar, 2009; te Brömmelstroet and Bertolini, 2010; Holden, 2012), occasionally complemented with the notion of organisational integration (Kidd, 2007).

A key premise of this research is that an important feature of integrated planning is the fostering of communicative practices over time, which enable the crossing of thematic and scalar boundaries and the creation of systemic and holistic planning solutions. Knowledge co-creation through communicative practices is specifically important for integrated planning, in which multiple perspectives should be adjusted with each other (Waddell, 2011; Holden, 2012). In practice, the increasing number of actors entering integrative processes could simultaneously increase the experienced complexities from within the processes themselves. These experienced complexities increase due to an increasing range of values, views and ideologies which may contradict institutional policies and frameworks. Thus, complexity is not only a feature of the urban environment, but is also an essential property of the collaborative integration processes themselves – influencing knowledge co-creation and process memory. A multidimensional understanding of knowledge co-creation and process memory development is essential, as they lay the foundation for collaboration and learning in planning processes.

Understanding communicative knowledge co-creation practices and process memory in integrated planning processes requires a deeper appreciation of the actor-relational level. This is because the social interactions at the relational level produce properties that are not present in isolated individuals (Eräranta, 2020). In addition, analysing planning process dynamics is critical for understanding these collaborative and value-laden processes, as there is a relation between process and substance (Innes and Booher, 2015). This procedural focus supports the temporal understanding of the integrative social dynamics at the actor level (Pettigrew, 1997; Langley, 1999). Contrastingly, although planning research has acknowledged that the actor-relational aspects of planning processes are not yet adequately understood (Boelens and Coppens, 2015; Boelens, 2010), methods for revealing their often-invisible dynamics and their effects over time are still missing. This lack of established methods for systematic longitudinal analysis is explained by challenges in acquiring applicable data, and missing conceptualisations. Consequently, methodological contributions are needed to understand the nonlinear and emergent nature of the actual social realities, and their implications for knowledge co-creation and process memory development in integrated planning processes.

With the above in mind, the aim of this research is to refine methodological contributions for understanding knowledge co-creation and process memory development in these collaborative processes over time. To illustrate the actual relational dynamics, the research presents an example of the actual social dynamics over a four-year statutory strategic spatial planning process in the Helsinki Capital Region, Finland. Social network analysis is used for identifying the networked dynamics over time (Dempwolf and Lyles, 2012; Eräranta and Mladenović, 2021), in combination with document analysis, interviews and focus group discussion with Finnish planners. The hypothesis is that this methodological combination can help in exploring the experienced and memorable reasons and implications of the networked structures, and in understanding the applicability and relevance of the findings for planning practice. This research aim is elaborated through answering the following questions:

- Q1: How did the social network structures unfold during the process timeline, when measured using Social Network Analysis (SNA) betweenness centrality?
- Q2: Why did the dynamic patterns of social interaction emerge over time?
- Q3: What were the implications from social interaction for knowledge co-creation and process memory development?
- Q4: What is the relevance of the findings for planning practice?

The Helsinki Capital Region case serves as a relevant example for exploring the social dynamics that emerge due to the collaborative nature of planning processes. In general, the Finnish planning system is mostly regulated by the Land Use and Building Act (132/1999), which is currently being re-evaluated. Planning processes are implemented in the context of a Nordic democracy, where planning is a central element of the urban development system (Puustinen et al., 2017). In particular, planning municipalities hold a planning monopoly, even though the processes involve various private and public actors (Mäntysalo et al., 2011). In the next section, process memory development and dynamics of networked knowledge co-creation are discussed in the context of learning in planning organisations. Thereafter, the utilised data and methods are presented, followed by the findings concerning the networked structures, and their possible reasons and impacts. Finally, the answers to the research questions are discussed.

2. Process Memory and Dynamics of Networked Knowledge Co-creation

The ability to learn from different perspectives is essential for knowledge co-creation in the context of integrated planning processes. Therefore, the significance of knowledge and learning in public administration and planning organisations has been broadly discussed (Rydin, 2007; Campbell, 2012; Tennøy et al., 2016). Knowledge influences the learning capacity of organisations (Argote, 2013), and learning is not possible without memory (Lehner and Maier, 2000). Therefore, knowledge, learning and memory are interdependent parts of organisational processes (Spender, 1996). Planning processes are an example of knowledge-intensive settings, in which a variety of specialised, partly overlapping and even contradictory knowledges is applied. Knowledge is an essential resource to be developed through the networks of various actors, which may partly reside outside of planning organisations (Reagans and McEvily, 2003; Rydin, 2007; Phelps et al., 2012). As new knowledge in planning is typically developed in interaction (Healey, 1992; Rydin, 2007; Rydin et al., 2007), discussion of the social processes in planning has emerged (Davoudi, 2015). In the social constructionist view of planning, knowledge evolves in social processes, and is continuously, purposefully and unconsciously filtered, selected, and post-rationalised. Learning in organisational processes takes place through memorization of different knowledges.

Various concepts regarding memory in organisations have been suggested by scholars, including organisational memory, network memory, systems memory, and transactional memory (e.g., Wegner, 1987; Walsh and Ungson, 1991; Spender, 1996; Olivera, 2000; Soda et al., 2004; Innes and Booher, 2010). Many of them highlight the social context of memory development. The variety of social interactions during planning processes may enable or inhibit process memory development by influencing the diversity and coverage of procedural and substance-related memories of the participating actors. Moreover, through the iterative utilisation of memory, organisations may also consciously unlearn and forget as original memories develop further (Holan and Phillips, 2004; Fernandez and Sune, 2009; Easterby-Smith and Lyles, 2011; Martin de Holan, 2011). This kind of intentional unlearning has been considered important for developing organisational processes (Martin de Holan, 2011). However, unconscious forgetting may have surprising impacts on organisational processes when valuable knowledge is lost (Holan and Phillips, 2004). A lack of process memory may challenge handling of complex planning challenges – for example, when process-related experiences and knowledge of substance-related solutions is lost. This memory loss is specifically a concern in long and knowledge-intensive processes, such as planning processes, in which personnel may change over time.

Public sector organisations have been criticised for their inability to assimilate knowledge (Moynihan and Landuyt, 2009). However, organisational learning capacity is essential for an organisation's development, influencing its capacity to adapt to changing societal needs (Senge, 1990; Prahalad and Hamel, 2000). Moreover, there has been considerable discussion about whether organisational learning and memory reside on the individual or organisational level (Senge, 1990; Walsh and Ungson, 1991; Nonaka and Takeuchi, 1995; Lehner and Maier, 2000). According to Senge (1990), individual actors learn, but learning itself happens through interpersonal dialogue as a relational activity. Previous research has suggested that learning in public sector organisations occurs in structural settings that encourage interaction (Moynihan and Landuyt, 2009; Siciliano, 2016). However, part of

the knowledge may be integrated into organisational structures, routines and traditions (Fiol and Lyles, 1985; Argyris and Schön, 1996). Consequently, memory in organisations also resides partly on the level of individuals and their relations (Argyris and Schön, 1978), and is distributional in nature (Walsh and Ungson, 1991). What is not encoded in information systems resides in the individuals, and transfers through their interaction in social networks. Coughlan and Coghlan (2011) have referred to the importance of network action in the context of inter-organisational learning. According to them, learning is both a capacity and a process, requiring intentional actions to be achieved. In order to enable learning and process memory development, an organisation has to be aware of its structures which affect the learning capabilities. Previous research on learning in the context of public administration organisations has merely acknowledged the interactions among organisations and groups. However, a multidimensional understanding of the actor-relational dynamics of knowledge-co-creation and process memory development as prerequisites for learning has not emerged.

The analysis of learning capabilities in organisations should deal with the dynamic processes of organising (Argyris and Schön, 1996) in social settings. Therefore, advancing the actor-relational perspective to the understanding of social networks is important for supporting the relational understanding of knowledge co-creation, process memory development and learning in organisational settings, as it makes the social processes of planning more explicit (Borgatti and Cross, 2003; Oh et al., 2004; Cummings and Higgins, 2006). The resulting hypothesis of this research is that learning in organisations is enabled through knowledge flows and memory development in various social networks. In order to deepen the view of planning as a socially constructed and knowledge-intensive process, this research focuses on actor-relational process structures which affect knowledge co-creation and process memory development over time. Building on current views regarding planning as a social process, this research acknowledges knowledge co-creation and process memory development as prerequisites to learning in planning organisations by moving the unit of analysis to the actor-relational level and longitudinal view of the complex and adaptive social systems (Innes, 2005; Innes and Booher, 2010) that reproduce knowledges over time.

3. Methodology

A lack of process memory poses a critical challenge for learning in planning organisations; therefore, this research focuses on an example of social dynamics in an actual practice-related planning context. A mixed-methods approach is used, and detailed longitudinal data regarding organised actor interactions during a four-year statutory strategic spatial planning process in one of the cities in the Helsinki Capital Region are the key source. The primary focus is on in-person actor interactions, as these are an important channel through which learning can occur. The raw data include the documented process data, which were available after the process was ratified by the city council. There were over 10,500 pieces of process documentation (see Eräranta, 2019 for a more detailed description of the data). The raw data were processed into a standardised time series of approximately 400 total interactions with 400 people in total. The process was classified into four phases according to statutory definitions, including, goal-setting (G), draft (D), proposal (P), and ratification (R), which were further divided into intervals of two months in order to increase the analysis' resolution. Resident information was not individualised during the process, and was therefore excluded.

In addition to the process documentation, social network analysis (SNA) was used for identifying the everyday reality of the networked dynamics over time. Instead of focusing on the individual actor characteristics, SNA considers the relational attributes for exploring the dynamics of nodes (i.e., actors) and their ties (i.e., interactions) (McCulloh et al., 2013; Wasserman and Faust, 1994). As a well-established methodology, SNA includes a variety of network- and node-level measures for understanding the relational structures (Granovetter 1973). In this research, analyses of the socio-temporal network structures were elaborated through the measure of betweenness centrality. Betweenness centrality was selected for its capacity to analyse the potential information flows between social actors. In particular, betweenness centrality can be interpreted as an indicator of an actor's ability to control other actors' access to all parts of the network; as it measures how often a node is positioned on the shortest path between two other nodes (Brandes et al., 2016; Freeman, 1978). For example, central actors may be considered gatekeepers, as they are able to manipulate or bias communication in the network due to their relationally strong position (Rowley, 1997). Borgatti (2005) has suggested an equation for the betweenness centrality (Equation 1) to measure the number of times that information reaches a specific node. In the equation, b_k is the betweenness of node k; g_{ij} is the number of geodesic paths from i to j, and g_{ikj} is the number of shortest paths from i to j, passing through node k.

$$b_k = \sum_{i,j} \frac{g_{ikj}}{g_{ij}} \quad (1)$$

In addition to its analytical capacity, betweenness centrality can be visualized with network graphs, where nodes represent actors (i.e., the individual participants) and links represent the strength of connection (i.e., participation in a same meeting during the process) between them. As a result, the actors with higher betweenness centrality have a more central position in the network graph. As SNA has not been applied in this context before, the findings were validated through individual interviews (Symon and Cassell, 2013) with participants of the analysed process. The applicability and relevance of the findings for planning practice were analysed through focus group interviews (Carey and Asbury, 2016) with practicing planners. All research data was anonymised to avoid harm to the research subjects.

4. Findings

4.1. Overview of Network Structure Dynamics

The overall finding is that the social network was in constant flux during the process, with many people entering and leaving. In Figure 1, the network graphs illustrate the betweenness centrality of the individuals, describing their relational positions for influencing the information flows between other actors. Each graph represents a two-month period in one of the four statutory phases. In the goal-setting phase (G1…G8), the process officially commenced, and the objectives were jointly discussed with multiple actors before the elected officials decided on the goals in G8. In the draft phase (D1…D4), the first draft of the plan was produced and published for public consultation. Thereafter, in the proposal phase (P1…P9), the draft was developed in response to submissions. Finally, in the ratification phase (R1…R6), the proposal was officially approved. In most of the graphs, the structure is strongly centralised with one clear core actor or a relatively small set of actors (an example of this structure can be seen in G7), suggesting that the relational power was highly centralised. The fewer central actors there are in the network, the greater their relational power may be, giving them a possibly stronger relational position considering the information transfer.

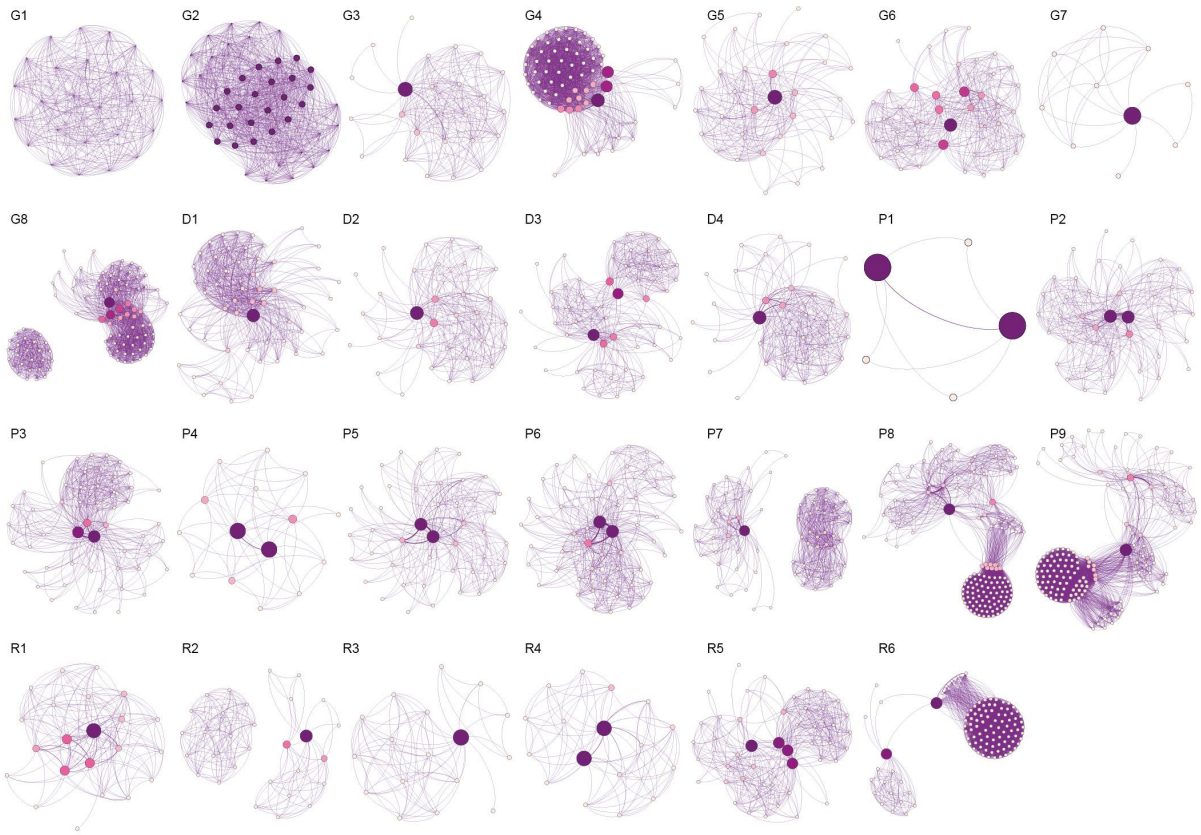

Figure 1 - The Betweenness Centrality Dynamics of a Four-year Strategic Planning Process

4.2. Factors behind the Dynamic Patterns of Interaction

Compared with the linear and sequential statutory phasing, the emergence of the networked structures was nonlinear. The structures were not tied to specific process phases, but were influenced by a variety of factors on multiple levels (for example individual, actor-relational, institutional). Some of the network dynamics were explained through institutional rules and routines, such as decision-making procedures; but some were shaped by emergent actor-relational factors, such as escalated arguments between some actors. Alongside the institutional framing of the collaboration, emergent social dynamics affected the interactions over time. According to the interviewees from the planning process, the social dynamics had effects on the intensity of their involvement in the process. These actor-relational dynamics were typically not bound to this specific process, but originated in, or had consequences for, other planning processes.

The findings show that the institutional framework did not support the longevity of network ties between processes. Planning processes are traditionally separated into different sub-projects led by different individuals – obstructing learning between the processes. As the processes are dependent on the same scarce organisational resources, the situation is vulnerable to disturbances. The administrative division of the processes is typically due to a large number of simultaneous processes, which may challenge the actors' ability to focus on an individual process. According to the interviews, when the participants see only disconnected snapshots in time, their commitment to the specific processes might decrease. Some actors did not have enough time for active participation, thorough consideration, information acquisition or collaboration. As the actors participated in the process infrequently, and only in relation to their own sectoral expertise, their overall understanding of the process remained severely limited. Moreover, their awareness of how their own input affected the plan solution, or the subsequent parts of the urban development process, remained low.

Based on the interviews, centrality reinforced more centrality in network structures. According to the interviewees, when the central actors were well-known by other actors, they were used for information acquisition in the process – in turn giving them an even more centralised position. All interviewed actors referred to one specific actor as a focal point for information transfers in the process. In addition, the polarised positions between the few central actors and the others was intensified by the intentional withholding of information. The decision not to inform everyone about changes in the process was aimed to protect the actors from information overflow and give them an opportunity to focus on their own responsibilities. However, some participants explained that this decision decreased their ability to form an overall understanding of the process. It also challenged their ability to develop an understanding of the interrelations between various scales and sectoral themes. Additionally, the sectoral themes were kept separate from each other, and were mainly handled among the few central actors and the assigned sectoral experts. In case an actor had a tight sectoral responsibility in the process, a holistic view of the plan solution was typically decreased. Moreover, the adhocracy of communication challenged the development of an overall understanding over time.

In addition to the aspects above, the actors' own activity (as well as the actual subnetworks in which the actors participated) influenced the emergent structures. Interviewees named securing support from other actors with similar backgrounds as an important reason for forming subnetworks during planning processes in general. The support structures were explained to be dependent on personal relations which take time to establish. However, some of the participants said that their collaboration patterns were negatively influenced by conflicting arguments, which led to their lack of input in the process. The participants explained that sometimes the planning solutions could have been different if they had not withdrawn from collaboration due to actor-relational disputes. Confrontations were intensified by the strongly centralised structures, leading to distrust between actors. As a result of previous experiences, some actors tried to avoid confrontations – reducing the information transfer and knowledge co-creation further. Thus, it is important to stress that emotional factors can influence processes and plans. Some participants even argued that challenges resulting from conflict and the compartmentalisation of information left the process occasionally seeming irrational. When some participants left the process their tacit knowledge was lost, and ways of working were changed. Changes on the individual level also affected collaboration patterns, as actors holding the same administrative position had different structures for their collaboration networks.

4.3. Implications of the Network Structures for Knowledge Co-creation and Process Memory Development

The network structures during the process can be classified into four main categories: single-core structures (e.g., G7 in Figure 1), dual-core structures (e.g., P2 in Figure 1), multi-core structures (e.g., G6 in Figure 1) and complete structures (e.g., G1 in Figure 1). In addition, disconnected structures (e.g., G8 in Figure 1) may be formed through combinations of two or more simultaneous networks without a direct connection between them. These lead to challenges when the networks do not communicate. Here, the four basic structures are explored (Figure 2), focusing on their possible advantages and challenges for information transfer between various fields of expertise and for process memory development. The possible advantages and challenges were discussed in focus group interviews with practitioners, who work in and around strategic planning processes.

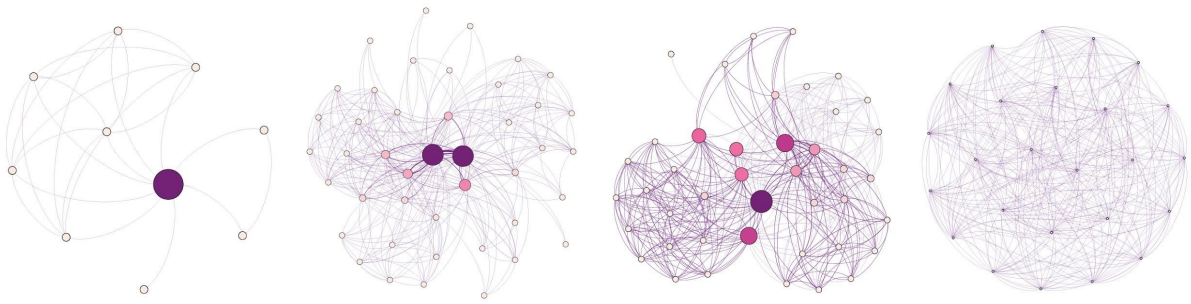

Figure 2 - The Four Main Categories of Network Structures (from left: single-core, dual-core, multi-core, complete).

Single-core networks have one central actor. According to the interviews, a single-core structure can be effective for information transfers with one clear coordinator, but it has few possibilities for wider deliberation and integration due to the scarce connections between actors. As one central actor manages the integration of the various views, the underlying reasoning remains unclear to the other participants. Moreover, as was suggested by some interviewees, the central actor can dominate the information flows. Considering process memory and knowledge co-creation, the single-core structure is risky as it is focused on one key actor. As was suggested by some of the interviewees, the structure may lower the quality of the planning outputs because it is not possible for any one actor to consider the variety of interrelations alone. In addition, if the central actor leaves the process, the rest of the network may be severely disturbed. Overall, according to the interviewees, overly centralised responsibility is beneficial neither for the individual, nor for the organisation, nor for the substance of the process.

Dual-core networks have a pair of central actors. As was suggested in the interviews, a dual-core structure allows either of the central actors to be replaced without a total loss of process memory. If one of the central actors leaves while the other remains, the remaining actor can train a replacement. According to the interviewees, the dual-core structure is similar to the single-core arrangement as it does not enable diverse enough discussion and ideas to emerge, and does not allow holistic consideration of the various sectors and scales. The process may also end up reflecting the personal views of the central actors – which was a concern articulated by the interviewees. The benefit of the dual-core structure is that the actors can support each other and discuss the issues. Some interviewees pointed out that for this structure to be efficient, both of the central actors should build their own subnetworks.

Multi-core networks are built around multiple, interconnected cores. Various experts, supported by their own subnetworks as mentoring structures, can form the core team. The central actors can integrate the knowledge of the subnetworks in the core – bringing added value into the process. According to the interviews, a multi-core structure allows all of the actors to proceed quite independently. When the central actors are strongly linked, and their subnetworks are known, they can also be replaced more easily. A multi-core structure enables the utilisation of shared expertise, as was suggested by some interviewees.

In complete networks, all actors are connected with each other. When actors represent different fields of expertise or different scale, the structure supports the testing and integration of various views. According to the interviewees, a complete structure has a low risk of disruption, as all actors hold similar meeting-based knowledge. From a process memory perspective (without considering the differences in expertise), any actor can be replaced without the risk of process memory loss. Thus, when everyone is equally informed, the risk of memory loss resulting from personnel turnover is low. According to the interviews, a complete structure has good possibilities for effective information transfer within the network. However, as a disadvantage, the structure can also be considered inefficient and resource-consuming.

4.4. Relevance of the Process Analysis to Planning Practice

In relation to process memory development, the planners stated that statutory strategic spatial planning processes are rare in planning organisations, and occur only once every 10-15 years in a specific area. When the process experiences are not documented and actors change, much of the memory is lost, and subsequent processes have to start from scratch. Thus, processes can become inefficient. Time is wasted on testing approaches and on re-establishing networks. As suggested in the focus group discussion, process memory supports organisations in situations when personnel turnover is high. Confining memory and knowledge to specific actors increases the risk posed by personnel turnover or the voluntary withholding of information. However, some interviewees pointed out that personnel turnover and unintended forgetting are not always a challenge. Contrastingly, it was suggested that organisations can also learn through personnel turnover by adapting new practices from outside. Moreover, when people change, process memory is dispersed into other organisations, and is not situated only in the originating organisation. According to the interviews, process memory also supports organisational learning between processes.

The interviews show that network and process thinking in municipal planning organisations is diverse and that changing the established practices is difficult. Many interviewees stated that planning processes are not understood well enough. Consequently, generating more understanding of the process structures is important in understanding the reasons behind the actors' involvement in the processes. According to the interviewees, the discussion of planning processes is strongly focused on digital methods instead of collaboration structures. Thus, it was suggested that improving awareness about networked structures and their possible impacts on knowledge co-creation and process memory development is important. Moreover, interviewees pointed out that SNA, as a method, is suitable for analysing the processes because it makes them visually understandable. In the interviews, the analyses were seen to be useful for learning new ways of thinking about process development in planning practice, and for visualizing process development needs. Improved process awareness may enable better utilisation of shared expertise, as actors become more aware of the phases in which they could share their expertise.

5. Discussion

The findings provide an overview of integrated planning processes. The different scales are visible through the varying sizes of the networks, which in turn reflect the to-and-fro of actors over time as different kinds of knowledges, skills and roles are required. In addition, the network structure includes the formation of subnetworks and high betweenness centrality. Knowledge and memory in the analysed process were strongly concentrated on the few central actors, who were trusted as information sources and acted as knowledge brokers in a manner similar to that described by Rydin et al. (2007). Moreover, it is important to underline that high-centrality structure was reinforced through the central role in information flows, highlighting the importance of understanding integration as communicative practice.

Previously established networks were primarily utilised for information acquisition, and the actors turned more easily to someone whose expertise they already knew in advance. Previous research, in comparison, has argued that core networks represent ties which provide support over time, while the peripheral network assists at specific moments (Cummings and Higgins, 2006). This seems to also be the case in the process studied in this paper. Central actors, and their ties, endured over time. The more peripheral actors typically changed from one phase to another. Moreover, in line with previous research (Oh et al., 2004), core ties seem

to have offered a more homogeneous social influence and constant support due to their strength – such as in mentoring relations. Contrastingly, the more peripheral ties provided ad hoc support through access to diverse knowledge and support. Although the memories of the process were generally incomplete among the peripheral actors, multiple participants visited the process for varying periods and carried parts of the process knowledge they acquired between processes. Consequently, memory in the process was not only located in the specific planning unit, but was also dispersed widely through the wider social network, positively influencing the longevity of ties over other processes.

In line with previous conceptualisations of organisational memory, at least two types of memories developed during the planning process: content-related and procedural. Content-related memories are context-dependent, spatially bound, and deal with the rationalisation and justification of the planned solution. They are applicable on various scales in a certain spatial context, and give answers to questions like 'what' and 'why'. Procedural memories are structural, and serve various purposes on different scales and in different contexts. They assist in process development aims, and answer questions such as 'how', 'why', 'who' and 'when'. The findings highlight the importance of procedural memories for organisational learning and process development, and cast additional understanding on the underlying social dynamics. Adding additional understanding to conceptions of organisational unlearning (Holan and Phillips, 2004; Fernandez and Sune, 2009; Easterby-Smith and Lyles, 2011; Martin de Holan, 2011), the findings suggest that memories of planning processes are vulnerable to accidental and intended forgetting. Moreover, unlearning not only presents challenges due to lost knowledge. It can also be associated with a decrease in trust among planning actors. In the case study, the actors' ability and willingness to collaborate depended on personal relations – whether they be confrontations or a supportive peer experience. Thus, emotionally experienced realities, either positive or negative, have an important effect on trust and memory-formation.

The findings also imply that process memories are typically recollected as patterns of activities which are detached from time. Thus, memories are affected by selection and post-rationalisation. Moreover, the intensity of involvement in the process influenced the randomness of memory-formation. The selected memories were strongly related to the actual networked structures, and their information transfer capabilities in the process. Differences in the process memory across actors were considerable, and typically related to the actor's thematic responsibilities and position in the network. The more an actor was involved in the process, the more exact their memories and wider their awareness of the process. The interview findings suggest that this was partly because information transfers were insufficient, and the interdependencies between the various themes were typically handled by only a few actors. As a result, the centralised structures inhibited the generation of integrated solutions.

Reflecting on previous conceptualisations of actor-relational network structures (Curtis and James, 2004; Stead and Meijers, 2009), the findings of this research imply that coordination refers to a single-core structure, whereas integration entails a more equally-connected structure. These different structures can have various implications for integrated planning, and on processes' vulnerability to process memory loss (Figure 3). In the structures that allow the simultaneous integration of a multiplicity of views, the vulnerability to process memory loss is decreased, as many actors know the rationalisation behind the plan solution. However, the depth of the collaboration and reflection of various views absorbs time and resources. As the number of central actors decreases, the possibility to integrate multiple views also declines and the integration is done by the handful of central actors, who coordinate the discussion between various separate thematic groups. Simultaneously, vulnerability to process memory loss increases.

The findings show that there is no one optimal solution for all processes, but various structures may serve various phases and purposes during planning processes. In case of high personnel turnover, holistic memory held only by one or two individuals is not a resilient strategy, as it is vulnerable to actor-level changes. This brings the questions about duration and the phasing of different structures in different planning processes into focus, as (non)repeating structures can affect (un)learning. Moreover, the actual duration and means dedicated to communication are important aspects for further consideration.

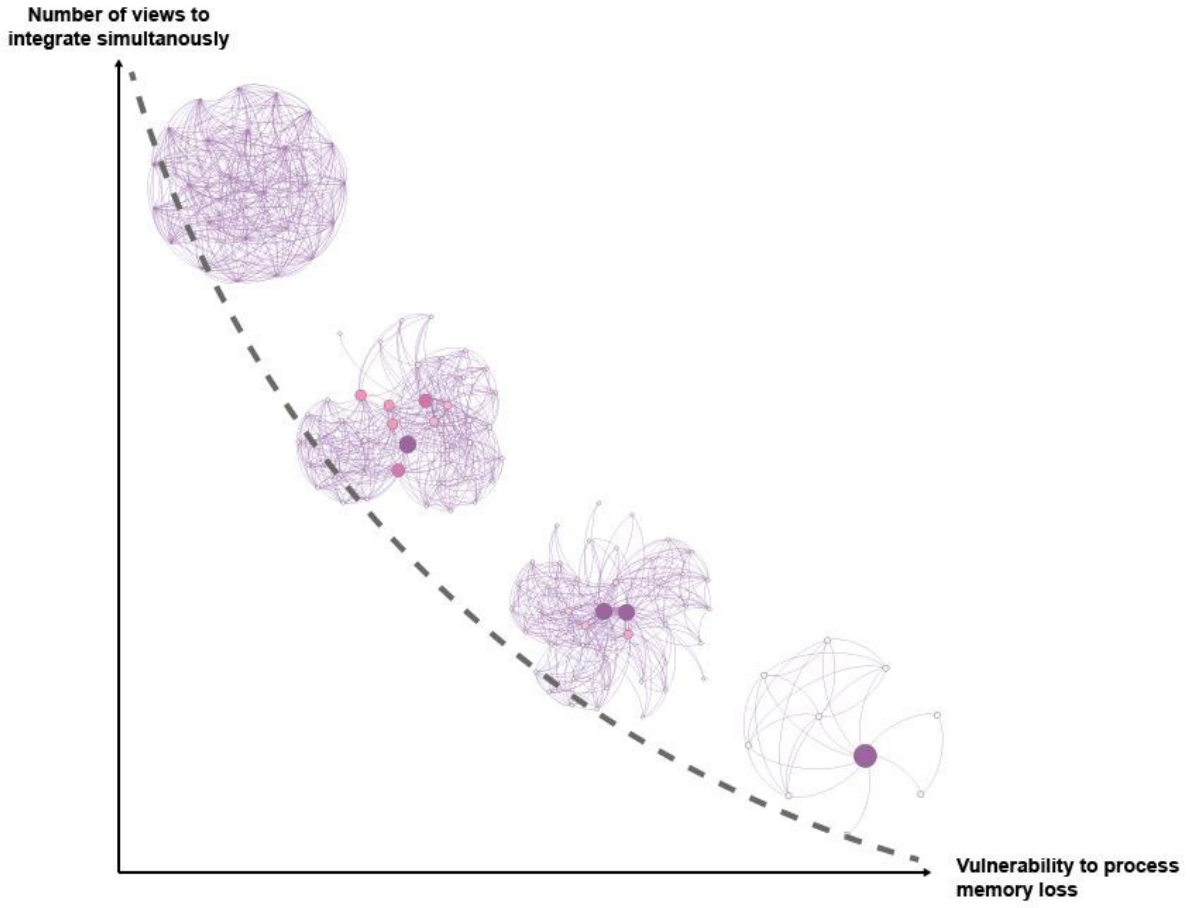

Figure 3 - Main network structure categories in relation to vulnerability to process memory loss and number of views for simultaneous integration.

The utilisation of longitudinal time-series data allows the analysis and evaluation of evolving phenomena, such as process memory. SNA may support the identification of structures which may cause sectoral siloing or process memory loss. In addition, using SNA in a mixed-methods framework supports the exploration of process memory development which is influenced by different relational dynamics. Currently, the related factors, such as organisational memory or experience (e.g., Wegner, 1987; Walsh and Ungson, 1991; Spender, 1996; Olivera, 2000; Soda et al., 2004; Innes and Booher, 2010), are mainly utilised in a descriptive manner without methods for analysing their relation with various process structures. Thus, the implemented methodology raises implications for the capacity of traditional methods, such as interviews, to trace process dynamics. Such methodological challenges are highlighted due to post-rationalisation and selective memorisation even among central actors. Contrastingly, the findings show that SNA has the ability to generate visual and statistical criteria for analysing such concepts, suggesting a methodological contribution for studying integrated planning processes. In particular, such mixed-methods approaches have relevance for both research and practice, and they could rely on visual thinking often present in the planning community.

6. Conclusion

The aim of this research is the development of methodological contributions for understanding knowledge co-creation and process memory development in collaborative planning settings over time. In order to enable the understanding of planning as a socially-constructed and knowledge-intensive process, this research focuses on actor-relational process structures, which are hypothesised to affect integrated knowledge co-creation and process memory development. The methodology has relied on a novel triangulation of social network analysis, document analysis, interviews and focus groups in one strategic spatial planning process. Planning processes are context-dependent and unique, and need to be considered in their contextual settings. This research

has provided the first illustrative example of the impact of actor-relational dynamics on integrated planning practice with the suggested research design. As the findings indicate, the proposed perspective and research design are promising for future applications. Despite the limitations of a single case process, we can infer the scale of dynamics and change in planning processes as social systems. The general conclusion of this research is that learning in organisations is enabled through knowledge flows and memory development in various social networks. These complex socio-communicative dynamics contest the everyday planning practice from within. Memories formed in a planning organisation are a basis for learning, and consequently, for conscious process development practices. These conclusions are already important points for consideration during the ongoing development of the integrated planning practices in Finland.

The findings highlight additional dimensions to knowledge development through the networked setting of interpersonal dialogue. In particular, they show that appreciation of several additional dimensions to communicative social practices at the level of actor-relational dynamics is essential for advancing the understanding of integrated knowledge co-creation and process memory development. The findings further indicate the value and knowledge-based foundations to these social dynamics, as well as the essential role of emotional experiences and trust building.

In the future, engagement with the policy learning literature might provide new opportunities for deepening understanding of knowledge integration in planning processes. Moreover, findings from this research have an opportunity to tie into an ongoing conceptual development regarding processual conceptions of policy integration (Candel and Biesbroek, 2016) which are essential for wider understanding of integrated planning. The findings also generate questions regarding generalisable and repetitive structures that go beyond the unique nature of particular planning processes. The research suggests that despite the possible integrative aims of planning, knowledge integration does not necessarily occur, partly because the networked structures do not enable integration. Consequently, further empirical research on integration in actual planning processes is needed.

The exploration of the social dynamics of planning processes, and their relations with process memory development and organisational learning, is a promising research direction. Here, the use of SNA with other qualitative methods was a valid approach with added value compared to traditional methods. This research stream may be supported with longitudinal and relational methods in future. They can enable a visual-analytical understanding and evaluation of the various networked process structures and their impacts. Further comparative analysis with processes within the same or in different planning contexts is another important stream for future research. In addition, a deeper evaluation of methods that are more suitable for understanding content-related (compared to process-related) memories is needed. Reflection over potential methods will inevitably lead to questions about other conceptualisations of organisational learning and associated social practices, as well as the nonlinear and complex nature of planning processes. Such a conceptualisation of complexity from within planning processes will have to deepen its understanding of the psychosocial realities that actors in planning experience on a daily basis (Mladenović and Eräranta, 2020).

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CITY-COUNTY CONSOLIDATION AND THE (RE)CONCEPTUALISATION OF URBAN-RURAL PLANNING:

A COMPARATIVE STUDY OF TAICHUNG CITY AND TAINAN CITY, TAIWAN

Wei-Ju Huang[a]

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Abstract

The Taiwanese central government views city-county consolidations as an effective method to strengthen national competitiveness and to balance regional development. But for local governments, consolidation presents a series of planning challenges, especially in relation to the reconstruction of planning concepts and discourses in their new territories. Aiming to understand the process, this study first proposes a typology of regional planning concepts as a conceptual tool to explore whether and how the consolidated governments (re)construct their urban-rural planning concepts, and then it examines the factors that may influence (re)conceptualisation through a comparative study of Taichung City and Tainan City. The research results show that overemphasis on using the concept of competitive city regionalism to balance regional development at the national level may lead to a widening of rural-urban disparities at regional and local levels.

Keywords

Urban-rural planning, city-county consolidation, planning concepts, city regionalism, regional development

a Department of Urban Planning, College of Planning and Design, National Cheng Kung University, Tainan City, Taiwan
E-Mail: wjhuang@mail.ncku.edu.tw

1. Introduction

Different forms of state rescaling and local government reorganisation – including city-county consolidation, annexation, mergers, interlocal agreements, and special districts – have been considered plausible strategies to deal with cross-boundary environmental and economic issues, such as urban-rural disparities, global competitiveness, smart governance, climate change, and watershed governance. In Taiwan, the national government relates city-county consolidations to the national strategic plan to strengthen national competitiveness and balance regional development (Executive Yuan of Taiwan, R.O.C., 2009).

The approach of the national government is underpinned by the concept of competitive city regionalism. In 2010, the Strategic Plan for National Spatial Development was announced. It detailed a national spatial structure at the regional level consisting of the northern city region (with the Taipei metropolitan area as its core), the central city region (with the Taichung metropolitan area as its core), the southern city region (with the Kaohsiung and Tainan metropolitan areas as its dual-core), and the eastern region, which is predominately rural (Council for Economic Planning and Development, 2010). At the end of 2009, three city-county consolidations were approved and conducted by the end of 2010, including the consolidations of Taichung City and Taichung County, Tainan City and Tainan County and Kaohsiung City and Kaohsiung County. For the national government, the three consolidated governments would play a leading role to promote city regional governance with their neighbouring counties and cities, and a regional growth pole to spur the development of surrounding areas.

On the one hand, the structure of the national strategic plan aims to balance the long-standing uneven North-South development of Taiwan. On the other, it implies a city-first perspective in which cities and their regions are considered the keys to competitiveness. The development of the core city (or cities) designated by the national government can foster prosperity, even in the most functionally disconnected and peripheral areas of the city region. However, previous studies have shown that the city-first perspective 'carries risks of addressing rural localities solely in terms of their relation to the urban, of disregarding any sense of an overarching, interregional rural condition' (Woods, 2009, p.853), or of 'marginalising (rural) spaces dislocated physically from an urban centre irrespective of whether they are functionally (dis)connected' (Harrison and Heley, 2015, p.1116). Therefore, the enlargement of urban-rural inequality at both national and regional levels is possible.

Nevertheless, city regionalism is likely to continue to take on various forms, and its consequences will depend not only on how the state manages its internal territorial structure, and prioritises the distribution of its expenditures (Jonas, 2013), but also on how the local governments respond to its conduct. In Taiwan, the state's city regional approach includes three consolidations, and two upgrades among them – those of Taichung City and Tainan City – through which the state expects each of the three consolidated governments to be a bellwether in their designated city regions. For the consolidated city governments, on the other hand, the consolidation raises issues of local finances, administrative efficiency, spatial governance, and development. Consolidation therefore has a direct influence on the lives of local residents through the quality of public services, and the development of urban and rural areas. From a spatial planning perspective, consolidation seems to bring many benefits. These include more appropriate and cohesive spatial development and land management in urban, peri-urban and rural areas, at least within their jurisdictions.

Despite the benefits, the consolidations have brought a series of spatial planning challenges to the consolidated city governments in relation not only to institutional arrangements and a shift in organisational culture but also through the need to reconstruct planning concepts and discourses in response to the newly consolidated territories. This process has variously involved a reconceptualisation of urban-rural relationships, and the manner in which this has been achieved influenced local urban-rural development and residents' lives. However, little attention has been paid to this issue in either city-county consolidation or city region planning debates.

This study explores the possible influences on local urban-rural development resulting from city-county consolidations. The factors which may influence the reconceptualisation of urban-rural divides are discussed through a series of questions. The first is whether and how the consolidated governments of Taichung City and Tainan City reconceptualised the overall principles of spatial organisation, urban-rural planning, and the

relationships between urban and rural areas. The second is connected with the underlying concerns of their spatial planning frameworks in relation to the rural. The third relates to the major similarities and differences between the consolidations in terms of urban-rural planning and their underlying concerns about (and perception of) urban-rural relations and development.

The city-county consolidations of Taichung and Tainan were selected as the case studies because, besides consolidation, they were upgraded at the same time. Kaohsiung City, another such consolidation, has been a special city since 1979. Its reorganisation was actually an annexation rather than a city-county consolidation. In contrast to Kaohsiung, Taichung City and Tainan City were originally provincial cities. After the consolidations, both of them were upgraded to the status of special municipalities, alongside Taipei City, New Taipei City, and Kaohsiung City. This creates a similar administrative situation and reorganisation challenges between them.

In this research, 18 in-depth interviews with planning officers of the two consolidated governments, document analysis, and discourse analysis are employed to examine the major similarities and differences of the cases in relation to their dominant planning concepts, major concerns, and their perceptions of rural spaces and urban-rural relationships. The examination is placed in the broader institutional setting of Taiwan's planning system and the local urban and rural development context of each case.

In the following sections, relevant literature in relation to the planning concepts of urban and rural areas is reviewed, and a typology is proposed as a framework. Then the two case cities are introduced and compared both before and after their consolidations according to the framework proposed. The major similarities and differences between the two cases are discussed in section four. The last section includes conclusions and suggestions for future research.

2. Underlying Ideas Guiding Urban-Rural Planning Activities

Faludi and van der Valk (1994) suggest that planning principles and planning concepts are interrelated and guide planning activities in a particular place. Planning principles concern 'the preparation of plans, their form, uses and/or effects', and are related to both the planning system and the planning professionals' (and/or the decision makers') understanding of how they can prepare plans and use the planning tools they have to realise their planning concepts.

Planning concepts refer to a body of thought related to the principles of spatial organisation, such as the Green Belts in the UK and the Green Heart in the Netherlands (Faludi and van der Valk, 1994). They are potentially powerful notions that can shape planning practices (van Duinen, 2015), articulate particular problems with certain solutions (Béland, 2005), and lead to changes of material reality (Healey, 2002); although the concepts may be underpinned by a set of taken-for-granted assumptions without any evidence to support them. They are, however, not static – and may simultaneously possess different meanings in different contexts (van Duinen, 2015). Concepts can also take different forms depending on the institutional setting and developmental trajectory of a given area (Huang and Fernandez-Maldonado, 2016).

Many regional development studies, such as that of Scott (2006), Tacoli (2003), Epstein and Jezeph (2001), and Douglass (1998), demonstrate that the regional development policy approaches are deeply influenced by the way policy makers and planners conceptualise rurality, urbanity, and the relationship between them in a particular region. Regional planning concepts can be categorised into three different sets of thought as a framework to examine how the two consolidated governments (re)conceptualised the urban-rural relationship within and beyond their jurisdictions and the extent to which the 'rural' figures in their spatial planning frameworks. The three different sets of thought are the 'urban-rural dichotomy', 'hub(s) and spokes', and 'regional networks' concepts (Table 1).

Table 1: A Typology of Regional Planning Concepts and Their Attributes

	Urban-rural dichotomy	Hub(s) and spokes	Regional networks
Urban-rural relations	Dichotomy	City-centred relations	Functional networks
Spatial system	A dual system consists of urban and non-urban areas.	Hierarchical, centred on one or a few dominant centres, usually identified by population size. Rural towns are put at the bottom of the system.	Horizontal, composed of a number of centres and their hinterlands, each with their own specialisations and comparative advantages.
Logic of rural development	Rural space is perceived as a place of nature resource-related production and living. Other economic activities and their potential in the rural areas are hidden from view.	The rural economy has to associate with urban economic processes, and rural areas are passive beneficiaries of 'trickle-down' from urban growth.	Both urban and rural areas make a contribution to the competitiveness of their region. It is sensible to look for synergy from reciprocal rural-urban and rural-rural partnerships.

The 'Urban-rural dichotomy' is the most conventional understanding of the physical structure of urban and rural spaces. Under this system, population size, density, economic structure, land use types, or a combination of these are commonly used as criteria to identify urban and rural areas. This cognition has been criticised on account that unhelpful differences between urban and rural areas can actually result from the drawing of comparisons. There is, after all, no absolute standard to distinguish between the 'urban' and the 'rural'. In fact, the standard varies according to the situation in a given country (Zonneveld and Stead, 2007). In short, this way of understanding provides an idea of a spectrum but is based on an assumption of binary opposition between 'urban' and 'rural'.

The dualist assumption has been challenged since the 1990s. Urban and rural characteristics are increasingly blurred and integrated. Agriculture and forestry have been industrialised, and many built-up areas and high-tech infrastructures are scattered in rural landscapes (Zonneveld and Stead, 2007; Caffyn and Dahlstrom, 2005). Some rural communities situated at or beyond the rural-urban fringe have been transformed by urban in-migration and the associated development of housing and recreational amenities (Woods, 2009).

In order to encompass these dynamics, the consideration of functional relations between urban and rural spaces has emerged and been addressed in political agendas. The 'hub(s) and spokes concept' and the 'regional networks concept' provide very distinct answers to the issues, and indicate very different spatial organisations and relationships among metropolitan regions, agrarian/resource-based regions, cities, towns, and villages (see Figure 1).

Indeed, the 'hub(s) and spokes concept' implies a city-first perspective. It is underpinned by the belief that a city (or cities) is (are) the locomotive(s) of national and (or) regional economic competitiveness. The rural areas adjacent to the city (or cities) subsequently benefit from trickle-down effects from city-centred strategies (Douglass, 1998; Ward, 2006; Pemberton and Shaw, 2012).

However, in practice, the concept is often implemented by identifying 'a hub (or hubs) before then indicating the metropolitan functions linked to them and which define the wider region' (Harrison and Heley, 2015, p.1123). This representation of the model can be misleading, especially since it conveys the notion that any place within the defined 'hub(s) and spokes' area can be easily integrated with, and prosper from, the hub(s) – even if they are the most peripheral and functionally disconnected places. Additionally, some rural spaces that are physically remote from the defined area, but are in fact functionally connected to the hub(s) and/or spoke(s), can become marginalised. Furthermore, the city-first perspective of the hub(s) and spokes concept overlooks the potential for agriculture- or generally rural-led development (Douglass, 1998), and defines the rural localities solely in relation to their place vis-à-vis the primary urban area rather than in their own right (Woods, 2009).

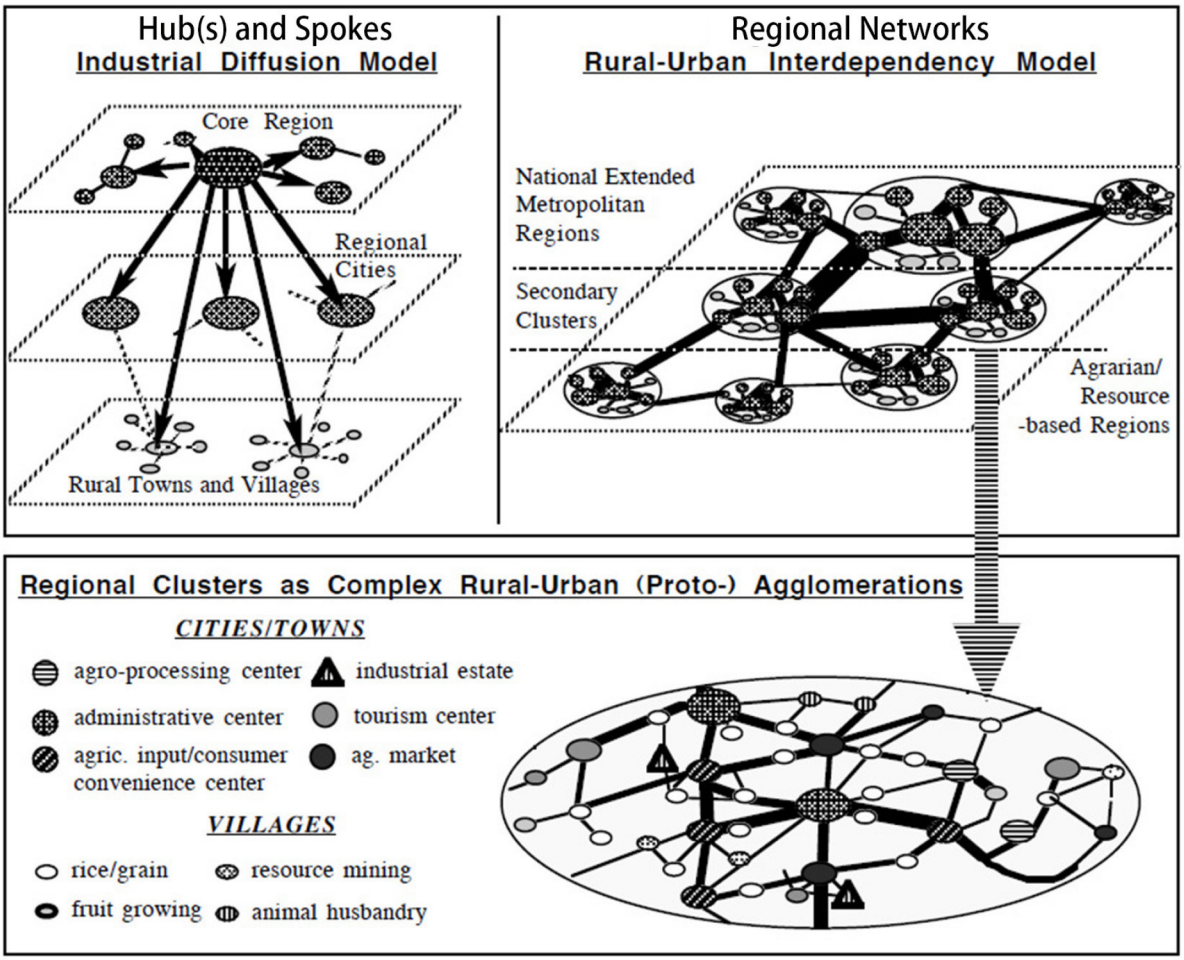

Figure 1 - Hub(s) and Spokes Concept Versus Regional Networks Concept
Source: Douglass (1998)

In contrast to the hierarchical and city-first hub(s) and spokes concept, the regional networks concept proposes a horizontal spatial system that is composed of a number of centres and their hinterlands – each with its own patterns of specialisation and comparative advantage (Douglass, 1998). Specifically, the regional networks concept is connected to a more equal, and horizontal, network view of rural-urban relations, and it highlights the particularity of each small town and its socioeconomic and spatial linkages to both large urban centres and surrounding villages (Tacoli, 1998). It recognises the various sizes and performance of rural and urban areas, as well as the diversity of rural-urban interrelationships in different functional regions.

The typologies of urban-rural interrelationships and the physical appearance of regional networks proposed by OECD (2013) give the concepts a clearer form. Studying its member states, the OECD (2013) classified three types of physical appearance for a region - including metropolitan regions, networks of small- and medium-sized cities, and sparsely populated areas with market towns – and five types of interrelationship between rural and urban areas – including demographic linkages, economic transactions and innovation activities, the delivery of public services, exchange in amenities and environmental goods, and multi-level governance interactions. These two typologies together characterise a variety of functional regions.

Regarding the fundamental logic of rural development, the three spatial concepts link to three different lines of reasoning respectively; namely local natural resources, urban economic processes, and urban-rural partnerships (see Table 1). In the urban-rural dichotomy concept, the rural space is perceived as a place of nature and resource-related production. Its traditional view ignores the diversification of current rural economies and excludes non-agricultural economic activities in rural areas (Ward, 2006).

The hub(s) and spokes concept considers rural areas to be passive beneficiaries of city-centred strategies, and imagines the rural economy solely in relation to urban economic processes (Harrison and Heley, 2015). As Scott (2011, p.858, 859) argues, many rural areas and small towns lying within them have 'become increasingly articulated with the rhythms and cultures of the modern metropolis…, either by physically exporting their products to external markets or by serving as centres of an increasingly profitable tourist trade'. This logic is related to the present dominant geographic imagination of rural areas as consumption and leisure spaces for urban dwellers (Hadjimichalis, 2003). Under this city-centred logic, how the relative isolation, heritage, and natural features of rural areas conform to urban tastes and preferences has become essential for rural development (Morrison, 2016).

In the regional networks concept, both urban and rural areas can make a contribution to the competitiveness of their regions (Ward, 2006). It is sensible to look for synergy from complementary and reciprocal rural-urban and rural-rural partnerships, because 'a cluster of well-connected and highly interactive rural and urban settlements may be better able than a single growth pole to provide a level of agglomeration and economic diversity to act as an antipode to the growth of core metropolitan regions' (Douglass, 1998, p.13). Under this logic, the focus of regional development would be to identify and optimise the existing interrelationships among villages, towns and cities within the particular region.

3. Comparative Study: Taichung City and Tainan City

The current spatial planning system in Taiwan follows the Regional Planning Law, promulgated in 1974, which is expected to be fundamentally changed in 2022 according to the new Spatial Planning Act promulgated in May 2016. These two laws indicate different underlying definitions and planning principles for urban and rural areas in Taiwan. The former develops a dual land management system, while the latter aims to integrate the dual system into one cohesive system. The fieldwork and interviews for this research were conducted from 2016 to the beginning of 2018. This was a moment of transition, and the possible influence of the new Spatial Planning Act on planning practices is taken into consideration when assessing whether and how the consolidated governments reconceptualised, and continue to conceptualise, the spatial dimensions to urban-rural planning. At the end of this section, a comparison between the two cities is drawn. This leads to cross comparisons and discussions in the next section.

3.1. Planning System in Taiwan

Since the enforcement of the Regional Planning Law in 1974, a dual land management system – an urban planning system and a non-urban land use control system – has been active in Taiwan. Under the system, urban land is located within an area where an urban plan has been issued, and non-urban land is everything else. There are three types of urban plan, including the city (town) plan, countryside street plan, and special district plan. Except for the special district plan, which might be formulated for conservation purposes, all of the city (town) plans and countryside street plans are formulated to provide legitimacy to develop the definite area according to the plan.

Spatial planning and development practices in urban and non-urban land follow different regulations under the Urban Planning and the Regional Planning Laws respectively. Urban plans promote development, while the protection of agricultural land is the aim of non-urban plans. The dual system therefore provides very different tools for planning and managing these two kinds of places. Skills and knowledge are non-transferrable. For example, urban planners struggle to handle the planning practices of non-urban areas, without prior experience (Chief of Regional Planning Division of Tainan City government, personal interview, 22nd June 2016).

The dual land planning system also plays an important role in shaping how planners and governments recognise urban and rural areas. In general, the former refers to urban land and the latter refers to everywhere else, but most rural areas have countryside street plans for the seat of townships or areas where the population has reached 3,000 and the industrial and business workers account for more than 50% of the population.

In other words, the division between urban and non-urban areas is theoretically clear in Taiwan's land management system, but a rural district may consist of an urban planning area where a countryside street plan or a special district plan has been issued. The institutional design creates a kind of urban-rural dichotomy – not only in practices but also in planners' minds – complicated by a fragmented project-oriented planning approach which lacks a comprehensive long-term vision and ignores the interrelationships between rural and urban areas.

In light of the deficiencies of the dual land management system, the central government was eager to promote the establishment of a city/county comprehensive plan at the end of the 1980s. It also sought the formulation of a legally binding city/county regional plan at the beginning of the 2010s, on the basis of the Regional Planning Law together with the series of city-county consolidations. The hope was to achieve more balanced urban-rural development while anticipating a new spatial framework in the Spatial Planning Law. But with the exception of New Taipei City and Taichung City, Taiwan's cities and counties did not complete their regional plans by the time of the promulgation of the Spatial Planning Law in 2016. Since then, cities and counties in Taiwan have decided to work on their own local spatial plans instead of continuing the drafting of their regional plans. The central government expects the local governments to complete their local spatial plans by around 2022.

According to the institutional arrangements for plan-making in Taiwan, the central government plays a key role in determining the content of local spatial plans through a review process. But at the local level, the mayors of the cities and counties have the power to resolve the draft content of spatial plans before submitting them to the central government. The decisive role of the mayor in plan-making results from his or her administrative power, which is embodied not only in chairing the local planning review committee but also in deciding the committee's members. This institutional design can ensure that the spatial plan of a city or county is in line with its mayor's policy, but at the same time, the central government's review can prevent the mayor from abusing his or her administrative power and prevent the plan from deviating from national interests, such as environmental conservation or farmland preservation.

3.2. Introduction of Taichung City and Tainan City

Before consolidation, the two case cities were classified as urban land, while the two counties consisted of both urban planning land and non-urban land. As shown in Table 2, the consolidated Taichung City is more urbanised than the consolidated Tainan City in terms of population density and the percentage of non-agricultural workers in the population. The population growth rate (0.72%) of Taichung City is much higher than the growth rate (0.03%) in Tainan City and the average growth rate (0.13%) in Taiwan in general. Since July 2017, Taichung City has been the second most populous city in Taiwan. It also has a more concentrated and monocentric spatial structure than Tainan, which is more multi-centric in structure (see Figures 2 and 3).

Table 2: Statistics of Taichung City and Tainan City

	Consolidated Taichung City	Consolidated Tainan City
Area (km^2)	2,215	2,192
Population (person)	2,767,239	1,886,033
Density (persons/ km^2)	1,247	861
2017 Growth Rate (%)	0.72	0.03
Non-agric. population of total population (%)	93	84
Industrial distribution of employed persons (1,000 persons)	1,307 (100%)	957 (100%)
Primary industry	44 (3.4%)	69 (7.2%)
Secondary industry	507 (38.8%)	402 (42.1%)
Tertiary industry	757 (57.9%)	485 (50.7%)

Source: National Development Council (2017)

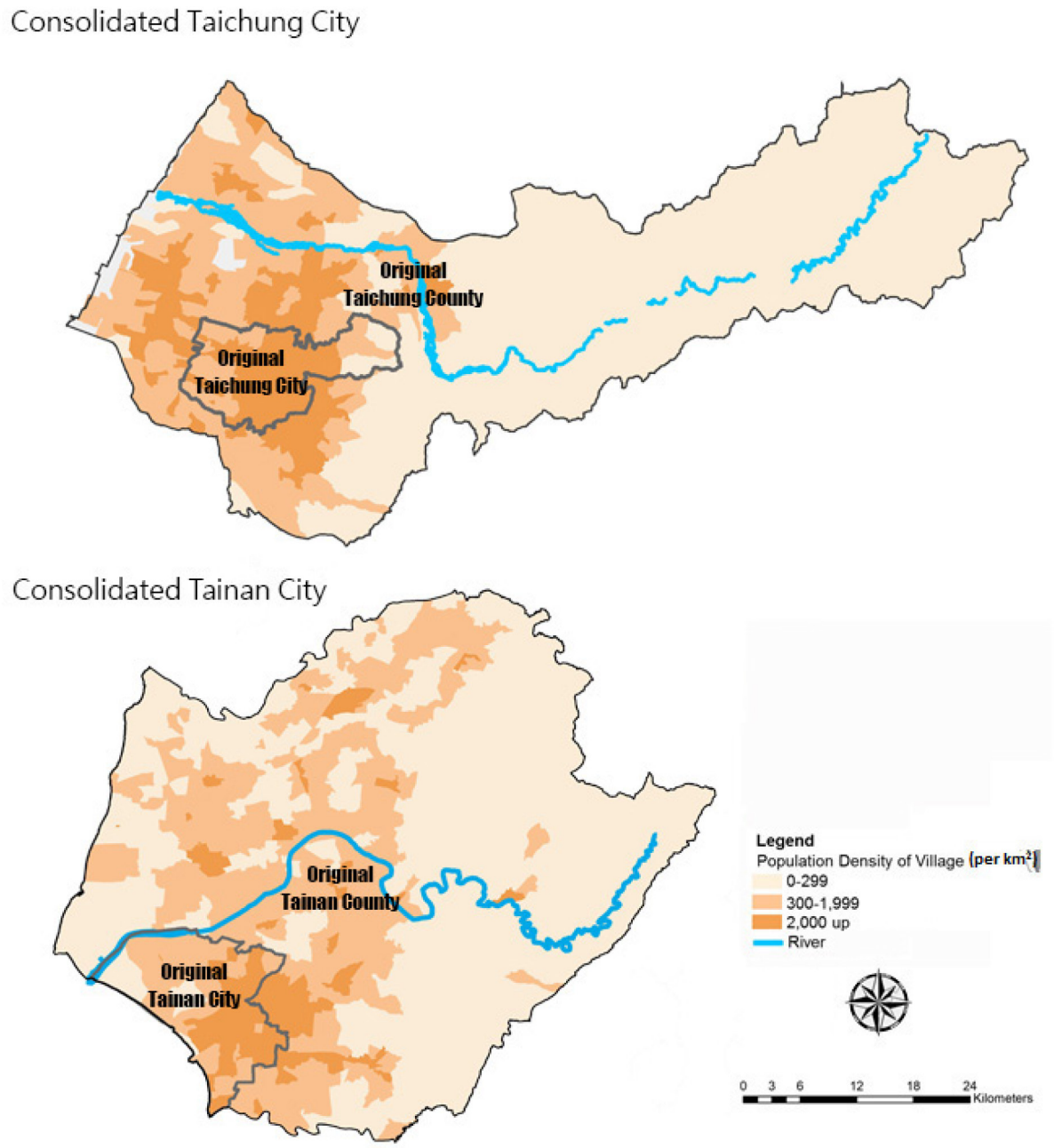

Figure 2 - The Distribution of Population in the Two Cities
Source: based on SEGIS (https://segis.moi.gov.tw/STAT/Web/Portal/STAT_PortalHome.aspx), accessed in January, 2018.

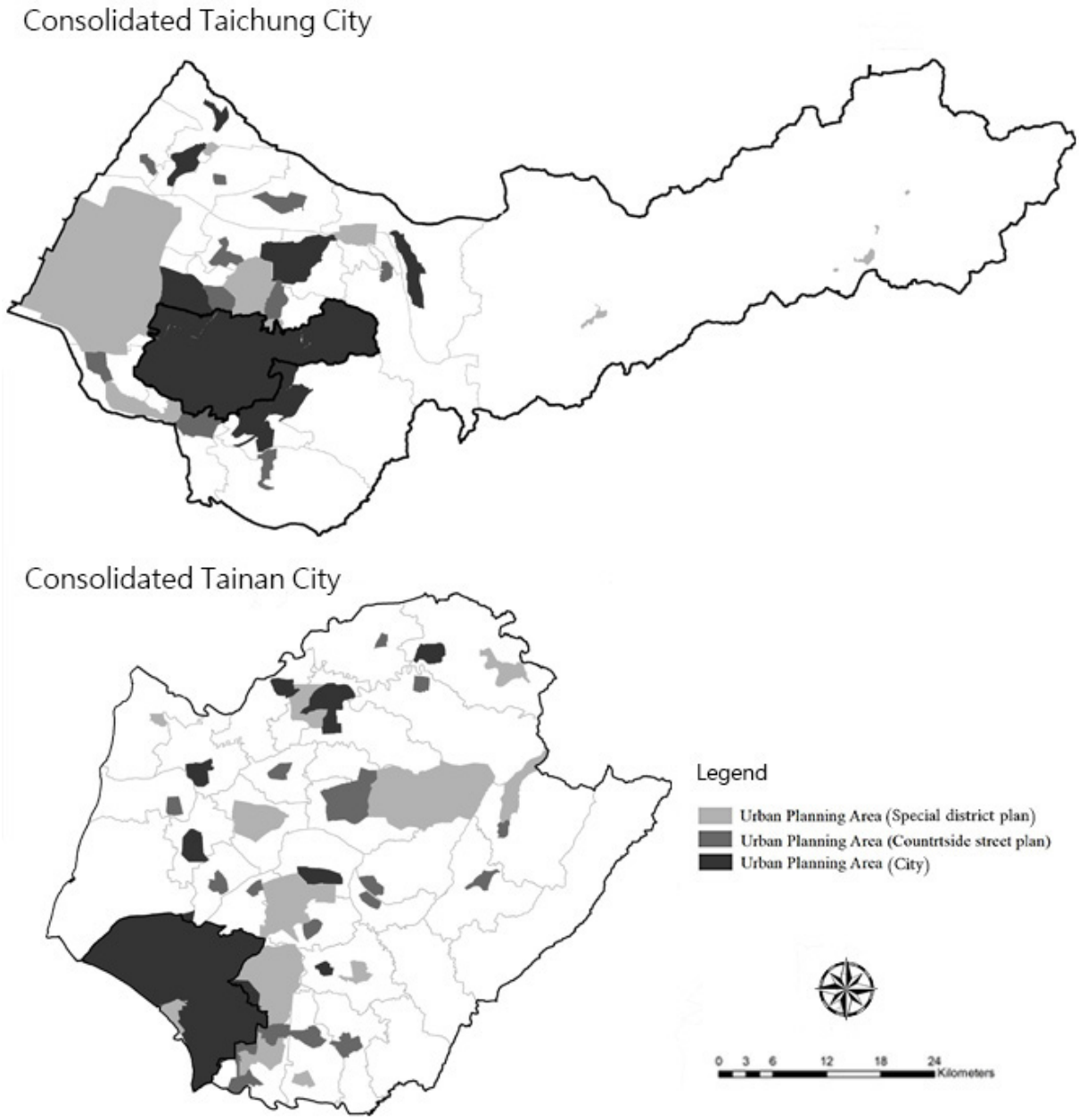

Figure 3: Distribution of Urban Planning Area in the Two Cities
Source: Comprehensive Review of Urban Plans and Urban Development Strategies in Taichung, 2013; Tainan Regional Plan (Draft), 2014.

3.3. Comparisons Between Before and After Consolidation of Each Case

Between 2000 and 2002, the governments of Taichung City, Taichung County, Tainan City, and Tainan County formulated a revised comprehensive plan for their own jurisdictions as a reference to lead local development and sectoral plans. After the consolidations, the two consolidated cities also started to formulate their own respective regional plans to guide local urban and rural development. The six documents provide a useful lens through which the consolidated governments' reconceptualisation of the relationships between urban and rural areas can be examined.

3.3.1. Taichung City

The revised comprehensive plans for Taichung City and Taichung County both show a bias in favour of the urban centre and consider the centre as the growth pole (see Table 3). The consolidated Taichung City government not only continued this city-centred view but also directly indicated that several rural areas were to be considered to be the 'front yard of Taichung city' or the 'backyard of Taichung city' in the Taichung City Regional Plan (Taichung City Government, 2018, p.4-11).

Table 3: Planning Concepts of Taichung Before and After Consolidation

	Taichung City	Taichung County (21 townships)	Consolidated Taichung City
Dominant Regional Planning Concept	Urban-rural dichotomy	Hub and Spokes	Hub and Spokes
Urban-rural relations	Urban-rural dichotomy	City-centred relationships, but the County government had various tools to assist the development of agricultural areas.	City-centred view with a goal to strengthen international competitiveness. The development of each district is positioned in accordance with the goal.
Spatial System	A dual urban-rural system with a monocentric view	Hierarchical, Taichung City played the dominant role and three sub-cores in the county area were identified and linked by a ring-like road system. The role of the airport and the seaport were addressed.	Hierarchical, the city centre plays the dominant role. Three sub-cores are identified and linked by a ring like railway system. The role of the airport and the seaport are addressed.
Logic of rural development	No clear idea about rural development. It viewed its rural areas (Dakeng of Touko mountain area) as the backyard of urban dwellers.	Mainly focusing on central place and consumption/amenity relationships; rural areas' specialisations were addressed, but in the long-term led to tourist development. Cross-boundary urban-rural partnerships were formed among townships.	Indicating central place, consumption and amenity, economic transactions, and environmental goods provision relationships. Cross-boundary urban-rural partnerships are formed at the regional level.

Source: Based on Revised Taichung City Comprehensive Plan (Taichung City Government, 2001); Revised Taichung County Comprehensive Plan (Taichung Country Government, 2002); and Taichung City Regional Plan (Taichung City Government, 2018).

Moreover, the Urban Planning Bureau of consolidated Taichung City – which is in charge of the formulation of the Taichung Regional Plan – argues that they do not have any tools to assist the development of agricultural areas (Chief of Comprehensive Planning Division of the consolidated Taichung City government, personal interview, 7th November 2017), although the Revised Taichung County Comprehensive Plan (Taichung County Government, 2002) demonstrated the various tools which are available, such as farmland and rural community land adjustment. Together with the city-centred view, the spatial system identified in the regional plan is hierarchical, and narrows the potential for the development of rural areas to mere consumption and leisure spaces for urban dwellers. In addition to the consumption and leisure imagination, the planning focus of rural areas centres around preserving agricultural lands in order to secure urban food supply.

The identified spatial systems of Taichung County and consolidated Taichung City are similar: 'one ring, two ports, three sub-cores, and one core centre' are the major spatial elements (see Figure 4) – though the ring concept has altered from a road system to a railway system together with a transport-oriented development (TOD) mode. Moreover, benefiting from consolidation – which makes the international airport, seaport, and the urban core centre fall under the same jurisdiction – the consolidated government considers that the city now has favourable conditions to strengthen its international competitiveness. Competitiveness was the priority when positioning each district's future development goals (previous Chief of Urban Planning Bureau of the consolidated Taichung City government, personal interview, 7th November 2017).

The Revised Taichung County Comprehensive Plan (2002) demonstrates how partnerships between networks of small- and medium-sized towns and sparsely populated areas with market towns can be achieved in relation to agricultural products processing, logistics and marketing, as well as tourism development. The Taichung City Regional Plan (2018) also shows close collaborations between consolidated Taichung City and its surrounding counties since the establishment of a regional governance platform in 2015; but the previous partnerships between towns within the consolidated area have disappeared because the towns are no longer self-governing. After consolidation, district offices replaced township offices as branches of the city government.

The consolidated city government now plays a critical role in deciding each district's development with the goal of strengthening the international competitiveness of the city as a whole. This may hinder the development of agricultural districts.

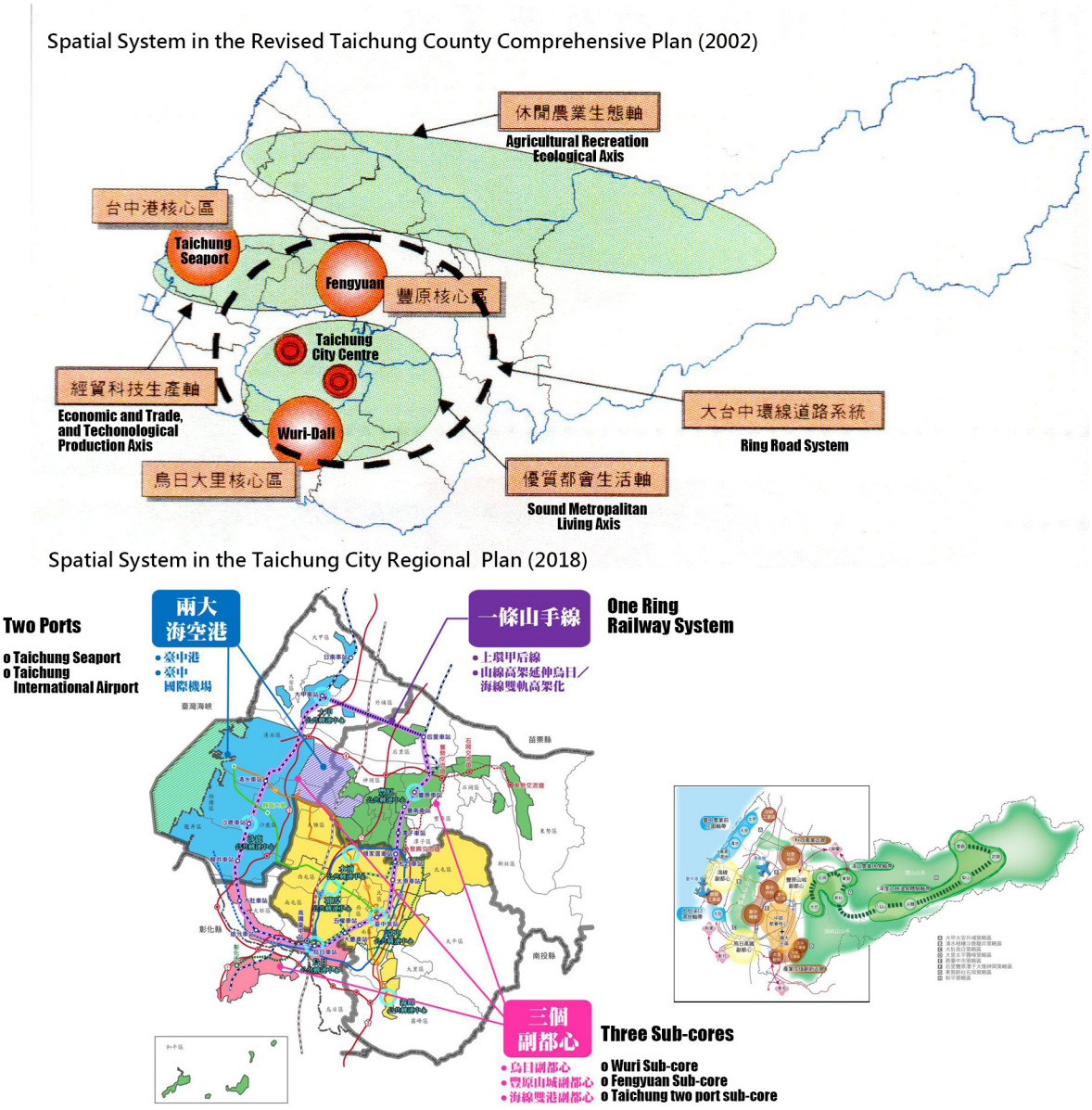

Figure 4 - Spatial Systems of Taichung County and Consolidated Taichung City
Source: These pictures are mere extracts from the Revised Taichung County Comprehensive Plan (2002) and Taichung City Regional Plan (2018) with a translation of their main captions.

3.3.2. Tainan City

The Revised Tainan City Comprehensive Plan (Tainan City Government, 2002) showed a bias in favour of the city centre, and a gap between the plans at county level and local level can be seen in the Revised Tainan County Comprehensive Plan (Tainan County Government, 2001) (which consists of three volumes – the Comprehensive Plan at County Level, Sectoral Plan, and Comprehensive Plan of Every Township). At the county level, a more city-centred and growth pole view dominated, while at the local level the township's own specialisations were the main focus in order to strengthen competitiveness. The county, by contrast, aimed to promote the development of two growth poles, including Hsiyin in the north of Tainan County and the Southern Taiwan Science Park (STSP) in the middle of Tainan County to reduce the backwash effect of Tainan

City. The plan also identified three corridors, but these were mainly based on the road system for the purpose of tourism development. Moreover, the interrelations between the corridors and the growth poles were not clear (see Figure 5).

The Tainan City Regional Plan (Draft) (Tainan City Government, 2014) takes the specialisations of each district and the interrelationships between networks of small- and medium-sized towns and sparsely populated areas with market towns as a starting point. At the same time, it strengthens the density of urban planning areas, which may be located in rural areas according to the dual land management system, in order to avoid urban sprawl. As shown in its spatial concept in Figure 5, it is inclined towards the regional networks concept but with a growth pole view. In the industrial development part of the regional plan both the manufacturing sector and agricultural sector are considered important industries. The importance of the agricultural sector can also be seen in its spatial system, which includes three major growth poles, two rural resource centres, and five regional clusters (see Figure 5). The two resource centres include the Yujing Agricultural Product Distribution Centre in the North-east hilly area and the Beimen Aquatic Product Distribution Centre in the North-west coastal area.

In short, the spatial concept of urban-rural planning and its spatial system have altered from a city-centred concept to a combination of regional networks and a growth pole view (see Table 4). The local government takes each area's own specialisations into account when making the regional plan (previous Chief of the Urban Planning Department of consolidated Tainan City, personal interview 17th January 2018), which indicates a polycentric spatial system in the whole territory, although the polycentric system is rather hierarchical.

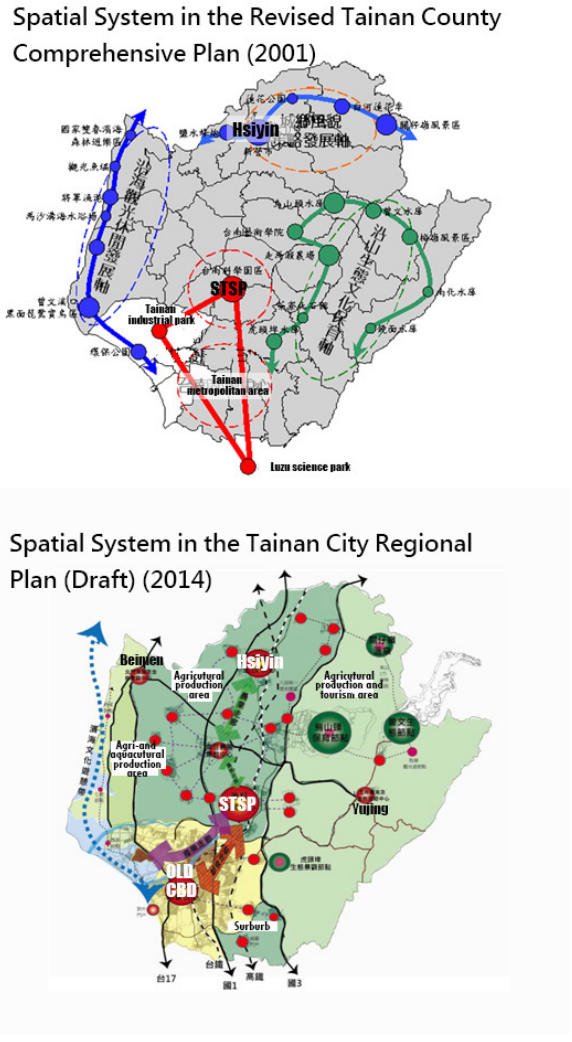

Figure 5 - Spatial Systems of Tainan County and Consolidated Tainan City
Source: These pictures are mere extracts from the Revised Tainan County Comprehensive Plan (2001) and Tainan City Regional Plan (Draft) (2014) with a translation of their main captions.

Table 4: Planning Concepts of Tainan Before and After Consolidation

	Tainan City	Tainan County (31 townships)	Consolidated Tainan City
Dominant Regional Planning Concept	Hub(s) and spokes	Hub(s) and spokes concept at the county level; regional networks concept at the township level	A combination of a regional networks concept and hub(s) and spokes concept
Urban-rural Relationships	City-centred relation	At the county level, it has a more city-centred and growth pole view; at the local level, the township's own specialties are the main focus.	Functional networks
Spatial System	A dual urban-rural system with a monocentric view	Aims to promote the development of two growth poles in the county to reduce the backwash effect of Tainan City.	Hierarchically polycentric system; three major growth poles in the middle corridor, two rural resource centres in remoter areas, and five regional clusters are identified.
Logic of rural development	No clear idea about rural development. It views urban fringe as a place reserved for urban expansion.	At the county level, a trickle-down effect from the STSP was expected; at the local level, some townships near to the STSP tend to emphasise their possibility to provide housing, while many of the rest focus on their own specialisations.	Indicating urban-rural partnerships and taking each area's own specialisations and comparative advantages into account.

Source: Based on Revised Tainan City Comprehensive Plan (2002); Revised Tainan County Comprehensive Plan (2001); Tainan City Regional Plan (Draft) (2014).

4. Cross Comparisons and Discussions

In comparing the trajectories of the two cases before and after their consolidations, three major similarities and one influential difference can be recognised. The first similarity is that the core city centre and growth poles are always the major elements that constitute the framework of the spatial system, while the positioning of rural areas may differ according to the planning style or the spatial concept of the particular government. The growth pole could be a central business district, industrial centre (such as a science park or a technology park) or an important transport hub (such as an airport, a seaport or a high-speed rail station). The prominence of that way of thinking shows the influence of the growth pole model.

The second is that there are three ways to conceptualise urban-rural relations in both cases before or after the consolidations. The first is a model in which urban areas provide public and business services for their hinterlands, and the level of services depends on their urban hierarchies. In the second, the peri-urban areas, which are close to the growth poles, can have a home-work relationship and economic interactions with the growth poles. In the third, the areas which are far from the growth poles or are environmentally sensitive, are seen as consumption, leisure and open spaces, or providers of environmental goods for urban dwellers. The economic relationships in these cases are related to urban expansion for industrial activities or residential demands, but there is a slight difference. Different from Taichung, the consolidated Tainan City government takes into account the primary industrial relationships between sparsely populated areas and their market towns. The ways governments structure the spatial system of their territory – and how they conceptualise urban-rural relations – both imply their priorities.

Finally, a common emerging trend of transition from the decentralised planning style to the centralised planning style can be identified in both cases, emanating from their consolidations and administrative status upgrades. Before the consolidations and upgrades, Taichung County and Tainan County consisted of 21 and 31 townships respectively; afterwards, the townships became district offices, which are branches of the consolidated governments. As a result, the townships lost their planning authorities, and the consolidated governments have become unified regulatory authorities responsible for spatial planning over their whole territories. On the one hand, this change eliminates the competitive relationships between townships, and may create a more efficient administrative system to integrate and allocate resources at the city level. On the other hand, the consolidated governments may easily ignore local demands and their particular features. Although city councillors might represent their electoral districts and play a mediating role, township councils have been abolished – weakening local voices.

Despite some similarities, one influential difference can be identified – namely the spatial concept behind urban-rural planning in the two case study areas. The consolidated Taichung City government continued Taichung City and County's urban centred view, while the consolidated Tainan City government has paid more attention to the endogenous economic potential of rural areas and their towns than before. The different trajectories of the two cases may result from: 1) the distinct urban hierarchy and characters of the cities; 2) their mayors' and planning bureau chiefs' perceptions of urban-rural disparities, and of their cities' positions in the regional/global context; and 3) whether the chiefs of the planning bureau see the urban land and non-urban land of the same district as a whole, and are familiar with the legal planning and development tools used in non-urban contexts.

Taichung is larger than Tainan, and it has an international airport and seaport. These ingredients give credence to the notion – which has been adopted by its politicians – that the city has world-class potential (previous Chief of Urban Planning Bureau of the consolidated Taichung City government, personal interview, 7th November 2017). This perception reinforces the urban-centred view and development-oriented planning concept. As the Chief of the Comprehensive Planning Division of consolidated Taichung City mentioned:

> We had no clear spatial image over the whole territory. The only thing we wanted to do was to conduct urban development, so we tried to transform all the farmland to buildable land. But we had to follow the restrictions and development principle in the National Regional Plan. Additionally, while taking the development status of the three sub-cores into consideration, the pattern of urban-rural development was gradually defined. In fact, the previous mayor was more focused on development. He was only concerned with future development possibilities in-between urbanised areas, while the current mayor is more concerned with the development of sub-cores and the implementation of the TOD concept. (Personal interview, 7th November 2017; translated by author)

In contrast to Taichung, the degree of urbanisation in consolidated Tainan City is low, and many of its districts located in what was the county part are rural (see Figure 4). The consolidation removed administrative boundaries as well as the competitive relations between Tainan City and Tainan County. The government officers and residences that used to be divided by city and county boundaries can now offset the negative impacts of the polarisation tendency when considering the city and county as a whole. This also makes the issue of urban-rural disparity visible (Chief of Urban Planning Bureau of the consolidated Tainan City government, personal interview, 26th December 2016). Different from the urban-centred view of the Taichung government, the regional plan of Tainan City is made on the basis of the following understanding articulated by the chief of the Regional Planning Division:

> The mayor does not want to make the whole territory become urbanised area entirely. He really thinks agriculture is one of the major features of Tainan. It is important for us, so we have to preserve good farmland. But we cannot limit ourselves to farmland preservation solely. We have to help farmers…for example, through establishing agriculture production districts… (Personal interview, 22nd June 2016; translated by author)

The strategy that the Chief of the Urban Planning Bureau of consolidated Tainan City proposes is to take each district's own specialisations and comparative advantages into account – regardless of its rural-urban composition – and help each of them to develop its own position and vision:

> It is not easy to get rid of the issue of marginalisation…we now change our way of thinking. We do not intend to reverse the marginalisation phenomenon using a strong hand. In fact, citizens have their own considerations when deciding where to live and what to do. It is not possible to make them change their decisions just through a single public policy. We first have to review the functional position and distinguishing features of each rural area, and then deliberate over what the area can be and what are its possibilities. We now do not assume we can let the population of a village to grow from thousands to more than tens of thousands. (Personal interview, 26th December 2016; translated by author)

The Section Head of the Urban Planning Division of consolidated Tainan City further explains the new planning approach:

> After consolidation, when we conduct periodical overall reviews of an urban plan (in rural districts), the first step now is to formulate a comprehensive plan for the whole district, which is beyond the boundary of the urban plan. The comprehensive plan also has to take the relations between the district and its surrounding districts into consideration. We expect to explore which role the district can play and what kind of resources it has in the non-urban areas before deliberating what the urban planning area can do for the district and what kind of issues we can deal with through the reviews. (Personal interview, 6th June 2016; translated by author)

This indicates that the planning bureau of the consolidated Tainan City government sees every rural district as a whole – even when it consists of both urban and non-urban land. This approach indicates a breakthrough for the concept of urban-rural dichotomy which has been embedded in the spatial planning system of Taiwan for more than four decades. The change corresponds to the promotion of the local regional plan since 2010, and the spirit of the new Spatial Planning Law of Taiwan promulgated in 2016.

By contrast, the planning bureau of the consolidated Taichung City government, which is in charge of formulating the regional plan, does not have any strategy to assist an agricultural areas' development.

> Urban planning does not take agriculture into consideration; only for a very few cases… It should be part of agricultural policy rather than the urban planning policy of Taichung. It is not possible to use urban planning tools to help agriculture…what we normally do is to increase the building coverage ratio or floor area ratio. Everyone (in the urban area) would think the increase is good. But you cannot use the same tools in agriculture areas…when we formulated the regional plan, we were at our wits' end with agricultural development. The only thing we can do in the regional plan is to preserve the farmland. (Chief of Comprehensive Planning Division of consolidated Taichung City, personal interview, 7th November 2017; translated by author)

This implies that the planning officers are not aware that all of their rural districts have at least one countryside street plan and/or one special district plan (see Figure 3). Despite this, planners actually can review and try to explore the possibilities to use the embedded urban land to provide space for agricultural production related activities and infrastructure development. This also shows that the planning bureau of the consolidated Taichung City government is unfamiliar with the legal tools which exist in relation to farmland readjustment and rural community land adjustment. This, in turn, suggests a lack of cooperation with other relevant bureaus, such as the Agriculture Bureau, to assist in the development of agriculture areas. The urban-rural dichotomy planning principles, thus, limit the planners' imagination and the development possibility of rural districts.

Moreover, the mayors' and chiefs' spatial concepts for urban-rural planning also influence the planning style adopted. Due to the administrative upgrades, the planning authority is centralised in the hands of the consolidated city governments, but consolidated Tainan City remains concerned with each district's own specialisations and comparative advantages and the interrelations between districts. The role of the city government is considered to be a facilitator and a broker to link and build partnerships between districts (Section Head of Urban Planning Division of consolidated Tainan City, personal interview, 6th June 2016). Taichung City, by contrast, applies a top-down approach with the priority of being a world class city when positioning each district's future development. The focus of partnership building is at the cross-boundary regional scale rather than between districts. This inclination fits the national government's intention to promote competitive city regionalism.

5. Conclusion

Through investigating the two cases, this research finds that city-county consolidations in Taiwan do offer an opportunity for the reconstruction of planning concepts and discourses. This reconstruction involves articulation between certain problems or visions and given solutions, but outcomes vary. Tainan and Taichung

cities have ended up on different trajectories, and this has had differing implications for urban-rural disparities. In all, overemphasis of the concept of competitive city regionalism to balance regional development at the national level is judged to potentially lead to an enlargement of rural-urban disparities at regional and local levels.

Although the administrative boundaries and local competitive relations are removed by consolidations, the two consolidated cities have different perspectives on the nature of the change. The consolidated Taichung City government considers the consolidation as a precondition to becoming a world-class city. This has intensified urban-centred and development-oriented views. On the other hand, Tainan City's government recognises the historic disparity between Tainan City and Tainan County, and is trying to improve the situation by taking each rural district's specialisations and comparative advantages into account. This fundamental difference fosters distinct planning concepts and discourses. The distinct trajectories result from not only the existing urban hierarchy and characters of the cities but also how their mayors and planning chiefs position the cities, perceive urban-rural disparity, and place the 'rural' in their spatial planning practices.

The cases show that an overemphasis on the role of cities in the development of national and regional competitiveness runs the risk of not only marginalising rural concerns, but also of putting the rural economy in the shadow of urban economic process, and thus losing the opportunities to bring rural-led development into play. This overemphasis often results from ignorance of the rural world and its contributions to the regional economy. In order to fully capture the benefits and reach a more balanced urban-rural development model, policymakers and planning officers of the cities need awareness as to the specialisations of rural areas and the diverse urban-rural, rural-urban and rural-rural interrelationships which exist or have the potential to develop. Carefully listening to local voices, actively encouraging local engagement, and constructively exchanging knowledge between city planners and county planners would be effective ways to stimulate the imagination of urban-rural relations and help the reformed government take each area's own comparative advantages into account.

In short, the typology of regional planning concepts this study proposes provides a useful framework to assess how (and if) the governments (re)conceptualise the spatial dimensions to urban-rural planning. The comparative study also demonstrates that institutional design in relation to the spatial planning system may be one of the factors affecting how planners understand urbanity, rurality, urban-rural relationships, and their roles in urban-rural planning practices. In other words, the planning concepts and planning principles are interrelated and together guide the planning activities in a particular place. Different perceptions of how the spatial plan can be prepared, and the form plans ought to take, can lead places down different paths even under a single national planning system. In light of this, the institutional design of the spatial system in a particular place, as well as how planning practitioners in that place perceive and use their planning tools, should be taken into account in future studies of urban-rural relations or partnerships.

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IMAGINING THE CITY OF TOMORROW THROUGH FORESIGHT AND INNOVATIVE DESIGN:

TOWARDS THE REGENERATION OF URBAN PLANNING ROUTINES?

Nicolas Lavoie[a], Christophe Abrassart[b], Franck Scherrer[c]

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Abstract

Ecological and digital transitions alongside concerns over social inequalities have signalled the advent of complex new challenges for contemporary cities. These challenges raise issues pertaining to the dynamic capability of urban planners: more specifically, their ability to revise their tools and planning routines in urban projects. New paradigms of collective action for the transition towards innovative cities have been developed in large organisations. European companies, especially in public transportation, have developed such tools based on innovative design theories. One of these methodological tools, the Definition-Knowledge-Concept-Proposition (DKCP) process, was used to generate a new range of planning options for an urban district in Montreal, Canada. For many municipal organisations, the formulation of innovative ideas only concerns one stage of the process, represented by the 'P' phase. However, innovative routines should rather include the earlier phases of identifying the scope of possible innovations, the search for intriguing knowledge and disruptive design activities. The desire to tackle the complex challenges of 21st century cities has led to a new professional identity: the 'innovative urban planner'.

Keywords

Urban futures, strategic foresight, routines, rule-based design, innovative design

a (Corresponding author) Université de Montréal, Pavilion of the Faculty of Planning, CP 6128 Succ. Centre-ville, Montréal (Québec) H3C 3J7 Canada. E-mail: nicolas.lavoie@umontreal.ca

b Université de Montréal, Pavilion of the Faculty of Planning, CP 6128 Succ. Centre-ville, Montréal (Québec) H3C 3J7 Canada. E-mail: christophe.abrassart@umontreal.ca

c Université de Montréal, Pavilion of the Faculty of Planning, CP 6128 Succ. Centre-ville, Montréal (Québec) H3C 3J7 Canada. E-mail: franck.scherrer@umontreal.ca

1. Introduction: The Necessary Paradigm Shift in Urban Planning as a Design Activity

Can urban planners be creative and innovative professionals? Can municipal organisations and their urban planners benefit from disruptive design approaches?

The increasing complexity of urban challenges raises questions about the capacity of municipal organisations to properly equip themselves to define innovative public policies. In many Canadian and US cities, innovation processes often consist of supporting the emergence of bottom-up solutions by, and for, stakeholders. In this context, municipal organisations can facilitate the development of new experimental spaces, such as living laboratories; these facilitate the co-construction with citizens of solutions to real problems (Mulder, 2012; Nevens et al., 2013; Lehmann et al., 2015; Nesti, 2017). In order to properly read and understand the implications of these bottom-up solutions, and also ensure municipal organisations' 'absorptive capacities' (Cohen and Levinthal, 1990), the latter must also develop their own innovation initiatives. New urban labs have recently flourished in Canadian and US cities (e.g. *Laboratoire d'innovation urbaine de Montréal*, New Urban Mechanics in Boston, City Studio in Vancouver). However, their processes and methods are still in the research and experimentation realms.

Several radical transformations are likely to affect Western cities in the coming years. These transformations will not only be complex, but they are also wicked and difficult to unravel (Rittel and Webber, 1973). They may require seeing traditional urban activities in a new perspective:

- The world of work will face strong mutations: it will be influenced by an explosion of different forms of work and workplaces including, for instance, open innovations and the emergence of innovation communities, alongside robotics and experiential work. However, our cities are structured under the logic of daily home-to-work commuting and highly segregated activities. The redeployment of activities in cities is also likely to create social tensions between certain groups, for example between very agile young people, who accept precarious jobs for short periods, and older employees who are loyal to traditional jobs in large organisations.
- Leisure time faces challenges with regards to issues of of social inclusion and sustainability, whilst also needing to resist pressures of algorithmic standardisation. The frenzied development of digital and immersive technologies may lead to new experiences which no organisation (city, museum, or theatre) is currently capable of hosting.
- Current environmental crises (for instance, climate, or local atmospheric pollution) require municipal organisations to urgently reinvent their mobility systems. The constant desire to be close to as many urban activities as possible may require the relocation of all activities within the urban fabric, or making commuting more pleasant. Changes in the nature of the activities set out here should also bring about new forms of mobility that, whilst more flexible and experiential, are also likely to be less predictable.
- Climate change is a 'super wicked problem' (Lazarus, 2010) that is difficult to unravel using traditional urban planning instruments. Human activities are responsible for sustained increase in greenhouse gases; especially those related to mobility and industrial activities in the context of urban sprawl. Urban densification and better functional mixity appear to be two solutions since they bring a large number of services closer to a multitude of users. The issue of housing will be transformed by the search for new living patterns based on flexibility and affordability of housing. Perhaps there will be an incentive to enrich certain notions; the notion of density for example could be approached through unfamiliar terms, such as the idea of seeking a 'pleasant density'. These new models are not only poorly adapted to current typologies, but may also exacerbate tensions between permanent and temporary neighbourhood residents. Moreover, they may ultimately raise spatial justice concerns by unfairly concentrating the negative effects of climate change, such as heat islands, in certain neighbourhoods while creating oases of greenery for the wealthy. Three of the challenges are to find the right scale of density and the right mix of services and clienteles, while generating positive effects from a climate perspective. With regard to this latter point, zoning tools seem to offer only a narrow and insufficiently contextualized assessment of urban activities.

Many cities are translating these challenges into policy statements that take the form of real utopias: the 'carboneutral city', the 'circular city', or the 'smart city'. In addition, cities must ensure that the necessary living conditions are in place to ensure the social integration of all populations, as well as economic prosperity.

These challenges, as well as the complexity of implementing effective responses to them, raise questions about the practices, tools, and intervention methods that need to be used in urban planning. The present practice of urban planning takes the form of a 'rule-based design activity'. This notion assumes the consideration of two postulates. The first is that urban planning constitutes a 'design activity', a formulation already used by Schön (1980, 1993) and Simon (1969). The goal of urban planning is to 'conceive' the right sequence of problem solving, exploration, informed decisions and experimentation to produce, in the long term, the greatest collective satisfaction. The second postulate assumes that this rule-based activity frames collective action to make it effective in a given context, according to rules that ensure predictability in a stable world. However, rule and design-base urban planning is less convincing as a way to guide change in an uncertain and changing world.

In recent years, municipal organisations have trialled new practices and approaches to renew their processes and instruments. For example, the City of Copenhagen has encouraged the networking of urban planners, citizens and designers. The Create Your City project helped shift the perspective of its city planners towards the less technical and more humane aspects of planning (Munthe-Kaas, 2014). Several Canadian and US cities have developed new planning tools - the form-based code in particular - which aims to integrate the user experience and its visual environment as a principle of development of the city (Duany and Talen, 2007). This enriched conception of rule-based urban design may have resulted in new directions for the work of urban planners, but it remains insufficient as a mechanism to reinforce their capacity to innovate. It avoids revisiting the identity of design objects (what is a public square, urban density, or smart and sustainable mobility?) and instead capitalises on and disseminates good practice.

To ensure that urban planning is fully able to respond to these challenges, this paper focuses on the practices, references, and paradigms that structure the routines of urban planners. This concept of routine has been used to characterize the optimal activities that one must follow in an organization in order to produce goods or services under the best conditions. It is therefore a mechanism by which we can think the genealogy of performance models and the learning dynamics within organisations (Coriat and Weinstein, 1995; Nelson and Winter, 1982; Brem et al., 2017).

How an innovative design routine can take hold is one of the possible responses to challenges facing municipal urban planners. A first reading of the legal and educational frameworks suggests that this has not yet occurred in the practices of urban planners in Canada in general, and in Quebec in particular. Legal and regulatory tools favour normative or prescriptive considerations and ignore the activity of design. On the professional development side, university urban planning programmes focus on learning, and applying a variety of regulatory audit tools. Barring a few exceptions (Scherrer et al., 2017), there is no training in Quebec on how to innovate, just as there is none in most architectural or design training programmes.

However, methods that make it possible to revisit the identity of routines can be found in private organisations that are facing rapidly changing technological or social contexts (Arnoux and Béjean, 2015; Potier et al., 2015). To anticipate these changes and force adaptation, they intentionally introduce elements of disruption. For example, they may create new roles for actors, explore new identities for objects, or enable the regeneration of tasks and jobs (Le Masson et al., 2017). The transposition of these methods to the public sector is currently limited to a few organisations with specific missions: development of the complementarity of modes of active and collective transport in urban areas (Amar and Michaud, 2009); or, rethinking services in regions despite a rationalization of railway activities (Laousse and Hooge, 2015). By associating with prospective methods (Durance, 2010; Durance and Godet, 2010), new methods may be applicable in municipal organisations.

Given the increasingly complex context of cities, the routines of future planners may need to be redefined. We hypothesise that an existing set of innovative routines developed in the private sector could inspire public organisations to redefine actual urban planners' routines. This set of innovative design routines is understood as four successive activities called DKCP (where 'D' is a common definition of desired explorations, 'K' is an

assessment of known and unknown knowledge, 'C' is the generation of concepts, and 'P' is their transformation into proposals or initiatives) (Hatchuel et al., 2009; Le Masson et al., 2011; David and Scheffer, 2017). Innovative design routines in private enterprise and their transposition to urban public organisations have been the subject of research by, amongst others, Georg et al. (2011) and Pinheiro-Croisel (2014). However, these routines are far from being systematised at this time.

Addressing this existing gap, we first propose focusing on the value of routines as a way to better understand design activities in urban planning. Thereafter, we explain the usefulness of intervention research as a methodology for framing scientific approaches to be used in urban planning when exploring the unknown. Thirdly, we present a case of conducting an innovative design approach in a Montreal district. Finally, we present a sketch of a set of routines that employ the four activities (D-K-C-P). We conclude by specifying the usefulness of these activities for future town planning practices

2. Professional Routines for Creativity

In our opinion, the concept of professional routine possesses indispensable virtues for the members of organisations, both private and public, who wish to implement responses to social and technological changes. It is also useful for understanding the work of urban planners.

2.1. Professional Routines to Understand Organisational Learning

In general, a routine refers to a series of habits which, repeated daily, structure the life of a given individual. In organisations, individual habits are transposed into routines that formalise behaviours shared by colleagues, and forge standardised behaviours (Hodgson, 2008). The most effective of these behaviours eventually become rules which are followed by all. The word routine also refers to the repetitiveness, disenchantment, and lack of surprise in day-to-day life. As such, a routine can become a form of enslavement that results in alienation from individual desires (Juan, 2015) because it prevents workers from trying out new tasks or services. Routine may also refer to the favouring of ready-made solutions that are not always adapted to changing social or environmental contexts (Knudsen, 2008).

Routines can also be considered for their positive effects on organisations. The actions and processes in various sectors can eventually make an organisation very efficient. This efficiency contributes to forge the particular identity of the company. It can be compared to the role played by genes in the human body, where each gene plays a particular role; it is the combination of all the genes that makes the body perfectly operational (Nelson and Winter, 1982). The strength of an organisation then lies in its ability to continually adapt routines to new challenges.

2.2. Turning Design Routines into Innovative Design Routines in Urban Planning

We should not see professional routines as ways to freeze an organisation in an immutable space-time, because routines adapt and evolve in response to the new tools, methods, and processes adopted by employees (Coriat and Weinstein, 1995). They also help support a learning dynamic within organisations by empowering employees, and allow them to see problems from different angles (Miner et al., 2008). At the same time, and especially within large public organisations such as cities, routines can create path dependencies (Teece et al., 1997). Routines optimise past structures rather than favouring disruption and demand changes in how they are implemented. However, Labatut et al. (2012) have shown that the techniques and methods used can produce unsuspected generative effects that completely change the practices of organisations and generate new actors. The effects of innovation are not only felt on the objects themselves, but also on those who produce them.

It is our opinion that the above discussion of professional routines highlights the particular challenges faced by urban planners' practices in municipal organisations. On the one hand, the empowerment dimension of urban

planners highlights the rigour with which they use their various instruments to solve the problems presented to them. On the other hand, the dimension of path dependencies is illustrated by planners' reflex to reproduce, in new projects or approaches, what worked well in the past, without enriching it in any particular way. In order to obtain the disruptive effects of innovation, it is useful to place urban planners from the outset, in a position where they can generate unexpected effects.

2.3. Exploring an Original Model for Conceptualising Urban Planners' Routines

It is also necessary to question the professional identity of urban planners by having them ask themselves how they can regenerate regulated routines. Rampa et al. (2017) formulated another set of criteria to evaluate the impacts of training for innovative design on organizational creativity in a study conducted within a public administration (an energy producer and supplier in Quebec): the ability to identify knowledge missing from the dominant design of an object; the ability to extend knowledge to enhance the initial functions of the dominant design; and enthusiasm and excitement about the creative process.

In order to characterise the design regimes of urban planners working in municipal organisations and their attempts at enrichment, we propose an original model of analysis. The model (as illustrated in Figure 1) combines the relationship between the objects being designed with the type of professional routine being followed:

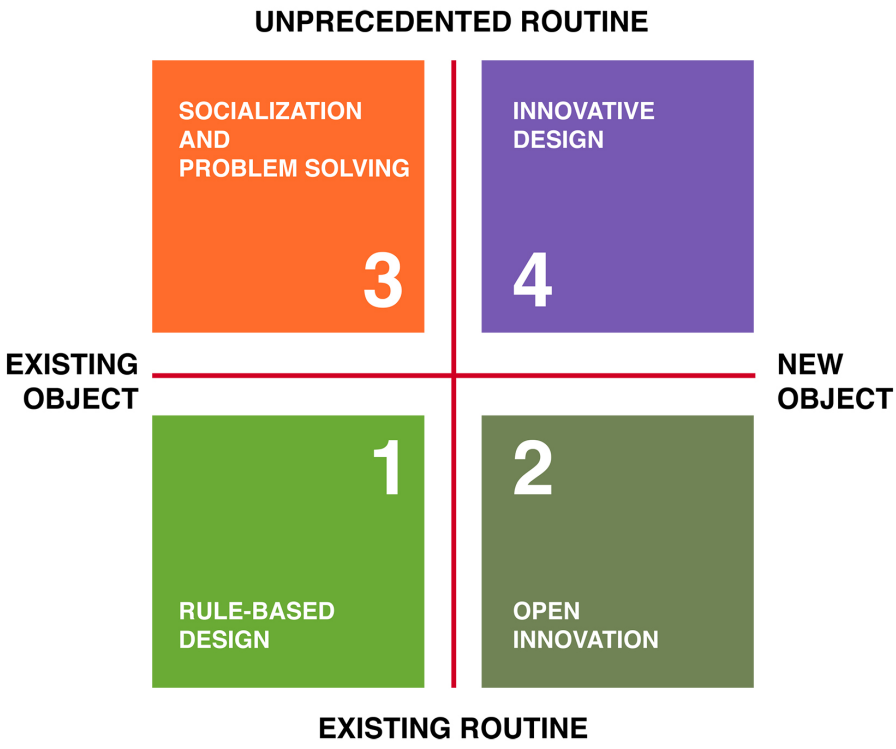

Figure 1 - An Original Model of Design Regimes in Territorial and Municipal Organisations

Each of the four quadrants deserves some explanation in relation to the description of what happens there, its advantages and its limitations:

- Quadrant 1 (existing routine, existing object). We find here the traditional practices well mastered by urban planners, strongly marked by a very fine knowledge of the objects and marked by previous learning. It is also caracterised by the tools of regulatory, legal or legislative framework, budgets, best practices, etc. The benefits are that this regime makes it possible to ensure consistency and common

identity within the profession. But there is a risk of not being up to the challenges that arise over time. The possibility of limiting oneself to path dependencies is also present.

- Quadrant 2 (existing routine, new object). This consists of open innovation practices. These are often carried out by a consultant who has a method that is applied consistently, regardless of the context. Standardised processes (architectural or design competitions) encourage urban innovation – for example, eco-neighbourhood projects (Georg et al., 2011) belong in this category. In France, the *marché de définition* (exploration study agreement) was an excellent way to enrich the traditional call for tenders. However, these approaches do not allow municipal organisations to learn about the innovation process, since they rely on the invisible routines of others (the consultant or those who are competing). The benefit of this method is an ability to quickly recognise a contribution of new knowledge. The limit is that the learning ability may be low. The municipal organisation may also be able to steer the content. Finally, there is a risk of the 'black box' effect, i.e., participants only share part of their content. The process itself remains hidden. As for the design competition, the reports of a jury constitute a vector for the socialisation of knowledge. However, these reports are more concerned with an appreciation of the results than with the design processes.
- Quadrant 3 (unprecedented routine, existing object). This is defined by creative tools that play with the (re)organisation of forms, activities and actors. Typically, these are knowledge-sharing activities (Lehman et al., 2015) that foster new routines such as hackathons or brainstorming. Nonetheless, these positions remain in the existing paradigm. They favour the sharing of existing ideas, without questioning their foundations (Agogué et al., 2014). This is an enriched public participation formula. It encourages better contributions from everyone involved in the thinking process. However, it generally proposes an original reorganisation of the existing routine, but one that is thought about and discussed within the same parameters.
- Quadrant 4 (unprecedented routine, new object). This is composed of tools or methods used to facilitate the process of disruption in the design of urban *dispositifs* (devices). It also calls into question the identities of objects or actors. The challenge lies in whether these innovative ideas can be reintroduced in projects. These kinds of products are more common in private companies (Arnoux et al., 2015) and parastatal organisations in France (Hooge et al., 2018). It may be considered as an opportunity to identify new spaces of values, new actor networks and the resulting practices. However, this approach may be very creative, but can neglect the important task of transforming the current set of organisational routines. Hence, the ultimate goal of innovative design routines is to recast and update the rule-based routines of an organisation (i.e. quadrant 1). One can also stay too close to the design brief, thereby limiting the expansion of knowledge.

Currently, urban planning routines are essentially confined to the first quadrant of the diagram, with some attempts to enrich them by moving towards quadrants 2 and 3. What is learned remains the property of the designers, and the participants remain confined to their usual practices. However, it is only in the fourth quadrant that planners can truly attribute new identities to those objects which will eventually condition creative professional routines (Le Masson et al., 2017). The fourth quadrant therefore represents a new space of innovation, and our hypothesis is that this innovative design routine can be generated by a set of four activities and their interrelationships.

3. Methodological Relevance of the Intervention - Research and its DKCP Formalisation Tool

To illustrate how this model can be used to understand the transition from regulated design to innovative design, we intend to present a real case of application that took place in Montreal, one of the major Canadian cities. This field experiment required the adoption of a research methodology appropriate to this particular context.

Our proposal to generate unprecedented routines for urban planners requires the identification of new forms of reasoning which describe and explain new realities – such as new routines, new urban objects, and the relationships that are established between them. Since we are in the field of building the cities of the future, these new reasonings must be based on observations of real situations.

3.1. Methodology

In this context, the data must be produced within organisations that possess real urban problems. This requires robust and consistent methods of investigation that allow the research questions themselves to be discussed and tested during the course of the research between the municipal organisation and a research team. For all these reasons, we believe that methodologies inspired by action research and its derivatives, particularly intervention-research or experimentation-research, deserve greater attention. Action-research is concerned with scientific knowledge that explains the actions taken by individuals and the rules and perceptions that enable divergent or convergent points of view to be discussed (Lewin, 1947). For Argyris and Schön (1978), it adopts a militant position which targets a better autonomy and critical reflexivity amongst actors in organisations.

Intervention-research differs from action-research (Hatchuel, 2000; David, 2013; David and Hatchuel, 2014; Radaelli et al., 2014). As Aggeri (2016) points out:

> The concept of intervention-research (IR) has been forged to designate the forms of research where the intervention of researchers with actors is explicitly claimed. It is a form of collaborative research, in the strong sense of the term, in that the research questions are themselves discussed and tested in the course of the research. This type of research is based on reciprocal commitments from both parties on the type of investigation to be conducted, the nature of the renderings and the type of objective sought [...] The intervention-research does not aim to test theoretical hypotheses that have been identified upstream, but rather to initiate an exploration in order to better characterize the problem at hand and to identify avenues for reflection or instrumentation (Aggeri, 2016, p.4-5).

In intervention-research, the identification of these points of view is modeled by the formulation of a rational myth which is intended to trigger a situated exploration. The research questions formulated on the basis of a wicked problem, the potential scenarios for reaching this rational myth, the co-construction of questions and solutions with representative actors, and their implementation and evaluation are each carried out in turn so as to form a complete sequential process. David (1999), following the work of Hatchuel and Molet (1986), identifies five stages of successful intervention-research (Table 1). We also establish a link between each stage in our intervention case of strategic foresight for a Montreal district in 2037.

Table 1: Stages of Successful Intervention-Research in Theory and Practice

	Description	**Transposition to our case of strategic foresight for a Montreal district in 2037**
Phase 1	Feeling of discomfort	Interactive discussion between urban planners and researchers on the description of the wicked problem (Phase D of DKCP)
Phase 2	Building a rational myth	Formulation of a rational myth combining two differents narratives: a coordination narrative for collective action (DKCP process, agreed-on Phase D), and foresight narratives of possible futures (four contrasted scenarios for the district in 2037). These scenarios are imagined at the end of Phase K, during a research seminar with actors from the municipal administration and external experts.
Phase 3	Intervention and interaction	A full day codesign workshop with a variety of stakeholders (Phase C): enrichment of the trigger scenarios for 2037 and discussion of potential pathways from 2017 to 2037.
Phase 4	Portrayal of a set of logics in the system of collective action	Clarification of the consequences of the codesign wokshop outputs and outcomes for municipal public policies, the urban planning process and potential collaborations with external actors.
Phase 5	The change process: transformation of the organisation	Assessment of the effects generated by the process. Drafting of propositions (Phase P) for the implementation of solutions and enrichment of the urban planners' routines (e.g. creation of an urban innovation lab for the district).

Source: Authors, adapted from Hatchuel and Molet (1986)

3.2. Mobilisation of a Tool for an Innovative Design Process: DKCP

To clarify the nature of these innovative design routines, we took this model as our hypothesis. To identify the richness of its disruptiveness, we used a methodological tool inspired by the theory of innovative design (Hatchuel and Weil, 2003). This tool, called 'DKCP' (Amar and Michaud, 2009, Hatchuel et al., 2009), favours the formalisation of creative ideas in response to a particular problem formulated in neutral terms. The tool takes its name from the four main activities of an innovation strategy (Abramovici et al., 2016):

- A definition and initial framing of possible innovation fields (Phase D);
- A pooling of knowledge useful for reflection, with important work to identify out-of-the-box knowledge (Phase K);
- An expansion of the knowledge translated into new concepts with highly disruptive potential (Phase C);
- The translation of these disruptive scenarios into concrete projects (Phase P).

This strategy relies on the formulation of stimulating briefs[1]. By adding new attributes, drawn from a knowledge disjunction, it is possible to partition this brief, thereby opening new avenues of exploration (Le Masson et al., 2010). The process of expanding knowledge and concepts leads, after a few steps, to the creation of a hierarchy of new functions, as well as uses and designs, which may unexpectedly lead to one or more unprecedented prototypes.

4. Results: An Application of DKCP to the Montreal Territory

The first experiment conducted with the DKCP method was carried out in the Rosemont-La Petite-Patrie Borough (hereinafter the Borough), one of the 19 boroughs of Montreal[2]. This municipal organisation asked the team at 'Lab Ville prospective' to initiate a debate on how to encourage new ways of living, collaborating or experiencing the city in the coming 20 years (Abrassart et al., 2018). The Borough expressed its initial vision in the brief: Live, Work and Play within Walking Distance in 2037. Over the next twenty years, the Borough will be strongly transformed by social, economic and technological changes (such as digital revolution, new mobilities, new ways of working, e-commerce, climate change, etc.). These changes will have impacts on the routines and aspirations practised by urban planners and could also generate new needs, inspire new lifestyles, and generate new forms of governance that might be more responsive and forward-looking. The municipal entity wanted to better identify these potential developments, that will have consequences on how services will need to be provided. The four DKCP phases were applied continuously over a period of about five months (as shown in Table 2).

1 A brief is a bold formulation of a problem, an original description of a way to solve it. At first glance, it does not have a logical status (Hatchuel and Weil, 2002), so it is considered prima facie neither true nor false. An example of a brief: design a boat that flies. In appearance, a boat floats but does not fly. By applying principles specific to aviation, it was possible to design the hydrofoil (Agogué et al., 2014).

2 Montreal, along the St. Lawrence River, is the second largest city in Canada in terms of population (3.4 million). It is a metropolitan area and an island (2 million inhabitants) composed of 16 cities, including Montreal (1.8 million inhabitants), itself divided into administrative units called 'boroughs' whose individual sizes and areas vary.

Table 2: Description of DKCP phases

	Phase	Description	
Pre-project	D	Conducted by the Université de Montréal team in close collaboration with a 'project team' made up of professionals and executives (half of whom came from the planning world). This phase ended with the establishment of a schedule of exploration activities. Deliverables: a calendar of activities and a roadmap specifying the desired learning.	Seminar[3]
	K	This knowledge was produced by the Université de Montréal team in close collaboration with three contributors. Their presentations focused on experiential mobility, the city and aging, as well as 'third places'[4]. The exploration of current trends and their extrapolation into the future allowed the team to imagine four evolution scenarios by variables, called in this case 'evolution hypothesis'. Each of these hypotheses was briefly described to the project team in order to transparently share the thinking behind the development of these so-called 'evolution hypotheses'. These trends have relied on identifying 'non-knowledge' that would potentially be crucial to innovation. This phase concluded with the formulation of projector concepts (which can be understood as new spaces of values) or triggers (which prepare the design activity of the next phase). Deliverable: disruptive projector concepts.	
	C	This phase began with the organisation and hosting of a prospective codesign workshop with borough stakeholders. The codesign workshop encouraged reflection on the transformations expected by the borough over the coming years in order to better address them. This phase ended with the formulation of a new prospective scenario, a narrative of fictitious characters in 2037 and the illustration of these scenarios by cartoonists. Deliverables: enriched scenarios and generative concepts rooted in the territory, and suggestions of possible action plans.	
Pre-project and projects	P	Some suggestions were made during the course of the codesign workshop. This pre-project stage would make it possible to propose a variety of projects that the Borough will be able to propose in the coming years as a way to respond to the new issues identified at the outset. This phase produced a report outlining ten (10) possible paths to carry out the ideas generated. Deliverable: an action plan to transform the municipal organisation.	

Four briefs were proposed to various stakeholders, including planners working within the municipal organisation. Among these briefs, two of them were particularly full of unknowns:

- Circular environments with positive energy: This first scenario proposes dividing the Borough into 26 sustainable living environments (or ecovillages) in which citizens can engage in most of their activities: working, living, entertaining and shopping; all within walking distance. These living environments generate 'positive social energy' because the inhabitants will be encouraged to participate in the social life of their community through accessing daily services. Two ways of living tend to collide. On the one hand, there is collaborative private housing (with grandparents, children, etc.) where one wants to stay in one's house for life. On the other hand, as access to housing has become expensive, 'the micro-habitat' (as seen in Japan) becomes a solution for 20 year old residents in 2037. They live in intimate spaces of small dimensions, basically intended for sleeping. They live their urban life outside of their homes. In this scenario, people work several jobs in a day or a week and they participate in the production of goods and services through their productive 'hobbies': it is the era of multi-work-leisure. Entertainment is serious, residents want to become effective human beings, and games/competitions between communities are regularly organised. In addition, residents are invited to travel to other ecovillages, whilst staying within the Borough.
- E-care zones with companion robots: In this scenario, inhabitants live away from their 'homes'. During the day, they are separated from their loved ones because they work elsewhere, but with the help of the new technologies, it is possible to provide support and care to loved ones remotely. The borough has set up 12 'e-care zones' (screens, gardens equipped with the Internet of Things, 'companion

3 This seminar took the form of eight meetings spread over five months, with meetings every three weeks. It was punctuated with preparatory exercises for the discussions, creative exercises, conferences, and disruptive activities.

4 Oldenburg (1989) has proposed the concept of third places to identify those spaces that are neither places of work nor places of employment (cafes, bars, restaurants), where one goes for entertainment or to work. These places may, however, become new friendly spaces as found in all urban fabrics.

robots' that can be activated remotely, and so on) near areas where their fragile or less autonomous loved ones are (schools, nursing homes). The habitat is individualised, digital (with remotely controlled home automation) and the inhabitants can stay in their house, if possible, for life. To include all inhabitants in these accelerated technological changes, the Borough has set up ongoing training for citizens ('robotic literacy') in public libraries. Permanent commercial entertainment dominates, and the robots are the good facilitators of 'e-care' in public spaces. They are also companions who let inhabitants travel in their minds by telling them stories from around the world.

The participants were then invited to participate in a working group led by facilitators previously trained by the research team. Three activities were proposed to them:

- In the first exercise, participants were asked to present the elements of the scenario and comment on their interest (assent) or disinterest (dissent).
- The second exercise was aimed at enriching the triggering scenarios presented in the introduction. Each participant had to imagine the logic of starting the scenario through an ideal family day in 2037 (which agenda, what life, work and entertainment experiences?).
- The last exercise, backcasting, was aimed at developing guides and possible scenarios to guide the Borough between 2017 and 2037 towards desirable futures.

Using the DKCP approach, participants were able to imagine new disruptive scenarios by moving away from local or current problems. The proposals also ventured well beyond the confines of traditional planning tools. Ideas emerged on how to better integrate the activities of certain institutions into the urban fabric. In many respects, travelling within the city was more understood as an activity unto itself, a source of fortuitous encounters, and a constraint that is experienced with difficulty by citizens. Some concrete ideas were proposed.

- A need to recognise and value social involvement in living environments: most people contribute to their community with daily actions which help their fellow citizens. Inspired by the idea of the 'Carbon Pass' and local currency proposals, this 'Social Pass' draws on good deeds performed by citizens in their neighbourhood in terms of social and community investments. In exchange for good deeds, points are accumulated which could become marketable at the Borough level since they contribute to its influence and also improve living conditions for citizens. Value would be attributed to points in order to motivate good actions.
- A need to consider the proliferation of 'circular' third places; inspired by the concept of the circular economy as a principle of local economic development, circular third places could be developed to encourage the development of innovative entrepreneurial initiatives in every living environment (e.g., repair cafes, tool libraries, textile micro-enterprises, urban agriculture, and so on). Some of these circular economy activities could be grouped into third places of various sizes to allow for economies of scale and to enable greater capacity for investment in specialised equipment (e.g. specialised Fab-Labs with 3D printing of spare parts, or highly productive and sustainable urban farms). In addition, third places registered in urban areas could be part of a network of specialised skills at the metropolitan level.
- A need to talk in terms of 'movement in the city' and experiential mobility, rather than transport or travel. Following Amar (2010, 2015), the 'speed-distance' paradigm, in which journeys between origin and destination are considered lost time, was discussed and criticised throughout the process. It was then picked up and supported by stakeholders during the codesign. The discussions often returned to the idea of promoting 'time-substance', i.e. transport time thus becomes a usable transition time, a resource to be exploited by users (take a pleasant walk, stopping along a route to work or play, meet with other people). This idea recognises the emergence of a population that seeks connection and experiential mobility, a form of everyday nomadism within cities. This drift is supported, even encouraged, by new technologies (and defines a way of thinking about 'intelligent mobility'). This trend could bring vitality to living environments (new passers-by creating surprises, an opening, meetings, bringing customers and users to the economic activities of communities and so on). It could also cause tension when there are conflicts of use, a new form of NIMBYism (e.g. when ephemeral nomadic gatherings occur in a living environment at a late hour or at the weekend).

5. Discussion: Tackling Future Urban Issues from the Perspective of a Set of Routines

For the majority of municipal organisations, the process of formulating creative ideas only focuses on one step in the process; represented by professional routine 'C'. An innovative process involves a much more complex path. Innovative design in large organisations (the 4th quadrant in Figure 1) is more of a succession of activities that predispose planners to discover a new set of routines. This new innovation process consists, in turn, of routines that are intertwined; as represented by the DKCP steps. They must be well coordinated to avoid the pitfalls that would either prevent discovery or prevent participants from moving into the other quadrants too quickly.

The first routine is that of definition: the 'D' routine. This is a necessary first step to fully understand opportunities available and imagine new spinoffs. It was at this stage that the team of researchers met with borough planners to identify various paths for exploring ideas.

The second routine is that of knowledge: the 'K' routine. Disciplinary decompartmentalisation is used to bring diversity of knowledge and disciplines (engineering, health sciences, arts, agribusiness, etc.) into the process so that the identity of planners' routines can be reimagined. This routine also involves identifying where a particular municipal organisation lacks expertise. More specifically, it involves seeing how other knowledge can help reopen pockets of knowledge that have been identified. For example, the notion of mobility does not only refer to the distance covered between two points, but by considering this distance as a moment to live a particular experience (Amar, 2010). Other new opportunities may arise if these two points are constantly in motion. Within the K routine it is also necessary to invite non-experts and to imagine cities through their future stakeholders.

The third routine is a design activity: the 'C' routine. This is a delicate and complex step. The urban planners were both surprised by the formulations of these scenarios and somewhat confused - they did not imagine being able to formulate them with such originality. Projector concepts must be formulated in terms which are sufficiently open to allow for the expansion of knowledge, and they must use relevant approaches for communication: scenario writing, representation through maps, illustrations in comics and so on. In the Montreal project, imagining the 'e-care zone' was a completely new, disruptive idea for the urban planners and citizens (and several participants also disagreed with the scenario). Projector concepts must also be described in understandable terms, otherwise citizen participation will be ineffective. Moreover, participant casting becomes a crucial issue. The time required to complete a proposed territorial project requires participants to set aside their short-term expectations. It follows, that individual paticipants must also be chosen according to their ability to 'expand' the knowledge mobilised in the urban project, not only on the basis of their representativeness.

These first three routines, D-K-C, also have a dimension that is specific to urban planning. Starting with the definition phase there is a need to deterritorialise knowledge (Scherrer et al., 2017). This does not suggest that we should ignore spatial or technical constraints, but instead suggests that we should move away from them temporarily, to better explore the 'field of breaks and possibilities' (Debarbieux, 2009; Klauser, 2012; Raffestin and Butler, 2012). If this is not done, spatial constraints can limit expansive thinking when they act as cognitive fixations (Hatchuel et al., 2011). These ideas are then recontextualised later in the process. In the case of the Montreal project, this recontextualisation step was an important part of the codesign project, but it only occurred once the participants had responded to the initial scenarios.

The fourth step is 'P', the routine of propositions. This is possibly the most important, underrated, forgotten, and complex step for urban planners. This is when it is determined what actions should be taken and their sequencing. It is the aspect that works to ensure that the most desirable scenario can be realised. This step of backcasting can, however, impede important changes that may occur along the way. In the Montreal project, participants had a mandate to imagine a major and potential event in 10 years' time that would require a reorientation of the scenario.

The last routine could be considered to be as binding as it is transversal to the process. In the case discussed here, it took the form of a seminar (held over several successive sessions, with each iteration enhancing previously generated knowledge). This stage allowed members of the project team to build their own knowledge, and they learned how to let themselves get caught up in the search for the unknown; even if it raised doubts about the predictability of their methods.

There are several ways to enrich existing routines:

- By improving the initial training of town planners, so that they learn how to use new methods or tools such as strategic foresight and innovative design (Scherrer et al., 2017). However, this type of process can take a number of years before the benefits become apparent.
- Providing continuous training for planners. This training could be provided in the form of courses or integrated into organizational routines. The seminar we organized in the municipal organization is an example of the latter.
- Establishing permanent soft infrastructures and places that host and manage ambiguous issues, explore unknowns and serve as an interdisciplinary platform. Examples of this include an urban laboratory within the municipal organisation.
- Using new and targeted methods, such as tactical urban planning (Mould, 2014; Silva, 2016), as a vehicle for experimentation and iteration. While iterations normally occur over very long cycles in urban planning, they can be accelerated through using such methods. The issue of referentials and tools for the evaluation of urban policies becomes key in this regard.

These new devices, and particularly tools such as seminars and tactical urban planning, can enable municipal organizations to develop much-needed endogenous organizational dynamics as a way to adapt to the rapid changes taking place in society. In addition, infrastructure, such as the urban innovation laboratory, makes it possible to ensure absorptive capacity (Cohen and Levinthal, 1990) whilst also further fostering urban planners' dynamic capabilities (Teece et al., 1997).

6. Conclusion: Implementing Disruptive Planning Routines

Urban planning is a discipline within the social sciences that is in constant turmoil. There is a need for municipal organisations and urban planners to renew their methods and develop their organisational functions.

Since Weber, municipal organisations have often been encouraged to assimilate the instruments and methods used in the private sector into their processes (Lascoumes and Le Galès, 2007). Such instruments exist, but learning how to exploit them in a municipal organisation may require support from a research group that can accompany this transition from public to private organisation.

The example presented here is only an experiment which was established in a particular context. It proved its usefulness by generating ideas that are at odds with the way urban planners usually approach urban planning. While the DKCP set of routines proved useful in regenerating urban planners' practices, the real ability of urban planners to implement each of the steps has yet to be demonstrated. Routines for defining innovation fields are easy to implement, but it is difficult to transform the disruptive scenarios inspired by these projector concepts into concrete projects. Urban planners still have difficulties mastering the design processes that would be necessary to bring these disruptive ideas forward.

Unlike private companies, a municipal organisation must demonstrate public accountability for the time and resources that it invests in innovation activities. A disinclination to take risks, the rigidity of organisations, and the challenges inherent in controlling the long time spans involved in urban projects are all obstacles that need to be overcome. The most effective way to reform would be for a municipal organisation, through its urban planners in particular, to promote innovative design approaches. The Montreal project is a first step in this direction.

The potential for scaling, i.e. transposing an experiment within a borough to the city as a whole, has yet to be validated. There is no guarantee that the scenarios presented in the framework of a smaller territorial unit could be applied on a metropolitan scale. Nevertheless, while they may need to be defined in broader terms, their effects in terms of regenerating the identities of objects will be just as effective.

We believe that innovative design approaches must be thought out and activated at all scales, including at the local scale. This step, which we started by activating actors at the neighbourhood scale, increases the chances that the proposed innovations can be more quickly adopted by citizens.

We must now move onto the next step and implement disruptive processes at various scales. We must accept that these projects are invaluable sources of learning for meeting current and future urban challenges. The integration of these divergent approaches could also lead to the emergence of a new professional identity for planners: the 'innovative planner', as opposed to the 'traditional rule-based planner'.

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EMERGING PLACES OF SOCIAL INNOVATION (POSI):

A CONCEPTUAL FRAMEWORK FOR SOCIAL INNOVATION IN CITIES

Nicholas Ardill[a], Fabiano Lemes de Oliveira[b]

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Abstract

Social innovation is recurrently positioned as an important collaborative element in helping cities to transition and address human needs and societal challenges to enhance the health, wellbeing, and welfare of citizens. To address a call for more sector-specific research on the spatiality of social innovation, and also further understanding of the process dimension of social innovation, this article presents a conceptual framework of the process of social innovation. By combining social innovation insight from process theories and urban spaces discourse the article indicates that of social innovation in the co-production of space can be grouped into four major processes: 1) Identification of human needs or societal challenges to sustainable development; 2) Development of social relations in systems or structures; 3) Provision of opportunity for social empowerment; 4) Reflection of socio-spatial development practice. Applying this framework, the article examines how productive green infrastructure emerges in the urban landscape as a Place of Social Innovation (POSI).

Keywords

Social innovation, co-production of space, places of social innovation, productive green infrastructure, healthy cities

a (Corresponding author) School of Architecture, University of Portsmouth, Eldon Building, Winston Churchill Avenue, Portsmouth, PO1 2DJ, UK. E-mail: nicholas.ardill@port.ac.uk

b Dipartimento di Architettura e Studi Urbani (DAStU), Politecnico di Milano, Via Bonardi 3, Milan, 20133, Italy. E-mail: fabiano.lemes@polimi.it

1. Introduction

Contemporary cities need to find more effective and efficient solutions to the societal challenges of climate change, immigration and demographic changes, inclusive public spaces, inequality, and healthcare (BEPA, 2011; European Commission, 2013; Frank, 2017). The field of innovation studies is well-placed to contribute to debates on urban transitions to tackle such challenges, but only when it considers the role of human agency in transforming built environments towards sustainable development (Geels and Schot, 2016). Presently, there is renewed attention on the role of social innovation in sustainable development, especially around how cooperation and participatory approaches to spatial development can build capacity for change (Ardill and Lemes de Oliveira, 2018).

There exist multiple meanings of the term 'social innovation' though it is broadly understood to encompass 'innovative activities and services that are motivated by the goal of meeting a social need' (Mulgan, 2006, p.146). In terms of collaborative approaches to addressing needs, participatory forms of urban growing have been emphasised in the search for socially innovative solutions to the social, economic, and environmental challenges of changing cities, whilst civil society and institution instigated growing projects have multiplied in recent times (Cunk et al., 2017). This socio-spatial process is reshaping urban landscapes, experimenting with alternatives to capitalist formations of urban environment (Harvey, 2012), and co-producing public spaces as sites of productive green infrastructure (Rosol, 2012). As a consequence, Places of Social Innovation are emerging in the urban landscape as a result of the co-production of space between multilevel stakeholders. The term 'Place of Social Innovation (POSI)' is defined here as the place-based process of urban change that takes place in the collaborative planning, design and delivery of public infrastructure that is both physical and social.

It has been argued that the process of social innovation performs a significant role in helping to integrate participatory mechanisms into urban decision-making processes, thereby increasing the social inclusion of disadvantaged groups, whilst also enhancing the resilience of urban areas and communities (Moulaert et al., 2005, 2010; Mehmood, 2016). Nevertheless, there have been few studies on the process dimension of social innovation that have investigated common patterns or aggregated learning (Mulgan, 2006), especially how it is 'designed, diffused and supported' (Caulier-Grice et al., 2012, p.33). Further research on social innovation spatiality is required to comprehend dynamics in social and urban change (Moulaert and Mehmood, 2011). This article contributes to the understanding of the social innovation process in the co-production of urban spaces. The article considers the topic of social innovation, and how participatory and collaborative processes may support the development of planning principles linked to healthier, more equitable built environments.

The article is based on a recently completed research project on 'Emerging Places of Social Innovation (POSI)' in which social innovation processes were analysed in the co-production of spaces across two cities in the United Kingdom. The six empirical case studies, three in each city, focused on different organisational levels of urban agency, innovation patterns, and the influence of contextual forces from micro to macro spatial scales. Through a cross-case comparison of the six cases, the conceptual framework proposed was tested and advanced by distinguishing and accounting for patterns of key processes. An openness to multi-directional movement was found to be important for social innovation processes, while shifting contexts suggested that key processes are potentially irregular and fluid depending upon circumstance. A case study from the project is presented in depth within this article in order to illustrate the primary characteristics of the proposed framework.

The structure of the article is as follows: Section 2 reviews current knowledge on the process of social innovation. In Section 3, a process framework is constructed for understanding social innovation in the co-production of space, which considers the various cooperative inputs that are necessary or possible from innovation participants. The research methodology based on multiple-case studies and process analysis with narrative explanation is outlined in Section 4, while an overview of a case of emerging POSI is presented in Section 5 using the proposed framework. Section 6 concludes the article with a summary and some final remarks.

2. The Process of Social Innovation

In this section a framework to investigate the process of social innovation in the co-production of urban space is proposed after reviewing three social innovation models put forward by Mulgan (2006); Moulaert et al. (2005, 2010); and Ayob et al. (2016). That is not to say, however, that these studies are the only processual models that are to be found across the broader field. For instance, Neumeier (2012) considers the process of social innovation from a rural development perspective, and distinguishes three stages: problematisation; expression of interest; and delineation and co-ordination to explain how capacity develops in addressing social problems. In turn, Benneworth and Cunha (2015) examine universities' contributions to social innovation, and propose a six-step model with two loops: first, the 'creating loop' where ideas are generated and demonstrated; and second, the 'up-scaling loop' of expansion and codification which drives social change. In contrast, Westley et al. (2007) explore social innovation as systems-changing and by applying complexity theory, identified seven stages from an innovators' perspective; from recognising social problems and injustices to seeing solutions succeed at the systemic level. For the purposes of this study, however, the selected models support an understanding of the social innovation process in the co-production of space by focussing on the ways in which innovation develops, socio-spatial dynamics, and collaborative approaches.

In the first model reviewed, Mulgan (2006) proposed a framework for the process of social innovation that was advanced by Murray et al. (2010) and other collaborators from the Young Foundation and NESTA UK (e.g. Mulgan et al., 2007; Bacon et al., 2008; SIX, 2010; Caulier-Grice et al., 2012), and identified six stages:

- Prompts, inspirations and diagnoses (which involves identifying and defining a need to be met)
- Proposals and ideas (the stage of idea generation and designing ways to deal with the identified need)
- Prototyping and pilots (where ideas get tested in practice through pilot projects with feedback from users and experts)
- Sustaining (when the idea becomes everyday practice)
- Scaling and diffusion (which involves developing a range of strategies for growing and spreading an innovation to a larger group or to other communities)
- Systemic change (so that it works on a broader scale by introducing entire systems)

Sustainable systemic changes in redesigning society through changes in the relationships that exist between institutions and stakeholders are positioned by policy advisors as being the principal focus of social innovation (Murray et al., 2010; SIX, 2010; BEPA, 2011; Baturina and Bežovan, 2015). Commenting further, Caulier-Grice et al. (2012) highlight that the innovation process proposed is iterative rather than linear, and that the model should be considered to be more like multiple spirals than straight lines. Therefore, it should not be assumed that initiatives will transcend all six stages as many will jump between or skip entire stages altogether. Some cases of social innovation 'remain small in scale and locally based, rather than attempting growth and scale, and very few social innovations effect or reach the stage of systemic change' (Caulier-Grice et al., 2012, p.34). It follows, that social innovation is understood broadly as the production of societal value in meeting social needs and creating new social relationships or collaborations to enhance society's capacity to act (Mulgan, 2006; Mulgan et al., 2007; Murray et al., 2010).

Another framework is the Alternative Model of Local Innovation advocated by Moulaert et al. (2005, 2010) to counter the social exclusion dynamics experienced at various socio-spatial scales. The model conceptualises social innovation dynamics which occur in interaction with each other over time, beginning with the deprivation of human needs across four areas: economic and/or material basic needs, such as food, clothing, shelter and employment; social needs of health and education; cultural needs of self-expression, identity and recognition; and political needs of equal opportunity and active citizenship (Moulaert et al., 2005, 2010). The deprivation of needs causes a reaction and the mobilisation of resources; recognised as human, social and institutional, organisational, and financial with mediation between stakeholders (e.g. civil society and state) in order to develop social initiatives which satisfy those human needs not currently being satisfied. This agency fosters processes of social changes in existing social and power relations towards inclusive and democratic urban governance systems to 'increase the level of participation of all but especially deprived groups in society' (Moulaert et al., 2005, p.1976). Consequently, previously excluded social groups are empowered through increasing the socio-political capability and access to the resources needed to improve rights to satisfaction of human needs and participation (Moulaert et al., 2005, 2010). Thus, social innovation is understood from

a radical perspective as the social and urban changes that achieve conditions of empowerment, and favour bottom-linked governance initiatives and inclusive infrastructure development, and 'explicitly refers to an ethical position of social justice' (Moulaert et al., 2005, p.1978).

The third model reviewed in this article is that drawn by Ayob et al. (2016). Examining how the concept has developed over time they argue that the social innovation process has 'five plausible routes through some or all of this process, all of which can be conceived of as social innovation' (Ayob et al., 2016, p.648). The five identified routes are:

- New forms of social relations lead to innovation
- Innovation leads to a restructuring of social and or power relations
- Innovation leads to utilitarian social value
- New forms of social relations lead to innovation which results in the restructuring of power relations (and thus societal impact)
- New forms of social relations lead to innovation, which creates utilitarian social value (and thus societal impact)

In doing so, the authors distinguish between two social innovation traditions and outcomes in social change. The first, seen as utilitarian, emphasises changes in aggregate individual utility. The second, considered more radical, 'sees social (and political) change occurring as a consequence of innovations in social relations' (Ayob et al., 2016, p.648). The authors proceed to draw similarities between co-production and the five social innovation pathways outlined through the common themes of:

- Collaboration (new forms of social relations)
- The generation of new ideas (innovation)
- Empowerment (utilitarian social value and/ or new forms of power relations)
- Societal change (societal impact)

The radical approach, termed 'strong social innovation', is suggested in this model to be strongly linked to co-production due to their shared emphasis on shifting power influences and dynamics between citizens and public institutions as a key component of this approach, notably through the engagement and empowerment of previously disadvantaged individuals and groups (Ayob et al., 2016).

The models outlined attempt to address different questions and develop their own viewpoints on social innovation process. Murray et al. (2010), building on the work of Mulgan (2006) and fellow collaborators, are interested by how innovations in the social field progress, and identified six stages 'that take ideas from inception to impact' (Murray et al., 2010, p.12). Whereas, Moulaert et al. (2005, 2010) examined what structural changes in social relations are happening, and make connections between urban governance, empowerment, and socio-spatial justice. Finally, Ayob et al. (2016) explored how social innovation has evolved, and in so doing linked pathways to co-production and shared actions in developing collaborative forms of social relations, leading to changes and societal impact. This article integrates these three models into a social innovation framework that encompasses the following three components: the development of the innovation, changes in socio-spatial relations, and collaborative agency. The article does so by defining a model of the social innovation process in the co-production of space involving four cyclical stages. Table 1 indicates how the stages of this model relate to the elements in the Murray et al. (2010), Moulaert et al. (2005, 2010), and Ayob et al. (2016) models.

Table 1: Relationship Between Different Stages of the Social Innovation Process in Models

Murray et al. (2010) How the innovation develops?	**Moulaert et al. (2005, 2010) What changes in socio-spatial relations are transpiring?**	**Ayob et al. (2016) How do collaborative actions cause change?**	**Ardill and Lemes de Oliveira, What is the stage of the social innovation process?**
Prompts, inspirations and diagnoses	Deprivation of human needs	New forms of social relations	Identification of human needs or societal challenges to sustainable development
Proposals and ideas	Mobilisation of resources	Innovation	Development of social relations in systems or structures
	Changes in social relations (and political relations)		
Prototyping and pilots	Empowerment	Utilitarian social value	Provision of opportunity for social empowerment
Sustaining		New forms of power relations	Reflection of socio-spatial development practice
Scaling and diffusion	Satisfaction of human needs and participation	Societal impact	
Systemic change			

Source: After Ardill and Lemes de Oliveira (2019)

3. Social Innovation Framework

The traditional linear process of technological innovation postulated that innovation always starts with research, is then followed by development, and ends with production and diffusion (Godin, 2006; Balconi et al., 2010). This model has been much criticised and fails to recognise that 'knowledge does not flow smoothly among different stages of the innovative process and among different organizations and institutions. Nor does it flow freely among geographical areas' (Balconi et al., 2010, p.7). Following Murray et al. (2010), this article proposes a framework for social innovation process based on iterative innovation processes, which allows for overlap, interaction and nonlinearity, as 'change needs to be understood through the iterative action of the processes and dynamics' (Van de Ven and Poole, 2004, p.317). While the individual stages are not necessarily linear or sequential, this article identifies four key stages in providing an analytical framework by which to think through all the activities taking place, the various agents involved, and the patterns which occur in the context of such innovation journeys (Rip, 2012). The proposed framework is visualised in Figure 1 as a circular process; the implication being that socio-spatial change is a constant activity. The following paragraphs in this section will describe key innovation stages and process dynamics.

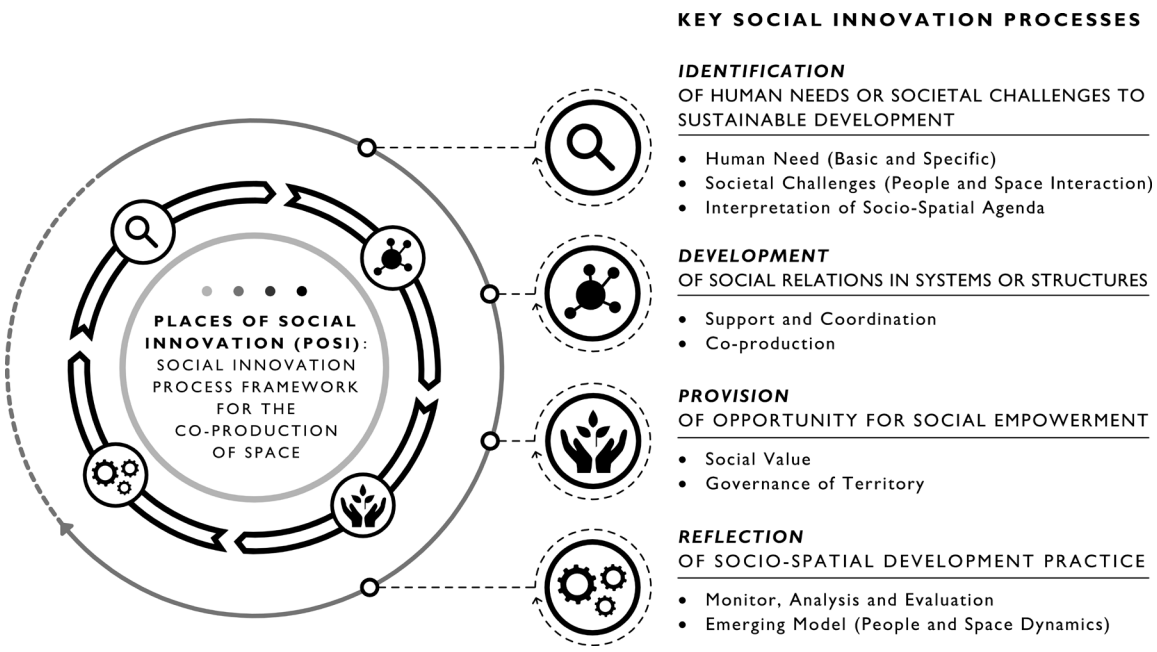


Figure 1 - Proposed Social Innovation Process Framework. (Source: Author)

The first stage: *Identification of human needs or societal challenges to sustainable development* involves prompts that highlight the need for innovation to address human needs or societal challenges (Murray et al., 2010; SIX, 2010). Human needs may include the basic or specific needs of individuals and groups. Maslow (1954) characterised the basic needs of physiological needs (e.g. food, clothing, and shelter), and safety needs as those pertaining to health and wellbeing, employment, and security. In contrast, societal challenges viewed from a sustainable development perspective are directed towards society as a whole and are recognised as major concerns that are shared by all citizens (BEPA, 2011; Baturina and Bežovan, 2015); especially uneven development, health, and climate action (Grimm et al., 2013). These challenges are highlighted by people and space interactions. Long-standing and emerging urban problems are brought into focus by an experience or event, or through the research and interpretation of a socio-spatial agenda by initiators of the innovation (Murray et al., 2010). This process involves diagnosing unmet needs or challenges by understanding the contextual dynamics which affect a given situation in order to frame opportunities and constraints (SIX, 2010). From the identification of needs, an idea for a solution is generated. Data gathered is synthesised as findings, and made into a persuasive argument to stakeholders affected by the innovation that the solution proposed can be effective, and a defined brief with strategic objectives and directions is set out (Torresa, 2017).

The second stage is the *Development of social relations in systems or structures*. A multitude of stakeholders will typically be engaged in this stage (e.g. the stakeholder that has identified the need or challenge, and other stakeholders that are interested in, or might directly benefit from, addressing the specific socio-spatial agenda). Generating cross-sector support and coordination is valuable here to mobilise the resources needed to work on the social innovation solution, and the co-production approach presents a way of collaborative working (Boyle and Harris, 2009; Voorberg et al., 2014; Ayob et al., 2016). The setup of a coalition and supportive structures to further develop the innovative solution (Murray et al., 2010) and the creation of a protected space for experiment is a significant feature of this process (Rip, 2012). This stage is aided by innovation intermediaries, such as agents and organisations which create opportunities and spaces (e.g. social, economic, and physical) through facilitation, configuring, and brokering activities to create relationships to support the innovation (Stewart and Hyysalo, 2008). Furthermore, the contribution of civil society through social entrepreneurship and social enterprise (Mulgan et al., 2007; Phills et al., 2008; Howaldt et al., 2018) aligned with state steering to coordinate processes of social innovation) creates the conditions required for hybrid partnerships to emerge (Baker and Mehmood, 2015; Nicholls et al., 2015). New coalitions comprised of public, private, and social participants in the organisation of development (Noworól, 2013) contribute to the rearrangement and restructuring of existing social relationships (Mumford, 2002; Moulaert et al., 2005). As such, the use of embedded resources and assets is a way of engaging a range of stakeholders in the co-design and development of solutions (SIX, 2010; Caulier-Grice et al., 2012; Manzini, 2014), whilst design-based approaches fusing design-thinking can progress and shape the idea (Brown and Wyatt, 2010; Manzini, 2015). To help ensure that needs are met, collaboration amongst the stakeholders contributing to the development of the social innovation solution is significant (Voorberg et al., 2014).

The third stage: *Provision of opportunity for social empowerment* is where a socio-spatial initiative is implemented, and seeks to create openings to enhance society's capacity to act in a changing environment (Murray et al., 2010; BEPA, 2011; Grimm et al., 2013). This involves generating social value, both to disadvantaged groups and society as a whole (Phills et al., 2008; Ayob et al., 2016), and through increasing participation in multilevel urban governance structures increases access to resources (Gerometta et al., 2005; Moulaert et al., 2005; Evers et al., 2014; Ayob et al., 2016; Brandsen et al., 2016). In this stage, opportunities for community development are enabled through inclusive practices and social engagement which encourage active citizenship to help meet needs (Davies and Simon, 2013; Mehmood and Parra, 2013; García et al., 2015). In this regard, social learning activities, where people can learn from each other collectively rather than through isolated individual activities (Reed et al., 2010) increase community capacity through the development of new skills and help to construct more resilient communities (Pol and Ville, 2009; Manzini, 2015). This capacity-building is important to contribute to sustainable place making and the promotion of sustainable development (Mehmood and Parra, 2013; Baker and Mehmood, 2015). In this process, improving access to urban resources helps to build capacities (TEPSIE, 2014), whilst changes in group-decision making and power relations create new socio-political capabilities, and enhance people's control over their own lives to support socio-spatial inclusion and justice (Moulaert et al., 2005, 2010; MacCallum et al., 2009).

The fourth stage connecting the process cycle is *Reflection of socio-spatial development practice*. This stage involves considering the measures of the success of the initiative (SIX, 2010; Bund et al., 2015), as well as the processes of selecting, developing, and prescribing a model of standardisation. The activities of demonstrating, refining, and testing ideas to obtain feedback from users and specialists in order to evolve solutions and maximise impact are important to learning (SIX, 2010; Torresa, 2017). Through iteration, conflicts can be resolved, and coalitions gather strength (Murray et al., 2010). This, in turn, supports ongoing 'infrastructuring' processes in enabling participation in spatial development and embeds stakeholder relations, networks, and resources (Hillgren et al., 2011; Björgvinsson et al., 2012). Here, the adaption of the idea and sustaining the initiative through use of evidence and identifying further resources is necessary if the innovation is to be carried forward (Murray et al., 2010; SIX, 2010). In this stage, the spreading and sharing of the solution through diffusion and emulation occurs (Murray et al., 2010; SIX, 2010; Caulier-Grice et al., 2012). It follows, that the provision of support and know-how from one organisation or place to another is significant to open knowledge advancement (Murray et al. 2010; Chesbrough et al., 2014; TEPSIE, 2014). This is necesary to move innovation from a community level to a widespread solution. It is important here to identify how an initiative can be imitated in other contexts so that it can provide solutions in in new situations and places (Windrum et al., 2016; Torresa, 2017).

4. Research Design and Methodology

A processual approach is employed as the study investigates how innovation processes transpire and evolve in the production of Places of Social Innovation (POSI) between multilevel stakeholders in urban environments. The strategy of a longitudinal and comparative case study complements the research focus. It enables the tracking of innovation processes across several scales and chronologies, enhances pattern recognition, and facilitates the identification of relationships (Van de Ven and Poole, 2004, 2005). Moreover, the multiple case study design supports cross-case comparison and the triangulation of results (Yin, 2009).

Six cases of green infrastructure as emerging POSI were examined across two UK cities: Brighton & Hove, and Portsmouth. Three cases were selected from each city with one case for each urban stakeholder level: bottom-up residents; intermediate non-governmental organisations; and top-down local government institutions. This strategy builds upon the recommendations of Pettigrew (1990) to use 'polar types' and 'extremes' (e.g. conditions within cities), and Flyvbjerg's (2006) suggestion of 'maximum variation' (e.g. type of stakeholder) to obtain information about the significance of various circumstances for case process and outcomes. Furthermore, two-pairs of three cases provides a practicable method to support basing wider conclusions in relation to the requirement for depth of process data and external validity (Van de Ven and Poole, 2004; Langley et al., 2013). The cases under study transpired between 2008 and 2018 and are summarised as follows:

> *Racehill Community Orchard:* A Brighton & Hove-based food advocacy organisation partnered with permaculture specialists to develop the largest community orchard within the city at 1.30 hectares. As an exemplar project, it served as a template for 'Harvest Brighton & Hove', a development programme that produced over 50 growing spaces citywide.
>
> *The Bevy Edible Garden:* A residents' co-operative in Brighton & Hove transformed the site of a former public house into a community owned hub and social enterprise; comprising several productive green spaces interlinked with a community cafe and training kitchen.
>
> *The Keep Community Orchard:* This Brighton & Hove City Council development was integrated with an archive centre for East Sussex. As a precedent for urban planning, the aim was to test innovative approaches in helping the city find ways to transition towards sustainable development. The development influenced the adoption of planning policy to support urban growing.
>
> *Southsea Greenhouse:* This resident led development in Portsmouth started at a seafront concession before transforming wasteland within a park into a community run social enterprise comprising productive green spaces. Residents formed a co-operative and sold shares in the community owned venture.

Charles Dickens Orchard Trail: A Portsmouth-based environmental organisation developed a productive landscape and heritage walking trail to connect deprived neighbourhoods within a highly urbanised centre. Co-design with the local authority assisted its spatial planning and configuration.

Stacey Community Orchard: This Portsmouth City Council initiative transformed an area surrounding a community centre into a demonstration space for food growing in small urban spaces. Central Government funding from a 'Healthy Towns' programme was used to trial innovative ways of tackling obesity by changing resident behaviour to live healthier lives, leading to the development of 11 community growing spaces across Portsmouth.

In order to seek triangulation of data through analytical stages and support theory-building (Yin, 2009; Creswell, 2014), the data collected in this study was based on multiple information sources. A selective 'information-oriented' approach to gathering data was employed (Flyvbjerg, 2006). Data sources comprised: semi-structured interviews with key informants within each case; content analysis of archival documents; and participant observation of innovation activities and environments.

The approach to qualitative data analysis used process-based methods that were complemented by a thematic mode of enquiry. This engaged a conceptual framework developed through a literature review with processual measures and narrative explanation derived from Pentland (1999), in combination with a data-driven inductive approach to identify emerging themes from Braun and Clarke (2006). An iterative sequence of interpreting and translating empirical data is summarised as follows:

Case narratives: rich text narratives are constructed by outlining chronological sequences of events and use of plot structures to handle data in an accessible manner with each case sequence produced from data gathering;

Data coding: coding integrates preconceived theory driven codes directed by the conceptual framework with emerging data driven codes (Fereday and Muir-Cochrane, 2006);

Within case analysis of key social innovation process: A study protocol of common questions derived from the conceptual framework is examined within each case narrative. This structured procedure enables a concentrated assessment and comparison of key innovation processes (Yin, 2009);

Visual narrative mapping of individual cases: positions case events and activities across space and time. Mapping offers concise conclusions to individual case narratives whilst preparing the ground for cross-case analysis and pattern searching in innovation activities across the cases;

Pattern recognition across cases: distinguishes and explains patterns of key social innovation processes in the co-production of POSI across the cases by comparing case sequences to advance the conceptual framework; and

Analysis of multiscalar contextual forces: classifies multiscalar influences on innovation processes at three contextual scales: neighbourhood, urban system, and national system, and incorporates themes within the case studies and insights from the literature to position and separate information into different groupings.

5. Towards Emerging Places of Social Innovation (POSI)

This section presents an overview of a case of emerging POSI, the Racehill Community Orchard in Brighton & Hove, UK, in order to illustrate the principle characteristics of the proposed framework. The section starts by introducing the organisation involved in the development of social innovation presented. Then, key processes are distinguished through employing the analytical framework outlined in this article. Thereafter, and to conclude, a graphic visualisation of the analytical framework as applied to the case is presented at the end of the section in Figure 2.

5.1. Case Background

The Brighton & Hove Food Partnership (henceforth the Food Partnership) was formed in 2003 due to the identified need for a partnership approach to integrate sustainable urban policy, agency, and change. It emerged as an umbrella non-governmental organisation within Brighton & Hove connecting cross-sector stakeholders to form a participatory and strategic approach to developing a holistic food system. The organisation is embedded in the city with over 4,000 members and links food policy with initiatives within public health, education, community development, land use, urban planning, and sustainable development.

'Harvest Brighton & Hove' was an innovative citywide programme instigated by the Food Partnership from 2009-2013 to develop local food projects. Altogether, Harvest supported the development of 54 new growing projects across the city, and transformed 1.19 hectares of urban land into productive green infrastructure. As a Harvest exemplar, the Racehill Community Orchard (henceforth Racehill Orchard) was the most significant community growing space to be developed with permission to grow to 1.30 hectares and is the largest orchard in the city. Contextually, the Whitehawk estate which borders the Racehill Orchard was, in 2015, the most deprived area in the city and the 332nd most deprived area in the United Kingdom, placing it just outside the bottom one percent (Brighton & Hove City Council, 2015).

5.2. Identification of Human Needs or Societal Challenges to Sustainable Development

At a national level, the Cabinet Office Strategy Unit (2008) review into the United Kingdom's food policies, emphasised societal challenges to meeting needs concerning economics, equity, and the health and safety of citizens. Previously, the Department of Health 'Choosing Health' (2004) report had identified local community food initiatives as an instrument to support behavioural changes and reduce health inequalities. The Food Partnership likewise recognised the social utility of community food initiatives to meet specific local needs whilst also helping to address wider societal challenges. Within Brighton & Hove, there was a contextual need to reduce inequalities to help realise a more 'just city', especially in relation to health. This approach to urban planning supports the moral and theoretical arguments made by Fainstein (2010) with regards to identifying the need for greater social justice and equity in urban spaces. For instance, the Annual Report of the city's Director of Public Health (2006) highlighted the challenges of growing health inequalities, and deprived wards having a life expectancy of up to five years below more affluent wards in the city (Brighton and Hove City Primary Care Trust, 2006). Furthermore, geospatial data exposed a social equity divide between rich and poor within Brighton & Hove (OCSI, 2007); bringing to light a socio-spatial injustice and prompting social innovation.

The Food Partnership interpreted the opportunity presented by the Local Food Fund (2007-2013) to develop an integrated citywide approach to make locally grown food more accessible and build material, personal, and cultural capacity to develop the overall capacity and resilience of communities involved (Local Food, 2012). In preparing their bid document, the Food Partnership organised meetings with members and partners, including Brighton and Hove City Council (henceforth the City Council) and Brighton and Hove Primary Care Trust, to jointly develop the proposal's aims, and outcomes, as well as the delivery of initiatives. The specific need for community growing spaces was demonstrated by a strong interest in local food, and its impact on the environment and health. The collaborative project development, between the Food Partnership and Harvest partners within the local system representing the identified beneficiaries, demonstrated a strategic approach to addressing needs and consultations with those potentially affected by development were significant to identifying a cohesive strategy. Harvest aimed to benefit residents citywide whilst also ensuring that areas of socio economic disadvantage would especially gain from interventions to address poor access to fresh food, high incidence of poor health, and lack of access to urban resources. As such, the Racehill Orchard Harvest exemplar was developed within the deprived Whitehawk neighbourhood of East Brighton because the high-density estate was identified as a location experiencing social need and it would enable more residents to participate in urban growing.

5.3. Development of Social Relations in Systems or Structures

Collaboration with other Brighton & Hove stakeholders through partnership working was central to the case, helped to strengthen and develop new or existing relationships within the local system, and was aided by

multilevel intermediation between network groups and people across issues and communities. For instance, a cross-sector advisory committee for the Racehill Orchard aided project partners in organising the co-production of space and ensured that interested parties were democratically represented. The participatory framework enabled a co-design process to promote a sense of community ownership and helped to collectively develop a spatial and programmatic brief. To undertake linking, the Food Partnership operated across multiple levels. They brokered top-down support from the City Council to access resources and develop strategies to ensure long-term support for Harvest's aims. In addition, they configured and multiplied their practitioner agency with other non-profit organisations through sharing resources and expertise in developing green infrastructure to realise more effective production than that which would have occurred by working independently, whilst also engaging bottom-up residents with neighbourhood growing projects to embed social practices and behavioural changes.

As a Harvest partner, the City Council provided organisational support by facilitating public land access and recognising the social value of citywide development, especially to deprived areas whilst also adhering to its strategic urban policy as part of its commitment to food growing and sustainable development. For example, the Sustainable Community Strategy (2006) aimed to increase land available for food growing, the City Food Strategy (2006) sought to increase growing opportunities, while the updated Food Strategy Spade to Spoon: Digging Deeper (2012) had the objective that 'more food consumed in the city is grown, produced and processed locally using methods that protect biodiversity and respect environmental limits' (Brighton & Hove Food Partnership, 2012, p.14). A 15-year land agreement for Racehill Orchard was also significant to the case. The implications of this secured agreement meant that it helped to sustain the initiative whilst also serving as a model for shared governance between the City Council and community groups for other Harvest growing spaces on public land which were later developed. As such, learning generated by Harvest enabled the Food Partnership to create a template for future community agreements with the City Council that outlines roles and responsibilities for each partner, maintenance arrangements, and conditions for governing areas of public green spaces.

5.4. Provision of Opportunity for Social Empowerment

Harvest increased the amount of food grown in the city by developing more community growing spaces and increasing the number of people involved. Through so doing, the programme supported community development as a means by which to meet urban needs and address inequalities. Material capacity was increased by developing physical infrastructure and improving public access to green space; these facets were complemented by educational opportunities that built personal capacity. Here, Harvest facilitated community development through training workshops, skills-sharing and open days which were delivered citywide to residents, often in community growing spaces; thereby supporting engagement. Consequently, confidence was built in food growing and developing abilities in running growing projects to help embed productive green infrastructure.

The Racehill Orchard demonstrates how opportunities were provided to residents within deprived East Brighton to contribute to their own personal development and social empowerment. For example, through Brighton Permaculture Trust, an organisation which promotes sustainable development through design, and training residents in traditional agricultural techniques including scything, tree and hedgerow planting, pruning, and caring for fruit trees. The social value of these opportunities enhances communities' capabilities and volunteers can be trained in leadership skills through a session leaders' course; helping to devolve organisation and diffuse knowledge. This approach to social behavioural change supports community empowerment through enhancing neighbourhood capacity to act, improves resident access to skills and resources, and helps growing projects to become self-sustaining.

The importance of increasing urban participation, especially amongst groups excluded from the built environment was, in some form, central to meeting Harvest's aims. At Racehill Orchard, free activities and events target people living on the deprived estate. Regular 'Healthy Activity Days' involve health walks, foraging events, pick and cook sessions, and other activities which promote healthy lifestyles and behaviour. The production of green infrastructure in bringing new land into food production, providing community events to build capacity, and improving the access to resources of specific target groups is reinforced by enabling public

access and rights to urban space. As such, the observed 'right to the city' being supported in this case connects to the arguments made by Lefebvre (1991) and Harvey (2012) for spatial justice and increased citizens' rights over urban spaces. Moreover, cultural capacity was developed here through public engagement and territorial appropriation to give residents a sense of connection with their urban landscape. Accordingly, it is significant to the 'social production of space', where space operates as both a product and a producer of changes in the urban environment (see, for example, Lefebvre, 1991; Soja, 2010).

5.5. Reflection of Socio-Spatial Development Practice

The citywide development was an architype for practitioner based social innovation. Harvest's integrated approach across multiple levels helped diffuse social innovation and generated a territorial infrastructure in relations, networks, and resources. The measure of social innovation success in terms of developing capacity in Brighton & Hove was evidenced by community growing spaces tripling from 25 to 79; thereby helping to diffuse ideas and behaviours whilst also amplifying the visibility of social practices. By undertaking Harvest, the Food Partnership helped to improve distributional justice by accessing new land for urban community growing, with many projects located in housing estates, public parks, church yards, and railway stations; increasing the public visibility of growing practices.

Central objectives of the Harvest experiment for the Local Food programme were to share experience and knowledge of the project's approaches to increasing food production, and to disseminate learning that could be replicated in other cities, both within the United Kingdom and internationally. This was undertaken in several ways: establishing a Reference Group to enable parties to learn from the experiences of nationwide projects; visits from other Local Food Fund Beacon Projects to demonstrate Harvest activities; attending international conferences on planning and food systems to exchange thinking; the Local Food 'Share and Learn' networking events and the national evaluation event 'More than just the veg' in 2012; and distributing reports on Harvest to influence policymakers by demonstrating outputs.

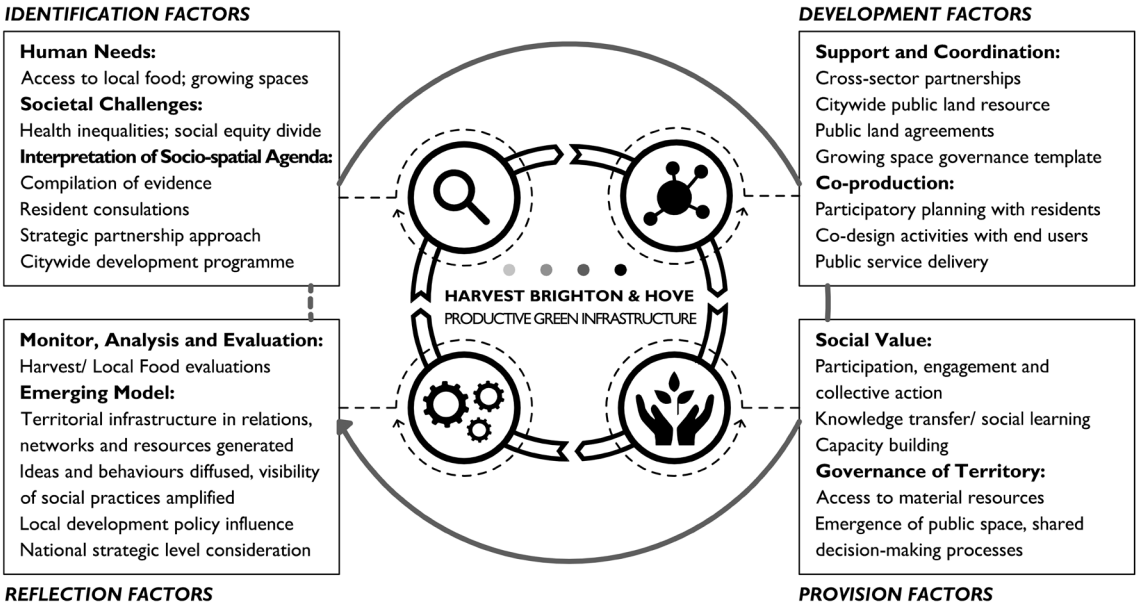
Locally, dissemination was supported by the innovativeness of the Food Partnership's intermediation between bottom-up and top-down levels of urban stakeholders. Grassroots working helped to mobilise an urban social movement of community growers and develop a network of growing spaces, whilst engaging local decision-makers helped to influence planning and development policy in addition to attracting the attention of national policy makers. To embed good practice into local planning, Harvest supported the successful lobbying to include references to food growing within several policies of the Brighton & Hove City Plan Part One (2016) and the City Sustainability Action Plan (2015). This set key actions for Brighton & Hove to develop productive green infrastructure as part of its commitment to sustainable development.

IDENTIFICATION
OF HUMAN NEEDS OR SOCIETAL CHALLENGES TO SUSTAINABLE DEVELOPMENT

- *Department of Health 'Choosing Health' (2004) report*
- *Cabinet Office Strategy Unit (2008) review into UK food policy*
- *Big Lottery Local Food Fund launched to increase communities access to local food and develop capacities (material, personal, cultural)*
- *Brighton & Hove Food Partnership formed 2003*
- *City Food Strategy (2006) adopted by Brighton and Hove City Council*
- *2006 Annual Report of the Brighton & Hove Director of Public Health highlights growing health inequalities*
- *Harvest bid evidence compilation. Need for community growing spaces and social equity divide exposed in Brighton & Hove*
- *Harvest citywide stakeholder consultation, project development*
- *Big Lottery Local Food Fund Beacon grant bid*
- *Harvest Exemplar Racehill Orchard development community consultations in Whitehawk deprived neighbourhood*

DEVELOPMENT
OF SOCIAL RELATIONS IN SYSTEMS OR STRUCTURES

- *Harvest Brighton & Hove cross-sector project partners formation*
- *Public land made available in the city for citywide food growing spaces development*
- *Proforma community food growing space governance template for Brighton and Hove City Council land use created*
- *Harvest Exemplar Racehill Orchard delivery partnership with Brighton Permaculture Trust*
- *Harvest Exemplar Racehill Orchard cross-sector advisory committee formed to organise development*
- *Racehill Orchard co-design activities with residents*
- *Racehill Orchard 15-year land agreement with Brighton and Hove City Council*



REFLECTION
OF SOCIO-SPATIAL DEVELOPMENT PRACTICE

- *Reference Group established by Food Partnership to share Harvest learning of urban food growing projects, visits to and from other cities involved in urban growing*
- *Local Food 'More than just the veg' evaluation event*
- *Harvest evaluation report produced by Food Partnership*
- *House of Commons Oral evidence by Food Partnership on Harvest and local food systems*
- *Brighton and Hove City Plan Part One (2016) includes references to space for food growing in Brighton & Hove*
- *City Sustainability Action Plan (2015) sets key actions to develop productive green infrastructure in Brighton & Hove*
- *Sustainable Food Cities UK Network formed*
- *Food growing and planning learning exchange with Sustain to develop local authority guidance on food growing spaces*
- *'Orchards without Borders' transborder programme collaboration in France to share learning and develop community orchards*

PROVISION
OF OPPORTUNITY FOR SOCIAL EMPOWERMENT

- *Over 50 community food growing spaces developed citywide*
- *Improved public access to urban green space and governance opportunities*
- *1.19 hectares of urban land transformed into productive green infrastructure, new land accessed for food growing*
- *Increased number of residents involved in urban food growing projects to approximately 4,000 residents annually*
- *Harvest citywide community development training programme workshops, skills sharing and open days*
- *Racehill Orchard horticultural training events*
- *Racehill Orchard Healthy Activity Days to promote lifestyle and behavioural changes*
- *Racehill Orchard session leader training opportunities to diffuse knowledge to residents to deliver community activities*

Figure 2 - Application of Social Innovation Framework. Populated with Harvest Brighton & Hove urban growing programme. Key innovation process factors highlighted in boxes and case dynamics bulleted. (Source: Author)

6. Conclusion

This article was interested in the agency of social innovation in supporting a health orientated built environment and has taken the perspective of how social innovation can contribute to the process of creating capacity to meet human needs and respond to societal challenges. Social innovation has gained attention in the promotion of active citizenship in sustainable development policy and practice, especially around collaborative service delivery and novel approaches to welfare (BEPA, 2011). The socially innovative development of productive green infrastructure is of interest as a participatory concept that can meet needs, create social relationships, and form new collaborations. However, as a process this innovative approach does not end with the development of a growing space. Like cities, it needs to continuously evolve in order to meet the challenges of affecting changes in social structures and systems with regard to participation in decision-making processes, social inclusion, and sustainable urban development (Cunk et al., 2017).

To comprehend social innovation dynamics in the co-production of urban space, a conceptual framework of social innovation was presented in this article. An advantage of this framework is that it has provided a basis for understanding how processes of social and urban change have occurred. Especially, in analysing how urban space is collaboratively produced by social interactions between multilevel participants throughout the social innovation process in a more just way to promote health and reduce built environment inequities.

In order to contribute some insights on the roles of social innovation in the process of an emerging POSI an overview of a case study of productive green infrastructure was presented: Harvest Brighton & Hove. The case comprised the collaborative planning, design, and delivery of a socially innovative development programme in the city of Brighton & Hove, United Kingdom, which sought to deal with challenges of health inequalities and equity divisions. The problems identified were; a lack of urban growing projects to meet needs, a need to increase training to build capacities, and a lack of coordination between community projects to function as networked infrastructure. The innovation solution put forward was a citywide food growing project that could be co-produced through an approach linking stakeholders. This developed new community growing initiatives to improve access to local food, especially within deprived areas. Harvest Brighton & Hove supported communities to grow and eat more local food, by developing skills and confidence, and helping to find more land for food growing. As such, the integrated development model presented an approach that improved access to local food, as well as increasing the land available and the number of people involved in urban growing.

Lastly, this article has contributed to enhancing understanding of processes of social innovation, by presenting the development of a conceptual framework from a cross-case comparison of six case studies. Further application of the model to other case studies would help advance the debates on 'Emerging Places of Social Innovation' (POSI). This could involve additional exploration of patterns in stakeholders' innovation agency within a multiscalar and structured environment. In addition to documenting the actions of urban stakeholders through case narratives and visual mapping to ascribe key innovation processes, there is a need to focus on the influence of various contextual forces at micro to macro scales catalysing and inhibiting this agency across space and time.

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THE CIRCULAR ECONOMY IN URBAN PROJECTS:

A CASE STUDY ANALYSIS OF CURRENT PRACTICES AND TOOLS

Federica Appendino[a], Charlotte Roux[b], Myriam Saadé[c], Bruno Peuportier[d]

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Abstract

Over the last decade, the concept of the circular economy (CE) has gained momentum among practitioners, politicians, and scholars because of its promise of achieving sustainability goals. However, there is still a need to demonstrate and assess the positive environmental impacts of the CE. With respect to the building sector, the CE is still a relatively new topic. To date, research has tended to focus primarily on the macro-scale (cities or eco-parks) and the micro-scale (manufactured products or construction materials). Nevertheless, the often-neglected built environment is also expected to play a crucial role in the transition towards a CE due to its high contribution to various environmental burdens. This paper contributes to this growing area of research by reviewing four cases of 'circular neighbourhood' projects in Europe. First, a conceptual framework analysis is defined and applied to the cases. Second, CE initiatives and actions are identified and classified using interviews and document analysis. Third, the use of assessment tools within these CE projects is investigated. The results demonstrate a diverse representation of the CE paradigm and the growing role played by the assessment tools.

Keywords

Circular economy, life cycle assessment, urban project, circular neighbourhood

a (Corresponding author) ESPI Paris – ESPI2R and Lab'Urba Laboratories. E-Mail: f.appendino@groupe-espi.fr

b Ecole des Ingénieurs de la Ville de Paris - Lab'Urba Laboratory. E-Mail: charlotte.roux@eivp-paris.fr

c Université Gustave Eiffel – EMGCU Laboratory. E-Mail: myriam.saade@univ-eiffel.fr

d MINES ParisTech, PSL Research University, CES - Centre for Energy efficiency of Systems.
E-Mail: bruno.peuportier@mines-paristech.fr

1. Introduction

Over the last 10 years, the concept of the circular economy (CE) has gained momentum in politics, business, and academia (Kampelmann, 2016; Reike, et al., 2017) as a means by which to overcome the contradictions that exist between economic and environmental prosperity (Geissdoerfer et al., 2017). The current economic model, characterised as 'linear' and based on a 'take-make-consume-throw away' approach of resources, is reaching its limits. In contrast, the CE forms an "economic system of trade and production which, at all stages of the product lifecycle, aims to increase the efficiency of resource use and reduce the impact on the environment, while developing the well-being of individuals" (ADEME, 2014, p.4). For these reasons, the CE already represents a core theme of major European plans and regulations (Petit-Boix and Leipold, 2018), such as the 'Circular Economy Package' adopted in 2015.

Today, several disciplines ranging from economics to urban planning are studying CE and how it can interact with, and contribute to, sustainable development issues (Kirchherr et al., 2017). However no univocal or shared definition of CE has yet been developed, despite wide dissemination of the concept (Prieto-Sandoval et al., 2017). CE constitutes an evolving notion (Merli et al., 2018), which is rather ambiguous and vague (Korhonen et al., 2017), and whose potential 'still needs to be unlocked' (OECD, 2020).

The built environment, given its important contributions to several environmental issues, is supposedly one of the main targets of CE strategies (Norouzi et al. 2021). However, scientific literature on the subject remains limited (Adams et al., 2017; Bocken et al., 2017), and concrete applications of the principle have so far only been slowly implemented (Adams et al., 2017; Pomponi and Moncaster, 2017; Densley Tingley et al., 2018). The CE is mainly understood as waste recycling and management (Ghisellini et al., 2018), and the potential effects of its implementation at an urban scale have been poorly investigated (Haupt et al., 2017). In addition, little consensus exists with regards to how best to approach and deal with this concept in the building sector, whilst the knowledge and tools required to enact it have yet to be developed (Leising et al., 2018).

The international scientific community has called for a better understanding of the roles played by the built environment in translating the CE concept into action. There is also a need to demonstrate and assess the environmental impacts of such translation. Implementing CE initiatives not only generates potential benefits, but also a number of environmental risks. 'Closing the loop' does not always positively affect the environment, and therefore 'circularity' should be assessed with relevant indicators (Kampelmann, 2016; Petit-Boix and Leipold, 2018). The CE is supposed to be not an end *per se*, but a means to an end as it provides tangible opportunities to do 'more with less' (OECD, 2020) and it is necessary to ensure implementation of the most environmentally relevant initiatives. For this reason, the application of systemic methods and tools corroborating the environmental relevance of the CE applied to the built environment is now required (Haupt and Zschokke, 2017; Haupt et al., 2017).

This paper explores how CE is (or plans to be) implemented at the neighbourhood scale, and which assessment tools are used. In the following sections, this paper provides an analysis of four 'circular neighbourhood' projects located in Europe. The next section briefly summarises the debate within existent literature pertaining to the CE in the built environment. Thereafter, the third section describes the methodology used in this study, whilst the fourth section presents the analysis of the case studies. The fifth section compares and discusses the main findings of this paper. Highlighting a diverse representation of the CE paradigm in urban projects corresponding to a wide range of practices, our analysis stresses the importance of assessing circular practices. Thereby it points to the need for adequate tools to avoid the implementation of actions promoted as circular, but potentially leading to environmental burdens.

2. The CE in the Built Environment: Fom the 'Circular City' to the 'Circular Neighbourhood'

The CE approach has gained momentum in the field of urban sustainability. Several studies, as well as some international meetings, have investigated the roles that the CE can play in ensuring the more sustainable

development of cities. References on the subject are growing (Cities Foundation, 2017; Ellen MacArthur Foundation, 2017; Prendeville et al., 2018). From existent scientific literature, Pomponi and Moncaster (2017) identify three scales of CE deployment: the 'macro scale' of cities, the 'meso scale' of buildings, and the 'micro scale' of construction elements. Academic research has so far consistently focused on the macro scale, through the assessment of urban metabolism and eco-parks, as well as on the micro scale; particularly materials and building components. The meso scale remains, however, poorly investigated.

Considering their pressures on the environment, urban research on the CE has focused on 'circular cities'. Several cities, such as Berlin, Rotterdam, Paris, London, Milan, and Amsterdam have recently adopted strategic plans and are launching specific actions and projects to make their economies more circular. For instance, in 2014 the City of Amsterdam adopted The Circular Metropolis Amsterdam 2014–2018, a strategic document which aimed to transform the city into a competitive and sustainable European metropolis. This document, which comprises part of the Amsterdam Smart City initiative, relies on the City Circle Scan approach and identifies areas where major CE progress can be made. Based on this tool, Amsterdam decided to focus on the construction sector as well as the organic production and biomass sectors. In addition, Amsterdam became a Fab-City in 2016; part of an international initiative which brought approximately 20 cities together with the goal of their becoming self-sufficient. Similarly, the City of Rotterdam also launched its 'Smart City Initiative', characterised by a great focus on the transition to a CE. The main objectives on the topic are outlined in the Roadmap Circular Economy Rotterdam adopted in 2016. The actions proposed sought to ensure the city's sustainable and circular development by 2030 and are based on the results of the Rotterdam Metabolism study which provided a comprehensive picture of urban flows. Rotterdam's CE strategy focuses primarily on the city's port area and the implantation of biosourced projects (Prendeville et al., 2018). In 2017, London and Paris also developed guidance documents. Following the 2015 General Assembly of the Circular Economy, Paris adopted its first Circular Economy Plan 2017–2020 and its operational roadmap. London similarly published a Circular Economy Route Map, which contains actions involving the construction, food, textile, plastic, and electrical industries. A complementary economic analysis estimated at £2.8bn the benefits of the CE in terms of wealth creation and employment. Initiatives and actions, such as those outlined above, are multiplying in parallel with the creation of global networks; bringing cities together. The Circular Europe Network (CEN), for example, has gathered dozens of European cities together to exchange best practice. At the international level, the Open Source Circular Economy (OSCE) organisation collects innovative solutions linking the CE and open data.

As noted above, existent research on the CE has dedicated little attention to the meso scale, even though a number of authors have stressed the importance of orienting CE research towards the built environment and the building scale (Glass et al., 2017; Pomponi and Moncaster, 2017; Leising et al., 2018). In Europe, the built environment accounts for almost half of total energy consumption, and more than 50% of all extracted materials (BPIE, 2011). In France, it is responsible for nearly 40% of energy consumption, 60% of electricity consumption, and approximately a quarter of national greenhouse gases emissions (ADEME, 2012). In addition, the construction sector generates nearly three-quarters of national waste (by volume) (CGDD, 2019), and consumes approximately 20 to 30,000 Ha of natural areas per annum (France Stratégie, 2019).

In this context, the built environment could become an essential cornerstone for the implementation of effective CE strategies in cities. Several authors have pointed out that the 'neighbourhood scale', linking cities and their building, is the most relevant scale at which to address different environmental problems (Lotteau, 2017). In Europe, attention paid to the neighbourhood scale has become central to sustainable city discourses (Souami, 2009). However, research on the application of the CE in neighbourhoods remains limited and there has been a lack of comprehensive studies that have reviewed recent advances. A number of pathfinder projects are, however, emerging and the number of 'circular urban projects' is increasing in practice; raising questions about their effects on urban project dynamics, as well as their environmental performances. To answer these questions, assessment tools have been developed (Popovici et al., 2004; Herfray et al., 2010; Roux et al., 2013), and applied to the design of urban projects at the neighbourhood scale (Peuportier 2005, 2015; Peuportier et al., 2012). However, only limited attention has been paid to the characterisation (Appendino et al., 2018) and the evaluation of the environmental impacts of such projects (Girard and Nocca, 2019). A recent literature review pointed out that current academic discourses focus only marginally on CE indicators and assessment tools (Appendino et al., 2018). To date, assessment frameworks have not provided adequate tools to effectively measure progress made in the field (OECD, 2019). Given this, the present paper addresses two questions:

- Q1) How can the CE be implemented in neighbourhoods?
- Q2) What assessment tools are used?

3. Methodology

This study analyses and compares four case studies of 'circular neighbourhoods'. The case study method was selected because it enables theory and practice to be integrated, and was aptly suited to the exploratory nature of this research (Leising et al., 2018). First, we conducted a literature review to identify relevant 'circular neighbourhood' cases. In addition to scientific papers, reports and urban planning documents were found within this corpus of reviewed work. Scientific literature was mostly limited to theoretical discussions with little attention given to the neighbourhood scale. The research involved texts in English, French, and Italian. Four case studies were found and selected: the first concerns the neighbourhood of Buiksloterham (Amsterdam), which will be developed into a sustainable district, based on circular principles; the second neighbourhood is Kera (Espoo), an industrial area destined to become a 'liveable CE neighbourhood'. The last two cases are located in Paris; the Groues, and Saint-Vincent-de-Paul eco neighbourhoods, both considered to be 'CE living labs'. The selection of all the cases was guided by two fundamental criteria: the willingness to implement CE principles at the neighbourhood scale, and the existence of a comprehensive CE strategy at the city level within which the individual projects fit. Following case selection, CE initiatives and actions were identified and classified using document analysis, whilst data collected through semi-structured interviews with local stakeholders involved in the projects was integrated into the study's considerations. Finally, we defined a conceptual framework analysis based on three criteria: CE practices, strategic city scale integration, and tools employed. We applied this analytical framework to the four case studies in order to aid comparative analysis and comment.

4. Case Studies Analysis

The selection of the four case studies relied on their innovative characters and the central relevance of the CE to each case. In all four urban projects, the CE was a key pillar.

Table 1 - Case Studies

Case	Buiksloterham	Kera	Les Groues	Saint-Vincent-de-Paul
City and Country	Amsterdam, Netherlands	Espoo, Finland	Nanterre, France	Paris, France
Size	1000 hectares	22 hectares	65 hectares	4 hectares
Site	Redevelopment of industrial areas	Redevelopment of industrial areas	Redevelopment of industrial areas	Redevelopment of hospital complex
Main Objective	'key innovation zone for circular development'	'a showcase district for circular economy'	'circular economy living-lab'	'a privileged space to develop and test circular economy
Starting date	Around 2015	Around 2018	Around 2018	Around 2018

Source: Authors

As illustrated in Table 1, despite differences in size and location, the analysed neighbourhoods presented some common features. For instance, all four cases constitute urban regeneration projects, and each is experimental, and functions as a showcase to test CE principles. It is also important to underline that all the projects are recent and at different stages of implementation. None of them is yet completed. For this reason, the analysis here focuses on the design phases of each project.

4.1. Buiksloterham, Amsterdam

Amsterdam represents one of Europe's pioneering cities in terms of its approach to the concept of the CE. The CE constitutes one of the main pillars of the Sustainable Amsterdam Agenda (2015). The Agenda sets targets for reducing energy consumption by 20% and increasing renewable production by 20% compared to 2013 (Hoek et al., 2017). In this strategic document, the Buiksloterham neighbourhood is considered 'an engine for the broader transition of Amsterdam' (Metabolic, 2015, p.12) towards a circular city.

Part of a larger redevelopment plan for the northern banks of the river, Buiksloterham is characterised by abandoned factories, wasteland, and docks. Once the site of Amsterdam's most polluting industries, the

neighbourhood could become, according to the city's vision 'a key innovation zone for circular urban development' (Metabolic, 2015, p.25). The municipality proposed a bottom-up approach for the area's redevelopment in order to build a more comprehensive sustainability strategy. To this end, approximately 20 stakeholders, including local actors, organisations, associations and companies, signed the Circular Buiksloterham Manifesto in 2015. This innovative manifesto included shared guiding principles for redeveloping Buiksloterham; a zero-waste objective, the implementation of clean technologies, and the use of biosourced materials.

Recognising the urgency of having a clear operational strategy, all involved stakeholders commissioned an Urban Metabolism Scan in order to understand the neighbourhood's complete workings from a systemic perspective. The analysis, carried out by the consultancy Metabolic and published in 2015, involved three stages: context analysis, stakeholder analysis, and metabolism analysis. The Urban Metabolism Scan focused on material and energy flows, biodiversity, environmental conditions, socio-economic factors, local actors, urban planning documents and plans, health, and the area's living environment. A study of the neighbourhood's CE potential followed this analysis. From this, the priority objectives for redeveloping Buiksloterham as a 'living lab for CE' by 2034 were translated into eight priority issues (Table 2).

Table 2 - Buiksloterham's Objectives

OBJECTIVES	
Energy	Buiksloterham is energy self-sufficient with a fully renewable energy supply
Materials & products	Buiksloterham is a zero-waste neighbourhood that with a near 100% circular material flow
Water	Buiksloterham is "rainproof" (rainwater and wastewater recovery) and has near 100% resource recovery from wastewater
Ecosystems and biodiversity	Buiksloterham's ecosystems are regenerated and its natural capital base is self-renewing
Infrastructure & mobility	Buiksloterham's Infrastructure is maximally-used and local mobility has zero emissions
Socio-cultural	Buiksloterham has a diverse and inclusive culture, and a high quality, liveable environment
Economy	Buiksloterham has a strong local economy that stimulates entrepreneurship and encourages the creation and exchange of multiple kinds of value (social, environmental, cultural)
Health & wellbeing	Buiksloterham is a healthy, safe and attractive environment with recreational activity space for all residents.

Source: Metabolic (2015)

With regard to the built environment, it is interesting to note that a Circular Building Standard applies to all renovations and new constructions. This innovative assessment tool, which is still in a development phase, would allow tax credits to local developers once the standard has been reached. Among the key recommendations, all buildings' roofs are equipped for clean energy production and rainwater collection, and all materials are registered in a digital passport to facilitate their identification. In addition, prefabricated building elements are preferred, facilitating deconstruction and reuse. To ensure these objectives, an action plan was first developed. The proposed actions consisted of two types: systemic actions aimed at ensuring the district's long-term transition, and technical actions which addressed specific issues. To define these actions, prioritisation work was carried out. Those actions which were considered most urgent related to new constructions and infrastructure, whilst priority actions centred upon the energy efficiency of the existent building stock, the flexibility of new infrastructure, the development of fresh mobility, and water recovery and management.

The project is currently underway, but Buiksloterham is also developing through local initiatives. Two pioneer projects have come to the fore: De Ceuvel – which consists of retrofitted houseboats, and Schoonschip; a new built floating housing community. Both sites have ambitious sustainability and circularity targets: 100% renewable electricity, heating, and hot water; 100% water self-sufficiency; 100% wastewater management; 50-70% nutrient recovery; and 10-30% food production on site (Metabolic, 2016).

4.2. Kera, Espoo

The City of Espoo, Finland, is a pioneering city in terms of sustainable development; as demonstrated in the comparative assessment study of 15 European cities carried out in 2017 by the University of Tilburg (Zoeteman

et al., 2017). Initiatives led by the municipality within the framework of the Helsinki Metropolitan Plan, as well as the Helsinki Metropolitan Area Smart and Clean Cooperation project, are multiplying, and the city aims to become carbon neutral by 2050. In most cases, the CE constitutes a central issue in these strategic documents

In this context, the Kera neighbourhood, located in the eastern part of Espoo and close to the railway station, presents itself as a unique opportunity for the municipality to experiment with innovative CE solutions. Previously an industrial area, and the site of the headquarters of Finland's largest distribution group, Kera will be transformed into a mixed-use and dense neighbourhood of 14,000 residents. In addition to commercial services and offices, the project includes day-care centres, schools, sports, and recreation services. The municipality's objective is to transform this industrial park into a liveable neighbourhood with a strong CE focus by 2035 (Table 3). The goal of the project is to make Kera an international showcase district for the CE. With this perspective, the case of Kera was presented as an example of a 'circular neighbourhood' at the 'World Circular Economy Forum' of 2017.

Table 3 - Kera's Objectives

OBJECTIVES				
The first Nordic neighbourhood built according to the CE principles	A 20-minute walkable neighbourhood, where everyday destinations are within walking distance	A sustainable planning and construction process, by using ecological and innovative building technologies and materials	A network of green infrastructure and multifunctional public places	A versatile, dense, mixed use, human scale urban fabric

Source: BM-Architects et al. (2016)

The ongoing project was the winner of the Kera Challenge which was launched in 2015 with the aim of identifying a vision and project for Kera's future, based on the principles of sustainable urban planning and CE. In the winning project, Co-op City, a CE is supposed to be achieved through a 'large range of different measures, from boosting resources efficiency and creating closed loop systems to involving the local residents' (BM-Architects et al., 2016, p.5). The main solutions to support the development of a CE put forward in the project are related to the recycling of existent industrial architecture, the development of a sharing economy and digital services, the creation of mobile platforms for smart mobility services, and the realisation of a resilient green infrastructure within public spaces.

With regard to the built environment, the Kera Design Manual describes the principal CE practices. In the manual, all constructions are required to be biodegradable or fully recyclable so as to aid with the gradual phasing out of construction waste. The flexibility of the constructed buildings represents one of the document's principles. This flexibility provides the basis for the possibility of a future 'circular regeneration' of building stock. In this perspective, Life Cycle Assessment (LCA) will be mandatory. Concerning reuse and recycling, attention is given in the project to both existing materials, such as asphalt, which must be recovered, and to the construction elements of existing halls, such as beams, slabs, and columns. In addition, the temporary use of some existing buildings is highlighted as a CE practice. For example, during building construction, the ground floor of the halls will be used for the temporary storage of materials and elements to be reused or recycled. Furthermore, the halls' structure will be reused when constructing new buildings or outdoor spaces. In addition, it is interesting to note that 100% of the primary energy demands of the future neighbourhood will be produced from renewable sources; some produced on site. Solar, geothermal, and wind energy production is planned, and these will feed into an intelligent energy grid. For new constructions, passive solutions are preferred.

4.3. Les Groues, Nanterre

The urban redevelopment project of the Groues in Nanterre, led by the *Etablissement Public d'Aménagement de la Défense Seine-Arche* (EPADESA), aims to create a mixed district, offering housing, office space, shops, services and equipment, accommodating nearly 12,000 inhabitants. Close to the business district of La Défense and served by a future line of the Grand Paris metro, the Groues neighbourhood covers approximately 65 hectares. It is characterised by numerous wastelands and dilapidated buildings. The project and its realisation are recent. In 2015, the EPADESA approved a Strategic Operational Project and in December 2016, the first *zones*

d'aménagement concerté (ZAC – integrated development zones) were created. The first development contracts are currently being awarded, and the process of construction is expected to continue until 2030 (ADEME, 2017).

The goal of the Groues development project is to become a 'laboratory for a dynamic, green and inclusive neighbourhood' (EPADESA, 2016, p.22) and, more generally, to become an experimental laboratory for the sustainable city of tomorrow. In particular, the project aims to be exemplary in environmental matters and to obtain *Label EcoQuartier* status, by becoming a positive energy territory. Five strategic axes constitute the foundation of the project:

Table 4 - Les Groues' Objectives

OBJECTIVES				
Energy transition and the fight against climate change	Biodiversity and respect for natural resources	Protection against nuisances and creation of healthy and comfortable environments	Creation of an economic innovation ecosystem integrating a diversity of actors and co-design approaches	Laboratory of a circular and solidarity economy

Source: EPADESA (2016)

The CE represents one of the main pillars of the project's sustainable development strategy. Winner of the Call for Expression of Interest Circular Economy and Urban Planning launched by the *Agence de la transition écologique* (ADEME - Agency for Ecological Transition) in 2015, the Groues project offers a location in which to apply the CE in an experimental manner at both neighbourhood and territorial scales. As ADEME (2017) notes, the actions planned for the CE are multiple and the built environment receives particular attention through the local management of construction site waste (choice of materials, grey energy, and local management of backfill/burial).

Furthermore, the ZAC project plans to place the built environment at the centre of the CE approach, as well as the project's overall energy efficiency ambitions. To this end, 'life cycle thinking' is encouraged with it being stated that 'The building must be understood in all its spatial and temporal integrity by real estate operators, who must understand the life cycle of their building: its manufacturing processes and materials, its duration over time and its capacity to adapt and evolve up to its deconstruction' (EPADESA, 2016, p.77). The concepts of 'grey energy' and 'transformation capacity' are also central. Other CE practices are highlighted as well, such as rainwater harvesting, building flexibility and modularity, neighbourhood waste harvesting, and the reuse of existing buildings.

In addition, EPADESA launched two calls for projects in 2016; aimed at inspiring innovative reflections and experiments on the CE theme. The first one concerns temporary urban planning approaches which enable an expansion of the lifespans of existing buildings. The ephemeral initiatives presented were highly diverse and ranged from soil remediation to the reuse of building materials, or even innovative start-up incubators. The second one directly concerns new constructions and seeks to develop innovative CE solutions in the construction sector. LCA has been applied to the design of 5 office buildings, and the environmental benefits of recycling have also been studied. The project is underway and after this first phase of experimentation, the challenge is to bring overall coherence to these CE actions at the neighbourhood level. In addition, there is a willingness to establish fruitful local alliances around the reuse of materials.

4.4. Saint-Vincent-de-Paul, Paris

Located in the 14th arrondissement of Paris, the former Saint-Vincent-de-Paul hospital remained vacant for approximately 10 years after having been decommissioned. In 2014, it was acquired by the Municipality of Paris with the latter intending to transform it into an innovative eco-neighbourhood (City of Paris, 2017). Covering an area of 3.4 hectares, the redevelopment project of the Saint-Vincent-de-Paul Hospital presented a rare opportunity for urban transformation in the heart of Paris' particularly dense urban fabric. In particular, the objectives pursued by Paris for the site are as follows:

Table 5 - Saint-Vincent-de-Paul's Objectives

OBJECTIVES			
Create a predominantly residential area, promoting social diversity	Lead an exemplary environmental approach, making Saint-Vincent-de-Paul an innovative and emblematic eco-neighbourhood for the city	Think of public and open spaces as green spaces, whether on roofs, floors or facades	Enhance the heritage and history of the site

Source: P&MA (2020)

In December 2016, the ZAC was created and *Paris & Métropole Aménagement* (P&MA), the developer appointed by the City of Paris, embarked on transforming the area. The construction work began in 2018, and it was envisaged that there would be approximately 60,000 m^2 of total floor area, broken down into housing (including 50% social housing), facilities, equipment (including a school and a gymnasium), shops, and a public garden (P&MA, 2020). With regard to the built environment, the future district aims to become an exemplary showcase for the entire city thanks to its ambitious environmental approach. Specifically, the Resilience Strategy adopted in 2017 described the project as the city's first resilient and carbon-neutral neighbourhood. In compliance with the city's framework documents, and as a 'pilot district for sustainable development' (City of Paris, 2017, p.86), the project aims to reduce impacts on the environment and to promote innovative technologies. It provides for reversible buildings, pooling resources, conserving and converting 60% of existing buildings, developing renewable energies, certifying new constructions, optimising energy systems, and recovering waste.

In addition, ZAC Saint-Vincent-de-Paul aims to be a privileged space to develop the principle[s] of the CE (P&MA, 2020). Several actions have been put forward in the field of the CE with regard to the orientation of the Parisian CE plan. For instance, attention is being paid not only to the reuse of certain buildings, to limit demolitions, and to the development of smart grids, to speed up ecological transition, but also to the social and inclusive economy. The project also has specific objectives related to the waste generated during the construction and demolition phase, including material and architectural elements recovery and energy recovery from waste.

Reflecting the aims outlined above, the recovery of dismountable elements, that might be reused, is planned for all the buildings. This process is supported by an inventory distributed to all the potentially interested local organisations. A specific project management assistance service for sustainable development is planned to ensure the delivery of these objectives. For both new construction and rehabilitation, architects have to demonstrate the proportion of reused materials that will be incorporated into their plans at the design phase of their project. CE indicators are being developed and will be introduced into the project's Building Information Modelling (BIM) to produce overall indicators at the neighbourhood level. As part of the PULSE-PARIS research project, funded by ADEME[1], LCA will also be used to evaluate St Vincent de Paul's CE actions related to deconstruction, renovation, and new constructions.

5. Cross-Case Comparisons and Discussion

The results of the analysis are summarised in Table 6 and compared by applying an analytical grid which was based on the following criteria: CE practices, strategic city scale integration, and tools employed. Following this three-step analysis, some significant similarities are noted.

1 The PULSE-PARIS research project aims to improve the relevance and operationality of eco-design approaches for urban projects in line with the CE strategic plans of the City of Paris. In particular, the project focuses on life cycle assessment (LCA) tools at the neighborhood scale, which are still in their infancy. The project will synthesis strategic approaches at the city scale and eco-design approaches on the urban project level, in order to verify the coherence and articulation between these decision-making levels. The evaluation of CE practices on this scale using LCA is innovative and would make it possible to better understand the environmental benefits of these practices. (The research project is led by the École des ingénieurs de la ville de Paris (Engineering School of the City of Paris – EIVP) and MinesParisTech).

Table 6. Cross-Case Comparison

		Buiksloterham	Kera	Les Groues	Saint-Vincent-de-Paul
Strategic city scale integration		Sustainable Agenda Smart City Initiative Circular Amsterdam	Sustainable Agenda Smart City Initiative	EcoQuartier Label	Resilience Plan Territorial Climate Plan Circular Economy Plan
Tools employed		Circular Building Standard Materials digital Passport MFA	Kera design manual LCA Buildings	(LCA Perspective)	LCA Building Carbon Footprint Municipality's assessment tool
CE practices	Energy	100% renewable energy PassivHaus Label Local energy production 100 % energy recovery from wastewater	100% renewable energy PassivHaus Label Local energy production (Géothermal, Eolic) Smart Grid	70% renewable energy Energy recovery from wastewater	40% electricity by photovoltaic panels PassivHaus Label Smart Grid
	Waste and materials	Reuse materials 100% "circular material flow" Deconstruction Zero waste objective	Reuse materials and construction elements Biodegradable or recyclable materials	Reuse of materials and existing buildings Local management of construction and demolition waste Waste recovery and valorisation	Reuse of materials and existing buildings Local management of construction and demolition waste Waste recovery and valorisation
	Water	Rainwater collection	"Green and Blue Tools"	Rainwater collection	Rainwater collection
	Other	Temporary occupancy of buildings Buildings' flexibility Prefabricated constructions and structures Auto-construction Urban agriculture and local food production	Temporary occupancy of buildings Buildings' flexibility	Temporary occupancy of buildings Buildings' flexibility Urban agriculture	Temporary occupancy of buildings Urban agriculture Short circuits CE stakeholders point of reference

Source: Authors

With regards to similarities, it is firstly noted that all four projects have been integrated into strategic documents which address sustainable development and the CE of each city, such as smart city initiatives or resilience and climate strategies. These documents always present the projects as 'experimental demonstrators' of the CE in urban projects. Therefore, there is always a strong link between the strategic planning scale and the operational scale of the individual urban projects. However, it is important to note that, in all the reviewed cases, the CE is often seen as one of the pillars of sustainable development, and that sometimes no distinction has been made between the proposed actions that are related to the CE, and those that are more focused on issues of sustainable development.

Second, similarities are also evident with respect to the CE practices identified in the four projects. With regard to the case studies analysis, it is possible to classify four categories of recurrent practices: energy, water, waste, and other. All of the cases demonstrate an insistence on flexibility and the temporary occupancy of buildings; the reuse of building materials, elements and existing buildings; and eco-construction. An important focus that is common to all of the projects is the emphasis placed on the energy aspects of new buildings, with details given in each case of the precise standards that are to be achieved.

All of the case studies also favour reuse over recycling. The focus is primarily on the reuse of existing structures; the most preferred option in each of the projects. For this reason, the flexibility of new buildings is also emphasised, to ensure an easy dismantling and further reuse of structures in the future according to renewed demands. Secondly, all elements such as doors, windows, and interior furnishings should be recovered and reused whenever possible. All of the case studies refer to selective deconstruction and disassembly as being best practice. It is also notable that there is a need for the temporary storage of materials and elements, and that where possible this should be close to the given site's location. This is particularly difficult in dense urban areas such as Paris, where space is at a premium; it is much more feasible in the cases of Kera and Buiksloterham, where substantial parts of the project areas have been vacant for a number of years. It is also the case that

the marketplace for second-hand building elements and materials is still immature, despite the development of digital platforms connecting different actors, supply, and demand. Very precise rules (technical, legal and economic) also govern the use of construction materials; limiting the possibilities of reuse (ADEME, 2016). Moreover, all four cases advocate temporary use of the buildings since these interventions seem to require relatively low investment and are easily reversible. Other CE practices highlighted by at least two cases relate to waste management, particularly construction site waste, as well as water management and urban agriculture.

More generally, the comparative table indicates a wide variety of CE practices, especially with regards to environmental issues. The other two pillars of sustainable development, economic and social, do not appear to be central. Despite the great number of CE practices within these cases, their implications in environmental, economic and social terms do not appear to have been studied in depth. Some practices remain vague. Quantified and measurable targets relate almost exclusively to energy issues.

Moreover, there is no consensus regarding the tools employed. For instance, the Dutch and Finnish cases rely on *ad hoc* assessment methodologies. These tools, mostly intended for design and construction phases, would set precise standards to be achieved in the field of circular construction. However, they are still under development and very little information about them is presently available; though the digital passport proposed in the Buiksloterham case appears to be very innovative with regard to the easy identification and valuation of materials available at the end of buildings' useful lives. Furthermore, only the case of Buiksloterham has mobilized metabolism analysis. Based on the material flow analysis (MFA) methodology, this analysis looks not only at the type and quantity of physical flows (energy, water, materials), but also at local socioeconomic flows. This well-identified assessment tool is often coupled with the CE, but according to Elia et al. (2017), it is not sufficient to validate the relevance of CE practices, because it does not explicitly account for environmental impacts. MFA is an important territorial knowledge tool, but it does not prioritise and make decisions between different CE actions.

Other tools, such as LCA, could support such decisions. LCA appeared in the early 1990s, and even if the expression CE was not employed at that time, most ideas corresponding to the CE were already integrated into it. For instance, recycling is one issue that has been particularly studied to reduce environmental impacts, see for instance (Schrijvers et al., 2016). In this regard, it is interesting to note that the 'life cycle perspective' is central in all cases, but not necessarily associated with LCA tools. Some scholars consider LCA to be the most comprehensive method for the assessment of environmental impacts and CE requirements (Elia et al., 2017). Nevertheless, in the Kera cases, LCA is planned to be used only at the building scale and for new constructions. The assessment of CE practices is not directly mentioned, except in Saint Vincent de Paul. The scale of the neighbourhood is never mentioned for the evaluation of CE practices using LCA. This can lead to contradictions because, as demonstrated during the 63rd discussion forum on LCA (Haupt and Zschokke, 2017), 'circularity' does not always positively affect the environment and contradictions can arise. Purely by way of example, it can be noted that while material recovery practices can reduce the consumption of natural resources, they are not necessarily relevant from climate or ecosystem points of view. In the case of a recycling site far from a worksite, the transport of heavy materials may reduce or even cancel out the environmental benefits of recycling. Similarly, the flexibility and modularity of spaces must be studied in conjunction with summer comfort: the systematic use of lightweight and low inertia partitions can lead to overconsumption of air conditioning compared to a design that has heavy partitions. Moreover, while it is true that the rehabilitation of a building generates less waste, it can also generate other environmental impacts.

Despite overlaps, MFA and LCA have different purposes: MFA aims to reduce the different flows, by identifying and quantifying them, whilst the LCA aims to characterize these different flows in order to quantify and reduce their possible impacts on the environment. Both tools could, therefore, be complementary for CE assessment, but they are not coupled in the case studies. Finally, it is important to note that all these projects are currently underway, and this contributes to a lack of precision regarding the performance that will actually be achieved upon their delivery. For this reason, the focus of this article is mainly on the design and construction phase which, in turn, raises questions as to how the CE can be perpetuated in urban projects in subsequent phases of development.

6. Conclusion

The literature review shows that the CE provides a useful perspective for rethinking sustainable urban development. The CE is becoming part of the urban agenda. Nevertheless, the CE remains a new topic for urban planning and research is lacking with respect to the application of CE principles to the built environment. This raises the questions of how the CE is concretely implemented in urban projects, and how to measure their environmental benefits. To address this gap, this paper provides a comparative analysis of four 'circular neighbourhoods' to identify and discuss the CE practices implemented, and the assessment tools utilised. The results of this analysis indicate a large panel of CE practices, focusing primarily on environmental dimensions, and an important issue of experimentation and consolidation of the CE models applied to urban projects. The case studies also underscore the additional requirements needed for the implementation of the CE, such as the need to store materials to be reused.

More generally, examining the different CE practices identified in the case studies shows significant similarities between eco-neighbourhood projects. Within sustainable eco-neighbourhoods literature, local and renewable energy production, rainwater collection, and urban agriculture are practices typically put forward. The main difference in these cases is a new emphasis on aspects related to deconstruction, management of construction and demolition waste, as well as building and materials reuse. Furthermore, both the referenced literature and the case studies reveal a limited use of indicators and assessment tools to establish the relevance and prioritisation of these practices. This raises questions regarding how to ensure that the CE generates real environmental benefits, and how to measure them. These assessment tools, when used, are useful in helping to avoid risks of greenwashing, and guarantee the adoption of more sustainable and environmentally friendly practices.

Further steps in this research field are needed and require the study of other cases and tools. In addition, several authors have highlighted the ability of LCA to evaluate aspects of the CE (Elia et al., 2017; Fregonara et al., 2017; Giorgi et al., 2017; Haupt and Zschokke, 2017; Ghisellini et al., 2018; Zanni et al., 2018; Peña et al., 2021). They underline two key characteristics of LCA: the 'life-cycle thinking' perspective, which should also be the basis of the CE, and environmental impact assessment. The relevance of LCA is becoming increasingly apparent to experts, who are emphasising the importance of LCA in the implementation of CE strategies. In this context, one of the objectives of the PULSE-PARIS project involves the concrete application of the LCA method to evaluate identified CE practices at the neighbourhood scale in order to study its relevance and propose possible improvements.

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