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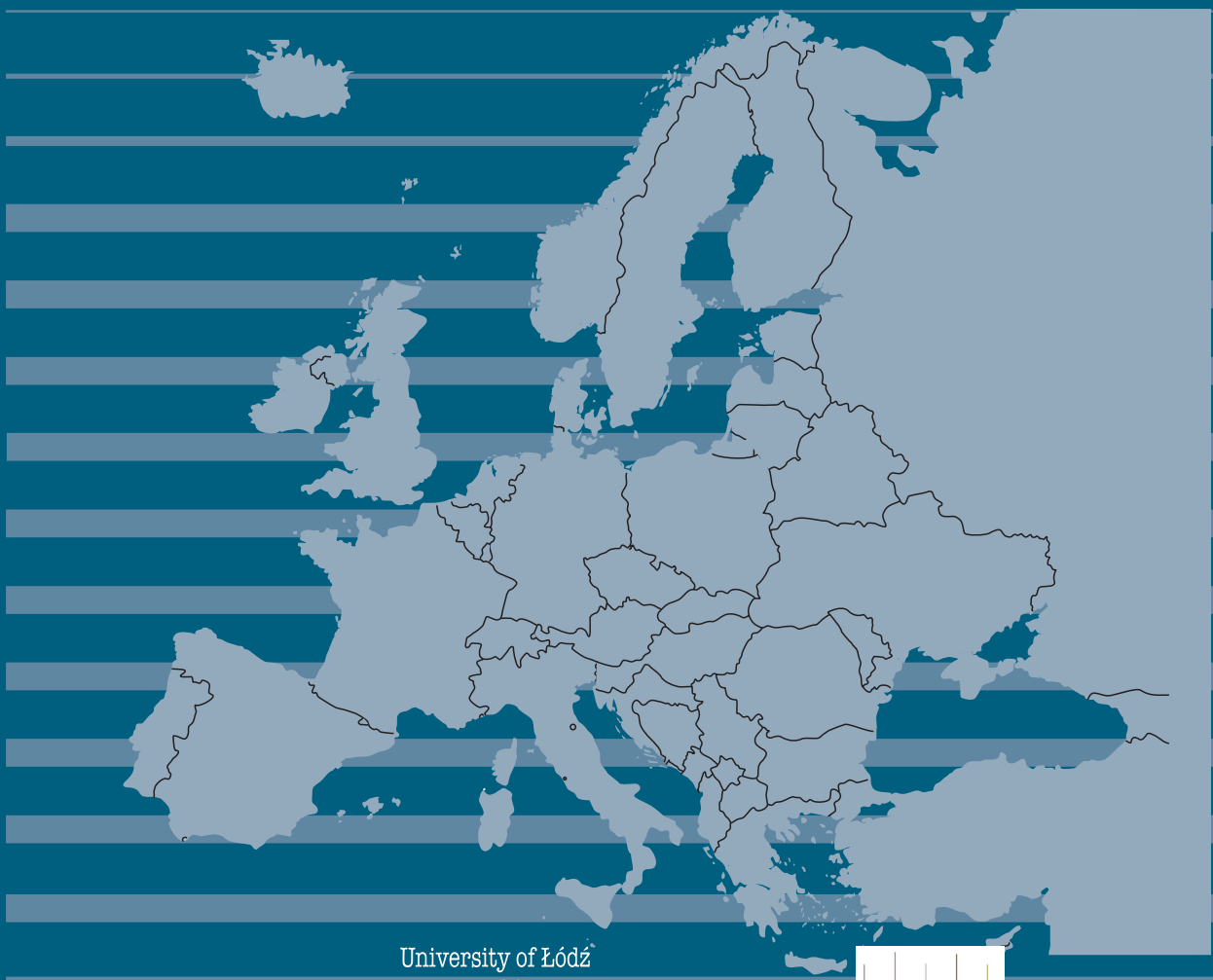

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EUROPEAN SPATIAL RESEARCH AND POLICY

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PART I

RE-ADDRESSING THE ROLE OF PROXIMITY ON A MICROSCALE THE CASE OF COWORKING SPACES AND BUSINESS INCUBATORS

Guest editor: Grzegorz MICEK*

FOREWORD

In recent years, the growing trend towards establishing new working spaces (coworking spaces – CSs and business incubators) that are said to be alternatives to common offices, has been observed. Following Oldenburg (1989), some authors call these spaces 'third places' in order to emphasise there are other work environments besides home and traditional offices. However, Akhavan *et al.* (2019) has rightly pointed out that CSs, which are a crucial subtype of new working spaces, often differ from typical third places such as libraries and bars; in a sense, CSs are designed and planned specifically to facilitate work by providing the basic infrastructure.

The development of CSs has been dynamic. Currently, there are over 20,000 of them in the world, and they have attracted over 2 million users (Global Coworking Survey 2019 based on Deskmag data). Besides physical co-location of users, the common feature of CSs is knowledge sharing (Capdevila, 2015).

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The development of new working spaces has been caused by many factors (Kojo and Nenonen, 2017), including the emergence of new forms of work, the high attractiveness of CSs for maintaining work-life balance, and their economic efficiency. The main success trigger of CSs is collaboration, openness and building a sense of community between coworkers (Capdevila, 2015). The creation of new, alternative work spaces is associated with the announcement of the Fab Lab Charter, the Coworking Manifesto, and the Maker Movement Manifesto (Dougherty, 2012; Hatch, 2014), which promote a common vision for these spaces across the globe.

Coworking spaces are understood as "spatial manifestations of the relationship between knowledge creation and space" (Schmidt and Brinks, 2017, p. 297). In economic geography, four research avenues are explored. First, the spatial (intra-urban or regional) patterns of CSs (Mariotti *et al*., 2017) are frequently investigated. The research is often conducted in order to detect spatial clusters and explain location patterns. CSs are often located in the most accessible and core areas. Hence, the majority of the studies focus on such metropolitan areas. Only a few studies on CSs looked at peripheral urban areas (e.g. Salone *et al*., 2017). Second, the varying impact of CSs on the local milieu (Akhavan *et al*., 2019) is studied. The direct and indirect effects of CSs' operations and coworkers' activities are reflected in social (e.g. Social Streets in Italy – Akhavan *et al*., 2019) and economic changes (employment). Third, locally and regionally varying values and norms may either be a barrier or a trigger for CSs to emerge. Hence, CSs might be studied within the broader framework of institutional economic geography. Fourth, what drives the dynamics of CSs (Kojo and Nenonen, 2017) is the historical background of the milieu and contingent events. This could be discussed within an evolutionary framework. With the majority of papers on locational patterns and factors, the first two above-mentioned avenues have been thoroughly explored, whereas institutional and evolutionary approaches are not used to analyse the emergence and growth of CSs.

The Special Issue consists of seven conceptual and empirical papers delivered by academics from Czechia, Germany, Italy, the Netherlands, Poland, and Turkey. Mariotti and Akhavan (2020) explore the phenomenon of Italian coworking spaces within the proximity construct. Based on a sample of over 300 co-workers, they have discussed the descriptive statistics of proximity measures, the factors attracting knowledge workers and the expected and perceived advantages. In the next paper, Bürkner and Lange (2020) offer a theoretical outlook on the co-creation of heterogeneous social, technological (digital), and physical spaces. They have proposed a perspective on hybrid work which focuses on contingent multiple, multidirectional and temporal scalings created by a variety of users while developing their own micro-worlds of work. These micro-worlds may be conceptualised as the outcomes of a centrifugal or centripetal movement. In the third paper, Schutjens and Kruger (2020) analyse the role of proximity in the exchange of resources within

the specific context of a business incubator in Leiden. They studied 118 business relationships of incubatees and argue that the role of geographical proximity (both between incubatees and outside the incubator) is limited. They indicate a considerable significance of personal similarity for the exchange of business knowledge. Next, Parlak and Baycan (2020) have studied the growth of creative hubs (CHs include: coworking spaces, incubation centres, makerspaces and labs) in Istanbul. The academics investigated the structure, focus, services, and values related to CHs. The main characteristics of CHs and their workers is also provided. The next paper, by Bednar and Danko (2020), provides insight into CSs as places that boost cultural and creative industries. In general, the authors examined the knowledge-related impact of CSs. Based on semi-structured, in-depth interviews with managers and entrepreneurs, they have argued that CSs enhance the entrepreneurship of creatives through collective projects and stimulate knowledge creation and open innovation in a creative ecosystem. Next, within a specific Polish context, Gądecki *et al*. (2020) have focussed on significant restrictions which hamper the emergence and growth of innovation districts in Cracow. Based on examples from selected neighbourhoods, they have showed how the morphology of such spaces and their functions can limit and foster development of innovative enterprises from the ICT industry. Finally, Micek (2020) has summarised the discussion on the role of various proximities in CSs. He identified the main research challenges in studying CSs from a proximity-related perspective.

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Grzegorz MICEK*

STUDIES OF PROXIMITY IN COWORKING SPACES: THE BASIC CONCEPTUAL CHALLENGES

Abstract. The article aims to identify main research challenges in studying coworking spaces (CSs) within the field of economic geography. It combines the perspective of proximity economics with the growing body of papers about spatial aspects of the operations of CSs and their role in stimulating collaboration. Based on a review of literature, the author identified the characteristic features of CSs and the corresponding proximity dimensions. He further assessed the significance of various dimensions of proximity in CSs. The article reveals how various proximities differ between CSs. It also distinguished the research strands referring to the spatialities of CSs. Next, it discusses the conceptualisation and operationalisation of proximity. Then, it applied it in the micro-scalar context of coworking spaces. The paper sheds a new light on 'real CSs' as physical spaces of strong institutional, cognitive and social proximities. It has been argued that even if organisational proximity in CSs is taken for granted, there is a heterogeneity amongst their users.

Key words: coworking spaces (CSs), collaborative spaces, new working ecosystems (environments), proximity, operationalisation.

1. INTRODUCTION

Modern economy has transformed working ecosystems. High-tech industries and advanced business services are offered both from permanent firm locations and temporary settings. The first type is represented by various innovation districts (Katz and Wagner, 2014; Katz *et al.*, 2015), business or technology parks and incubators, whereas the latter is by multiple venues of a temporary nature such as fairs, conventions, business meetings, etc. Work is also performed at multiple places such as customers' locations, co-working spaces (Parrino, 2015; Kojo and Nenonen, 2017), open creative labs (Schmidt and Brinks, 2017; Brinks, 2019),

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makerspaces (van Holm, 2017) and fabrication laboratories 'Fablabs' (Schmidt *et al.*, 2014; Pauceanu and Dempere, 2018; Suire, 2019). The paper focuses on coworking spaces (CSs) as a subtype of collaborative spaces. Their dynamic emergence and growth is evident: between 2015 and 2019 the number of CSs rose 2.5 times and the number of users almost quadrupled exceeding 2.1 million by the end of 2019 (2019 Coworking Forecast, 2019).

Various social and organisational factors impact the growth of collaborative places. These include (Schmidt *et al.*, 2016; Schmidt and Brinks, 2017) increasing project orientation of work which influences the forms of organising work and labour, the growing number of firms following the 'open innovation' model, more community-led urban regeneration, and unusual players involved in entrepreneurial agency.

Both in permanent and temporary settings, work may be performed in close spatial proximity. Studies of the interplay between physical proximity and knowledge interactions provide mixed evidence on its range and importance. On the one hand, there is a growing concern that "co-working places[1] appear to be more about people and connectivity than the physical spaces themselves" (Kojo and Nenonen, 2017, p. 171). Not only the physical milieu, but also co-location alone should not be claimed to stimulate networking and collaboration (Fuzi, 2015). Following this approach, it is social or organisational proximity that facilitate knowledge interaction. In CSs in Milan (Parrino, 2015) the simple co-location did not facilitate accidental knowledge exchanges. From this perspective, "geographical proximity seems rather to have a key role in favouring the exploration of similarities and contact points among co-workers only under certain conditions". (Parrino, 2015, p. 270), However, for proximity economics small geographical distance is claimed to be complementary to relational (social, organisational, institutional and cognitive) proximities (Boschma, 2005). In the context of 'innovation districts' Katz *et al.* (2015) emphasised the increasing value of 'place' in stimulating knowledge interactions and collaboration. The belief is that physical assets affect the vibrancy of communities and knowledge interactions. Mariotti *et al.* (2017, p. 48) argued that another diffused hypothesis "is that relational and geographic proximity within these new working spaces may foster information exchange and business opportunities" (Spinuzzi, 2012) through face to face contacts. To sum up, it must be argued that the geographical research on knowledge interactions does neglect the link between social context and physical place (Rutten, 2017). The research that deals with interrelations between organizing work in new working environments, various established proximities (distances) and the materiality of such spaces remains scarce. Both temporary and permanent settings should be regarded as spatial manifestations

[1] One must bear in mind that there is a difference between coworking and co-working. While the term 'coworking spaces' refer to shared workspaces, the latter term ('co-working') stands for collaborative activities between individuals who are a part of the same organisation (Associated Press Stylebook, 2019).

of the relation between knowledge interactions and physical space. Hence, the issue of involved spatial scales has emerged. Even if knowledge creation takes place within global knowledge communities, it is shared in a particular open creative lab (Schmidt and Brinks, 2017). Hence, all CSs may be regarded as local anchors for global knowledge communities and places which may link and enhance a local buzz through global pipelines (Bathelt *et al.*, 2004).

CSs may be positioned as 'third places' (Oldenburg and Brisset, 1982; Oldenburg, 1989) as Moriset (2014) suggested as emerging hybrids of 'telecentres', 'business centres' and 'start-up incubators' (Waters-Lynch *et al.*, 2016). These new working ecosystems are 'neither office nor home' (Ross and Ressia, 2015) that combine formal and informal interactions in one new work environment between individuals (Brown, 2017). In contrast to traditional third places such as coffee shops, beauty parlours, bookshops or bars, CSs provide the basic office infrastructure (Akhavan *et al.*, 2019). Hence, CSs differ from the other third places and they are treated as a hybrid form of the other three places and classify them besides comingling and co-living spaces, as 'fourth places' (Morrison, 2018) – the most important venues for knowledge sharing, social interactions and network creation. At least in theory, these new work environments are not dominated by the logic of hierarchies or markets, but by the logic of social relations (Waters-Lynch *et al.*, 2016).

In this review article, I aim to identify the **research challenges for proximity-related studies of coworking spaces (CSs)**. I argue this includes two crucial issues of the **conceptualisation and operationalisation** of proximity in the micro-scalar context of CSs. The structure of the article is as follows: the next section provides a review of the literature on coworking spaces with a novel identification of research strands referring to the spatialities of CSs. Then, based on an overview of the literature, the conceptualisation and operationalisation of the dimensions of proximity are discussed. In Section 2, the main research gaps and challenges are presented, including the definition of CSs. Subsection 2.2. suggests methods for the measurement of the various dimensions of proximity in CSs. Finally, selected conceptual links between CSs and various theories and constructs are discussed in Subsection 2.3.

1.1. Recent studies of the relations between CSs and space

Several literature review papers on the co-working phenomenon have been published recently (Waters-Lynch *et al.*, 2016; Brown, 2017; Bouncken and Reuschl, 2018; Yang *et al.*, 2019; Orel and Dvouletỳ, 2020). Waters-Lynch *et al.* (2016) examined co-working as a complex social and spatial phenomenon. However, they have only posed (but have not answered) some questions on the relations between: the spatial distribution of CSs and economic activities in general; and between

CSs, residential location and urban mobility. Brown (2017) has questioned the popular view (Moriset, 2014; Gandini, 2015) that CSs may secure urban transformation, especially in smaller cities. In contrast, she has recognised the vital role of CSs' managers who curate CSs, namely select workers, particular co-working values (culture), and engagement strategies, and consequently build relations and provide knowledge (Brown, 2017).

Originally, co-working as a communitarian means of addressing work is more about sharing similar values and disseminating knowledge than about physical space (Brown, 2017). However, even if the infrastructure of CSs is often used by remote workers, the analysed phenomenon takes places in a bounded area with a specific design, layout and ambience (Ross and Ressia, 2015; Orel and Alonso Almeida, 2019). There are also local surroundings that may be affected by the operations of CSs. Hence, this article tends to position the operations of CSs in economic geography and regional studies. It focuses on relations between CSs and local or regional space.

I have conducted a systematic literature review of the Web of Science Core Collection database. First, I addressed the query with the use of following phrases 'coworking spaces', 'co-working spaces' and 'collaborative spaces'. It resulted in 1,781 papers. Second, I narrowed down this query to six following academic disciplines and subdisciplines (Web of Science categories): geography, management, social sciences interdisciplinary, urban studies, regional and urban planning, sociology and business. It resulted in 460 papers. Third, I read the abstracts of these papers in order to eliminate papers that did not focus on the relations between CSs and space. Finally, I selected 81 papers with this specific focus. As a result, four strands of literature that explicitly referred to the spatial aspects of functioning of CSs have been identified.

First, there is a couple of **conceptual contributions** referring to the interplay between time, place and social practices in knowledge work (Rutten, 2017), involving the studies of various proximities (Parrino, 2015) or related variety/local diversification (Suire, 2019). This group of research consists of conceptual considerations focusing on the social and economic transformations that drive the rise and diffusion of CSs. It corresponds with the analysis of CSs at the macro level (Ivaldi, 2017) which examines the broader social and economic context of the functioning of such spaces.

Second, there are classical papers on CSs' **location factors** (Mariotti *et al.*, 2017). This strand of literature represents the meso level of the analysis of CSs, which considers the coworking organisation or CS as the unit of analysis (Ivaldi, 2017). Capdevila (2017, p. 87) argued that in the case of CSs, "the specific location plays a more important role than in the case of hackerspaces or FabLabs." It is generally agreed upon that there are multiple CS location factors. Based on the research conducted in Milan (Mariotti *et al.*, 2017), the most crucial location determinants include: urbanisation and localisation economies, market size and potential, skilled labour force availability and business opportunities, and transportation accessibility.

Urbanisation economies are manifested in 'creative clusters' that attract CSs. Additional factors include "low real estate prices, former industrial buildings' availability, and 'personal' considerations" (Mariotti *et al.*, 2017, p. 61).

Third, the most common topic of the studies of CSs is to what extent and **how CSs enhance** knowledge interactions (van Winden *et al.*, 2012; Mariotti *et al.*, 2017), relationships (Kojo and Nenonen, 2016), social support (Bianchi *et al.*, 2018) the collaboration between individuals (Spinuzzi, 2012; Bilandzic *et al.*, 2013; Ross and Ressia, 2015; Bianchi *et al.*, 2018), creativity (Katz *et al.*, 2015) and, consequently, innovation (Capdevila, 2015; Brinks, 2019). Based on the empirical study conducted in Open Creative Labs in Barcelona, Brinks (2019) discovered that these new working ecosystems have been substantial resources for innovation. By some scholars (Moriset, 2014) collaboration and innovation generation seem to be semi-automatic and CSs are regarded as 'serendipity accelerators' where social encounters are obvious.

However, the direct impact of coworking spaces on collaboration and innovation is often questioned (Ross and Ressia, 2015; Brown, 2017). For instance, Cabral and van Winden (2016) have suggested it is often taken for granted that CSs contribute to innovation (Botsman and Rogers, 2011). In this respect, the strongest critique has been raised by Brown (2017), who thoroughly questioned the role of physical co-location and has argued that spontaneous knowledge sharing does not "just happen" in close proximity and, consequently, the "serendipity machine" (Olma, 2012; Brown, 2017) seems to be a myth.

The multi-scalar character of innovation processes was often neglected by economic geographers (Bunnell and Coe, 2001; Brinks, 2019), who ignored the micro-scale of analysis in the localised innovation processes (Capdevila, 2015). However, various spatial scales are believed to be affected by CSs' operations (Capdevila, 2015). Besides the individual and company levels, at the rarely-studied in economic geography micro-local (community) level, CSs generate a 'micro-local buzz' and represent specialised innovation communities that are often able to coordinate heterogeneous knowledge bases (Capdevila, 2015). They are believed to form micro-clusters which, by operations of individuals, provide crucial dynamics of innovation, but at another spatial and organisational (non-firm) scale than typical clusters. At the local (district or city) level, CSs may integrate locals and co-workers in collective innovation processes (Capdevila, 2015). CSs contribute to urban creativity and sustaining innovation (Moriset, 2014; Weijs-Perrée *et al.*, 2019). Global pipelines (Bathelt *et al.*, 2004) are established by foreign professionals providing external knowledge, while visiting CSs (Capdevila, 2015).

Fourth, at the meso level of analysis (Ivaldi, 2017), the **local economic and infrastructural impact** of CSs is studied (Mariotti *et al.*, 2017). The following effects have been distinguished in the literature:

– micro-scale physical transformations (Mariotti *et al.*, 2017; Akhavan *et al.*, 2019). CSs' contribution to the improvement of the surrounding public space is recognised

(Akhavan *et al.*, 2019), although it has been questioned by Brown (2017) whether CSs may be a "quick fix" urban renewal solutions (Moriset, 2014; Gandini, 2015);

– the collaboration between coworking spaces and local community initiatives, which results in, e.g. the creation of social streets (Akhavan *et al.*, 2019). This distinct and rather rare tool in a given city or state is a way of dealing with social exclusion and creating vibrant communities that join co-workers and the locals (Akhavan *et al.*, 2019). In that way CSs may contribute to urban regeneration in the social sense (Akhavan *et al.*, 2019). It has been argued that the effects produced by CSs in their urban context are clearer at the urban scale than at the local scale (Mariotti *et al.*, 2017);

– new job creation (van Holm, 2017; Wolf-Powers *et al.*, 2017); induced and indirect multiplier effects (Micek, 2011) which are hardly recognised;

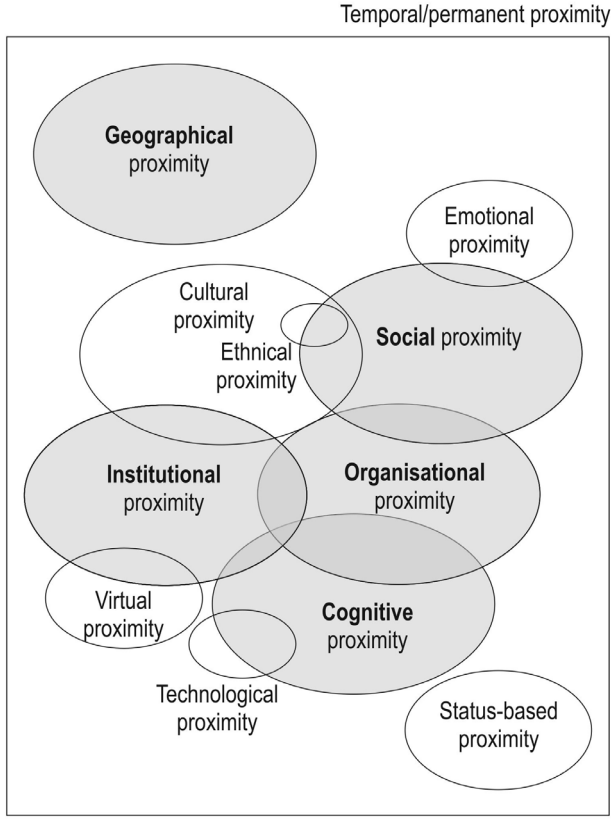
– the triggering of entrepreneurship (Fuzi, 2015; van Holm, 2017; Wolf-Powers *et al.*, 2017). CSs provide various forms of support (for a discussion on social support, see Gerdenitsch *et al.*, 2015) and facilities for start-ups. In regions that are lagging, CSs provide hard infrastructure designed in such a way that the social, emotional and financial support necessary for entrepreneurship can also emerge (Fuzi, 2015). On one hand, in large cities CSs may provide new business opportunities (Cabral and van Winden, 2016). On the other hand, Brown (2017) has revealed that CSs in smaller cities struggle to find new members necessary to ensure financial sustainability. The main target of CSs' operations may sometimes be reduced to providing subsidised office space (Rus and Orel, 2015).

The local economic, social and infrastructural impact depends on ownership structure, the types of users and businesses, and the local and regional contexts (especially the types of local milieu). That is not always positive. In the case of top-down CSs, Brown (2017, p. 121) questioned whether "the benefits of coworking reached beyond immediate members or that linkages were established between coworkers and local (resident or business) communities." Additionally she rightly indicated the "local/non local" tensions if CSs attract businesses and people from outside a neighbourhood (Brown, 2017).

1.2. The dimensions of proximity

One of the constructs most often discussed in modern economic geography is the concept of proximity. This concept combines two basic theoretical approaches: agglomeration and network economies. However, inter-organisational proximity is a subject of research for many disciplines, including economics, sociology, and management sciences. Most often, it is assumed that proximity means belonging to the same group or the degree of similarity (convergence) between objects autonomous from each other in different dimensions. Therefore, inter-organisational proximity should be treated as a multidimensional variable (Rodriguez-Pose,

2011; Mattes, 2012) and, according to Godart (2012), an exhaustive typology of its dimensions has not yet been developed. Currently, the division provided by Boschma (2005) is the most popular in economic geography. He highlighted geographical, social, cognitive, organisational and institutional proximity (Fig. 1)[2]. Although the dimensions of proximity suggested by Boschma (2005) slightly overlap Moodysson and Jonsson's ones (2007), the division is already widely used in the literature and has been used in this article.



Note: In bold, dimensions distinguished by Boschma (2005)

Fig. 1. Relations between various dimensions of proximity

Source: derived from Micek (2017), modified.

[2] Previous research also distinguished other types of proximity: cultural (Gill and Butler, 2003; this can be treated as an element of institutional proximity, see Knoben and Oerlemans, 2006) and technological proximity (Basile *et al.*, 2012; often equated with cognitive proximity), as well as proximity based on the status within the hierarchy (*status-based proximity*; Godart, 2015; expressed by the age of the actor and their position in the sector and the degree of similarity in terms of stylistic identification and selection of seasonal trends).

In comparison to the previous divisions, Boschma (2005) proposed the introduction of the **cognitive dimension** of proximity. Currently, it is most often recognised that cognitive proximity is based on the similarity between the so-called knowledge bases available to both actors (Broekel and Boschma, 2012). Depending on the subject of research, there are two approaches to the **operationalisation** of cognitive proximity. The first analyses the compliance of patent technology classes, determined on the basis of relevant classifications (Fritsch and Slavtchev, 2011; Balland, 2012; Broekel and Boschma, 2012). The second approach verifies whether an enterprise is classified within the partner's sector or industry. An advanced approach in this case is the analysis of the degree of similarity between NACE classification codes. Broekel and Boschma (2012) and Broekel *et al.* (2015) have recognised that two enterprises are cognitively close when they share the first three digits of the NACE code. Unfortunately, the operationalisation of the concept of cognitive proximity can be much simpler. In the studies of the global navigation satellite sector, Balland (2012) distinguished four subsectors: infrastructure, hardware, software, and services. When two entities belong to one of these they are in cognitive proximity. A very reasonable division of cognitive proximity based on knowledge and skills was presented by Huber (2012), who distinguished:

– proximity in terms of the common technical language,
– similarity in the way of thinking about technology or products,
– similarity in terms of detailed technical solutions and arrangements (*know-what*),
– similarity in terms of the *know-how* (how to produce and solve problems).

Knoben and Oerlemans (2006) had already noticed that there are serious differences in understanding **organisational proximity**. In *sensu largo*, organisational proximity is contrasted with geographical proximity, and includes those actors who belong to the same relationship space (Oerlemans and Meeus, 2005). In *sensu stricto*, organisational proximity describes the degree to which organisations share practices, customs and incentive mechanisms (Metcalfe, 1994). In economic geography, it is most commonly assumed that we can talk about organisational proximity when enterprises belong to the same owner, the same industrial group (Balland, 2012; Godart, 2015) or, more generally, to the same network (Oerlemans and Meeus, 2005). A simplified measurement of proximity is present in studies using a *network-based approach*. An example would be the division of entities into two sectors of activity (academic and non-academic) or into public or private organisations (Broekel and Boschma, 2012).

It can be assumed that those actors who share the same network of social relations, especially personal relations, are characterised by **social proximity** (Oerlemans and Meeus, 2005). Hence, social proximity is sometimes called personal (*personal proximity*; Schamp *et al.*, 2004), because it involves friendship relations, camaraderie relations, and trust relations (Boschma, 2005). The

measurement of social proximity is also not easy. It would be best to capture it with the help of network distance between actors in a social network, which is actually quite often used (Balland, 2012; Crescenzi *et al.*, 2013). However, the social network is not always identified on the basis of strong and permanent links – they are often short-term or one-time cooperation relationships. In the case of social proximity, dichotomous variables are also used relatively often in modelling. An example would be the research of Broekel and Boschma (2012), conducted in Dutch enterprises of the aviation sector, in which entities that were close in terms of social relationships were considered to be those in which board members had previously worked in former Fokker factories. However, the operationalisation of social proximity should be based mainly on qualitative variables and include the measurement of trust in a partner (Aguilera *et al.*, 2015), the assessment of the scope of previous cooperation of actors in the past (Frenken *et al.*, 2010), and the duration of acquaintance with the main partner (Aguilera *et al.*, 2015). The background of a relatively poor operationalisation of the social dimension of proximity is positively influenced by an interesting suggestion from Huber (2012), who postulated the distinction of three degrees of social proximity and their qualitative measurement:

– mutual acquaintance: the degree to which one's private life is known;

– emotional proximity: the degree to which a person cares about the good of the other;

– sense of personal commitment: the degree to which an individual feels obliged to help when the other person asks for it, and this would require a considerable amount of time.

Institutional proximity includes common standards, customs (e.g. cultural, ethnic and religious), accepted practices, rules and laws regulating the relations between individuals and groups, as well as the principles of the functioning of business entities (Boschma, 2005; Broekel and Boschma, 2012). Therefore, institutional proximity refers to culturally or politically based relations (Talbot, 2010). The recognition of institutional proximity is characterised by the greatest simplifications. In this case, close entities are often understood as those that have the same institutional form, assuming that they also share a system of standards and principles (Ponds *et al.*, 2007). Most often, the division based on the triple helix model (Etzkowitz and Leydesdorff, 2000) is used here in enterprises, scientific research units and public administration institutions. Sometimes the aforementioned triad is supplemented with a fourth category, i.e. non-profit organisations (Balland, 2012). Due to problems with operationalisation, Broekel and Boschma (2012) in their analysis of proximity in the aviation sector analysed only four of its dimensions, ignoring institutional proximity.

Although being considered as a construct that is easy to operationalise, **geographical proximity** is also a complex concept (Torre and Rallet, 2005). One can, therefore, distinguish the following two dimensions of geographical proximity:

– objective proximity – real, defined in a given coordinate system, in which physical, economic or temporal distances can be measured. Objective proximity results from spatial accessibility (understood as *accessibility*) and is associated with overcoming space;

– subjective proximity (Aguilera *et al.*, 2015) – resulting from the perception of real space and distances existing in it. This perception can result from one's own experience of travelling a distance. Sometimes, however, this subjective assessment results from other people's verbal accounts, media coverage, and distance images from books or magazines. It is worth remembering that this assessment considers, e.g. the exaggerated values of infrastructure equipment indicators or network congestion.

Geographical proximity can occur on three spatial scales: macro, meso, or micro. The first has an international scale, the second – an inter-regional or inter-city scale, and the third – an intra-city scale (this can, for example, be expressed by the presence in the same coworking space or the same business incubator; see Spinuzzi, 2012). In proximity economics, it is generally agreed that co-location does not simply lead to larger knowledge interactions and innovation (Boschma, 2005).

In the case of CSs, geographical proximity is often equated with physical proximity (Parrino, 2015). The physical proximity paradox consists of the fact that stronger cooperation occurs between distant and not close partners (Boschma and Frenken, 2010). Using the example of the ICT cluster in Montreal, Ben Letaifa and Rabeau (2013) showed that geographical proximity could even be a barrier to communication and knowledge flows.

Likewise in the context of knowledge networks in economic geography, it is also argued that close physical proximity does not simply imply collaboration and "co-locating people in a CS help but applying the right strategic tools can enhance the effect" (Cabral and van Winden, 2016). There are various spatial strategies that encourage interaction between the users of CSs (Cabral and van Winden, 2016; Orel and Alonso Almeida, 2019). Cabral and van Winden (2016) identified forces affecting interaction and analysed four management strategies which CSs spaces can employ to boost interaction and foster innovation. One of them is related to the supportive role of CSs' design (Orel and Alonso Almeida, 2019). Understood as a good look or feel of a work environment, a CS' friendly ambience, constitute spatial comfortability of a CS (Orel and Alonso Almeida, 2019). However, the attractiveness and aesthetics of a space does not matter for collaboration. Common physical areas (e.g. central shared meeting hub) which enable physical proximity are perceived to enhance knowledge interactions (Cabral and van Winden, 2016).

Proximity dimensions interact with each other. The large amount of relations between various dimensions of proximity is complementary. Geographical proximity is believed to enhance other dimensions of proximity (Broekel and Boschma, 2012), especially the social one (Boschma, 2005). Balland *et al.* (2015) and Huber

(2012) argued that strong social ties and cognitive proximity (especially in terms of common technical language) compensate for spatial proximity. It holds true for IT firms and freelancers (Huber, 2012) who are crucial users of many CSs. Cognitive proximity is essential in the common understanding and is highly necessary to establish collaboration (Huber, 2012). The lack of institutional proximity may be compensated by geographical proximity (Boschma, 2005).

2. RESEARCH GAPS AND CHALLENGES

2.1. Defining coworking spaces

Almost every CS provides its own definition of co-working. Hence, unfortunately, there is no shared interpretation of CSs (Spinuzzi, 2012; Ivaldi *et al.*, 2018). This is due to the fact that CSs represent significant differences in their offer, type of space, number of users, business models, work culture, shared common values, etc. (Parrino, 2015).

Capdevila (2017) argued that Fab Labs, hackerspaces, makerspaces and CSs should be treated as subsegments of a broader umbrella term 'collaborative spaces' which are "localized spaces that offer open access to resources" (Capdevila, 2017). To stress their physicality, the epithet 'localised' is often added (Capdevila and Moilanen, 2013; Capdevila, 2017). Lately, Capdevila (2017) narrowed his perspective and distinguished the term "localised space of collective innovation", which puts a stronger emphasis on invention and technology sharing. However, neither collaboration nor collective innovation in CSs is automatic (Bilandzic *et al.*, 2013). In his ethnographic study, Butcher (2013) focused on learning as the process which leads to collective innovation and recognised how co-workers learn. They learn to become collaborative, intentional, and to perform contestation (develop practices that contest entrepreneurial orthodoxies and to introduce changes) (Butcher, 2013). Castilho and Quandt (2017) studied two mechanisms of the development of collaborative capability. 'Convenience Sharing' tends to foster collaborative capability through knowledge sharing, whereas in the Community Building model CSs tend to foster collaborative capability by enhancing a creative field and individual action for the collective. Bouncken *et al.* (2018) focused on the coopetition in CSs: collaborative efforts may lead to the creation, but also to appropriation of values. Bouncken *et al.* (2018) found that the increasing of the level of openness in CSs drives a coopetition tension. The vast majority of papers reveal that there are additional efforts (especially managerial ones – Brown, 2017) necessary in order to stimulate knowledge interactions between CSs' users. Physical proximity per se cannot be treated as the only prerequisite of collaboration or innovation.

Capdevila (2017) has argued that the combination of exploitation (not exploration) of knowledge and bottom-up (not top-down) governance system is what distinguishes CSs from other localised spaces of collective innovation. CSs are classically established and led by bottom-up counter-movements (Lange and Bürkner, 2018), although it changes dramatically when large chains of CSs emerge. From a real-estate market perspective, CSs may be classified into the broader category of multi-tenant offices. This consists of several subgroups: shared offices (offering workspaces with a high level of services), incubators and accelerators (offering services for innovative start-ups), and CSs (Weijs-Perrée *et al.*, 2019). Waters-Lynch *et al.* (2016) identified three features that distinguish CSs from serviced offices: the profiles of the original co-workers, the centrality of social interactions, the aesthetic design of the spaces themselves. The relationships between CSs and other forms of collaborative spaces are shown in Fig. 2.

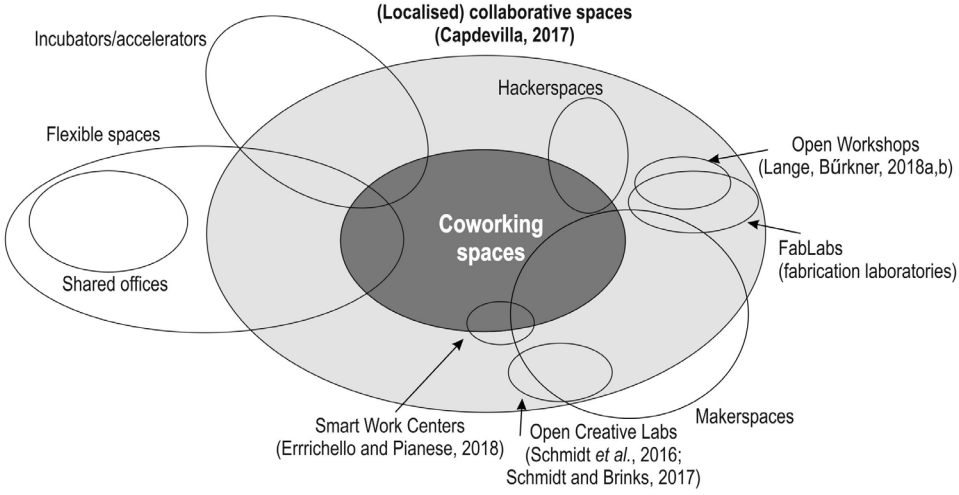


Fig. 2. Relations between various forms of collaborative spaces

Source: own work.

The most common and followed by the majority of scholars **definition** of coworking spaces (understood as a **special subsegment of collaborative spaces)** has been provided by Spinuzzi (2012, p. 399), for whom CSs are "open-plan office environments in which they work alongside other unaffiliated professionals for a fee." However, this definition neglects the most important feature of CSs that differentiates them from shared offices. Many authors (Butcher, 2013; Capdevila, 2015; Bouncken *et al.*, 2018) have rightly argued that one of the most important features of CSs is their focus on knowledge-sharing dynamics (even if it is some-

times limited due to managerial weaknesses; see Brown, 2017)[3]. What differentiates CSs from other types of collaborative spaces is that co-working is "an atmosphere, a spirit, and even a lifestyle" (Moriset, 2014, p. 7). Based on a systematic review of the literature, some common features of CSs and corresponding proximity dimensions which are enhanced by each feature were distinguished (Table 1).

Table 1. Characteristic features of CSs and corresponding proximity dimensions

Feature of CS	References	Proximity dimension
Specific physical location (the same for each individual)	Kojo and Nenonen, 2016, 2017; Howell and Bingham, 2019	Physical proximity
Work alongside colleagues, and companies in a flexible setting	Spinuzzi, 2012; Fuzi, 2015; Gandini, 2015; Gerdenitsch *et al.*, 2015; Merkel, 2015; Parrino, 2015; Ivaldi *et al.*, 2018; Orel and Kubátová, 2019	Social proximity
Temporary character of work (renting a desk on a monthly, weekly, daily or even hourly basis	Merkel, 2015; Mariotti *et al.*, 2017	Temporary proximity
Specific design (usually open plan)	Fuzi, 2015; Akhavan *et al.*, 2019 Kojo and Nenonen, 2017	Physical proximity
Resulting social and knowledge interactions and collaboration within CSs	Capdevila, 2015; Gandini, 2015; Parrino, 2015; Bouncken *et al.*, 2018; Weijs-Perrée *et al.*, 2019	Social proximity
Shared common values and norms	Moriset, 2014; Brown, 2017	Institutional proximity

Source: own work.

Some authors emphasise the fact that CSs should be membership-based offices (Orel and Kubátová, 2019; Howell and Bingham, 2019). Membership of a social or professional community is not, however, a distinct feature of all CSs. What is supposed to be a feature of 'real CSs' is the sharing of common norms, values, and beliefs, i.e. institutional proximity.

In terms of the operations of CSs, at least five spatially important, differentiating dimensions should be considered. First, there is the users-related dimension. Surprisingly, there is a gradual shift in terms of new tenants in the direction of non-classical users. The recent large-scale survey by Coworker (2019 CMCAs, 2019) has revealed that dominant groups of CSs' users are small and medium enterprises and start-up teams (37.93% and 27.12% of coworking space,

[3] The distinction between 'real CSs' that practically share common norms and focus on collaboration by their 'curation' (Brown, 2017) by managers and 'fake CSs' that are only theoretically engaged in collaboration, should be made. The latter type is often represented by corporate (chain) CSs.

respectively). Traditional users of CSs such as freelancers, remote workers and digital nomads (Orel, 2019) form the minority. Second, there is the industry dimension. Due to their nature, CSs attract knowledge service sector firms and individuals (Reuss and Ressia, 2015). We assume that organisation and knowledge sharing in CSs does not differ between industries, as it rather varies between different types of owners and users. Bouncken *et al.* (2018) recognised four different types of CSs based on value creation and appropriation. The identified types (the corporate coworking-space, the open corporate coworking-space, the consultancy coworking-space, and the independent coworking-space) differ also in terms of CSs' ownership. Third, regarding the country dimension, CSs grow in advanced economies. However, there is a large difference between the understanding and the operations CSs in North America and Europe. The majority of new working ecosystems in the US are corporate driven CSs whereas there are some local community driven examples of CSs of Europe. Fourth, regarding the local and regional dimension, it must be emphasised that co-working is still mainly an urban phenomenon, narrowed to a limited number of 'creative cities' (e.g. New York, San Francisco, London, Paris, Berlin, Amsterdam, and Barcelona, but also in megacities in Asia, South America and Australia) (Moriset, 2014). However, more and more CSs emerge in peripheral urban settings (Salone *et al.*, 2017), small towns and less populated regions (Fuzi, 2015; Avdikos and Merkel, 2019). Fifth, the micro-local dimension of CS operations should be definitely distinguished. This includes: the type of the building being used, e.g. whether it is of mixed use or solely dedicated to CS (Ross and Ressia, 2015). There are also other dimensions that differentiate CSs (Ross and Ressia, 2015). They include, e.g. the period of membership and CSs' ownership (community workspaces vs. professionally and/or privately run centres) (Ross and Ressia, 2015). However, these dimensions are not relatively important for the spatial dimension.

Business incubators and flexible spaces (Fig. 2) often provide co-working opportunities, but a real CS should be dedicated to generating collaboration. **Incubators and accelerators**[4] focus on the support and development of new businesses (Fuzi, 2015) and offer the necessary services to conduct business activities. CSs are not mainly focused on this, but provide a working environment to independent workers (Fuzi, 2015) in order to concentrate on creating a **community** (Weijs-Perrée *et al.*, 2019).

Apart from CSs, there is a wide variety of other collaborative spaces. In the US context, collaborative spaces are often wrongly used interchangeably with the term '**makerspace**' (Amato, 2017; van Holm, 2017) and incorrectly include Fablabs (fabrication laboratories) and hackerspaces as types of makerspaces.

[4] There are differences between incubator and accelerator models. It does not only include much longer history of the former, but also the usual seed funding in exchange for equity in the latter (Waters-Lynch *et al.*, 2016).

In fact, Fablabs are distinct from makerspaces. Like open workshops, Fablabs tend to focus on providing and maintaining tools and equipment for the actions of individuals (the 'do-it-yourself' approach). The main idea behind these is to enable invention, design, testing, monitoring, and analysis (Mikhak *et al.*, 2002). Hackerspaces and makerspaces tend to focus on community building (the 'do-it-together' model). Besides community building, makerspaces may provide access to machines and tools (e.g. milling machines or laser cutters) (van Holm, 2017). Hence, not only services, but also products are offered by individuals and firms operating in makerspaces. However, there is an additional rationale behind naming a given spaces a 'makerspace', i.e. when the organisation wants to be perceived as the element of the so-called 'maker movement'. The term 'hackerspace' calls back to the old-school laissez-faire underground computer clubs.

In Europe as the equivalent of fabrication laboratories, the concept of '**open workshops**' has emerged in Germany. These common working spaces comprise highly innovative and diverse elements such as "prototyping technologies, 3D printing, screen printing, traditional crafts, bicycle repairing, and others" (Lange and Bürkner, 2018, p. 96). Like Fablabs, open workshops are set up to test, experiment and integrate various technologies and solutions.

The concept of '**smart work centers**' (Errichiello and Pianese, 2018) resembles the construct of CSs as analysed the most. They are organised as innovative open spaces of collaboration stemming from flexible work arrangements, in particular "smart working, i.e. a holistic approach to managing employee flexibility that is able to overcome drawbacks attributed to homeworking" (Errichiello and Pianese, 2018, p. 14). Smart work centres are creative workplaces, so the work environment is organised to influence individuals' creativity. Brinks (2019) has recently introduced the term '**open creative lab**' that could be categorised under the makerspace model. Open creative labs provide work stations, infrastructure and technologies to various users and are based on the flexible membership model with low entry barriers (Schmidt *et al.*, 2016; Brinks, 2019).

To sum up, real CSs may be classified under the broader category of 'collaborative spaces' even if collaboration is sometimes fragile. Interactions together with the presence of the necessary infrastructure and specific design, provide a dynamic and inspiring milieu for collaboration, knowledge sharing and collective innovation (Butcher, 2013; Moriset, 2014; Castilho and Quandt, 2017; Bouncken *et al.*, 2018). This should be treated as a precondition for a given space to be termed a real CS.

Unfortunately, the distinction into the subtypes of collaborative spaces is currently becoming more fuzzy, when in recent years growing number of CSs is attracting SMEs and start-ups (2018 Coworking Forecast, 2018). Moreover, more and more incubators and accelerators are getting open on providing space for independent workers.

2.2. Operationalisation of proximities in coworking spaces

In this sub-section I shall translate the multidimensional construct of proximity, formerly used in meso and macro scales, into a microscale of social and economic relations present in CSs. In order to measure the various proximities between individuals or firms operating in CSs, there is a need to go beyond a simple, descriptive analysis, often based on selected quotations. The best solution would be to extend conducted interviews in order to identify all important stakeholders for a given CS. Next, social network analysis should be applied. This would make it possible to visualise and measure distances both between insiders and outside agents. Unfortunately, such analyses are rather rare. In economic geography, the only exception of using social network analysis is the research of Fiorentino (2019), who drew a social network diagram showing the interactions between the various stakeholders related to CSs in the emerging entrepreneurial ecosystem of Rome. In social sciences, the pioneering research by Parrino (2015) shed some light on the use of social networks between individuals in order to visualise links and identify the types of shared knowledge. She has drawn egocentric knowledge transmission networks for two CSs. Without considering any fundamental parameters of networks like centrality, betweenness or closeness, it was discovered that there are differences between the ranges of networks in terms of their physical scope (Parrino, 2015).

Moving to operationalisation, for internal relations in CSs, **geographical proximity** usually stands for physical proximity (Fig. 3) established on the micro-scale of a given collaborative space. All external links are treated as non-proximate. In terms of **social proximity**, friendship- and kinship-based links should be mapped. However, it would be most appropriate to apply a more specific measurement of the intensity of such relations. A good case in this respect was presented by Huber (2012), who introduced three dimensions of social proximity: knowing each other, emotional closeness, and the sense of personal obligation. The application of these three different levels of social proximity would help in assessing the strength of social ties. Parrino (2015) distinguished the types of 'know-who' knowledge that could be translated into the dimensions of social proximity. These included: occasional help for specific issues; collaborative or supplier-customer relationships; and communication or contact with third parties or introduction of/to third parties. As with the social dimension, there is a need to go beyond dummy (dichotomous) variables while measuring **cognitive proximity**. Huber (2012) introduced the following dimensions of cognitive proximity that may be applied to CSs: proximity regarding a common technical language; the similarity of the way of thinking about a technology or product; a similarity in terms of work-related technical details/facts (know-what); a similarity in terms of work-related know-how (how to do things or to solve a problem). In his Cambridge-focused study of the software industry he found that high levels of similarity in terms of the technical language

are essential for understanding each other. Alternatively, backgrounds of co-workers could be also studied in order to grasp the cognitive distance between them. Allowing some cognitive distance between co-workers, it must be pointed out that basic proximity, at least in terms of technical language (Huber, 2012) is a prerequisite for collaboration.

In CSs, **institutional proximity** should be measured by capturing the common norms and values shared by co-workers. It must be investigated to what extent visions shared by various organisations, charters and movements such as Fab Lab Charter, the Maker Movement (Hatch, 2014; Schmidt and Brinks, 2017) or the Coworking Manifesto are commonly present and accepted by all CSs users. These documents and other charters often form the cornerstones of an organisational culture evolving in a specific collaborative environment. By building a specific culture, they contribute to institutional proximity. Brown (2017, p. 113) argued that originally co-working has been more about "an informal means of organising people who shared similar attitudes and values and who wanted to adopt a loose commitment to a shared way of working." Hence, the main idea behind the emergence of CSs (excluding real estate-driven CSs) is institutional proximity per se.

In CSs, **organisational proximity** is often taken for granted. However, there are different types of users (firms, freelancers, etc.) in terms of organisational forms in some collaborative spaces. According to the Coworker study (2019 CMCAs, 2019), SMEs and start-ups are becoming a more common target group in CSs than freelancers or individuals. It is rather organisational heterogeneity that stimulates collaboration and competition (Bouncken *et al.*, 2018). Ross and Ressia (2015) applied a more nuanced perspective that the cooperation between heterogeneous members may be possible (Ross and Ressia, 2015). Ivaldi *et al.* (2018) and Weijs-Perrée *et al.* (2019) have argued that individuals should come from different business backgrounds (in terms of occupation and the sector of work, organisational status and affiliation). In contrast, Schmidt and Brinks (2017, p. 298) argued that "it is questionable whether labs in fact attract diverse groups of users."

To sum up, physical and institutional proximity constitute the foundations of CSs' operations (Fig. 3). However, institutional proximities may slightly differ between CSs. Next, in terms of importance, one should consider cognitive and social proximity. There may be even some organisational distance that should not hamper knowledge interaction.

Certainly, CSs differ in terms of the proximities established. One of the key factors that influences the process of building proximities and distances is the level of openness of CSs (Bouncken *et al.*, 2018). Corporate CSs (Bouncken *et al.*, 2018) introduce some cognitive and institutional proximity, but due to hierarchical relationships and organisational routines they usually do not put a major emphasis on social interactions.

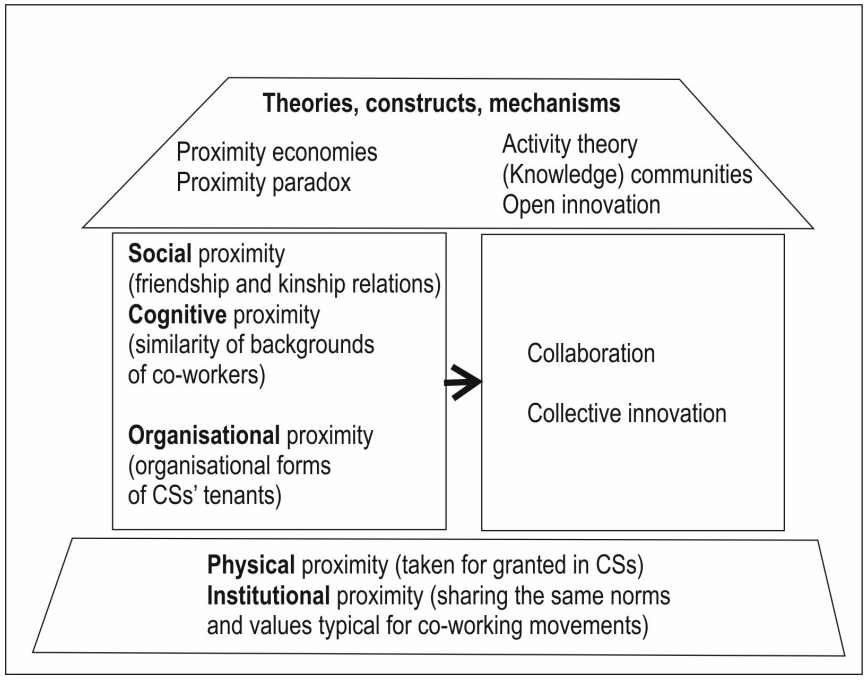


Fig. 3. Framework for proximity-based studies of CSs

Source: own work.

Open corporate CSs (Bouncken *et al.*, 2018) introduce new institutions for collaboration, and consequently put a larger emphasis on social and institutional proximity. Consultancy coworking spaces focus on delivering some social and cognitive distance with relatively strong institutional proximity, while independent CSs mainly concentrate on strong social relationships (Bouncken *et al.*, 2018).

2.3. The challenges of CSs' studies

The literature on CSs mainly relates to the field of social sciences, especially to management studies, and the spatial aspects of CSs' operations are not fully integrated with the theoretical frameworks developed within economic geography and spatial planning (Fiorentino, 2019). Hence, with the growing number of research analysing CSs, there is a need to neatly embed them in existing conceptual frameworks. Apart from proximity economics, at least three theoretical approaches related to social proximity may be applied to explain the rise and evolution of CSs in space.

First, activity theory may be applied to explain collaboration in CSs. Following Engeström (2009, p. 310), Spinuzzi (2012) argued that 'real CSs' are "bounded hubs of concentrated coordination efforts." However, it must be better understood how good

neighbours become good partners (Spinuzzi, 2012; Brown and Ressia, 2015). In other words, the question "how unrelated activities done individually may transform into team-based collaboration" should be addressed. The fourth generation activity theory (Spinuzzi, 2012, p. 404) considers "internetworked activities by examining the inter-organizational collaborations to which they contribute. These challenges correspond closely with the long-term employment trends and changes in work organization."

Second, the notion of 'communities' explains the emergence of new collaborative spaces. In this respect, communities "are regarded as entities that may exist within organizations, as alternative structures to organizations, as substitutes for organizations or as intermediaries between individuals and organizations" (Schmidt and Brinks, 2017, p. 291). Learning enables co-workers to develop a sense of community necessary to become entrepreneurially proficient (Butcher, 2013). Rus and Orel (2015) likened co-working to a community of work. CSs are also similar to the concept of cognitive and social-proximity-based 'communities of practice' (Wenger, 1998). By some authors, knowledge communities are thought to meet in CSs to collectively innovate (Butcher, 2013; Capdevila and Moilanen, 2013; Müller and Ibert, 2015). Hence, CSs can be understood as "local anchors of knowledge generated in global communities" (Schmidt and Brinks, 2017, p. 297) or places where knowledge creation is taking place on a global scale. To sum up, conversations on the meaning of social spaces of knowledge creation may be anchored in multiple locations (Rutten, 2017).

Third, Lange and Bürkner (2018) proposed using an open innovation model (Chesbrough, 2003; Elmquist and Ollila, 2011) in studies of CS in order to refer to the recent boom observed in advanced industries which require 'open access' and a more collective understanding of innovation processes. Schmidt and Brinks (2017, p. 298) argued that "little is known about the interplay between establishing openness and securing control over an innovation."

Table 2. Main theoretical approaches and challenges of the research into CSs from the proximity perspective

Theoretical construct/ theory	**Challenge**	**Proximity dimension**
Fourth generation activity theory to explain the collaboration in CSs	How do internetworked activities contribute to interorganisational collaborations?	Social proximity Cognitive proximity
(Knowledge) communities	To what extent are conversations on the meaning of the social spaces of knowledge creation anchored in multiple locations?	Social proximity
Application of open innovation model	What is the interplay between establishing openness and securing control over an innovation?	Social proximity Cognitive proximity

Source: own work.

There are at least two more challenges that should be addressed while studying CSs. First, knowledge flows, collaboration and innovation processes are strongly volatile in CSs (Parrino, 2015). For instance, all of the four innovations studied by Brinks (2019) have left collaborative spaces. Hence, due to the fact that longitudinal analyses of proximity (Balland *et al.*, 2015, 2020) and evolution of CSs are rare, there is a need to use lenses of evolutionary economic geography in order to investigate the dynamics of CSs.

Second, in the case of CSs, the proximity paradox has not been tested so far (Boschma and Frenken, 2010). Geographically, the results of Parrino's study (2015) indicated the possibility of the existence of more links with partners outside a CS than from the same CS. Parrino (2015) has showed that this applies especially to CSs, in which there is no intra-organisational platform for the exchange of thoughts. This mechanism has not been tested on a larger sample, so it is not known whether the proximity paradox in CSs is a general rule or rather an exception. Other dimensions (social, cognitive or institutional) of the proximity paradox have not yet been tested.

3. CONCLUSIONS

Both proximity economics (Boschma, 2005) and scholars who study CSs (e.g. Cabral and van Winden, 2016; Brown, 2017) argue that co-location does not automatically contribute to collaboration. Physical proximity per se which is the prerequisite of defining CSs does not always result in collaboration. Conditions for collaboration and knowledge interactions may not emerge spontaneously without conscious and careful 'curation' (Brown, 2017) by a local centre champion or manager (Ross and Ressia, 2015). Such efforts may be named 'coordinated serendipity' (Liimatainen, 2015; Rus and Orel, 2015).

To sum up the definitional discussion, coworking spaces are shared venues (for short or medium-term rental) offering a facilitative milieu for social and knowledge interactions between their users. In the paper, I redefined 'real CSs' as the physical spaces of strong institutional, cognitive and, preferably, social proximities that may lead to knowledge interactions, collaboration and innovation. I have argued that even if organisational proximity in CSs is often taken for granted, there is a heterogeneity of their users. Hence, one of the main contribution of the paper involves the translation of the definition of CSs into the language of proximity economics. Based on a review of literature, I identified the characteristic features of CSs and the corresponding proximity dimensions. I also assessed the significance of various dimensions of proximity in CSs. With the use of Bouncken *et al.* (2018) typology I was able to indicate how proximities differ between CSs.

The operationalisation of proximity dimensions still remains under-researched. The important message which stems from a review of the papers in proximity economics is that dichotomous (dummy) variables of proximity should be avoided. I argue that there exists a continuum of proximity (at least in reference to its social and cognitive dimension). Even if it is not possible to measure proximity using continuous variables, the non-dichotomous variables should be used to assess the level of proximity.

Taking into account the debatable role of CSs in local development, new working ecosystems should become an increasingly important focus in local and regional strategies (Fiorentino, 2019). Hence, firstly, there is a need to search for local leaders that may curate these ecosystems, because, especially in non-core areas (Brown, 2017), the major problem is to attract new members to CSs (2019 Coworking Forecast, 2019). Secondly, proper governance and support of CSs should be introduced (Waters-Lynch and Potts, 2017), especially due to the fact that CSs are strongly fragile in the era of COVID-19.

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EXPLORING PROXIMITIES IN COWORKING SPACES: EVIDENCE FROM ITALY

Abstract. Since the mid-2000s, the rising phenomenon of coworking spaces (CSs) has provided a flexible and mainly affordable solution for freelancers, entrepreneurs, small firms and start-ups, which may had experienced the issues of isolation when working from home, to work in a shared workplace, interact, socialize and share knowledge. This article explores the phenomenon of CSs within the theoretical framework of proximity measures *a là* Boschma (2005) – cognitive, organisational, social and institutional – that underpin the aspects of innovation, interaction and knowledge exchange. Though some studies on CSs have indirectly studied the different aspects of proximity, only a few of them focused on the importance of proximity measures at the workspace. With the aim to fill the gap in the literature, an empirical study was applied to Italy with 549 active CSs in 2018. The data was collected through an on-line questionnaire, addressed to a sample of 326 coworkers, focusing mainly on the set of questions devoted to understanding whether coworkers have exploited the proximity typologies in their CSs, have experienced increases in their revenues and well-being. The results are critically discussed, and some insights on policy implications are proposed.

Key words: coworking space, coworker, proximity measures, Italy.

1. INTRODUCTION

Within the last decade, the nature of work has changed significantly. Working has become less dependent on distance, time or space (Gaspar and Glaeser, 1998; Joroff, 2002). Despite that, due to the emergence of the knowledge economy (Dolfsma and Soete, 2006; Neef, 1998; Cooke, 2002), technological developments and the digital economy, and also because of the rising number of self-employment, freelance and independent workers, more flexible forms of working are becoming prominent,

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as opposed to the traditional work (full-time employment) (Howell and Bingham, 2019). Thanks to the diffusion of the Information and Communication Technology (ICT) people can work remotely: working from home, or using public spaces, such as libraries, cafés/ bars, hotel and airport lounges, which are typically not planned to host productive activities, yet are increasingly being occupied as spaces for work (Di Marino and Lapintie, 2017) – also known as 'third places' (Oldenburg, 1989) for work[1]. The borders between private homes, productive spaces and socialising site are thus becoming less evident (Moriset and Malecki, 2009; Fonner and Stache, 2012; Gold and Mustafa, 2013). However, teleworking in such an informal working environment entails a lack of face-to-face interaction. In other words, early stage entrepreneurs, freelance, self-employed and independent knowledge workers need social and professional interactions in order to overcome the risk of isolation and loneliness – typical of working from home – and also to increase meeting and networking opportunities (Johns and Gratton, 2013; Moriset, 2014; Mariotti *et al.*, 2017). Proximity studies have underlined the impact of geographical proximity, as well as agglomeration economies, on interactive learning and innovation (Boschma, 2005). Furthermore, the importance of geographical proximity should always be examined in relation to other proximity dimensions (see Section 2).

Within this context, since the mid-2000s, a relatively new and promising form of a workplace, known as a coworking space (hereinafter CS), has emerged that is becoming increasingly accepted by diverse groups of workers – from freelance, self-employed individuals and entrepreneurs to dependant contractors, with various professional profiles and competencies, ranging from the creative industry – e.g. architects, designers, journalises, etc. – to engineering and digital sectors, namely IT, software developers, consultants, etc. (Gandini, 2015; Spinuzzi, 2012).

Although coworking is becoming more and more popular worldwide, the phenomenon of CSs is still relatively new, and yet to be studied both theoretically and empirically. Within this framework, this paper aims to fill that gap in the literature as it has not yet tackled the role of the proximity measures a là Boschma (2005) – cognitive, organisational, social and institutional – in the development of community within a coworking space, as well as in fostering innovation, interaction, and knowledge exchange, but also economic performance and well-being. To reach this goal we shall analyse and discuss the results of a survey addressed to a sample of 326 coworkers.

The remainder of this paper is structured as follows. The next section briefly reviews the literature on CSs, as well as the proximity studies in the economic literature, in order to position the current paper within a theoretical sphere. The

[1] Interestingly, Morrison (2018) has reconceptualised in the Fourth Place the combination of the First, Second and Third Place. The Fourth Place aims to foster networking, promote mingling (combination of the First and Third places), and to favour collaboration, face-to-face interactions, and the exchange of tacit knowledge.

third section is dedicated to the empirical study on Italy; the methodology and the mode of data collection are described in length. In Section 4 a discussion of the descriptive statistics is presented. The final section summarises the main findings and outlines some policy implications that brings the paper to a close.

2. THE THEORETICAL FRAMEWORK: COWORKING SPACES AND THE PROXIMITY DIMENSIONS

2.1. The phenomenon of coworking spaces

CSs are membership-based workplaces that ensure a flexible workplace: with a monthly/daily rent the individual gains the right to enter and work in the space, as well as a membership in social and professional community. Each 'coworking-user' or coworker (hereinafter CW) works separately – being assigned a desk/ office space – in a physical space which is shared with others (Raffaele and Connell, 2016). The CS model has gained legitimacy among different group of professionals not only for its provision of office space and its cost-effectiveness, but also for its capacity to establish a community (Akhavan and Mariotti, 2018) and a quality of working behaviour of '*working-alone-together'* (Spinuzzi, 2012). According to Kwiatkowski and Buczynski (2011, p. 19), CWs share five main values: *collaboration* (the willingness to cooperate with others to create shared values), *community* (intangible benefits, shared purpose), *sustainability* (do good to do well and offset the environmental footprint of the space), *openness* (free sharing of ideas, information and people), and *accessibility* (financially and physically accessible, diversity). Therefore, CSs are regarded as a profitable business model that may intensify private and business relationships, along with a high level of autonomy that serves experimentation and creativity (Bouncken and Reuschl, 2018).

Moreover, Merkel (2015, p. 122) has stated that "as flexibly rentable, cost-effective and community-oriented workplaces, coworking spaces facilitate encounters, interaction and a fruitful exchange between diverse work, practice, and epistemic communities and cultures". For Davies and Tollervey (2013), the CS model may facilitate the creation of an economy than supports community and innovation. In such environment, each CW can, therefore, learn from others through sharing spaces, interaction and being part of the social/ professional activities offered by an organisation. Some scholars have classified coworkers based on what they may earn from CSs (Bilandzic and Foth, 2013):

– *Utilizers*, use CSs for their demand to technological infrastructure;
– *Learners*, make use of CSs in order to gain and exchange knowledge, attending events, etc.;
– *Socializers*, seek recognition and acknowledgment in CSs.

Though their economic significance remains uncertain, the importance of emerging new workplaces, and more specifically the CS, in the era of digital economy – with a growth in entrepreneurship, freelance and teleworkers – is characterised by their dramatic global spread, specially since the mid-2000s. This statement is also evident in the numbers collected by Deskmag[2] and reported in their 2019 Global Coworking Survey: the coworking movement has roughly doubled in size each year since 2006 and by the end of 2019 almost 2.2 million people are expected to work in over 22,000 coworking spaces worldwide.

Table 1 outlines some relevant publications from various disciplines on CSs – from 2012 to the very recent (2019) – that define CSs. Although the literature on the emerging workplaces in general, and specifically on CSs, is rather scarce, during the recent years this topic has been drawing a growing attention.

Table 1. Definition of CSs based on different disciplines

Contribution	Discipline	Definition of CS
Spinuzzi (2012)	Sociology	CSs are open-plan office environments in which people work alongside other unaffiliated professionals for a fee
Capdevila (2013)	Business/ Management	CSs are defined as localised spaces where independent professionals work sharing resources and their knowledge with the rest of the community
Bilandzic and Foth (2013)	Technology	CSs provide ensure a flexible and autonomous use of office and social space that eases the direct interaction among the users for social, learning and business-related interests
Moriset (2014)	Geography	CSs as potential "serendipity accelerators" …beyond the room layout, coworking is first an atmosphere, a spirit, and a lifestyle
Avdikos and Kalogeresis (2017)	Economy	It helps freelance designers become more embedded in business networks (in terms of collaborations), both local and foreign, compared with working in isolation, as lone eagles
Robelski *et al.* (2019)	Psychology/ Health care	As a telework arrangement, coworking spaces are becoming an increasingly established workplace among the self-employed and freelancers working in the creative line of business, as opposed to home office that is mainly used by employed workers

Source: updated from Akhavan and Mariotti (2018, p. 87).

For Moriset (2014), CSs are 'accelerators of serendipity': serendipity of production for creative people and entrepreneurs who are in search for working envi-

[2] See www.deskmag.com.

ronments to enhance the chances of meeting others and collaboration. Others have discussed the 'sense of community' offered by CSs to overcome the issue of social isolation, which may affect independent workers and teleworkers (Garrett *et al.*, 2017; Blagoev *et al.*, 2019; Spinuzzi *et al.*, 2019). Therefore, individuals can satisfy their needs for social interactions while maintaining their desired autonomy and independency at work. A recent study by Akhavan and Mariotti (2018) on a sample of 236 CW in Italy (July 2017) provided insights on how coworkers experienced a sense of community inside their working spaces and outside in the urban context: the majority of CWs, who responded to the questionnaire, reported that they had experienced social proximity, and had also perceived a positive impact of the CS on their urban environment, the neighbourhood in this case.

2.2. Proximity dimensions

The importance of proximity has been addressed in literature that spans across different discipline boundaries: from urban and regional economics, economic geography to innovation economics and evolutionary economic geography (Salvador *et al*., 2013). In the economic geography literature, *proximity* is considered fundamental as it "underpins the joint production, circulation and sharing of knowledge" (Gertler, 2008, p. 203). At the beginning of the 1900s, economists recognised that spatial and social proximities play a key role in corporate growth and competitiveness (Weber, 1909/1929). More specifically, geographical and social proximities have been addressed as two genetic conditions necessary, though not enough, for an area to be an industrial district (Capello, 2007). The first attempt at a formal classification of the reasons for companies agglomerating in an industrial district was made by Marshall (1925) and subsequently by Becattini (1990). The Marshallian industrial district and its Italian variant version stressed the role of space as the generator of locational advantages: lower production and transaction costs, and a more efficient use of resources, which enable firms to achieve higher levels of productivity and profit (Capello, 2007, p. 193). Additionally, in the 1980s, the work developed by the GREMI group (Groupe de Recherche Européen sur les Milieux Innovateurs) stressed the role played by innovation in enhancing economic development, and concluded that the factors related to 'relational proximity' (social interactions, interpersonal synergies, and collective action among actors) enhance innovative capacity (see, e.g. Aydalot, 1986). According to this theory, economic and social relations among local actors influence the innovative capacity and economic success of specific local areas termed 'milieu innovateurs' (Capello, 2007). Moreover, Torre and Gilly (2000) and Torre (2010) stressed the importance of organised proximity[3], that is

[3] For a review of the role of organizational structure, see Allen *et al.* (2008).

not geographic but relational, and expressed the way in which two actors could be close regardless of the kind of geographical relationship (i.e. level of interaction, sharing knowledge, social relation, etc.).

Although a large body of literature confirms that agglomeration and geographical proximity positively affect the formation of ties in knowledge networks (Hardeman *et al*., 2012; Balland *et al*., 2015), there are other forms of proximity crucial to innovation and knowledge exchange (Boschma, 2005). In 2005, Ron Boschma recalled the proximity measures and underlined that geographical proximity could not be assessed in isolation but should always be examined in relation to other proximity measures (cognitive, organisational, social and institutional) that may provide solutions to the problem of coordination. Indeed, due to advanced information and communication technologies, networks through which learning takes place are not necessarily spatially delimited. The proximity measures *a là* Boschma (2005) are the following: (i) Cognitive: people sharing the same knowledge base and expertise may learn from each other, facilitating effective communication; (ii) Organisational: such as networks, which are mechanisms that not only coordinate transactions but also enable the transfer and exchange of information and knowledge beneficial for learning and innovation; (iii) Social: socially embedded relations between actors at the micro-level (based on friendship, kinship and past experience) that may stimulate interactive learning due to trust and commitment (elements of social capital e.g. trust); (iv) Institutional: common habits, routines, established practices, rules, or laws that regulate the relations and interactions between individuals, which may reduce uncertainty and bases for economic coordination and interactive learning; (v) Geographical: the spatial or physical distance – short distances bring people together, favouring contacts and facilitating the exchange of tacit knowledge (see also Akhavan and Mariotti, 2018).

Some studies have confirmed that the different proximity dimensions should not be considered separately and it is crucial to study their interaction. In this regard, Cohen and Prusak (2001) discussed the face-to-face contact that enhances other forms of proximity essential for knowledge exchange within organizations. Balland *et al*. (2015) have studied the joint and co-evolutionary dynamics between knowledge networking and proximity. They argued that the processes of learning, decoupling, institutionalisation, integration and agglomeration could affect the five proximity dimensions. Based on other empirical studies, geographical, organisational and institutional proximity measures favour collaborations (Balland, 2012). Others have found that geographical proximity positively affects tie formation in knowledge networks (Hardeman *et al.*, 2012; Balland *et al.*, 2015).

The proximity literature is generally based on the level of companies. Although a few studies on CSs have indirectly addressed the different aspects of proximity, only a few researches have directly focused on the importance of proximity dimensions at the workplace level. The empirical work by Parrino (2015) – on CSs in Milan and Barcelona – has shed light on the theoretical framework of

proximity in CSs and examined specifically the role of proximity in facilitating interactions and the transmission of knowledge among the workers in CSs, and the relational potential of geographic proximity of CWs. This analysis is based on the qualitative study of two maximum-variation case studies of CSs: the first where CWs share only a physical space, few are the manifestations of sociality, and the transmission of knowledge among CWs proved to be scarce and episodic; the second where CWs exploit the organisational platform managed by the CS, experience knowledge flows with other CWs, and interact frequently.

3. AN EMPIRICAL STUDY ON ITALY

3.1. Data collection and methodology

The study presented in this paper is based on the data collected through the research project entitled "New working spaces. Promises of innovations, effects on the economic and urban context" exploring new workplaces, coworking spaces and makers spaces, in Italy – FARB Project, funded by the Department of Architecture and Urban Studies (DAStU), Politecnico di Milano. The data was collected from two main sources:

– an original georeferenced database on CSs in Italy was developed; it contains all the necessary details, such as size, number of desks, facilities offered, etc. The data was collected mainly from the official websites of CSs and through contacting some of the spaces for the missing information;

– an online survey (questionnaire), which was sent to CS managers to be distributed among CWs.

As of January 2018, Italy hosted 549 CSs: about 50% were located in Italian metropolitan cities, with Milan (112), Rome (50), Turin (23), and Florence (17) hosting about half of them (Fig. 1). As expected, Mariotti *et al.* (2017) have found that in the case of Milan, CSs were mainly agglomerated in urban centres where there was a concentration of urban amenities.

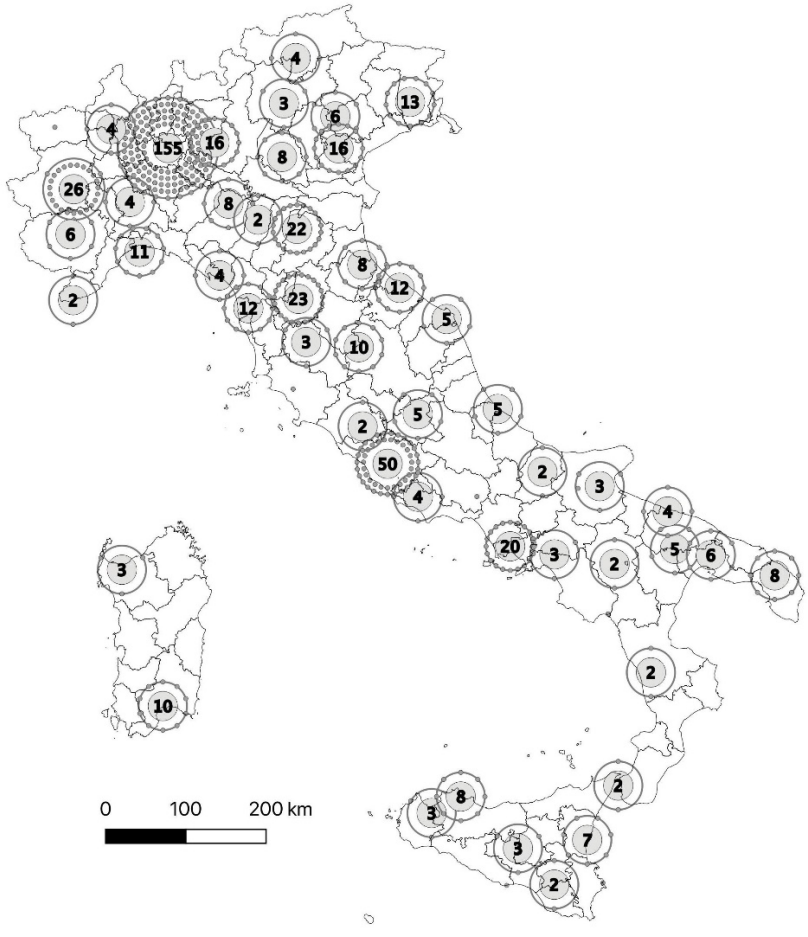

Fig. 1. The location of CSs in Italy as of January 2018

Source: own work.

The on-line questionnaire was composed of 55 questions, structured in 7 sections:

1. Socio-demographics (gender, years, age, education, etc.), employment position and sector;
2. Motivation for selecting the coworking space (location factors);
3. Perceived and expected advantages and dis-advantages to work in a CS;
4. Proximity typologies (social, institutional, cognitive, organizational);
5. Level of satisfaction in working in the CS;
6. Willingness to work in a CS in the next 3-years;
7. Impact on the neighbourhood.

In order to control the proximity dimensions *a là* Boschma (2005), we asked the following questions:

- Social proximity
  1. Have you made new friends?
  2. Are your relationships with most coworkers based on trust?
- Institutional proximity
  1. Do you find that there is an affinity in terms of principles between you and a significant number of coworkers? (political ideas)
  2. Do you find that there is an affinity in terms of principles between you and a significant number of coworkers? (lifestyle)
- Cognitive proximity
  1. Do the coworkers with whom you share space have on average your level of knowledge?
  2. Do the coworkers with whom you share space have on average your level of experience?
- Organisational proximity
  - o The choice to work in a shared space is related to its useful service/ to have access to training opportunities/ To have access to new information channels/ to have access to spaces such as meeting room, kitchen, etc./ to have access to services such as secretariat, administration, etc.

Geographical proximity was defined as the co-location of CWs which existed in CSs. Social proximity concerns the elements of social capital (e.g. trust) that enhance socially embedded relations between agents, in this case CWs, at the micro-level (Boschma, 2005). Institutional proximity is proxied by the affinity among the CWs regarding their political attitudes and lifestyle, which facilitates the development of a "sense of community". Sharing the same level of knowledge and experience concerns cognitive proximity, which stimulates collaboration and fosters new business opportunities. Finally, organisational proximity is proxied by the services and facilities offered by the organisational platform of a CS, and most of the times by the coworking manager themselves, which can enhance knowledge flows among workers heterogeneous in terms of their occupation, business sector, organisational status, affiliation and personal and organisational motivations (Parrino, 2005)[4].

4. EMPIRICAL ANALYSIS AND FINDINGS

By January 2018, 326 CWs, from 138 CSs (about 25% of the total), answered the questionnaire. They were located in 83 cities homogenously distributed in the four macro areas (the north-west, the north-east, the centre, the south and islands).

[4] All the CSs studied have developed an organisational platform.

There is a concentration in the Italian Metropolitan areas[5] (34%), with Milan registering 60 CWs. 44% of the respondents were female and 56% male; 52% were aged 36–50, followed by CWs aged between 25 and 35 (38%), over 51 (9%), and those aged 19–24 (1%). They were mainly freelancers (48%), employees (29%), managers (19%) and other (11% – apprentices, stagers, students). About 37% had spent at least 6 months abroad, for the purpose of education or work. The CWs' sectors of work mainly belonged to the creative industry (65%), followed by management consultancy, training, and other sectors.

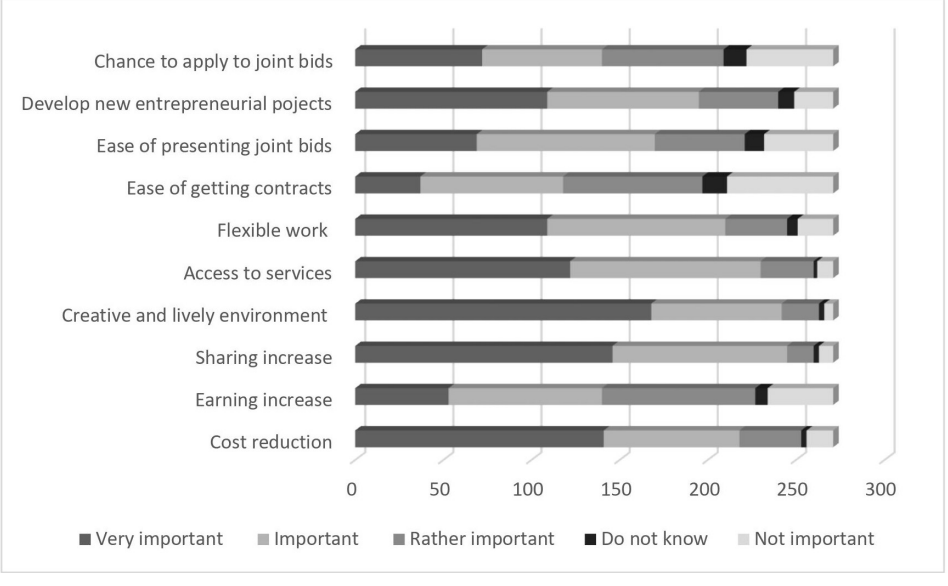

Fig. 2. Motivation for selecting the coworking space (pull factors)
Source: own work.

The CWs underlined that the main ("very important") motivation supporting the selection of a CS was related to cost reduction (Fig. 2). Indeed, during the economic downturn, CSs represent a valid and cheaper alternative to traditional offices. Other pull factors applied to the opportunity: (i) to work in a lively and creative environment, that well fits the CWs that were mainly specialised in the creative industry; (ii) to increase knowledge sharing; (iii) to access shared services

[5] In Italian known as *Città metropolitana*, Metropolitan cities are administrative divisions, which are comparable to the provincial scale, which includes a large core city and the smaller surrounding towns that are closely related to, economically and for provision of public facilities. They are 14 in total: Roma, Torino, Milano, Venezia, Genova, Bologna, Firenze, Bari, Napoli, Reggio Calabria, Catania, Messina, Palermo, Cagliari.

and instruments (i.e. IT, secretary, common rooms, meeting rooms, etc.); (iv) to access a flexible labour organisation; (v) to develop new entrepreneurial projects; (vi) to apply for joint bids and ease of presenting joint bids; (vii) ease of getting contracts; and (viii) to increase earnings.

These answers stressed the importance that respondents allocated to the main patterns of the coworking: cost reduction and the lively and creative environment, characterised by the sharing of services, spaces and knowledge, which could increase new business opportunities. These answers underlined the role of organisational proximity that CWs experienced in a CSs (i.e. services, facilities, training courses, etc.), which enhanced knowledge sharing and business opportunities growth.

Table 2. The proximity measures as declared by coworkers (*percentage*)

Proximity typologies	Yes	No	Do not know	Total
Social proximity 1	77.6	19.9	2.5	100.0
Social proximity 2	73.7	19.6	6.7	100.0
Institutional proximity 1	54.9	23.9	21.2	100.0
Institutional proximity 2	73.6	14.1	12.3	100.0
Cognitive proximity 1	61.4	19.6	19.0	100.0
Cognitive proximity 2	55.8	27.3	16.9	100.0
Organisational proximity	86.0	11.3	2.7	100.0

Source: own work.

The questions about the proximity typologies *a là* Boschma (2005) showed interesting results (Table 2). About 74% of the respondents had experienced a relationship based on trust (social proximity 2) with most of the CWs; about 78% had established friendships with them (social proximity 1), and specifically 52% with more than one third of the coworkers. About 55% share similar political attitudes (institutional proximity 1), and 73% similar lifestyles (institutional proximity 2); as for cognitive proximity, about 61% stated to have had similar levels of knowledge (cognitive proximity 1) and about 56% similar levels of experience (cognitive proximity 2). Finally, 86% made use of the service and facilities offered by the CS (organisational proximity), including training courses, designed to encourage synergies among CWs.

These results confirmed the key role of the sense of community, which is funded in social proximity (trust, new friendship and collaboration) and institutional proximity (sharing the same lifestyle, political ideas, etc.). As stated by Kim and Kaplan (2004), the members of a community share the feelings of collective identity and may exploit a 'community spirit' (Etzioni, 1994; Rovai, 2002) if they

share the feelings of understanding and belonging. The sense of community is also related to the space, services and facilities supplied by the CS (organisational proximity) and can also be enhanced by cognitive proximity. As stated by Davies and Tollervey (2013), each coworker can learn from others through sharing spaces, interacting and being part of the activities offered by an organisation.

Additional questions have further stressed the importance of the layout of CSs, which fosters meeting opportunities. For instance, about 38% of the CWs (always or very often) discussed working issues during lunch time, mainly in the kitchen or other dedicated spaces of the workplace.

All the above-mentioned effects of the workplace on coworkers might impact their economic performance and well-being. 39% of the CWs and 29% of the firms experienced revenue increases since they had started working in the CS. Interestingly, about 73% of the respondents declared to have developed new products and services, of those 52% have done it jointly with other CWs. Additionally, almost all CWs (97%) confirmed they were satisfied with working in the current CS. It can, therefore, be stated that CWs have evaluated positively their CSs, indeed 57% declared that they intended to work in the same CS in the next three years, 5% would move to another CS, 34% did not know and only 4% would not work in a CS anymore.

5. CONCLUSIONS AND POLICY IMPLICATION

The current survey among 326 CWs in Italy highlighted some interesting points: although the main motivation to work in a CS was cost reduction, a key role was played by the lively and creative environment, characterised by the sharing of services, spaces and knowledge, which enhanced social proximity and organisational proximity, thus increasing new business opportunities. Additionally, the CWs shared cognitive and institutional proximities since they had similar levels of knowledge and professional experience, as well as similar lifestyle and political attitudes, respectively. The sharing of knowledge and collaboration between the CWs fostered the development of new, innovative products or projects. Further, more than one third of the CW had experienced an increase in their revenues and almost everyone confirmed they were satisfied with working in a coworking setting.

The study offers interesting insights for policy makers willing to foster entrepreneurship in an ageing society to sustain the level of skilled employment. Coworking could be regarded as an opportunity to revitalise city centres by making use of empty office spaces (Mariotti *et al.*, 2017), and foster the development of peripheral areas (Mariotti and Di Matteo, 2020), an issue that attracts a significant attention among academicians and policy makers especially during the current pandemic caused by the massive spread of the new coronavirus SARS-CoV-2.

Indeed, peripheral destinations in Italy, probably because of the natural isolation that their orography imposes, are those which have suffered less from the spread of the COVID-19, and probably these places will be the first to remove the 'social distancing' principle and restart a normal life at the end of the emergency, thus being considered 'safer places'.

Further research might focus on a comparative study inside coworking spaces in different countries to explore the role of cultural and context factors in shaping coworking spaces and, consequently, the interactions among coworkers[6]. The present analysis requires some caveats. First, an appropriate counterfactual analysis might better disentangle the differences and similarities (i.e. economic performance and wellbeing) of the workers of CSs and those working in traditional offices and/or at home. Besides, the analysis only explored those that in January 2018 were working in a CS, thus excluding the ones that moved out. The results of the descriptive statistics should be also corroborated by an econometric analysis. This will be the objective of a future paper.

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[6] This is the object of the four years Cost Action – CA18214 project, entitled: "The geography of new working spaces and the impact on the periphery" (https://www.cost.eu/cost-action/the-geography-of-new-working-spaces-and-the-impact-on-the-periphery/), which involves 28 countries and started in 2019. The authors are members of the project.

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NEW GEOGRAPHIES OF WORK: RE-SCALING MICRO-WORLDS

Abstract. The recently emerging new types of collaborative work and unconventional workplaces indicate that shifting social and economic practices have odd spatial implications. The diversity of work, mostly based on hybrid social and economic logics, has brought forth a number of new contextualised spatial constructs in recent years: makerspaces, fab labs, open workshops, and co-working spaces now require detailed analytical reconstruction and conceptualisation. This article is a theoretical discussion of the nature of fluid and contingent spatialisation against the backdrop of binary explanatory categories (e.g. local-global; proximity-distance). Drawing upon modernised concepts of horizontal scaling, we propose a perspective on hybrid work which focuses on contingent multiple, multidirectional and temporal scalings created by a variety of users while developing their own micro-worlds of work.
Key words: scale, flat ontology, new work, alternative workplaces, collaboration, social innovation.

1. INTRODUCTION

Co-working spaces, fab labs, open creative labs, open workshops, repair cafés, and other forms of 'untypical' work have recently puzzled urban scholars and economic geographers. They seem to indicate that new types of collaborative and community-oriented work entail shifting social and economic practices. These practices, in turn, have odd spatial implications which become obvious through emerging alternative and 'diverse' places (Gibson-Graham, 2008; Lange and Bürkner, 2018; Brinks, 2019; Schmid, 2019a). In particular, their spatiality involves temporary scalings triggered by digital technologies and a new sense of locality. Heterogeneous as the socio-economic processes and their spatial connotations obviously are, scholars of human geography and urban planners have restricted themselves

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to casual empirical descriptions, rather than engaging in systematic conceptualisation. This paper therefore seeks to provide a theoretical perspective towards the socio-spatial and scalar aspects of the rise of the new micro-worlds of work which have begun to change urban and economic realities.

The complexity of the problem is twofold. On the one hand, new work is based on heterogeneous social innovations and community building which seem to have strong ties to urban spaces (Brinks, 2019; Fabbri and Charue-Duboc, 2013). It departs from formal understandings of ubiquitous wage-dependent labour as it emerges from locally situated small-scale freelance and entrepreneurial activities, as well as from everyday practices of repairing, tinkering, computerised prototyping, sharing, and other forms of degrowth activism (Krueger *et al.*, 2018; Lange and Bürkner, 2018; Schmid, 2019b). On the other hand, such informal approaches to 'new' work challenge geographers' traditional understandings of the relevance of space and scale for social and economic change. The phenomena mentioned above require more up-to-date conceptualisations of post-industrial and post-capitalist small-scale production, the utilisation of new technologies and alternative ways of 'doing economy' (Chatterton and Pusey, 2019). Practically speaking, an acute view is in demand on how economies are being reconfigured today under the impact of altered social practices. We need to understand how social needs are met and economy is practically 'done'. This will not only refine disciplinary representations of social and economic change. It will also allow policy makers to better understand the geographies of new work. Last but not least it will enable them to develop well-informed action plans that may support the emerging fields of various forms of economies in cities and regions.

2. PLAN OF THE PAPER

This paper aims to clarify the significance of scale within the proliferating contexts of spatialisation connected with new types of work. It starts with a brief review of existing academic literature on coworking spaces, open creative labs, and open workshops, identifying scholars accounts of the significance of space and scale (Section 4). It then proceeds to discuss the hitherto undertheorised implications of scale and procedures of scaling, as related to technology-informed types of what we call 'hybrid work' (Section 5). Common notions of formalised work are based on the stipulation of a particularly economic logic of work formation. They imply a sharp distinction between economic rationality and different kinds of social logics, most of which have an impact on everyday life and reproduction. Consequently, many social and economic studies suggest that socio-spatial constructs are based on a similarly distinguishable opposition of either social or economic rationalities.

However, within the new areas of 'doing economy', such dynamism has come to blur, and sometimes even extinguish, former distinctions between the economic and the social, raising hopes for successful future conceptualisations of social production (i.e. non-profit or low-profit production for social purposes) and non-alienated (i.e. self-organised and exploitation-free) work (Chatterton and Pusey, 2019). Therefore, in Section 6 we introduce a heuristic concept of 'hybrid work'. It defines the categorical division between economically defined labour and socially motivated concrete work. On this basis it describes the effects of digitisation and technologically advanced communication on work, namely as factors of the juxtaposition, and of the blending, of the various social and economic elements of work.

By adding a virtual dimension to activities at a local level, digitisation imposes further elements of hybridity on time-space relationships involved in work. For example, a co-working space or a coffee shop where a peer group works on a joint project does not only incorporate the specific sociality of peers but also takes in social relations to members of a wider community available in digital networks. All of them have effects on work routines and possible economic outcomes.

We aim to demonstrate that hybridisation does not simply consist in a blurring of categories provoked by digitisation. It is rather a flowing recombination of heterogeneous social and economic elements which assumes a distinct quality of its own: It is by constant flows of hybridisation that such heterogeneous, event-driven, socially motivated and community-oriented forms of concrete work take on their specific, often locally situated, individuality.

3. CONCEPTUAL CONTRIBUTIONS OF THE PAPER

In this perspective, we contribute to the debate on work which formerly had been classified as 'untypical' or 'amateurish', however, now assumes a quality that reshuffles society and space in a bottom-up way. Our approach not only alludes to an already well-known phenomenon that has been addressed as 'third space', i.e. the generation of hybrid public places by internet-based communication (Soukup, 2006). What is even more important is that it – once again – disturbs our everyday and academic concepts of space. Hybrid work challenges the traditional understandings of what is 'local', 'global', 'virtual' or contingently situated 'in between'. It refers to scale and temporary processes of scaling without suggesting the existence of clear-cut or invariable scales.

Quite obviously, then, new work has unprecedented scalar implications. However, scale theory, as implemented in many models of economic and social geography, as well as in political theory, has rather limited explanatory capacity when confronted with the hybridisation of social and economic practices. Therefore, in Section

6 we shortly discuss the limitations of conventional concepts based on the idea of scale hierarchies. Alternatively, we opt for a tailored implementation of the 'flat ontology' approach to scale, as initially presented by Marston (2000) and Marston *et al.* (2005). In particular, we postulate to give up the idea of pre-fixed scales in favour of the temporal, event-driven creation and alteration of scales according to the needs of individual and collective actors, their particular ways of interacting and the challenges they meet. We then proceed to propose a concept of scaling which comes closer to the reality of emerging micro-worlds of work based on social innovation.

Finally, in Section 7 we will sketch how this reconceptualisation of scale might stimulate future research on micro-worlds of work. We assign the task of reconstructing the particular spatialities, created by new types of work, to an analytical perspective that seeks to identify multiple practices of open-ended scaling. By way of a careful ethnographic reconstruction of scaling practices that are salient within diverse work environments it will be possible in the future to paint a more differentiated picture of the scale implications of work. This task involves the demythologising of general categories, such as proximity/distance, which have so far dominated the debates in economic geography and the regional sciences on the social and economic construction of space.

4. NEW WORK AS A TRIGGER OF NEW SPATIALITIES: STATE OF THE ART

4.1. Types of workplaces

A small body of literature on neglected forms of 'diverse' economies, originating more than 10 years ago, has recently received new consideration (Gibson-Graham, 2008; Gibson-Graham *et al.*, 2013). Its authors indicated the rather underrepresented status of reproductive work in academic literature on community economies, everyday informal production and other economic niches (especially Gibson-Graham, 2008). Moreover, within the critical debate on the social effects of late capitalism, those various forms of work which complement industrial labour have often been left aside and denied more acknowledgement.

Recent technological advances, in particular internet-based community building, have brought new academic recognition to 'untypical' work, together with a search for apt conceptualisation. There has emerged an everyday world of informal, amateurish, hobbyist, semi-professional and small-scale entrepreneurial activities, spurred by digital communication and a commons-based sharing of knowledge. They have been addressed as a variety of heterogeneous activities that particularly equip economic niches but also generally deviate from the dogma of economic growth, as disseminated by neo-liberal policies. Informally institu-

tionalised as maker spaces, open workshops, fab labs, co-working spaces, and other types of community-based small-scale undertakings (Budge, 2019), they have been increasingly raising the attention of academic scholars.

Looking closer at the scalar terminologies used to describe the forms of work involved, it can easily be demonstrated that new work leaves the organisational logic of industrial production and location building. Mainly located outside the scope of formal categories and taxonomies of industrial labour, new concrete work has proliferated 'on the ground', mostly within urban neighbourhoods, as well as within virtual worlds, as represented by activist homepages, the social networks of the internet, online chat forums, specialised blogs and other meeting places of online communities (Quan-Haase and Martin, 2013).

Informally organised work has given rise to 'alternative' places which embrace working communities as well as occasional users of open-access facilities. These places share the feature of low organisational complexity and profit-free or low-profit management, often done by knowledgeable peers. Table 1 summarises the key types of such places which over the past decade have proliferated within mostly urban settings.

Table 1. Typology of alternative workplaces

Key types of alternative workplaces	**Practices of doing and working**	**Organisational and spatial practices**
Open Workshop (e.g. metal, wood, digital, clothes, mobility, plastics and others)	Testing, experimenting, repairing, prototyping, as well as socialising with peers	Operating as private associations; core peers manage these spaces; changing types of community building
Repair Café	Fixing and repairing of everyday consumer goods under tutelage of peers	Fixed opening times; core group of responsible peers; visitors of Repair Cafés use the place on demand only
Creative Lab	Developing ideas, tools and processes for creative production; analogue and digital segments	Run by experienced and responsible 'place holders'; external users rent spaces for temporary purposes
Fab Lab	Low key as well as high level application of 3D printers, laser cutters, and other digital fabrication tools	Volunteering experts in technical handling oversee machine and tools usage; clearly regulated door and entrance policies
Co-working Space	Office-like spatial infrastructure for individual and collective work; mainly frequented by freelancers and startups	Open access for temporary or regular use by individuals or collectives; organised on basis of low-profit rental services

Sources: Hielscher and Smith (2014); Kleibrink and Schmidt (2015); Durante and Turvani (2018); Lange and Bürkner (2018).

Diverse as these workplaces may be in social, economic and structural terms, they have a number of traits in common which set them apart from formalised industrial workplaces and job settings: they do not follow rigid working time schemes (e.g. the famous nine-to-five model); they enable open access of interested individuals, be they professionals or 'amateurs'; they embrace a wide range of forms of institutionalisation, extensively covering informal approaches based on friendship and peer relationships; they are driven by key protagonists who tend to decline profit-making in favour of degrowth rationales and the fulfilment of social needs (Lange and Bürkner, 2018). These workplaces have proliferated over the past decade at a similar rate as debates on post-growth economies and degrowth philosophies gained momentum among European and Transatlantic communities of experts and scholars.

4.2. Refined definitions: labour vs. work

Because of the obvious opposition between industrial and post-growth types of work, we follow Chatterton and Pusey's suggestions to distinguish between abstract, system-conformal *labour* and concrete, systemically footloose *work* (Chatterton and Pusey, 2019, with reference to Holloway, 2010). This distinction is particularly important as many studies on new work have indulged in outspoken categorical fuzziness. Moreover, the various worlds of new work have raised the attention of urban and regional policy makers who want to make use of this 'humus' and are keen to explore open entries into new and evolving digital worlds of production, as provided by 3D laser printing, laser cutting, and computerised prototyping. They begin to acknowledge the achievements of communities of crafts-oriented repairers, tinkerers, amateur designers, pro-ams ('professional amateurs') and prosumers (Grabher and Ibert, 2018). To distinguish between labour and work will help political actors to remember the different ideological starting points and the planning implications of industrial and 'alternative' activities more easily.

Such awareness becomes increasingly important as politicians have started to identify potential points of departure of post-growth infrastructures and supply, hoping that these might serve as substitutes in the recent recession of formal industries and services which followed policies of austerity (Chatterton and Pusey, 2019). Such expectations have been particularly nourished by the contingent formation of user-driven local assemblages where physical and digital tools, work rooms, internet access, meeting places, and learning facilities are organised on a more or less private and neighbourhood-related basis (Lange and Bürkner, 2018). However, their capacity to generate unexpected effects and follow idiosyncratic rationales has so far baffled politics. Community-oriented practices and social motives helped many 'new workers' to resist political attempts to exploit their original achievements. Their obstinacy invites close-up inspection and demands respect of the social autonomy implied.

4.3. Social innovation and political work in post-capitalist and degrowth contexts

While often claimed to be connected to political activism based on post-capitalist and degrowth values (Demaria *et al.*, 2019), the general openness of these assemblages to the public nevertheless enables a variety of users to put their diverse orientations and motivations into practice. Emerging social demands for the collective organisation of experimenting, learning, and processing materials are thus strongly supported by bottom-up social innovation, i.e. new practices, values, and norms that are gradually accepted and promoted by a given community of users (Smith, 2017).

Such socially situated innovation (Demaria *et al.*, 2019) has been seminal to nascent micro-worlds of concrete work. At first sight these micro-worlds seem to be local phenomena, occasionally supplemented by a virtual world that individual users avail themselves of on demand. However, there is a more complex intertwining of heterogeneous elements involved, i.e. of individual actors, their social and work-induced relations, emerging networks and communities, data streams, knowledge produced and acquired, moods and atmospheres created, and symbols communicated. They are moulded and temporally fixed ('localised') at different places, levels, scales, transgressive spheres of transition and passage, or other elements of heterogeneous and flexible spatialisation.

Initial attempts by policymakers and academic scholars to address these phenomena as an original achievement of local actors, complemented by virtualised add-ons, quickly produced new urban myths. It was all too tempting for politicians to tell stories of the 'self-healing forces of the local neighbourhood', not without nurturing hopes for binding new – probably productive and wealth-producing – actors to urban localities that were facing new crises. After these neighbourhoods had been semantically conquered by Richard Florida's rhetoric of 'creative cities' 20 years ago (Florida, 2005), they are now prone to abandonment by the poorer part of the creative class (and other low-income groups) through the accelerated impact of powerful forms of financialisation, gentrification, and urban commodification. This holds true at least for the European contexts of urban development (McRobbie, 2015).

4.4. Spatial proximity: the theorist's false friend

Another potential factor in the creation of myths are scholarly convictions represented by well-established narratives of spatial proximity (Huber, 2012a; Martin *et al*., 2005). Regional sciences, urban studies, and economic geography have seen three decades of research on innovation regions, industrial clusters, branch networks, and creative economies where the category of the spatial proximity of important actors and institutions had been highlighted as key factors of explaining economic growth

and future expectations for the viability of regions (e.g. Huber, 2012b). Such narratives of innovation-by-proximity, and also wealth-by-proximity, are now again found in connection with public conjectures on the significance of makerspaces, open creative labs, co-working spaces, community innovation labs, and their further derivates (Kleibrink and Schmidt, 2015). We are sceptical about such optimism and ask the focal question: Is the category of proximity plausible as an overall explanation of new work and its various economic and social implications, especially if these are embedded in post-growth milieus of practitioners?

For the time being, the answer still is ambiguous. Reading between the lines, the few empirical studies on work practices that characterise this new socio-economic field – situated between micro-entrepreneurialism and communitarian hobbyism – reveal that the category of proximity has a stake but does not explain for everything. Rather, there are indications of contingent and very flexible build-ups of multidirectional proximity-distance relations (Grabher and Ibert, 2018). Working 'on the ground' with traditional craft tools in a workbench fashion, while simultaneously applying digital tools, produces differential individual and collective 'attachments' to a workplace and surrounding communities of various composition (physical-local ones but also purely internet-based, hence virtual ones).

Moreover, important holders of expertise and knowledge may be locally co-present co-users and at the same time seemingly distant members of online communities. Conversely, even physically 'distant' actors may be very close to individual users, in fact closer than locally co-present partners might be, as they directly provide advice and disclose much of the intimate technical knowledge they command. They often also serve as important 'supra-local' or even cosmopolitan masterminds who influence local actors and activities. For example, many fab labs, open creative labs, and open workshops regularly communicate with expert members of online communities, including the US-based 'inventors' of the first makerspaces worldwide (Budge, 2019).

4.5. Intermediate summary of the state of art and necessary of conceptual changes

The flexibility, temporality, and intersecting nature of multiple, multidirectional and multiscale socio-spatial constructs requires careful analytical reconstruction and theory building. In particular, the simplistic proximity/distance theorems of the past must be overcome as they not only enticed scholars to disregard relational and scalar complexities in the field but also immediately led to several analytical pitfalls. Among the most important, we detected:

– Firstly, premature insisting on the relevance of space where the nature of work, i.e.specific relations of community, network and space, relations had been unclear (see e.g. Mack and Mayer, 2016);

– Secondly, conceptual narrowness which marginalised non-physical (i.e. social, communicational, ideational, emotional) proximity/distance in favour of physical aspects (Liedke *et al.*, 2015);

– Thirdly, a rather schematic juxtaposition of spatialised pairs of opposites (e.g. local/global) where it was clear that manifold interweavings between different spatial constructs and cross-level activities or phenomena had to be grasped (Graham *et al.*, 2017);

– Fourthly, the tendency to assume a general spatialisation of social activities and relations, thus postulating an anthropological constant, whereas quite ostensibly digitisation and virtualisation implied the negation of space, if only partially or temporarily.

This short screening illustrates the urgent need to reconceptualise spatial relations and scales against the backdrop of accelerating digitisation and its impact on emerging new work. As we will discuss in Section 4, it will be expedient to adopt revised open scale models of the flat ontology type. Such models will have to refer to concrete work practices to evaluate their scope, flexibility, and shifting roots (e.g. those created by social innovation). From such a perspective, seemingly distinct 'spatial' levels will prove to reflect temporary situation-bound visions rather than solid ontological items.

Contingent and chaotic interconnections ascribed to some fixed 'ground level' can easily be rendered virtual or even fluid by considering the virtual (in older, reifying terms: 'global') spatialisations provided by digitisation and new community building. But before we delve deeper into these details, we here add some necessary remarks about the nature of hybrid work which has an effect on the scaling procedures occurring within these micro-worlds.

5. HYBRID FORMS OF WORK: HARDLY ADDRESSABLE BY ABSTRACT CATEGORIES

Until recently, studies on local and regional economies have focused on formalised and abstract types of work, generally referred to as 'labour'. Generalised economic understandings of work have even been applied within studies on urban creative industries which, paradoxically, had exposed the varieties, different origins and socio-spatial contexts of concrete work (Lange, 2011). Such negligence of the rich contextuality of work can be attributed to the underlying assumption that economic and social rationalities are basically separated.

This assumption has a long history in economic geography and the regional sciences. The social/economic divide theorem had mainly been popularised by using the narrative of the 'social embeddedness' of particular economies. It was

introduced into economic literature by Granovetter (1985), then adopted by the proponents of relational economic geography (Bathelt and Glückler, 2003), and recently critically revised by McKeever, Anderson and Jack (2010). The basic idea follows the logical pattern of exceptionalism: the economy has a rationality of its own that is exceptionally altered by social or political practices. These practices can be either supportive or hindering; in the case of successful economies they have a supportive effect. Cross-cutting categories such as spatial (i.e. physical) proximity/distance, social proximity/distance or global/local interplay have contributed to the repeated reproduction of this conceptual pattern. The social/economic divide of rationalities is supported by suggesting either the economic necessity of (mostly spatial) proximity, as e.g. implemented in cluster models (see Porter, 1998), or the occasional intrusion of the socio-spatial nearness of actors (e.g. through social milieus, clubs, peer groups or cliques) into economic fields, as represented in various concepts of a culturalised economy (McRobbie, 2015).

The practice of imagining social procedures as having exceptional or disturbing effects on the economy had a streamlining effect on economic model building. It allowed scholars to keep economic categories from becoming 'contaminated' by too many social connotations. As a consequence, the usage of 'labour' and abstract understandings of work continued to prevail. In contrast, concrete work, with its close factual links to everyday life, has been kept at a distance from theory building. In particular, the theoretical concepts of local or regional economic innovation and cluster building have extensively neglected the dynamic characteristics of heterogeneous, event-driven, socially motivated, 'atypical' or non-classified work (Avdikos and Kalogeresis, 2016).

Important steps towards acknowledging concrete practices and forms of work included the introduction of the concept of diverse economies with its focus on reproductive work (Gibson-Graham, 2008), and the recent approaches to alternative economies (Krüger, Schulz and Gibbs, 2018) that addressed more varieties of atypical work. However, these steps hardly incorporated the recent impact of new technologies on various actors and institutions. In effect, during the past 20 years digitisation and technologically advanced communication have rendered former divisions between social and economic rationalities increasingly questionable. In particular, they have begun to blur the formerly rigid roles of producers and consumers, inextricably integrating everyday life and its values into small-scale economies (Grabher and Ibert, 2018).

Therefore, the basic elements of work might still be addressed as 'social' and 'economic' but they actually coexist and interact so that they can often hardly be told apart. They are part of a particular hybridity which has to be taken into account when theorising small-scale activities placed against diversified backgrounds of digitisation and virtualisation (Moriset, 2013). Social *and* economic ends might be pursued by one and the same individual while being involved in one and the same process of work. We posit that such hybridisation is non-static

and not necessarily 'bound to ground' but, on the contrary, explainable beyond the idea of a spatial fix which is favoured by former spatial theories. While the spatial fix has been conceived as an inevitable spatialization of economic mechanisms, as critically described by Faulconbridge (2006), the idea of hybridisation escapes this economic determinism by demanding heterogeneous causation. Hybridity thus evolves according to the social relations, ideas, communications, and technological tools utilised by relevant actors within open fields of 'doing economy'. The motivations, intentions, and achievements of those who work may tremendously differ according to social and economic contexts. They may shift from one situation to another, and so do related spatial constructs and their implications for social practices.

There is still another type of hybridisation introduced by digitisation and internet-based communication. Hybrid work, as defined above, is facilitated by digitisation because the former confinements of workplaces are either relativised or becoming obsolete. The 'local' worker always has a world-wide virtual space on standby. What they have produced can be made visible to global communities within seconds, and the responses to 'work in progress' can be incorporated from any non-local fields immediately. Hybrid communication, combining on-the-ground and face-to-face interaction with internet communication, partially liberates individuals from fixed socio-spatial environments such as neighbourhoods or local clubs. It introduces social experience and knowledge gained elsewhere and promotes reflections about social practices at a local level (Reckwitz, 2006).

Moreover, we are aware that within diverging fields of nascent hybrid work, progressing digitisation and the co-evolution of local and virtual networking (including community building of various types) blend, but also diversify and intersect, producing effects on scale building. For example, the user of a local open workshop who is involved in digital prototyping through 3D printing might get some advice from members of an online forum which momentarily opens his personal scaling to a particular global niche made up of peers. They deliberately open 'their' local space to a limited virtual space 'out there', taking their everyday set of internalised norms, conventions, and rules of conduct into a sphere of open and only weakly regulated communication. They might especially appreciate the warm atmosphere and the sensitive way of responding to the practical concerns that they express when reporting about their work. Hereafter this person might also address members of an open access online community to get some general information about the technical aspects of the workpiece they are creating, suspending the more socially motivated connection to the former forum members in favour of new information of a technical or economically relevant nature.

Another scaling may be enacted side by side with the formerly socially motivated one. Both of them might impact back on the local home base of our worker, e.g. in the course of the improvement they make in the technical handling of

individual procedures of prototyping, and at the same time in communicating to their local peers about the changes they made. Scalings of different extension and impact are established on a temporal basis which are brought together upon a specific occasion (e.g. the need to gain knowledge or communicate one's experience).

For an empirical analysis, as well as for conceptualisation, the crucial point is the problem that it cannot be predicted how the two different scalings will occasionally combine to produce something unforeseen. Moreover, it will have to be determined in each case how and in what way individual scalings will have an effect and how strong this effect on social practices and economic relations will actually be.

Suitable theoretical tools to meet this challenge are rare. Earlier attempts to categorise scalings and their effects have often remained abstract and taxonomic (e.g. Pratt, 2013). They tacitly replicated the 'global-local interplay' theorem which had been generally ascribed to the post-modern network society (cf. Castells, 2010) while underrating the contingencies involved in concrete social practices. While the notion of 'interplay' suggests a fair amount of variability, the category itself hardly ever refers to social practice. In particular, there has been a considerable lack in the consideration of serendipity, especially when identifying the field-specific ways in which spatial relations and different horizons of flexible activities are construed.

Explicit consideration of the indeterminate, context-dependent qualities of hybrid work leads us to a better conceptualisation of the situated the origins of spatial relationships. Hybrid work has to be regarded as a generator of quickly shifting points of departure of temporary spatial constructs, rather than providing stable and geographically fixed socio-spatial relations. This perspective has already been mirrored by the flat ontology approach of the scale theory that we consequently adopt to clarify the spatial implications of hybrid work.

6. FLAT ONTOLOGY APPROACHES TO SCALE THEORY AND THEIR RELEVANCE

6.1. Scale and its spatiality

Traditional understandings of scale as spatially nested hierarchy have been repeatedly criticised for being static, reifying and under-complex (Moore, 2008; MacKinnon, 2011). In their perspectives, recent innovation practices and new work might only be addressed as relations and routines which 'span' or 'cross' pre-fixed local, global and other levels. They might at most be imagined as being involved in 'scale jumping' (Herod and Wright, 2002) or 'scale bending', the latter denoting the multidimensional restructuring of spatial scales through the inter-

woven fields of activities and the temporary variations of the reaches of individual activities (Smith, 2004).

For example, a local stakeholder might address a specific problem through co-operation with a globally active organisation that helps disseminate locally raised issues on a world-wide scale. Such bending of normally fixed scales usually refers to political or institutional strategies. It hardly accounts for micro-processes of leaving, re-joining and finally blending scales in the course of everyday work that individuals and communities perform within technologically advanced environments.

However, this is exactly the key process that must be addressed, i.e. flexibly changing open scaling, as performed by individuals who communicate face-to-face within a local frame, join online forums and networks a few minutes later, present a blog text to a world-wide audience and send e-mails or tweets to friends and colleagues working next door.

Such flexible scaling is basically 'flat' or non-hierarchical in the sense proposed by Marston *et al.* (2005) since it takes the social relations and interactions as points of departure for the incremental construction of scalar relationships. Relevant interactions can easily be observed in practices that individuals develop when they are exposed to the everyday impact of digitisation and globalisation. Bridging situations and contexts that are nearby and very distant at the same time bears signs of what has been coined before as 'time-space compression' (Harvey, 1989) but now clearly exceeds such abstract notions by its mere everyday multi-referentiality. Scaling is now woven into the fabric of what people actually do as situated actors who operate inside a digitised cosmos of everyday life. It instantly binds together what had been separated by another situation or context. It allows actors to deliberately refer to shifting social spheres and partners without having to leave the situation.

6.2. Multiple forms of fluid scales

It is all there at the same time, ready for use, regardless if it is physically available next door, through an online database or a virtual social network. Temporary scalings by individuals and collectives assume a multiple, multidirectional and heterogeneous nature. This tremendous multiplication of cross-referentiality has unprecedented technological underpinnings: for the most part, it draws on the exponential acceleration of communication speed through optical transmission (light-wave cables, satellite-based wireless transmission) and the high switching capability of the internet that promises to temporally synchronise social relations, ideas, activities, and material conditions.

Early calls for detailed analysis and open conceptualisiation of the processual aspects of scales in terms of 'everyday scaling' (Moore, 2008) and 'scalar politics' (MacKinnon, 2011) did not elaborate on digitisation as a driving force and a tool of scaling. These scholars nevertheless prepared the analytical ground, even

though they had to realize that they did not find much resonance in coeval research communities of the political sciences where the problems of scale had originally been debated.

With the recent public and scholarly recognition of nascent practices of actors who are involved in the everyday flux of scaling and rescaling, especially of moving through nearby *and* distant physical, social, and virtual spaces, the question of how scales emerge can now be raised again in a more focused way. Apt concepts may address multiple individual and collective scalings which involve crisscrossed, circumvented or 'turned on and off' scales that are temporarily developed. In the particular case of makerspaces and labs such temporality is created according to incidentally arising necessities felt and debated within a particular community of actors who avail themselves of digital tools.

The potential applicability of such a perspective might be illustrated by simple everyday observations. For example, it is obvious that the particular fluidity of scaling and scale relations, as effected or influenced by digitisation, has already changed work practices in the mainstream economy and the related communication in everyday life. Digitisation and the top-down reorganisation of unqualified work within the platform-based gig economy have not only affected the procedures and social environments of work; they have also changed workers' job market competitiveness (Graham *et al*., 2017), i.e. from managing personalised worker-employer relationships to status seeking within the opaque hierarchies of automatically assessed micro-workers. Different scalings may serve to interrelate these seemingly unrelated spheres to keep individuals competitive and motivated. Of course, this is a neo-liberal scenery of scaling triggered by digitisation, but similar degrees of fluidity can be assumed for post-growth sceneries as well.

6.3. Flat ontologies

By virtually adding next-door competitors and collaborators who may in fact be located in the global South, former scale relations have been rendered obsolete on a day-to-day basis. This is not a mere process of delimitation which had been identified as a core process of globalisation by its early theorists (e.g. Castells, 2000). Rather, it is a chaotic, individualised, and technology-bound delimitation which has to be specified in order to become theoretically relevant. It is new hybrid work in particular which has brought specific ways of the reshuffling and liquefaction of scales to an extreme, as it continually multiplies relevant social and spatial points of reference. Fab labs, makerspaces, open workshops, and co-working spaces represent micro-worlds of work with oscillating situational and temporary scale relations. By imagining scaling as an ever-changing social phenomenon created and revised on an everyday basis it can be expected that analysis will move closer to the reality of the micro-worlds of heterogeneous work.

The existing scale concepts which have already begun to address flexible and shifting scaling promise to provide at least some points of departure for identifying the scalar relationships that characterise the socio-economic fields of new work. The notion of flat ontologies, as introduced by Marston (Marston, 2000; Marston *et al.*, 2005), does not only imply horizontal relationships and communication between individuals but also applies to reconfigurations between actors, institutions and material elements involved. This point has been emphasised by Farias, an actor-network theorist, when he stated that concrete actors and contexts shape multiple instances of space, scale and time which are assembled at concrete local sites (Farias, 2010, p. 6).

While there is some danger of marginalising the existence of vertical social relationships, hierarchies and power relations (cf. related criticism by Leitner and Miller, 2007), particular sensitiveness towards the issues of power can be easily incorporated into open scaling concepts. For example, it can be acknowledged that even decidedly 'flat' configurations of actors within an assemblage, even those in the fashion of fab labs and makerspaces that are expected to 'democratise' access to advanced technologies (Schneider and Lösch, 2019), still have their small organisational elites or knowledge elites that capitalise on their ascribed roles as informal teachers and advisors of users (Bürkner and Lange, 2016, p. 313).

The question about the modifications and corrections which will have to be made to grasp the specificities of recently evolving micro-worlds characterised by hybrid work, especially under conditions of digitisation and virtualisation, will be crucial for the applicability of such an approach. More precisely, it will be important to identify and interpret the 'vertical excursions' along established or emerging hierarchies that everyday actors individually or collectively perform – locally and, at the same time, throughout virtual communities.

7. SCALAR RELATIONS WITHIN NEW MICRO-WORLDS OF WORK

7.1. Applying flat ontologies to new forms of work

Two basic procedures are required to apply the perspective of flat ontologies: firstly, identify in detail the various directions and extents of movements that individuals and collectives perform while being involved in practices of hybrid work and the proliferation of its varieties; and, secondly, to establish a critical perspective on the locale, in particular on urban localities, as a point of conceptualisation where older myths of proximity are increasingly challenged by various expectations of multiple rescaling.

The first procedure can best be implemented by focusing on particular activities unfolded by users of fab labs, open workshops, and makerspaces. For example, social practices such as sharing or the non-profit exchange of material and immaterial goods (among others, lenging teaching assistance and doing favours), often unfold via the internet. Users may prefer informal types of communication (chatrooms, forums); they may also make use of more formally organised platforms and applications, including social media outlets such as Facebook.

In this way, if the member of an open workshop in Berlin puts a very simple question of the type "*Has anyone got an idea how I might make my 3D printer produce the structure that you see on the picture I posted?*", they will receive answers from people that may be close in social terms, because the user already knows the respondents very well, and at the same time geographically very distant because the respondent lives in, say, Taiwan. Using virtual communities as suppliers of innovative ideas may be something that involves the global sphere, but it might also be restricted to a 'circle' of friends and communication partners living in the same town or region but interacting through the internet.

Flat ontologies of this sort are dynamic and volatile. A simple act of 'flat' communication with peers creates several horizontal axes through a virtual space, at least as long as there is no social differentiation established between the peers. However, as soon as one respondent begins to hold specialised knowledge that they capitalise upon, or holds a well-respected position within an online community (e.g. one organised by the inventors of the first makerspaces), an element of hierarchy emerges which criss-crosses the idea of pure horizontality.

A similar level-up extension of an axis occurs if the locality of a user is known to others and prompts them to express respect or admiration. For example, the peer from Taiwan might say that they were wondering why they were asked for advice because open workshops in Berlin would rank as a global avant-garde. This symbolic valuing of a place refers to place hierarchies already established outside the internet but being reproduced and traded there. Since the online peer usually does not know exactly about the social contexts that are connected to the place, they might also extend their admiration to the social community located there.

In summary, we may note complex, heterogeneous configurations of multiple coincident scaling involved in one simple act of communication that brings in aberrations from the 'horizontal' sphere assumed.

7.2. Changed perspectives on flat connectivities

To take the last example even further: A closely related process of scaling may be initiated if the user who asked the original question took the advice they received online to their workplace the next day. Although he personally did not care about reputation, the local peers who were present on that occasion might have referred

to the Taiwan-based user as someone who commands advanced knowledge, introducing a personalised hierarchy of reputation to what might otherwise have been a plane of social equality.

It can easily be seen that flat ontology and formerly horizontal scalings respond to spontaneous suggestions to build hierarchies, at least for a limited time. At the same time, the concrete place 'on the ground' is reshaped. In our example, it is collectively construed as a striving locale hosting ambitious co-workers. A simple act of implementing new knowledge with a connotation of 'stepping up in the global hierarchy of knowledge holders' may thus contribute to the collective re-construction of space. Of course, this is not the only formative act that shapes a place; there may be other valuations made by face-to-face co-present users who appraise the tools, the social setting, the atmosphere and other features of the workplace.

In this way, the complex, intersecting and interweaving quality of scaling reveals itself as soon as it is explored in detail. Within the context of hybrid work, scaling must be understood as the outcome of flexible mental and communicative extensions of a workplace. Complexity might be further increased by the degree of economisation that users develop while experimenting with materials and communicating with peers. Some of them may be inspired to engage in computer-based prototyping, ending up with an idea for a marketable product. They might even plan to establish a start-up enterprise and formalise their activities, so that their work becomes more accountable to others. Finally, promises of continually delivering high-quality products might be made.

Such an upscaling of seminal economic concepts does not necessarily marginalise social rationalities, so that hybrid work might finally be abandoned. Rather, it may still interact with peers' expectations for grassroots experimenting, tinkering and sharing. It will temporarily produce vertical axes of scaling which intersect with more horizontal axes. These 'upward-bound' axes, geared towards a formalised mainstream economy, might diminish as soon as economic failure looms or factually happens.

They might nevertheless leave an imprint on the local community which suspects the want-to-be entrepreneur of betraying their degrowth aspirations. This, in turn, might affect the work practices and the future plans of the individual deviant.

7.3. Local-global interplay of new forms of work

This brings in the second, more critical procedure mentioned above. At first, the local place in question might appear as the breeding place of social innovation and unexpected social or economic initiatives and work routines. New local communities of tinkerers, 3D enthusiasts and sharing practitioners might appear as original creators of the locality. They seem to conform to the old idea of spatial proximity which stifles innovation, recently augmented by virtual communication and extended knowledge resources that help to furnish this particular place.

However, the preceding consideration of concrete work practices and the manifold scaling processes involved have already indicated that there might be no unilateral or exclusively local construction of space at work. Adding to the collective desire to have a meeting place for like-minded informal workers, or a place where to acquire knowledge and proficiency, supra-local activities are always implicated. Local users are also globally floating internet users: on several occasions they act as setters of manifold and temporarily shifting touch-down areas of virtual networks and communities, regardless of whether they aware of it or not. They help to introduce 'external' ideas to a local level, e.g. ideas about profitless or profit-reduced work procedures which had formerly been debated online (but to a lesser extent also on the local ground).

Such place building is obviously based on heterogeneous social causation. It involves members of other societies, openly communicating within online communities, who are often unfamiliar with a place. It also incorporates members of one and the same domestic society who are newly aggregated through a particular community that is familiar with the place and its evolution. The place is assembled by a particular contingent logic which has been transformed by scaling before and continues to do so by freshly emerging activities. By the same token, it can have reciprocal effects: it might become visible as a trendy or avant-garde place which is taken as a matter of discourse and discussed by online communities around the world, with effects for other localities where hybrid work emerges.

8. CONCLUSIONS

Our theoretical explorations into 'doing work' and establishing new, hybrid forms of work have rendered flexible processes of scaling and re-scaling an important implication of nascent micro-worlds of work. These worlds can now be described more precisely by explicit consideration of the heterogeneous social and economic impulses incorporated into new work practices. Such impulses manifest themselves through multidirectional communication within a composite social, economic and virtual space. They are enacted by multiple, heterogeneous intersecting and blending scalings. At minimum, micro-worlds may be conceptualised as the outcome of a centrifugal movement originating from local (or localised) social communities that proceed in the direction of growing virtualisation and the creation of flexible touch-downs of virtual communities. But they may also be conceived the other way around, as the results of a centripetal movement through the local fixation of global online networks and other (seemingly external) networks. Both movements are interconnected through hybrid communication channels and types of sociality. They rely on the co-creation of heterogeneous social, technological (digital) and physical spaces.

Future explorations into the nature of hybrid work and its spatial implications will have to shed more light on social innovations and the binding forces they create for the evolution of hybrid work. On the methodological side, this will require more ethnographical work than geographers or regional and urban scholars have probably been accustomed to. This is not an end in itself but rather something necessary due to the requirement to provide detailed analyses of emerging work forms and flexible scalings. Additionally, it will open up new interfaces to theories of social practice and revived debates on the culturalization of globalised economies.

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THE ROLE OF PROXIMITY IN RESOURCES EXCHANGED BY INCUBATEES OF BIOPARTNER CENTER LEIDEN, THE NETHERLANDS

Abstract. Subject literature assumes that spatial proximity stimulates collaboration in thematic clusters. However, even in micro-scale settings, resource exchange is rare or entails only tangible resources. We empirically unravel how specific proximity indicators relate to the types of resources exchanged in incubatees' business relationships. Based on 118 business relationships of incubatees, we conclude that on the micro-scale of an incubator, site proximity to another incubatee has a limited relation and geographical proximity to business partners outside the incubator has no relation to the types of resources exchanged. For the latter business relationships, personal similarity positively relates to the exchange of specific business knowledge resources.

Key words: types of resources exchanged, business relationships, spatial proximity, personal similarity, university business incubator.

1. INTRODUCTION

"No mating without meeting" is a well-known phrase in the sociological literature on social capital (Verbrugge, 1977, p. 577). Additionally, in studies on entrepreneurship, economic geography and spatial economics, it is understood that face-to-face interaction between firms is necessary to enable the exchange of resources, which may build trust and ultimately result in stable networks where collaboration and innovation take place. As such, it has been assumed that as a result of spatial proximity among firms, a thematic geographical cluster stimulates collabo-

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ration and innovation (McCann and Folta, 2011; Katz *et al*., 2015). However, there is evidence that even in micro-scale settings specifically developed to foster inter-firm networks, such as university business incubators (UBIs), professional relationships between firms do not develop automatically or easily (Cooper *et al.*, 2012; Fuzi, 2015; Parrino, 2015). Furthermore, it seems that even when business relationships *do* develop, firms rarely exchange valuable resources with various parties (Soetanto and Jack, 2011) and seldom formalise their collaborations (McAdam and Marlow, 2008).

It remains unclear why many business networks among incubatees, located at close physical proximity in an incubator, are small (Parrino, 2015) and, in particular, why resource exchange is rare. To form inter-firm linkages and actually exchange resources, firms must be aware of other incubatees' presence and activities, must be in need of the resources they might exchange (Redondo-Carreto and Camarero-Izquiedo, 2017), and must have easy access to other firms. At the micro-level of an incubator, firms are spatially proximate to each other but still might find it difficult to actually access and contact other firms. This might be due to physical barriers, such as multiple incubator buildings, locked doors between buildings, or even limited access to other floors within buildings. Therefore, spatial proximity might reduce barriers such as travel time (see Boschma, 2005; Torre and Rallet, 2005), but the actual face-to-face contacts that facilitate the exchange of resources in specific business locations require ease of access and, therefore, proximity at a more detailed, micro-level (Redondo-Carreto and Camarero-Izquiedo, 2017). Furthermore, as the phrase "no mating without meeting" suggests, a match between partners is necessary for interaction and resource exchange. Firms, individuals and entrepreneurs who share characteristics might be more prone to interact and form relationships than dissimilar ones. Here, another saying applies: "birds of a feather flock together". That is, likeminded and similar people tend to connect, which might facilitate resource sharing or resource exchange.

However, the effects of both spatial proximity at the micro-level and similarity between business partners on the actual resources exchanged might differ between specific types of resources. We explicitly exclude trade in the value chain (supply and demand linkages) and focus on resources that are necessary to produce and sell products, the so-called 'business-relevant' resources. The trade and sharing of tangible assets, such as equipment, materials, and office space, is facilitated by close physical proximity between business partners. However, frequent and intensive face-to-face contact and personal similarity might be even more crucial for intangible knowledge exchange on both generic and more specific business matters, such as market information and product development, respectively. This distinction between tangible and intangible resources relates to the difference between explicit and tacit knowledge, as proposed by Polanyi (1958). The exchange of tangible resources involves the sharing or trading of physical objects

such as products, equipment, machinery, space, or instruments (Van Rijnsoever *et al.*, 2017). In contrast, intangible resources refer to business knowledge, which might be explicit or coded when it can be easily documented and exchanged, such as generic information, or it can be tacit when it is personal, firm-specific and context-bound knowledge (see Usman *et al.*, 2019; Mason *et al.*, 2012). For new firms and incubatees who are often in the early phases of a firm's life cycle or for small firms, new knowledge and information is crucial for business survival and growth, but, at the same time, protecting their specific competitive advantage is also important (McAdam and McAdam, 2006; Massaro *et al.*, 2019). Due to the need to cope with these conflicting business interests, incubatees may differentiate between sharing generic business information (about markets or suppliers or general ideas) and sharing more valuable, specific business knowledge (for instance, on close collaboration or research and development). It is this distinction between resource types, i.e. tangible resources and intangible (both generic and specific business knowledge) resources, that is the key of this paper. Instead of focusing on proximity factors driving network creation and the maintenance of business relationships (the 'ties' or 'tubes' themselves), this article emphasises the role of proximity in the types of resources that actually 'flow' through these relationships between business partners.

This study investigates whether and how specific dimensions of proximity to business partners relate to the exchange of tangible and intangible resources by incubatees of the UBI BioPartner Center Leiden, the Netherlands. These business partners may be located within or outside the incubator.

Remarkably little is known about the variation in incubatees' resources exchanged and thus their actual use of business networks (Cooper *et al*., 2012; Soetanto and Jack, 2011; McAdam and Marlow, 2008). In focusing on actual resources exchanged in incubatees' business relationships, we contribute to the existing knowledge in several ways. First, we hope to contribute to the old but ongoing academic debate concerning the role of proximity in business networks at the micro-level. Further, according to Boschma (2005), the geographical proximity of businesses is not an absolute prerequisite but a catalyst of collaboration, especially when other types of proximity are absent. Second, as we apply his ideas to the value of spatial proximity to resource exchange in business relationships at the micro-level of an incubator setting, we also add to the literature on incubator configurations (see Hackett and Dilts, 2004). This literature entails the drivers of the mere existence of inter-firm relationships (McAdam *et al*., 2006; Cooper *et al*., 2012) and of knowledge exchange and interactions in specific coworking spaces (Parrino, 2015; Fuzi, 2015), incubators (Redondo-Carretero and Camarero-Izquierdo, 2017) or a specific company division (Usman *et al.*, 2019). However, whereas the latter scholars qualitatively investigated business relationships, this paper adapts quantitative methods to investigate whether spatial proximity and similarity between two business partners relate to the types of resources ex-

changed in business relationships. We apply the name-generator technique used in social network analyses to detect business partners and their attributes. As such, this is an explanatory study using quantitative methods to assess whether proximity dimensions relate to the resource types exchanged. A third contribution is our emphasis on personal contacts, as Redondo-Carreto and Camarero-Izquiedo (2017) have recently advocated. By introducing an indicator of personal similarity in the analysis of the resources exchanged in incubatees' relationships, this paper answers the call for empirical research and the operationalisation of concepts related to proximity (Caniëls *et al*., 2014) and the mechanisms related to personal relationships – instead of only cost and efficiency drivers related to bridging physical distance (Redondo-Carreto and Camarero-Izquiedo, 2019).

In the empirical part of the paper, we use an actor-centred approach by focusing on the types of resources exchanged in the business relationships of the incubatees of BioPartner Center Leiden. Using the name-generating technique in semi-structured interviews with 17 incubatees, combined with a questionnaire, we traced the resources exchanged in 118 unique relationships between business partners inside or outside the incubator, from which proximity indicators could be calculated. The resulting data set enabled a quantitative investigation of the relationship between three specific indicators of business partners' proximity on the one hand and the types of resources actually exchanged on the other. As the spatial proximity of businesses at the micro-level within an incubator has a quite different meaning than in relationships with businesses outside the incubator, we differentiated between business relationships in the two settings (inside and outside the incubator).

After a short literature overview on the dimensions of proximity that relate to resource exchange in business relationships, section 3 describes the context and spatial configuration of BioPartner Center Leiden. Section 4 explains the data and methods used to capture the dimensions of proximity, similarity, and resource exchange. In section 5, we present the results of the role of proximity in the resources exchanged in the business relationships of UBI Leiden incubatees. Finally, section 6 concludes the article.

2. LITERATURE

2.1. Dimensions of proximity

Thus far, both business relationships and university business incubators have received ample academic attention. Regarding the former, many studies show a positive link between entrepreneurial networks and business survival and growth. Business relationships are an important means of gaining access to re-

sources, especially for firms in vulnerable strategic positions such as start-ups (Eisenhardt and Schoonhoven, 1996; Soetanto and Jack, 2011) or for entrepreneurs with small or biased personal networks (see Mozumdar *et al.*, 2019). Regarding (university) business incubators, many studies have focused on their impact on the performance of start-ups, either via direct support (funding, office space) or via indirect support by giving start-ups access to other businesses or organisations (Buys and Mbewana, 2007; Cooper *et al.*, 2012; Peters *et al*., 2004; McAdam and Marlow, 2008; Ahmad, 2014; Van Rijnsoever *et al.*, 2017; Eveleens *et al.*, 2017).

Scholars have long elaborated on the concept of 'proximity' as a facilitator of contacts, networks and resource exchange (for an extensive overview, see Caniëls *et al*., 2014). For instance, in sociology, the proximity concept gave way to approaches emphasising actor similarity (McPherson *et al*., 2001). In economics, Williamson's transaction cost theory (1958) is the main pillar of the argument that firms and entrepreneurs seek out repeated and standardised business relationships to reduce the costs of new contracts. In their search for and efforts to maintain stable and routinised business contacts to reduce uncertainty and thus avoid costs, entrepreneurs of particularly new or young firms tend to favour close-by firms. According to Harrison in his critical conceptualisation of industrial clusters, repeated interaction is facilitated by personal contact, which in turn benefits from geographical proximity: "proximity leads to experience leads to trust" (Harrison, 2007, p. S116). At the crossroads of sociology and economics, the work of Granovetter (1985) on embeddedness created novel insights into the role of social contacts in economic transactions, paving the way for the acknowledgement of the importance of experience, trust and reciprocity between economic actors and the importance of the distance between them. Based on the notion that knowledge spillovers are place-bound (Jaffe *et al*., 1993), economic geographers interested in intensive (innovation) business relations have focused on distance as measured by geographical proximity. In accordance with the work of the French School of Proximity Dynamics, academics have developed different dimensions of proximity (D'Este *et al*., 2012; Beugelsdijk and Mudambi, 2013). In his seminal article on proximity and innovation, Boschma (2005) argued that in addition to the traditional geographical interpretation of physical distance, proximity consists of several components, each of which distinctively impacts knowledge exchange, learning, and innovation. Cognitive proximity refers to actors sharing the same reference and knowledge space, and is a prerequisite for successful knowledge sharing. Organisational proximity refers to the closeness of actors in organisational terms and can stimulate two organisations to collaborate. Institutional proximity refers to whether two parties share an institutional environment. Social proximity consists of "embedded, trust-based interaction between actors" (Boschma, 2005, p. 64), and geographical proximity refers to the spatial distance between two parties. In response to Boschma's plea for more empirical research to isolate the effects of

these different dimensions of proximity, Parrino (2015) studied spatial aspects of knowledge flows in two contrasting coworker spaces and concluded that collaborations and relationships are rarely created in the absence of an organisational structure supporting other forms of proximity. In other words, co-location itself seems insufficient for interaction between co-workers. This notion is linked to the so-called paradox of proximity: being too close to one another might dampen the benefits of interaction (Micek, 2019).

As most incubatees in a small-scale mono-sectoral setting, as in BioPartner Centre Leiden, can be expected to be cognitively, organisationally, and institutionally proximate to one another (see Cooper *et al.*, 2012), these forms of proximity are of limited usefulness in explaining variation in the resources exchanged. Spatial distance between incubator firms, of course, is also extremely small. However, as 'running into each other' and engaging in face-to-face interactions are important for building networks, experiences and, finally, trust, within incubators, the physical distance between firms may still matter for the formation of business relations and especially the types of resources exchanged. Spatial proximity can, therefore, be conceptually divided into two components.

Regarding incubator-external relationships, geographical proximity can be applied in its original meaning as the spatial distance between two parties. In general, geographical proximity fosters collaboration between parties because the time and the effort required to meet or to visit the other party decreases as spatial proximity increases. However, it should be noted that geographical proximity is "neither a necessary nor a sufficient condition" for inter-firm learning and collaboration (Boschma, 2005, p. 620) but should instead be regarded as an additional catalyst of collaboration between parties that were already likely to collaborate (Boschma, 2005; D'Este *et al*., 2012). For incubator-internal relationships, however, this study adopts a more small-scale geographical notion: "*within-incubator site proximity"* (or just "*site proximity"*), referring to the relative physical distance between two incubatees, such as whether they are located in the same incubator building or on the same floor. Site proximity between two firms at the micro-scale of an incubator seems to facilitate collaboration as well, without being necessary or sufficient per se (Parrino, 2015). Proximity, then, simply increases the frequency of contacts and, as such, helps incubatees build and maintain networks. In 1987, Sweeney found that "the probability of two persons communicating at least once a week drops from 0.98 at a separation distance of 2 meters to 0.06 at 50 meters. Distance between organizations has the same effect" (in McAdam *et al*., 2006, p. 463). Accordingly, site proximity matters because it makes an encounter between two parties more likely. In their study on an incubator in the USA, Cooper *et al*. (2012) also found empirical evidence of a positive effect of site proximity on the likelihood of collaboration between two firms in the same incubator. In that ethnographic study, several entrepreneurs stated that they collaborated more often with incubatees located on the same floor than with incubatees located on other floors.

In addition to site proximity and geographical proximity, both referring to physical or spatial distance, the influence of a third factor on resource exchange is analysed. This factor is related to the social proximity dimension to which Boschma (2015) referred. Because co-working spaces, including small-scale incubators, can be regarded as "microclusters" (Capdevila, 2015, p. 20), the individual rather than the firm is the focal actor. By emphasising the role of individual entrepreneurs in creating and maintaining business contacts at this micro-scale of a university incubator, this study combines the notions of personal proximity (Caniëls *et al.*, 2014) and social similarity (Vissa, 2010). Caniëls *et al.* proposed the notion of personal proximity, referring to the proximity between individuals in terms of "personal characteristics and behaviors, which may be an important factor to determine the 'click' between two individuals" (p. 6). As such, personal proximity is the result of individuals having similar characteristics as well as similar personality traits. The "click" that occurs as a result of being similar, best described as a sense of mutual understanding and respect, is a key aspect of personal proximity and benefits interaction and collaboration in at least three ways. First, due to personal proximity and the resulting click, actors can communicate more easily because they share common knowledge, meanings, vocabulary, attitudes, and beliefs (Caniëls *et al*., 2014; Vissa, 2010). Second, a high degree of personal proximity enables individuals to predict the behaviour of their network partners, which fosters trust and facilitates the exchange of specialised or tacit knowledge, i.e., intangible resources. Third, individuals who are personally proximate to each other generally perceive their interactions as more pleasant and rewarding.

The concept of personal proximity strongly relates to the notion of social similarity (Vissa, 2010). According to Vissa, social similarity refers to the degree of similarity in characteristics such as ethnicity, gender, and age. Vissa (2010) stated that if two individuals are alike in a number of characteristics, they feel that they pertain to the same group. Individuals are more likely to perceive out-group members (who are not similar to them in terms of these attributes) as more dishonest, untrustworthy and uncooperative than in-group members (Vissa, 2010).

However, the concept of social similarity differs from the personal proximity concept in two important ways. First, Vissa's notion of social similarity only refers to similarity as such and does not refer to the resulting personal clicking of personal proximity. In that sense, proximity goes one step further than similarity because proximity is related to the quality and nature of the relationship, whereas similarity is the mere combination of characteristics of two individuals. Second, for Vissa's social similarity, the social context is important because it is the feeling of belonging to the same social group, and that stimulates trust and collaboration. In contrast, personal proximity is relevant in a personal context because it is the shared characteristics plus the personal click between two individuals, rather than the feeling of belonging to a larger social group, which fosters trust and collaboration.

In combining social similarity and personal proximity concepts, this paper focuses on personal similarity. On the one hand, personal similarity emphasises the personal rather than the social aspect because it only looks at whether the personal characteristics of two individuals are similar, regardless of the larger social context or a feeling of belonging to a group. On the other hand, personal similarity adopts the aspect of similarity, rather than proximity, because it only looks at whether individuals are similar, not at whether this results in the feelings of proximity. Thus, personal similarity refers to whether two individuals are similar in terms of a number of personal characteristics, such as age, gender, ethnicity and educational level.

2.2. How do dimensions of proximity matter for the resources exchanged by incubatees?

Site proximity has been recognised as a factor that stimulates the exchange of resources between parties located in the same business incubator. However, little is known about whether site proximity relates to *which* resources are exchanged in a business relationship. Nevertheless, based on the findings of Cooper *et al.* (2012), we expect site proximity to mainly stimulate the exchange of tangible resources and generic business knowledge, as well as specific business knowledge, but the latter to a more limited extent. Cooper *et al.* analysed the communication network among a number of incubatees located in a UBI, finding that most interactions are face-to-face and mostly occur in hallways, in elevators, and at coffee machines. Similarly, McAdam and Marlow (2008) found that networking activities mainly took place in office corridors. In such interactions, the main resource exchanged appeared to be business-related information (Cooper *et al.*, 2012). Consistent with the findings of Cooper *et al.* and McAdam and Marlow, we also expect that a face-to-face interaction in which generic business information is exchanged is more likely to arise if two parties are located on the same floor or in the same building. Additionally, for practical reasons, we expect that the exchange of tangible resources, particularly laboratory equipment and facilities, is more likely to occur if two parties are located in each other's vicinity. Sharing a laboratory with a neighbour is easier than sharing a laboratory located 200 metres away from your office. Moreover, we expect that the effect of site proximity on the exchange of specific business knowledge is not as strong as its effect on the exchange of generic knowledge and tangible resources. In other words, we expect that research collaborations and joint product development are not necessarily more likely to arise between two parties located on the same floor or in the same building. As we presume that specific business knowledge is more valuable to a firm's success and performance – and therefore its strategy – than generic business information and tangible resources, we expect that incubatees will look more actively for partners with whom

to exchange specific business knowledge. Thus, regarding these highly valuable and specific knowledge exchanges, incubatees will be less hindered by the fact that a business partner is located on a different floor or in a different building.

Regarding geographical proximity, more is known about its effect on the types of resources exchanged in incubator-external relationships. In 2004, Smith and Powell showed that especially in biotechnology, specialist knowledge acquired from external network partners spurs innovation. However, another question arises here: does distance matter? Both Agrawal *et al.* (2008) and Boschma (2005) provided reasons to believe that if two parties are geographically proximate, they are more likely to exchange specific human capital resources. In his conceptual account, Boschma (2005) asserted that geographical proximity plays a role in interactive learning and innovation, although the role of geographical proximity should always be assessed in relation to other types of proximity. According to Agrawal *et al.* (2008), geographical proximity between two parties increases the probability of knowledge flows. A possible reason for this, although not mentioned by Agrawal *et al.* or Boschma, is that geographical proximity can foster interactions and, in the end, mutual trust, which is especially important if two parties are bound to work on the same project together for a long time, as is the case in the exchange of specific human capital knowledge. In more practical terms, this means that if two parties are located close to each other, they are more likely to work on a research project together or to develop a product together than to exchange any other resource type (such as financial resources or business information).

In addition, the role of personal similarity in the types of resources that two parties exchange seems to be equal for incubator-internal and incubator-external relationships. As personal similarity seems important for building trust, it is likely that parties sharing the same characteristics exchange those types of resources that require a high degree of trust. Again, trust seems to play a large role in the exchange of specific human capital resources, i.e. when two parties work together on a research project or on developing a new product. Such long-term collaborations involve a large degree of knowledge exchange, which, according to Caniëls *et al.* (2014), is facilitated by personal proximity. Moreover, in the exchange of specific human capital resources (i.e. specific knowledge), smooth communication is essential. Since Caniëls *et al.* argued that personal proximity facilitates communication between actors, it can be expected that personal similarity is positively related to the exchange of specific human capital resources.

2.3. Other drivers of resource exchange between businesses

There is ample reason to believe that the characteristics of both a firm and an entrepreneur affect the types of resources that a firm exchanges with other parties. Regarding firm characteristics, the age of a firm can have a positive effect on the

share of tangible resources that the firm exchanges. Already in 1988, Bygrave asserted that investing in biotechnology start-ups comes with high risk. Especially in the start-up phase, when the product exists only in the entrepreneur's head, venture capitalists face a high degree of uncertainty related to such factors as the talent of the entrepreneur, market demand, and the further development of the product. Similarly, Behrens *et al.* (2012) argued that investing in a young company is riskier for capital investors than investing in an older company. Younger companies are not as attractive to capital investors as older companies: younger companies are more prone to failure, have not yet established a good reputation, and have not yet demonstrated the ability to bring their product to the market (Behrens *et al*., 2012). However, young companies may be prone to failure not because they are young but because they are small. This hypothesis has been dubbed the "liability of smallness" (Freeman *et al.*, 1983, p. 692). Accordingly, it may be the case that capital investors are more hesitant to invest in smaller companies than in larger companies. Thus, the size of a firm may be negatively related to the share of financial (and therefore tangible) resources that a firm exchanges.

Concerning entrepreneurial characteristics, it appears that female entrepreneurs, young entrepreneurs, and inexperienced entrepreneurs all have limited access to business contacts in comparison to male, old and experienced entrepreneurs. This limited access negatively affects the share of tangible resources exchanged in the business network in particular because financial resources (classified as tangible resources) are generally harder to obtain than other resource types (Czarnitzki and Hottenrott, 2011; Zeng *et al*., 2010). With regard to gender, Verheul and Thurik (2001) argued that female entrepreneurs have less access to financial resources than male entrepreneurs because men are more likely than women to have prior entrepreneurial experience. Moreover, women are more likely to work part-time than men and, therefore, have less time to maintain and expand their networks (Verheul and Thurik, 2001). Blisson and Rana (2001) also argued that women have less access to associations, networks and clubs, or, as they call it, to the "old boys' network". Additionally, the age of entrepreneurs active in an enterprise may influence the types of resources exchanged in the business network. According to Snel and Bruins (2004), start-ups founded by older entrepreneurs collaborate more often with other enterprises than do start-ups founded by younger entrepreneurs. This may be because older entrepreneurs have more (entrepreneurial) experience, which results in more access to contacts in their network. Finally, according to the argument of Verheul and Thurik, and Snel and Bruins, it is not the age of an entrepreneur per se but the underlying factor of prior entrepreneurial experience that influences the resources exchanged in a business network. For instance, Sørheim (2003) asserted that entrepreneurial experience can provide entrepreneurs with access to investors. Zhang (2011) confirmed that entrepreneurs who have established a firm in the past can acquire more venture capital than entrepreneurs with no prior entrepreneurial experience.

Table 1 summarises the literature regarding the relationships among proximity, similarity and firm and entrepreneurial experience on the one hand and the resources exchanged in business relationships on the other.

Table 1. Literature findings on factors related to the types of resources exchanged in business relationships

Dimension	**Variables**	**Types of resources exchanged in business relationships**		
		Tangible resources	**Intangible resources**	
			Generic business knowledge	**Specific business knowledge**
Proximity and similarity dimensions	Personal similarity	**–**	**–**	**+**
	Site proximity	**+**	**+**	**–**
	Geographical proximity	**–**	**–**	**+**
Firm characteristics	Firm age	+	0	0
	Firm size (# of employees)	+	0	0
Entrepreneurial Characteristics	Entrepreneur age	+	0	0
	Gender (male)	+	0	0
	Entrepreneurial experience	+	0	0

Note: Explanation of signs: "+" stands for a positive effect and "–" a negative effect on resources exchanged. In cases of a 0, no literature was found on the effect.

The relationships tested in this study are indicated by larger font, **bold**.

Source: own work.

The following two hypotheses are tested in the empirical section of this study:

Hypothesis 1: In business relationships where entrepreneurs are personally similar, the exchange of specific business knowledge is more likely than in relationships between businesses whose entrepreneurs are personally dissimilar. Especially in the exchange of specific knowledge, mutual trust and good communication are essential. According to Caniëls *et al.* (2014) and Vissa (2010), personal proximity fosters both, and it is expected that the more personally similar two parties are, the more likely they are to exchange specific human capital resources.

Hypothesis 2: In incubator-internal relationships between businesses whose firms' sites are spatially proximate, the exchange of tangible resources and generic knowledge is more likely than in business relationships characterised by a low degree of site proximity. Based on previous studies, site proximity seems to be

particularly conducive to the exchange of tangible resources, such as equipment, and generic business knowledge, such as market information. Site proximity does not seem to have a similarly strong effect on the exchange of specific business knowledge.

3. SETTING THE STAGE: BIOPARTNER CENTER LEIDEN

The university incubator BioPartner Center Leiden was founded in 2007 as a merger of the *Center for Academic Companies of Leiden Foundation* ("Stichting Academische Bedrijven Centrum Leiden") and the *Life Science Incubator Leiden Foundation* ("Stichting Life Science Incubator Leiden"). The foundation was funded by the University of Leiden, the academic hospital of Leiden (*"Leids Universitair Medisch Centrum"*) and the municipality of Leiden (BioPartnerCenter Leiden, n.d.) The university incubator "aims to enhance the growth and innovation potential of life science companies" (BioPartnerCenter Leiden, n.d.) To this end, the foundation offers accommodations and laboratory facilities to businesses operating mostly in the biotechnology sector and often specialise in pharmaceuticals and vaccinations. The incubator's focus is on entrepreneurs who have already invested considerable time and effort in setting up a company. At the time of the empirical research, i.e. in April 2013, according to incubator management, 47 companies and organisations were located in the incubator. Firms may stay in the incubator during two five-year stages: the incubator stage and the accelerator stage (Kruger, 2013).

BioPartner Center Leiden is located in the vicinity of a number of large biotechnology companies (Centocor, Crucell, Pharming, OctoPlus, TNO), the University of Leiden and the university hospital LUMC. At the time of the research, BioPartner Center Leiden housed firms in three different buildings (see the spatial layout in Fig. 1).

The first two buildings ("BioPartner BP1 and BP2") are identical, with approximately 15 metres space between the two entrances. At the time of the empirical research, BioPartner 1 housed 10 businesses and BioPartner BP 2 accommodated 11 businesses. The third building ("BioPartner BP3") is located opposite the first two, approximately 50 metres away. At the time of the data collection, this building housed 23 different businesses. Three firms were located in two or more different buildings.

A number of characteristics of BioPartner Center Leiden stimulated the formation of business networks within the incubator (or "incubator-internal contacts"). Most firms were active in the same sector, i.e. the red biotechnology sector, where organisms are used in medical and pharmaceutical research to improve human

health, e.g. by developing vaccines. This specific industry focus makes collaboration more profitable for incubatees and, therefore, more probable. Moreover, all firms in the incubator were located in each other's vicinity, with a maximum distance of approximately 100 metres; the layout of the incubator and its open design were important factors that stimulated the formation of an incubator-internal network. The incubatees could look through their windows and see other offices, and they shared a kitchen on each floor of each building, which increased the likelihood of incidental encounters. As mentioned by the incubator manager, BioPartner Center Leiden regularly hosted networking events meant to stimulate the formation of networks. BioPartner Center Leiden had free facilities where incubatees, external parties, and the university could organise lectures or networking events/drinks. Whereas in 2013, incubator management did not actively organise such events itself, it did support others who organised them. Finally, the incubator manager actively linked the incubatees to external parties (one-to-one support) whenever a company expressed a need for help in building networks.

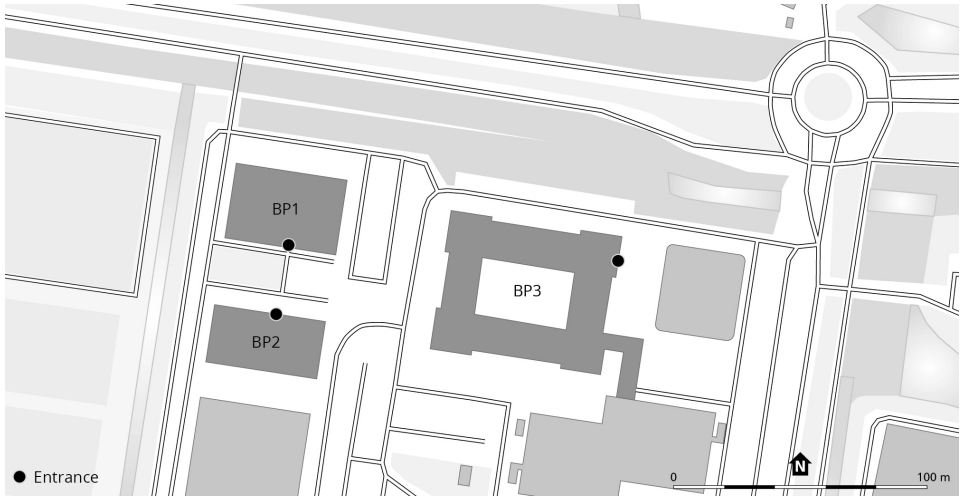

Fig. 1. BioPartner buildings at SciencePark Leiden

Source: own work.

In spite of the favourable conditions for the formation of incubator-internal business networks, some factors seemed to impede the formation of these business networks. For instance, as Fig. 1 shows, the incubator consisted of three different buildings. Additionally, some companies had their own entrances and did not use the main entrances of the buildings. Thus, these entrepreneurs could not be as likely to run into each other compared to a situation where an incubator only has one building and one entrance used by all entrepreneurs. Moreover, the incubator had

a closed-door policy, which means that entrepreneurs could not enter parts and floors of the building where their firm was not located. Although understandable from the incubator's perspective on safety and privacy, this policy could impeded spontaneous encounters and networking and could affected both the formation of business relationships and the resources exchanged in these relationships.

4. DATA COLLECTION AND METHODS

4.1. Sampling and data collection

The selection of BioPartner Center Leiden was based on the strong clustering of specialised (biotech) businesses active in the same industry and the specific spatial layout of the three buildings, which enabled us to study spatial proximity at the micro-level. This focus on this single, particular case has limited generalisability but provided us with the opportunity to test the assumptions derived from the literature on the importance of dimensions of proximity for resource exchange.

At the time of the empirical research (2013), not all 47 companies or organizations registered at the incubator were firms or organisations performing research and/or entrepreneurial activity at an office space located *in* BioPartner Center Leiden. All the organisations that were not engaged in any entrepreneurial activity in the incubator (i.e. they were using it for a mailing address or storage space only or were part of the university) were excluded from the study and were not approached for interview. After we subtracted these eight registered organisations from the list of 47 businesses and organisations, 37 companies and two non-profit organisations could be approached to participate in this study. The two non-profit organisations were regarded as normal cases because they had a physical location and employees in the incubator, and their activities involved other biotechnology companies.

In May 2013, all 39 organisations that were eligible to participate were approached, following a number of steps. A letter was sent first, mentioning the goal of the study and the consent of the incubator manager and inviting the entrepreneurs to participate. Two entrepreneurs responded positively to this letter and were willing to be interviewed. Subsequently, all remaining 37 entrepreneurs were approached by telephone (attempts were made on five different days). In total, 21 entrepreneurs were reached by telephone, 12 of whom were willing to participate. Nine entrepreneurs were not willing to participate. Finally, an e-mail was sent to the remaining 16 entrepreneurs who could not be reached by telephone, and consequently, three interviews were arranged. In total, 17 entrepreneurs were interviewed, nine entrepreneurs were not willing to be interviewed, and the remaining 13 entrepreneurs could not be reached.

The data was gathered through structured interviews in which a questionnaire was completed. The first part of the questionnaire focused on the firm characteristics of an incubatee and its situation within the incubator, whereas the second part focused on the characteristics of an entrepreneur. Third, questions were asked about the business relationships and specifically which resources were exchanged that were necessary to produce and sell products (but outside the value chain). Fourth, a number of questions were asked about the personal and firm characteristics of the five most important network contacts both within and outside the incubator. The interviews took place at the firm's office, they were recorded with the interviewee's consent, and took 20 to 60 minutes, with an average of 30 minutes. The interviewees mentioned a total of 118 relationships with other businesses: 50 relationships with another incubatee (incubator-internal) and 68 relationships with businesses outside the incubator (incubator-external).

4.2. Methodology

In the empirical research design, each unique relationship between a firm and another firm or network contact was regarded as one case. The characteristics of both an interviewee and another network contact were analysed to calculate site proximity, geographical proximity, and personal similarity. To obtain information about the network partners of the interviewees, a highly structured and systematic query technique called the name generator was used to identify network members and to gather information about other network members (the so-called 'alters', Van der Gaag, 2005). All the interviewees were asked to recall five most important incubator-internal and five most important incubator-external network contacts with whom resources were exchanged. To give the interviewees a clue to the kind of contacts that could be provided, a list of examples of resources was mentioned first. Afterwards, the interviewees were asked for more specific information about the other network member and about the specific resource type that was exchanged. The advantage of asking each interviewee to provide information about a number of other parties is that by interviewing a limited number of people, information about many more people can be gathered. Thus, the number of unique relationships becomes much higher than the number of interviewees. An important drawback of this method, however, is that it is a one-sided perspective – only from the viewpoint of an interviewed incubatee. As all information about other network members mentioned by the interviewees was treated confidentially, we could not contact the business partners mentioned by the interviewees to verify the information about the resources exchanged, about other characteristics of the business relationship or about the entrepreneurial characteristics of the business partner. Additionally, since many (incubator-internal) businesses that were mentioned by the participating entrepreneurs did not participate in our study them-

selves, we could not ask them to assess the business relationship from their side. Regarding business relationships and the resources exchanged, a triangulation of the data gathered was neither possible as in the incubator there were no records available of specific resource exchanges between and the incubatees, and no other sources where this in-depth information was gathered.

We analysed the total set of incubator-internal relationships and incubator-external relationships separately. Each interviewee was asked to mention a maximum of five incubator-internal and five incubator-external business contacts to ensure that data about both types of contacts were gathered. However, because we explicitly asked about an equal number of incubator-internal and incubator-external contacts, both types cannot be pooled, as this would create a biased set. In solving this, both data sets were analysed separately, allowing only a comparison between incubator-internal and incubator-external relationships in terms of the type of exchanged resources.

This study has a cross-sectional design because it has more than one case and was conducted at a single point in time to gather quantitative or quantifiable data (Bryman, 2012). This approach implies that the direction of causal influence detected in the study could be ambiguous. For example, it could be the case that if two parties or two individuals collaborated for a long time, one of them may have moved to the incubator to be more proximate to the other. In short, despite the theoretical evidence for causal relationships between proximity and resource exchange, the design adopted here merely allows for the detection of correlations. Therefore, the term "relationship", rather than "effect", is used when referring to the relationship between dimensions of proximity and resource exchange.

4.3. Operationalisation

4.3.1. *Dependent variables*

We asked the interviewees to mention all business partners with whom resources were exchanged and to select five most important partners both within and outside the incubator setting. Supplier and market relationships were intentionally not included. For all resulting 'resource exchanging' business relationships, we asked the interviewees about the types of resources exchanged, and all details were self-reported. Three types of resources were determined: tangible resources, defined as 'anything that can be seen or touched or that has to do with financial matters', and two types of intangible resources: generic business knowledge and business-specific knowledge. During the interviews, a list of examples of resources was shown to the interviewees without mentioning the category to which the examples of resources belonged. Table 2 shows the mentioned examples and indicates to which category they were assigned afterwards.

Table 2. Examples of each type of resource mentioned by the interviewees and afterwards categorised in the analysis stage

	Tangible resources	Intangible resources			
		Generic business knowledge		Business-specific knowledge	
Examples	Sharing equipment	Joint venture/ Merger	Market information	Access to contacts	Research/project Collaboration
	Sharing lab or office space	Investments	Business ideas/ concepts	General scientific ideas/ knowledge	Business-related service
	Selling business-related product	Patents/ copyrights			Specific product development

Source: own work.

4.3.2. *Independent variables*

For each relationship, proximity scores were calculated.

– Personal similarity. Personal similarity was determined by comparing the individual characteristics of an interviewed entrepreneur ("entrepreneurial characteristics") to the characteristics of the main contact person of the businesses mentioned by the interviewee. The interviewees themselves chose which person they regarded as the main contact person of the business or organisation they referenced. If it was not immediately clear who the main contact person was, the following question was asked: "Who would you contact first if a major problem occurred in the exchange process?" Four questions were asked about the contact person to gather information about the gender, age, the level of education, and ethnic background of the 118 exchange partners. These details were combined with the data about the gender, age, the level of education, and ethnic background of the interviewees (ego). The total personal similarity score of a relationship was calculated by taking the average score of gender proximity, age proximity, educational proximity and ethnic proximity (see Kruger, 2014 for details on calculations). In the few cases where one or more personal characteristics of the other network member mentioned were missing, for instance, if an interviewee did not know some of the characteristics of the contact person, the personal similarity score was based only on the other characteristics mentioned. Thus, the proximity score of all cases could still be calculated. For all relationships combined, the average similarity score was 0.754. The total personal similarity score of incubator-internal relationships was 0.820, whereas the personal similarity score of incubator-external relationships was 0.705; however, this difference was not significant (see Table 3).

– Site proximity (for incubator-internal business relationships only). Site proximity is defined as the relative physical distance between two firms within

the same incubator. Given this definition, site proximity can only be measured between incubatees. Because the incubator consisted of three different buildings, firms located in the same building were closer to each other than firms located in different buildings. Moreover, within the same building, firms that were located on the same floor were closer than firms located on different floors. Site proximity was a categorical variable with three possible outcomes and it was coded as follows into a binary variable: two companies could be located in different buildings (coded 0), in the same building but on different floors (coded 0) or in the same building and on the same floor (coded 1). As incubator management provided the actual locations of every incubatee in the three incubator buildings, the site proximity score could be assessed for all incubatees and all the interviewees.

– Geographical proximity (incubator-external business contacts). Geographical proximity resembles the concept of site proximity in that it also applies to the physical distance between two parties. However, whereas site proximity is measured between incubator-internal contacts, geographical proximity is measured between an interviewee and each of their incubator-external contacts. For each external contact, the country of location was inquired, and if the contact was in the Netherlands, the city of location was also inquired, resulting in three categories: outside the Netherlands, within the Netherlands (but outside Leiden), and in Leiden. We used a proxy to measure geographical proximity to the business partner: located in the same city of Leiden (coded 1) or beyond (coded 0).

Table 3. Descriptive statistics of the business relationships mentioned by the interviewees

Variable	Statistics/answers	Value/share	(N)
Personal similarity	Average:	0.754	(118)
	Standard deviation:	0.250	
Site proximity (only incubator-internal relationships)	Same floor in building	70.0%	(50)
	Other building or other floor	30.0%	
Geographical proximity (only incubator-external relationships)	Leiden (same city)	29.4%	(68)
	NL – outside Leiden	41.2%	
	Abroad	29.4%	
Age entrepreneur (years)	Younger than 47	45.0%	(118)
	47 or older	55.0%	
Entrepreneurial experience	No	50.0%	(118)
	Yes	50.0%	
Firm age (years)	Less than 7	24.2%	(118)
	7 or older	75.8%	

Variable	Statistics/answers	Value/share	(N)
Time in incubator (years)	Less than 4	54.0%	(50)
	4 or more	46.0%	
Firm size (number of employees)	Less than 6	48.0%	(118)
	6 or more	52.0%	

Source: own work.

A nonresponse analysis was conducted to analyse whether the group of interviewed entrepreneurs and their firms were representative of the total group of entrepreneurs and firms. This analysis was conducted for the ethnicity, gender, and age of the entrepreneurs and for the building in which they were located, based on two sources of information. The incubator staff provided information about the gender and location of each entrepreneur or firm. Information about the age and ethnic background of the entrepreneurs was not provided by incubator management, so this information had to be deduced from the interviews, in which the incubatees mentioned the characteristics of other incubatees. In total, information about the ethnic background, gender, and age of 30 out of the 39 individual incubatees was gathered. This group of 30 incubatees was used for the nonresponse analysis and compared to the group of 17 interviewed incubatees. The observed values of site proximity were compared to the expected values of site proximity, which were calculated by analysing all potential business relationships of all interviewees. The business relationships between two incubatees were significantly more likely to occur within the same building and on the same floor than between different buildings (results available upon request).

Additional chi-square tests showed that the share of female entrepreneurs, the age distribution and the nationality of the entrepreneurs did not significantly differ between the interviewed entrepreneurs and the total incubatee population. With respect to the exact location of the firms within the incubator, the responding group of entrepreneurs was representative of all incubatees.

5. THE RESULTS

Business relationships inside and outside the incubator were substantially different. As Table 4 shows, the types of resources shared differed significantly between business relationships with other incubatees and business relationships with organisations outside the incubator. More business-specific knowledge was exchanged with external partners.

Table 4. Types of resources per the orientation of business relationship (incubator-internal versus incubator-external)

Types of resources exchanged in business relationships	Incubator-internal business relationships	Incubator-external business relationships	Total
Tangible resources	15	25	40
	30.0%	36.8%	33.9%
Intangible: generic business knowledge	29	7	36
	58.0%	10.3%	30.5%
Intangible: business-specific knowledge	6	36	42
	12.0%	52.9%	35.6%
Total	50	68	118
	100.0%	100.0%	100.0%

Chi2=35.5; p=0.000, Cramer's V=0.548

Source: own work.

Based on the literature, we hypothesised that personal similarity and site proximity between an incubatee and their business partner would be related to the types of resources shared. However, the literature states that other factors related to an entrepreneur or a business can also be important. We captured this by including the key dimensions of personal similarity, site and geographical proximity, and control factors step by step in the models (Tables 5–7). We expected personal similarity to be positively related to business knowledge exchange instead of the exchange of tangible resources, especially for a specific business knowledge exchange.

Table 5. Parameter estimates of logistic regression analysis on the probability of exchanging intangible resources instead of tangible resources (all 118 business relationships)

Variable	Probability of exchanging intangible resources (instead of tangible resources)							
	Model 1		Model 2		Model 3		Model 4	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Intercept	-0.479	0.607	0.557	0.931	2.109	1.557	2.655	1.825
Personal similarity	1.545	0.781**	1.421	0.798*	1.295	0.805	1.176	0.830
Entrepreneurial characteristics								
Age entrepreneur			-0.648	0.456	-1.045	0.547*	-1.076	0.549*8**+*
Entrepreneurial experience			0.158	0.453	0.318	0.482	0.339	0.482

Variable	Probability of exchanging intangible resources (instead of tangible resources)							
	Model 1		Model 2		Model 3		Model 4	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Firm characteristics								
Firm age					-0.724	0.473	0.339	0.482
Firm size					0.124	0.413	0.139	0.414
Incubator-external relationship							-0.247	0.426
-2 Log Likelihood	147.097		144.936		142.576		142.238	
Cox & Snell R Square	0.034		0.051		0.070		0.073	
Nagelkerke R Square	0.046		0.071		0.097		0.100	

*** $p < .01$; ** $p < .05$; * $p < .1$ (two-tailed tests).

Source: own work.

The models in the above Table 5, depicting the probability that in the business relations mentioned, either generic or business-specific knowledge (intangible resources) are exchanged instead of tangible resources, show that at first sight (Model 1), personal similarity between business partners was positively and significantly related to the exchange of business knowledge. This effect, however, decreased in both significance and size when we verified the entrepreneurial and firm characteristics of the ego. In particular, the age of the entrepreneur seemed to be important: older entrepreneurs tended to exchange fewer intangible (i.e. more tangible) resources than younger ones. Perhaps they have surpassed the stage of information exchange, eventually resulting in the exchange of concrete, tangible resources. Models 3 and 4 show that including firm characteristics – and especially the difference between incubator-internal and incubator-external relationships – did not affect the size or the positive/negative inclination of the model parameters significantly, although the effect of personal similarity was no longer significant. However, considering the small change and the persistence of the positive/negative inclination and size of the parameter, we suspect that this was due to the small number of cases. It seems that personal similarity between business partners was slightly positively related to the exchange of intangible resources. Taking a closer look at the role of personal similarity in both generic and specific business knowledge exchange renders the results depicted in Table 6.

Table 6 focuses on the two types of intangible resource exchange. Regarding the exchange of generic business knowledge, personal similarity seemed to be of no importance, and all parameters of the control variables were also insignificant.

Table 6. Parameter estimates of the logistic regression analysis on probability of exchanging 1) generic business knowledge, and 2) specific business knowledge (all 118 business relationships)

Variable	Left panel: Probability of exchanging generic business knowledge						Right panel: Probability of exchanging specific business knowledge					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Intercept	-1.533	0.712**	-0.886	1.466	5.141	2.093**	-1.188	0.659*	0.296	1.418	-5.052	2.007**
Personal similarity	0.953	0.878	0.999	0.911	-0.344	1.089	0.781	0.819	0.475	0.844	1.731	0.979*
Entrepreneurial characteristics												
Age entrepreneur			-0.227	0.500	-0.754	0.613			-0.665	0.488	-0.498	0.542
Entrepreneurial experience			-0.292	0.464	-0.087	0.564			0.473	0.440	0.450	0.491
Firm characteristics												
Firm age			0.151	0.465	-0.240	0.555			-0.770	0.461*	-0.568	0.504
Firm size			-0.294	0.427	-0.208	0.505			0.446	0.420	0.416	0.463
Incubator-external relationship					-2.622	0.529*					2.347	0.532***
-2 Log Likelihood	143.905		142.020		110.352		152.694		148.548		123.532	
Cox & Snell R Square	0.011		0.026		0.255		0.008		0.042		0.255	
Nagelkerke R Square	0.015		0.037		0.361		0.011		0.058		0.309	

*** $p < .01$; ** $p < .05$; * $p < .1$ (two-tailed tests)

Source: own work.

Table 7. Parameter estimates of the logistic regression analysis on probability of exchanging 1) intangible resources (incubator-internal: n=50), and 2) specific business knowledge (incubator-external: n=68)

Variable	Left panel: INCUBATOR-INTERNAL BUSINESS RELATIONSHIPS: Probability of exchanging intangible resources						Right panel: INCUBATOR-EXTERNAL BUSINESS RELATIONSHIPS: Probability of exchanging specific business knowledge					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Intercept	2.056	1.550	5.300	2.412**	6.151	2.725**	-1.420	0.782*	-1.397	1.197	0.126	1.936
Personal similarity	-0.210	1.543	-0.487	2.034	0.131	1.935	2.240	1.055**	2.207	1.072**	1.942	1.100*
Site proximity	-1.362	0.844	-1.582	0.899*	-1.546	1.013						
Geographical proximity							-0.167	0.562	-0.198	0.576	-0.206	0.587
Entrepreneurial characteristics												
Age entrepreneur			-1.760	0.873**	-1.897	0.910**			-0.060	0.547	-0.473	0.635
Entrepreneurial experience			0.050	0.898	0.111	0.927			0.205	0.543	0.357	0.565
Firm characteristics												
Years in incubator					-0.913	1.012						
Firm age											-0.817	0.596
Firm size					0.098	1.048					0.287	0.531
-2 Log Likelihood	57.941		51.786		50.445		88.849		88.707		86.715	
Cox & Snell R Square	0.061		0.170		0.192		0.073		0.075		0.102	
Nagelkerke R Square	0.086		0.241		0.272		0.098		0.101		0.136	

*** $p < .01$; ** $p < .05$; * $p < .1$ (two-tailed tests)

Source: own work.

Model 3 in the left panel of Table 6, however, shows that in incubator-external relationships, far less generic business knowledge was exchanged than in incubator-internal business relationships. This closely mirrored the results of the analysis of the effect of incubator-external partnerships on the exchange of specific human capital: model 3 in the right panel depicts a significant and large positive effect of incubator-external relationships. In this latter analysis, however, personal similarity was also positively related to the exchange of specific business knowledge, hinting that the fact of personally resembling a business partner increased the chance of sharing specific and detailed information and knowledge when the location of this business partner was controlled.

Differentiating between incubatees' relationships with businesses within and outside the incubator enabled us to see whether the other two dimensions of spatial proximity (site and geographical proximity) mattered for the types of resources exchanged. The two panels in Table 7 present the results of the analyses on exchanging intangible resources and exchanging specific human capital resources for incubator-internal and incubator-external business relationships, respectively. Due to the small number of business relationships, further detail was not possible. However, the fact of distinguishing between incubator-internal and incubator-external relationships enables us to focus on the effects of site proximity and geographical proximity, respectively, in addition to the personal similarity dimension. For incubator-internal business relationships, we used 'years in incubator' instead of 'firm age', as these characteristics were highly correlated. Our argument here was that the time spent in the incubator was far more relevant for incubator-internal business relationships than for incubator-external business relationships.

In relationships between businesses whose sites were very proximate – that is, businesses located on the same floor of the incubator – tangible resources were exchanged more often than in relationships between businesses located on another floor or in another building. This effect decreased in significance; however, the positive/negative inclination and the size did not change much when control variables were included (left panel: models 2 and 3), suggesting that this result was caused by the small number of cases but rather by interfering effects of control variables. In particular, we found that older entrepreneurs exchanged fewer intangible resources within the incubator than their younger counterparts did. This could indicate that young entrepreneurs were still sharing information and knowledge, as they had not reached the stage of concrete resource sharing.

For the 68 relationships with businesses outside the incubator, geographical proximity did not affect the probability of exchanging specific human capital (Table 7, right panel). In other words, whether the other network member was located abroad or in the Netherlands, inside or outside Leiden, it was of no importance to the exchange of specific knowledge and information. However, as we already expected from Table 6, personal similarity had a positive effect on the exchange

of specific human capital resources – and this effect endured when we checked for other factors. For incubator-external relationships, the physical proximity of incubatees or the ease of visiting nearby businesses seemed to be compensated by sharing business partner characteristics.

We conclude that hypothesis 1, i.e. that personal similarity positively impacts the exchange of business-specific knowledge, was partly accepted; meaning it could not be rejected entirely. The positive inclination for all 118 relationships involved was no longer significant after we checked for other factors; however, when only the incubator-external relationships were included, personal similarity substantially enhanced business-specific knowledge exchange in relationships. Hypothesis 2 must be rejected because the positive relation between being located on the same floor and exchanging tangible relationships lost significance when other factors were taken into account. However, this might be due to the small number of cases, as the parameter positive/negative inclination was robust and relatively large and positive.

6. CONCLUSION AND DISCUSSION

The overall aim of this study was to investigate whether personal similarity and geographical proximity are related to the types of resources exchanged in the business relationship of incubatees, both within and outside an incubator setting.

It should not be ignored that to the incubatees interviewed, incubator-external network partners seemed to be more important for resource exchange than incubator-internal contacts. In this respect, the term Bio*Partner* is perhaps slightly euphemistic. However, our results also suggest that site proximity plays a (albeit small) role in the resources exchanged between incubatees: it seems that tangible resources are more often exchanged if firms are located on the same floor. The mechanism here can be that neighbouring incubatees regularly and frequently run into each other and, therefore, see, witness, and discuss practical matters or basic problems instead of discussing business-specific issues in depth. Our finding is in line with the evidence from the ethnographic research of Cooper *et al*. (2012) of a positive effect of site proximity on the likelihood of collaboration between two firms in the same incubator. Geographical proximity was found to be unrelated to the types of resources exchanged with incubator-external business partners. With respect to personal similarity, the results suggested that this dimension of proximity, combining the personal characteristics of an entrepreneur and network members, might influence the resources exchanged through business relationships. This new concept, constructed from the pivotal work of Boschma, Vissa and Caniëls *et al.*, calls for new tests with more cases in different contexts and

incubator settings. Regarding the latter, Redondo-Carretero and Camarero-Izquierdo (2017) recommended looking at incubatees' eagerness to interact, their sense of belonging to the incubator area, and affective commitment. Our findings are only partly consistent with the literature. The types of resources exchanged in business relationships, however, were hard to predict in our models. The finding that entrepreneur age is positively related to the exchange of tangible resources in incubator-internal relationships was rather unexpected and calls for further research. It may be true that older entrepreneurs are less hesitant to share material goods than to exchange intangible (knowledge) resources, perhaps as a result of past experiences or risk-avoiding behaviour. This might be related to recent academic findings on inter-firm relations suggesting that a firm's purpose of collaboration (Usman *et al.*, 2019) and a combination of trust and control (Massaro *et al.*, 2019) matter for knowledge transfer.

It is important to note that this study had methodological limitations that may have affected its reliability and validity. First, due to the cross-sectional character of this study, the relationships between some factors analysed could be correlational rather than causal, or the causality may be different than assumed. Second, the number of missing cases was rather high. Instead of including all potential relationships between firms and their network contacts within the incubator, the study examined only 50 inter-incubator relationships mentioned by the interviewees. Third, due to confidentiality, we could not verify the types of resources exchanged or the entrepreneurial characteristics of business partner contacts mentioned by the incubatees interviewed. Furthermore, at the relationship level of the analysis, all relationships were treated as independent cases, whereas in fact, each firm could have had multiple relationships with one or more business partners. Therefore, a multilevel analysis would have been an appropriate method of analysing the results, grouping the relationships based on the firm to which they belonged. Last, this study was conducted in only one specific incubator setting. The relationships between proximity and business relationship characteristics may depend on the characteristics of the incubator, the sector of the incubator, the surrounding environment of the incubator (such as a larger science park), and cultural factors. Therefore, the findings of this study may not be applicable to firms in incubators in other sectors or countries. However, the study results, especially the name-generating technique to identify business partners, can be of use in reproducing the study in other incubator settings, business sites or even clusters.

Despite its methodological caveats, this study provides at least three new insights into how an incubator can shift from being a collection of similar yet independent firms to a geographical cluster where incubatees collaborate and externalities emerge. Although site proximity only seemed to matter for the exchange of tangible resources, such relationships might evolve over time into the exchange of specific human capital resources. However, a transition from exchanging lab equipment to collaborating on a research project was likely only if the two parties

involved could benefit from the partnerships. This was usually the case only if two firms were active in the same niche of biotechnology. A first recommendation to incubator managers is, therefore, to locate firms that are active in the same sector in each other's (geographical) vicinity – and by this we mean the same floor rather than just the same building. In the case of an incubator with different buildings, it would even be possible to make thematic buildings, each with firms active in a specific niche of biotechnology. A second suggestion is to rethink the incubator's closed-door policy, as this might limit the opportunities for collaboration between incubatees. If entrepreneurs are not able to enter the buildings, the floors, or the parts of the floors where they are not located themselves, the chances of coincidentally meeting other incubatees decline. The closed-door policy is understandable from the perspective of the incubator, but it would be good to reconsider its advantages (privacy) and its disadvantages. Finally, as some entrepreneurs attend events and conferences to meet other incubatees, the fact of frequently organising networking events or network drinks in the incubator or elsewhere at the science park can also contribute to the formation of the incubator-internal network.

One may conclude that the limited importance of the incubator to the resources exchanged in the incubatees' business network means that geographical proximity does not play a role and that a geographical cluster with resulting externalities cannot be found at BioPartner Center Leiden. However, this would be an erroneous conclusion. It may be that the incubator setting itself is not essential for the resources exchanged in the business network of the incubatees, but the firms, organisations and citizens in the vicinity of the incubator are. In line with Capdevila (2015), we argue that instead of being seen as independent and isolated organisations, coworking spaces and university incubators should be seen as pieces of a larger specialised cluster, within which externalities do emerge as a result of contact between geographically proximate parties. Our quantitative attempt to test whether proximity dimensions matter for resources exchanged by incubatees gives some answers but also raises new questions on how to capture, measure, and subsequently stimulate (spatial) the spill-over effects of micro-level proximity. Therefore, we encourage future research that uses different data collection methods on the resource exchange by and business relationships between incubatees, for instance, using in-depth interviews of both parties, documents, narratives or observations.

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COWORKING SPACES AS A DRIVER OF THE POST-FORDIST CITY: A TOOL FOR BUILDING A CREATIVE ECOSYSTEM

Abstract. Collaborative places nurture creativity and efficiency of cultural and creative industries. Research in collaborative places revealed they are essential for networking and cooperation in the creative ecosystem. The results of studies focusing on competitiveness of coworking spaces and their effect on boosting entrepreneurship are rather vague. Furthermore, an awareness of how coworking spaces stimulate coworkers to engage in urban regeneration through local community initiatives is limited. Hence, this study seeks to provide an insight into coworking spaces from the organizational perspective devoted to entrepreneurship and competitiveness. Simultaneously, the paper aims to reveal synergies between creative communities and local development. The method of data gathering consists of semi-structured in-depth interviews with managers and entrepreneurs from selected countries of the EU applying the grounded theory for their analysis. The results suggest that coworking spaces indicate a boosting of the entrepreneurship of the creative class through collective projects. These activities tend to stimulate knowledge creation and open innovation in the creative ecosystem that benefit local development. Coworking spaces also represent a driving force to initiate and maintain a dialogue between the creative ecosystem and local authorities for culture-led urban development.

Key words: coworking spaces, coworking, creative ecosystem, creative industries, post-Fordist city.

1. INTRODUCTION TO CREATIVE INDUSTRIES AND COLLABORATIVE PLACES

The notion of the cultural and creative industries (CCI) was firstly acknowledged by the Department of Culture, Media and Sport (DCMS, 1998) as a novelty concept based on individual creativity, skills, and talent. Furthermore, the CCI are considered

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a driver for job creation, mainly through the exploitation of intellectual capital (Florida, 2002). The development of digital media raised awareness of the CCI as they are linked with wider processes and sectors outside creative economy. Therefore, they occur in traditional sectors with the use of ICT, while many scholars (Chapain, 2010; Plum and Hassink, 2014; Chapain *et al.*, 2014) believe that these links make the CCI more innovative than traditional industrial sectors. According to the EU (2010) the CCI and their innovativeness is associated with the creation, production, and distribution of creative products in non-creative sectors. Thus, innovativeness is also stimulated by utilisation of talent, creativity and unique ideas (Howkins, 2002). Concurrently, in the digital era, the CCI depend on the culture and arts as they are often integrated in the process of production (Jones *et al.*, 2015). From the economic perspective this phenomenon is associated with the changes in the relationship between supply and demand among individuals and companies. Consequently, these processes contribute to the shift of public policies towards an advancement of creative economy. Further, the development of the creative economy is also associated with the processes of de-industrialisation and the expansion of the service sector. As De Propris (2013) mentioned, the concept of the CCI is essential for restructuring manufacturing activities mainly after negative events such as a financial crisis. Another aspect of emerging synergies between the CCI and the service sector leads to the process of output commercialization these industries generate (Martin-Rios and Parga-Dans, 2016). Furthermore, the essential part of output commercialization is its' uniqueness and non-replicated nature (Jones *et al.*, 2016). This eventually corresponds to the process of cultural and creative education with the involvement of users/customers in the process of creation. Involvement of various agents create a favourable environment for crossover innovation that comprises both internal and external features (Cooke, 2018). Moreover, favourable an innovative and entrepreneurial environment nurtures economic growth with pre-conditions corresponding to creativity and interaction in time and place (Copercini, 2016; Farina *et al.*, 2018).

Collaborative places currently provide favourable conditions for the creative and cultural industries in certain areas. Coworking spaces are such a type of new working spaces that unite independent freelancers and micro-companies as they co-exist at the same place. Furthermore, they offer prospects for developing the creative economy and serve as an effective tool for creating and nurturing favourable conditions for the CCI with the focus on non-standardized production. Regarding the favourable conditions, there is a great variety of activities that support collective learning and education (Katz *et al.*, 2015). Mutual activities in collaborative places also rise public interest in active and passive participation in the creative economy on both the local and regional levels. Previously, studies were devoted primarily to conceptualising collaborative spaces with their taxonomy (Mariotti *et al*, 2017; Capdevila, 2017).

Furthermore, research activities were focused mainly on the characteristics of co-workers as knowledge workers in the entrepreneurial ecosystem (Brown,

2017; Bouncken and Reuschl, 2018). The fact of facing ongoing challenges of local development entails the need for empirical contributions regarding coworking spaces as micro-clusters. Moreover, coworking spaces denote the idea of third places with different socio-spatial characteristics that might invent new ways of collaboration (Kojo and Nenonen, 2017). However, Mariotti *et al.* (2017) argued that the physical proximity does not necessarily lead to networking and collaboration. Thus, coworking spaces and other collaborative places often depend on competent managers and facilitators that contribute to the creative ecosystem.

In addition, managers might develop synergic effects that stimulate new ways of cooperation within the creative class that represent trust-based community (Fuzi, 2015). Thus, the CCI and coworking spaces could enable open innovation approaches that bring various actors to collaborate on mutual projects in the process of production. Nonetheless, a combination of actors changes a view on working and leisure. As Suire (2018) mentioned, this leads to an interplay of time, place and social settings in knowledge work. This might underline the need for a shift in governance not only from practitioners and managers but from policy makers and local authorities alike.

Coworking spaces combine the CCI with places that have cultural and social settings that develop a "local buzz" that is essential for non-standardised production in terms of styles and trends (DeFillippi, 2015). Nevertheless, a local buzz and non-standardised production that is specific for coworking spaces represent a local source that might contribute to global knowledge through global pipelines (Bathelt *et al.*, 2004). Hence, the paper is build on the previously-mentioned empirical contributions and aims to address a research gap regarding coworking spaces as permanent and temporary work settings in boosting entrepreneurship in the sense of competitiveness (Capdevila, 2013; Suire, 2018). Additionally, the paper discusses the implications for local development through coworking centres, and their local communities and initiatives for micro-scale physical transformations (Mariotti *et al.*, 2017). Considering that, the paper is intended to contribute to an overview on coworking spaces as a part of collaborative spaces enhancing collaboration and knowledge interactions for policy implications in urban development and social participation in decision-making for smart urban regeneration (Parrino, 2015; Czupich, 2018; Babb *et al.* 2018).

2. COWORKING SPACES AND THE ROLE OF THE CREATIVE CLASS IN LOCAL CREATIVE ECOSYSTEMS

Collaborative spaces are an alternative way to a second place where freelancers share flexible and part-time work placement (Kubátová, 2016). They are specific for their idea of sharing facilities and offices that bring strangers to

coexist. Nevertheless, the physical proximity and coexistence could be summarised as the first stage of developing collaborative spaces. More importantly, they denote the idea of collaboration that is unique and essential for the creative economy in terms of the crossover of an innovation that utilises technologies and techniques from other related industries (Cooke, 2018). Hence, managers of coworking spaces face challenges of developing human capital in order to achieve sustainability and viability in the long run. Human capital refers to the accumulated value of investments in employee training, competence, and the future. Human capital can be further sub-classified as the employees' competence, ability to build and maintain relations, and values (Kannan and Aulbur, 2004). Furthermore, the relevancy of human capital among coworking spaces is considered most important for those that operate in complex and dynamic competitive environments, where the ability to rapidly acquire and assimilate a new market and technological capabilities is the key to having enduring advantage over competitors (Hayton, 2003).

However, human capital describes the value of the know-how and competences of an organization with competences, competence improvement, staff stability, and the improvement of the capacity of persons and groups (Montequín *et al.*, 2006). Particularly staff mobility is relevant for the creative industries that are associated with a wide range of theoretical streams. Richard Florida is considered a pioneer of the creative class with his book *Rise of the Creative class* (2002), where he considered creativity as a crucial competitive advantage. Florida distinguished professions with capacity to invent new and unique ideas (ibid.) Thus, the creative class is a critical mass for collaborative places, represented by individuals engaged in professions such as design, architecture, software design, advertising, publishing, arts, crafts, fashion, film, music, theatre, research, TV, radio, and gaming. Florida (2002) argued that these professions form the "creative core", while individuals employed in finance, trade, law, and healthcare are perceived as "creative professionals". The creative class is considered more open-minded, flexible, and having higher levels of individuality (Kagan and Hahn, 2011; Florida *et al*., 2013). Communities in which the creative class is concentrated are more competitive and more inclined to adopt advanced technologies (McGranahan *et al*., 2010). These are essential feature of the creative class that are relevant for developing successful coworking centres with diversity and sustainability of communities and mutual activities. The creative class concept is also a subject of critique mainly by economic geographers regarding the fuzziness of some of the concepts and definitions (Pratt, 2008; Clifton, 2008). Nevertheless, Florida (2002) argued that to attract the creative class, cities have to pursue "the three T's" consisting of talent, tolerance and technology, along with a focus on details, such as diversity and individuality. The attraction of the creative class is simultaneously based on two different streams based on job motivated migration (Niedomysl and Clark,

2010), and the role of cultural amenities in cities (Lawton *et al.* , 2013). Additionally, Florida (2002) developed the Creativity index as a tool for describing how the creativity class is attracted to a city. The use of the Creativity index is still highly limited due to the difficulties in identifing some indexes (Kloudová and Chwaszcz, 2012).

Nevertheless, the current debates among scholars regarding the creative class are not limited solely to attraction per se, but rather to its' retention in cities, where coworking might play a vital role for the local ecosystems. Factors influencing the retention of the creative class are associated with pleasant neighbourhood characteristics, local cultural amenities, and the lifestyle in communities (Van Heerden and Bontje, 2013). Then, the factors influencing their retention in small and rural places are community sense, outdoor amenities, and time with family, which are reflected in the nature of coworking centres (Verdich, 2010; Bereitschaft and Cammack, 2015). Hence, coworking centres might facilitate the structural changes of cities, especially in post-Fordist cities that are based on the knowledge economy with flexible production and human capital (Asheim, 2012). Furthermore, the links between the creative class and coworking centres could be further developed by a Neo-Schumpeterian Approach associated with the fifth wave cycle characterised by information technology and innovation in post-Fordist cities (Cooke and Schwartz, 2008). Sternberg (2000) argued that post-Fordism is characterised by flexible and specialised companies with new forms of working and technologies based on collaboration.

Previous studies underline the eminence of creative cities, where the creative class shall contribute to openness, globalisation, and de-industrialisation through flexibility and specialisation (Scott, 2006). Hence, creative cities provide favourable conditions for collaboration and a flexible specialisation approach towards customised goods. Thereby, these principles underline the mutual interactions of various stakeholders that contribute to professional relationships and social networks for access to knowledge (Söpper, 2014; Vinodrai, 2015). Consequently, we assume that knowledge-based competition requires more from freelancers and micro-companies than just the application of their knowledge to generate creative solutions within post-Fordism (Jackson *et al.*, 2003; Amin, 2011). Thereby, they are required to identify the problems to be solved, and present them in meaningful and compelling ways, where coworking centres might play a vital role regarding exhibitions, workshops, and presentations. This could be recognised as knowledge sharing that affects business environment in which coworking centres are located and operate. Generally, the ability to create new knowledge, which enables firms both to innovate and to outperform their rivals in dynamic environments, results from the collective ability of employees to exchange and combine knowledge (Collins and Smith, 2006).

3. THE RESEARCH GAP BETWEEN COLLABORATIVE PLACES, THE CCI AND COMPETITIVENESS

In previous sections, we elaborated on the fundamental underpinnings of coworking centres and their role in post-Fordist cities, mainly regarding socioeconomic transformations. These are being taken into consideration within the concept of the creative economy that develops economic and social activities in collaborative places that overlap a creative ecosystem. Additionally, collaborative spaces are based on both competition and collaboration that create and develop a local creative ecosystem with challenges for enhancing competitiveness and achieving long-term sustainability. Nevertheless, the issue concerning how to create suitable conditions for socioeconomic development through collaborative spaces in both central and peripheral cities remains unclear (Mariotti *et al.*, 2017). Moreover, there is a limited insight into what role do local and regional authorities have in local development towards collaborative places, and what initiatives do local communities take in order to contribute to micro-scale transformations. As a consequence, there is a research gap regarding addressing the role of permanent and temporary work settings in boosting entrepreneurship for which collaborative spaces arrange (Suire, 2018).

Hence, the paper aims to answer the research question regarding how governance in coworking centres develops, and address the current issues regarding entrepreneurship and what mechanisms are utilised in order to achieve competitiveness of human capital. In addition, the paper seeks to clarify the specifics of collective learning and knowledge sharing in the creative ecosystem. The paper considers previous studies that addressed similar research questions and helped to specify the research gap, primarily regarding a) human capital development in coworking centres (Kubátová, 2016) with mobility of labour market; b) the knowledge transfers in the CCI and quadruple helix with institutional frameworks (Cruz *et al.*, 2019); and c) the economic diversity in coworking spaces regarding innovation and business development (Vidaillet and Bousalham, 2018, Farina *et al.*, 2018). Furthermore, the paper follows empirical research concerning emerging workspaces in post-functionalist cities (Di Marino and Lipantie, 2017) as a study to investigate human capital development and collaboration between key agents preferably in post-Fordist cities. Additionally, in order to address the research gap, the paper focuses on collective activities to enhance competitiveness, and adaptive resilience in coworking centres and determinants to boost entrepreneurship (Durante and Turvani, 2018). In order to focus on the research question, the paper is based on qualitative research concerning the phenomena specific for conceptualising new working spaces in local creative ecosystems. Finally, the paper provides an insight into the interplay of time, place and governance in different socioeconomic settings with a key methodological advantage in the process

of gathering and analysis extensive primary data of coworking centres and their practical implications for entrepreneurs and policy makers in developing local creative ecosystems (O'Connor and Gu, 2014).

4. THE METHODOLOGY

The first step was based on a desk research to identify dynamic coworking centres in the EU. Thus, the selection of coworking centres was to highlight the similarities and differences in new working spaces. The research sample was designed to included new working spaces based on their specialisations, active periods, target groups, and socioeconomic activities (Patton, 2014). Subsequently, respondents were selected according to systematised efforts for proposal and implementation of public policies towards the creative economy as a source for competitiveness local development. Even though countries included in the sample were at different stages of policy implementation, they shared a common goal of developing sustainable creative economy as a driver for socioeconomic development. Purposeful sampling was employed with the aim to include coworking spaces with experience in human capital development through collective learning and knowledge sharing. Hence, the respondents could share their opinions and expertise in different settings for boosting entrepreneurship. As a final point, the sample reflects on collaboration with public authorities in order to identify policy implications for urban development and regeneration. In order to address the research question regarding coworking centres in post-Fordist cities, the paper includes new working spaces located in both peripheral and central cities, where brownfields were recognised. A new element proposed by the paper could be the diversity of human capital involved in cultural and creative activities for enhancing competitiveness and developing the entrepreneurial spirit among the creative class. Subsequently, a key advantage of the methodology might be marked in structure and analysis-focused interviews in different cultural settings (Leavy, 2014).

Data collection was performed with extensive face-to-face semi-structured interviews that lasted 90 minutes each, with management in order to address top-down and bottom-up approaches in coworking centre development. The interviews were conducted in 2017–2018, with the total sample of 20 observations (see Table 1 for their list and selected structural indicators). The sample included post-Fordist cities, more specifically capital cities Berlin, Copenhagen, Stockholm, Helsinki, Tallinn, Riga, Warsaw, and peripheral cities Linz, Zlín and Trenčín. Moreover, it was designed to be gender balanced to avoid any bias in the creative class management and development. The respondents were selected based on their expertise in management of coworking centres along with best practices criteria in the creative class development, which was reflected in sustain-

ability and viability of new working spaces. The best practices criteria were based on desk research of coworking centres, which were intended to support the development of the CCI along with their activities to nurture the creative ecosystem. In addition, the selection respected the approaches of local governments towards the creative economy as a tool for local development and entrepreneurship. Hence, the paper employed purposive sampling concerning coworking centres and their characteristics, which was later enriched with the respondents causing a snowball effect to widen the perspective on competitiveness and entrepreneurship.

Interviews were structured into three blocks in order to address the underpinnings of boosting entrepreneurship, knowledge sharing, and the participation in local development. The first block of questions was devoted to the involvement of local stakeholders in the creative ecosystem development and local development in terms of changes in the scenery where coworking centres were situated. The second block was concerned about knowledge sharing and collective learning towards boosting entrepreneurship through mechanisms, mutual activities, and constrains/opportunities. The third block of interviews was devoted to the specific role of communities in local development through engagement of various stakeholders in the process, along with an insight into the mutual interactions of coworking centres and the local milieu. In order to address volunteer bias regarding the respondents in the sample, we had discussed the process in the research group with a focus on errors of judgement prior their selection. Nevertheless, the sample embraced differences in economic activities of the creative class, where respondents were randomly selected by managers. Thus, this procedure was intended to avoid volunteer bias in the selection of entrepreneurs.

Table 1. Sample characteristics

Coworking centre	Brownfield/ownership	Previous purpose	Financing
CWS1, Berlin	No/private	office building	fees
CWS2, Berlin	Yes/private	wood factory	fees/crowdfund
CWS3, Berlin	Yes/private	family house	fees/crowdfund
CWS4, Copenhagen	Yes/public	hospital laundry	public finance
CWS5, Stockholm	Yes/public	factory	public finance
CWS6, Helsinki	No/combination	university building	public finance
CWS7, Helsinki	Yes/combination and public	cable factory	fees, grant
CWS8, Tallinn	No/private		fees
CWS9, Tallinn	Yes/combination	power station	fees, public finance
CWS10, Tallinn	Yes/private	factory	fees/crowdfund
CWS11, Riga	Yes/private	factory	fees/crowdfund
CWS12, Riga	Yes/private	mill	fees/crowdfund

Coworking centre	Brownfield/ownership	Previous purpose	Financing
CWS13, Riga	No/private		fees/crowdfund
CWS14, Warsaw	Yes/private	rubber factory	fees/sponsorship
CWS15, Warsaw	No/private	family house	fees/crowdfund
CWS16, Linz	Yes/public	tobacco factory	public finance
CWS17, Linz	No/public		public finance
CWS18, Zlín	No/public		public finance
CWS19 Trenčín	No/combination		fees/crowdfund

Source: own work.

Considering the research gap mentioned above, the qualitative research design employed a critical incident technique in order to learn the perspective from the respondents. Furthermore, this procedure was included to address positive or negative activities regarding permanent and temporary work settings in developing human capital towards entrepreneurship and competitiveness. In order to capture similarities and differences among coworking centres, the survey entailed fifteen questions regarding establishing, managing, and developing coworking centres in post-Fordist cities, which were proposed and pre-tested in order to comprehend responses and issues regarding semi-structured interviews. Additionally, respondents were asked about the motivations to establish and develop coworking centres and the target groups they were focused on in the initial stage and later in the process. Subsequently, the questions were focused on the criteria of localisation, experience with collaboration outside of centres, and the opportunities in financing new working places. Regarding boosting entrepreneurship, the respondents could share their experiences with developing human capital, critical events, opportunities and barriers for collaboration, and local competition. Semi-structured interviews enabled them to share their views on the strengths and weaknesses of coworking centres, along with apparent benefits coworking centres generate for local creative ecosystems. Both managers and the creative class could share their insights and perspectives in the changes of the scenery by coworking centres regarding urban development. Hence, the paper employed the Grounded theory as the systematic qualitative methodology approach focused on qualitative data collected with semi-structured interviews. The systematic approach was dedicated to an inductive process with an objective to reveal, understand and interpret critical incidents and circumstances in boosting entrepreneurship (Shen, 2014).

The final stage of the methodology was devoted to thematic data analysis that relied on a constant comparison of codes and categories to complete constructivist paradigm (Braun *et al.*, 2018). The critical incident technique and the grounded theory were selected to address different forms of links between management, entrepreneurs and communities with an explanatory approach and an interplay between data, cate-

gories and concepts (Glaser *et al.*, 2013). Both these methods were applied to investigate and interpret critical events and meanings in different socioeconomic settings that new working spaces represent. Nevertheless, both could be affected by a misinterpretation of data and categories by authors, or even inconsistence in coding and categorisation. In order to avoid diminishing original significance of the phenomena, we utilised the process of coding and categorisation in a group (Birks *et al.*, 2013). Thereby, we applied the systematic methodology in investigate specifics of place, key actors and activities of coworking spaces in order to understand interactions of stakeholders, and their activities towards boosting entrepreneurship and competitiveness in local creative ecosystems. The methodological advantage of the procedure might be reflected in pattern coding regarding the reduction of large amounts of data into compact units that enable one to identify construct patterns in the data.

5. THE FINDINGS

5.1. An overview of findings

Generally, the respondents agreed that the desire to change of the respective cities and its attitude towards the position of arts, culture and design in local creative ecosystem was the motivation to develop coworking centres. Furthermore, interviews revealed that new working spaces were an effective tool for promoting local young talent and providing quality environments for their development in terms of human capital. In the case of boosting entrepreneurship, centres promoted and linked the creative class with active communities that met at the workplace every day. The respondents emphasised that some aspects of freedom and variability of environment coworking centres provided stimulated creativity and networking, which resulted in new contacts regarding new market opportunities along with professional guidance to run sustainable business.

'*Our centre allows members to experiment from prototypes to very specific events that help to stimulate local communities and individuals*'.

Hence, the respondents highlighted the role of urban regeneration, especially places that were not attractive for longer periods of time that became vital and interesting for economic and leisure activities. We can summarise that most of coworking centres were established by more people cooperating in local networks or as small teams forming communities with shared goals, which supports social participation. Communities primarily included freelancers, new start-ups and graduates, who together with the local creative milieu created an opportunity for the creative class retention. This opportunity was also reflected in the positive

feature of coworking centres on the civic aspect in particular cities, due to establishing and developing creative coworking centres. Managers and representatives of the creative class experienced higher interest in educational activities within the cultural and creative industries due to various mutual events to promote the CCI and to bring the creative ecosystem into the spotlight.

'*We have a long term vision to create an environment where people learn from each other and pursue their careers*'.

Generally, managers identified the creative class as the target group, however, they stressed that a further development of the local creative ecosystem attracts related industries that might not be labelled as the CCI, for instance crafts and software development. However, creatives who are not typical businesspeople who generally manage coworking centres. Thus, the respondents emphasised the necessity to develop an entrepreneurial spirit through collective learning and knowledge sharing. Competences in management and creative economy form a favourable alternative or new working spaces that stimulate creativity, the entrepreneurial spirit, and combine both for the development of the community. The respondents highlighted the role of coworking centres as places for mutual competition to some extent offering opportunities for collaboration on common goals together with building mutual trust among co-workers.

In most cases, common goals were to promote cultural and creative industries and run sustainable and viable businesses. Despite that, the respondents noted the fact of there existing competition in new working spaces, they stressed the variability in spaces for work and free time allows for knowledge exchange based on mutual trust to work together and boost entrepreneurship among co-workers. Thus, successful management depends on trust building through continual networking and supporting mutual projects to stimulate innovation activities and generating new ideas. In addition, the respondents underlined that coworking centres helped build mutual trust with public authorities resulting in communication that is more effective, and relationships that are more cultured. This might be attributed to the process of engagement in local development, where communities share a common goal with public authorities. Hence, the collaboration of coworking centres and public authorities might generate new opportunities for boosting local entrepreneurship and urban development through unambiguous public policies in post-Fordist cities.

5.2. The role of coworking centres in boosting entrepreneurship in post-Fordist cities

The respondents stressed that finances was the main barrier in the process of establishing centres and their further development. Thus, some centres were dependent on EU projects in the initial stage. That support was utilised for the infrastructure.

Also private finances were provided with the aim of boosting entrepreneurship in the local creative ecosystem. In case of development, certain difficulties were identified from the managerial perspective, especially with process of managing small groups with different scopes of economic activities. Those issues were based on the differences regarding knowledge and skillset among the creative class. Hence, managers faced challenges in bridging different branches and knowledge in order to facilitate collaboration. The central piece for addressing these challenges is trust building through mutual activities. Even though the CCI might be labelled as a fuzzy concept, there are certain rules to follow regarding intellectual property.

The creative class is exposed to open environment and relationships in coworking spaces that reflect both strengths and weaknesses. The respondents mentioned creative people as the major strength, because they work and live in the community and they create the overall atmosphere with intangible benefits for boosting entrepreneurship. Non-standardised shifts and free spirit gives the members the freedom and comfort to bring new ideas into the reality of business. Moreover, the respondents considered a well-organised management team and the right visual identity as additional strengths as coworking centre provide brand name that could be utilised for gaining access to new markets. The respondents highlighted the role of coworking centres as a bridge between "the artistic and the real" worlds, especially regarding the promotion of the creative economy to private and public sectors. Thus, coworking centres provide an orchestrating role for promoting non-standardised production on both local and regional levels. The respondents indicated such promotion benefits as the brand name of coworking centres, and brought the CCI into the spotlight for potential consumers. Mutual events and activities engage the population in the process of the creation and presentation of creative outcomes that might stimulate new forms of collaboration. In order to develop a brand name that brings various branches together, the management faces the challenge of finding an effective way of marketing profit and non-profit activities together. The interviews revealed that marketing on social media is not enough to promote a brand name and the respondents indicated the importance of events as a tool for marketing in terms of presentations.

Presentations and exhibitions of cultural and creative outputs were identified as a crucial factor for marketing the CCI and raising awareness of the creative economy in a broader sense. These efforts nurtured the cooperation with local organisations in the cultural or creative industries that were not part of the coworking centres. Hence, coworking centres successfully engage other entrepreneurs in the local creative ecosystem in terms of developing entrepreneurship on temporary or permanent settings. The engagement is reflected mainly in entrepreneurial education with a focus on business skills, marketing and effective presentation in order to reach new markets and opportunities for collaboration. The development of business skills of the creative class is crucial for their sustainability and viability that create synergies between the real and the artistic worlds. The respondents

also highlighted the need to collaborate with other centres in terms of sharing experience in development and seizing opportunities to address mutual objectives for developing sustainable and long-term socioeconomic activities. The sharing of knowledge in that sense is considered as knowledge or ideas behind coworking centres that are often difficult to define. Nonetheless, it similarly depends on the specifics of a place, people, environment, and the atmosphere in permanent and temporary workplaces. The interviews revealed that individuals were motivated to take part in coworking centres due to their image as a favourable environment that stimulates creativity and enhances entrepreneurial perspectives of the CCI. In terms of developing entrepreneurship, co-working centres aid to seize networking opportunities for accessing new potential markets. Sharing information about opportunities among co-workers was identified as one of the main benefits to support entrepreneurship among the creative class that might struggle with entrepreneurial thinking and business skillset required to run sustainable economic activities. Hence, all the above-mentioned features leads to conceptualisation of CWS in boosting entrepreneurship (see Fig. 1).

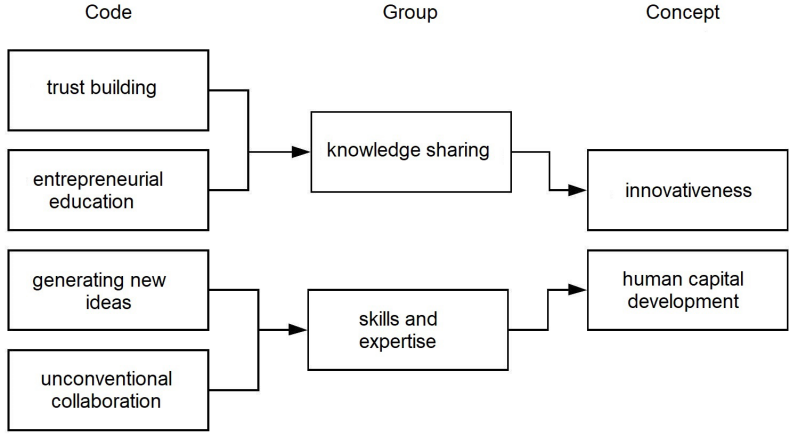

Fig. 1. Conceptualisation of CWS in boosting entrepreneurship
Source: own work.

5.3. Specifics of coworking centres in post-Fordist cities

The localisation of coworking centres took place preferably in old industrial buildings identified as brownfields, while the main criterion was the potential for a culture-led urban regeneration in post-Fordist cities. However, the regeneration of brownfields and old industrial buildings requires long term participation and re-

lies on public investment, which happens to be a constrain for developing a local creative ecosystem. Nonetheless, the respondents stressed it was not necessary to localise in large buildings, but rather smaller that are easier to maintain, mainly due to the fact that creatives were motivated to start with their economic activities as soon as possible. Localisation was also based on availability of public transport and nearby green places, parks, museums and galleries that might be summarised as cultural amenities with a potential for collaboration on various projects. The interviews revealed that culture helped stimulate business environment by bringing the CCI into spotlight with the efforts of coworking centres. In terms of coworking centres and their contribution to regeneration, that is reflected in their operation and maintenance that are financed by membership fees. Additional financial resources for developing new working spaces are generated by events, workshops, lectures, and conferences. These facilities are attractive due to their uniqueness of work and free time environment for both the CCI and related industries.

'*Our centre serves as a platform to put local agents together to change a scenery in an effective way*'.

In regards to the previous features, the respondents highlighted the role of communities and their links to different stakeholders. Exhibitions, seminars, lectures, presentations, and workshops increase the attractiveness of coworking spaces for both the private and the public sectors. Additionally, various cultural and social events create an image and attractive environment in post-Fordist cities. In terms of the socioeconomic development of a local creative ecosystem, coworking centres are responsible for creating a social motion in the districts they are located mainly through a variety of events and cultural initiatives to connect the artistic world with local communities. The respondents stressed the role of coworking centres as mediators in establishing and facilitating communication between the creative class and the public sector towards smart governance. The interviews revealed that coworking centres helped develop tourism in post-Fordist cities as they increased people's interest in the cultural and creative industries in local creative ecosystems. The respondents stated that the contribution also consisted of raising the awareness and relevance of design and architecture in the civic perspective as those branches were previously considered as redundant. Currently, coworking centres and the creative class contribute to entrepreneurship with spill-over effects in post-Fordist cities by dint of crossover innovations combining various stakeholders in the process of production.

'*The variety of events nurtures local creative communities and brings creative industries into the spotlight*'.

Therefore, positive effects were not limited merely to certain districts and communities in which they were located. The interviews revealed that they improved the cooperation between various branches of the CCI in terms of generating new

ideas for mutual projects through systematic knowledge sharing towards new social environments like the "fourth place". Continual efforts to showcase the CCI enhances local creative ecosystems, since members agreed on increasing attention and participation on lectures and workshops, along with increasing attendance at exhibitions and sideshows presenting cultural and creative outcomes. This could be also interpreted as a better communication between the real world and the artistic world in cities with developing human capital capable of implementing public policies towards smart governance and the CCI.

'*Systematic joint activities and being visible raise interest in cultural and creative industries from local communities and public authorities*'.

Interestingly, residents often support centres and members financially and with their engagement in public leisure activities that the centres organise. However, the capacity is limited. That also affects community development since there is a focus on quality rather than quantity in terms of their sustainability and viability. Furthermore, limited capacity also means a unique atmosphere for collaboration in coworking centres for creatives and artists. The respondents expressed the role of cultural socialisation among the strengths of coworking centres that might attract the creative class to be a part of permanent and temporary work settings in post-Fordist cities. Hence, all the above-mentioned features lead to the conceptualisation of the role CWS represent in post-Fordist cities (see Fig. 2).

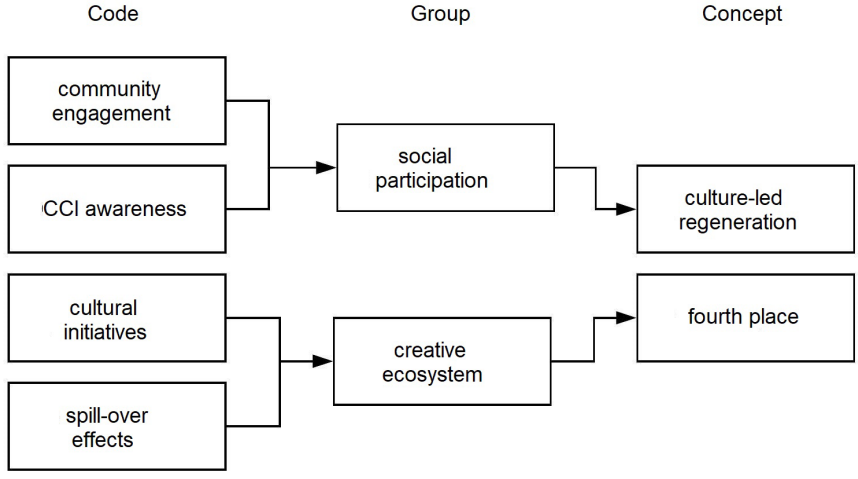

Fig. 2. Conceptualisation of the role CWS represent in post-Fordist cities

Source: own work.

6. DISCUSSION AND CONCLUSION

In general, the paper strengthens the notion of the coworking centres towards encouraging entrepreneurial spirit of the CCI. Furthermore, it provides empirical evidence on how coworking centres develop human capital in the creative economy with opportunities for cross-over innovation in the local creative ecosystem. The paper supports the findings of Durante and Turvani (2018) regarding the sustainability and viability of coworking centres, which depend on internal factors related to entrepreneurial actions. Concerning the former idea, the results indicated that internal factors were crucial for human capital development through knowledge sharing and mutual events engaging various stakeholders. The analytical part extends findings by Farina *et al.* (2019) regarding coworking places and innovation activities that are based on mutual trust, tacit knowledge, and expertise in non-standardised production. Hence, as the respondents highlighted, learning from experience and sharing tacit knowledge in communities combining various stakeholders in the CCI is the key principle in boosting entrepreneurship in the local creative ecosystem (see Bouncken and Reuschl, 2018). These values reflected on different stakeholders collaborating together on shared objectives regarding their economic diversity presented in a study by Vidaillet and Bousalham (2018). Furthermore, the creative class in coworking centres embraced social movement in communities that might be of both formal and informal nature. Moreover, the findings underlined the importance of engagement in events that serve as a showcase of outcomes in the CCI with an idea of developing a mutual brand name and identity of a place. Remarkably, social movement tends to be a catalyst for bridging the artistic and real world in post-Fordist cities as it triggers the interest of both the private and public sectors in the creative economy. In regards to post-Fordist cities, coworking centres indicate the idea of a culture-led urban regeneration by creating cultural identity and developing sustainable communities that involve various stakeholders in the CCI as mentioned by Zeng and Chan (2014).

To summarise, coworking centres could be utilised as an effective tool for maintaining a dialogue between the creative economy and public authorities who might collaborate on developing policies to retain and attract the creative class in local creative ecosystems. Temporary and permanent settings boost entrepreneurship mainly via a systematic approach towards human capital development and networking in order to support cross-over innovations. Hence, the paper presents a novelty view on entrepreneurship in coworking centres that are based on the creative economy, and the specifics associated with the community-place interaction that results from the micro-scale physical transformations in post-Fordist cities as a contribution to Capdevila (2013). Coworking centres

and their creative class represent prospects for culture-led urban development through systematic planning concerning coworking centres as a driving force for socioeconomic development. Key findings indicate that the districts where coworking centres are located experienced changes of their scenery by dint of the social movements and synergies between cultural-creative activities. Therefore, coworking centres boost entrepreneurship by linking different stakeholders and creative branches in collaboration on common ideas and projects in local creative ecosystems, while these link support innovative thinking in non-standardised production. In addition, these synergies stimulate the engagement and participation of communities in urban regeneration through profit and non-profit oriented projects. Hence, active coworking centres facilitate platforms for micro-scale transformations in post-Fordist cities through networking and social interactions, along with collaboration and competition in the sense of the "fourth place" (Morisson, 2018).

The findings have certain implication for practitioners in order to develop competitive and entrepreneurial permanent and temporary collaborative spaces that create a liveable and vibrant environment. The paper provides an insight into policy making that could tap into the local creative ecosystem regarding the design and implementation of locally oriented policies and initiatives towards smart governance in post-Fordist cities. Public policies and initiatives concerning culture-led urban development ought to be based on a systematic collaboration of coworking centres, cultural amenities, and local authorities in order to ensure policies which respect the local specifics and industrial heritage towards smart governance (see Babb *et al.*, 2018). Further research could be directed towards geographical differentiation, primarily considering the fact that there were no major differences identified in the study regarding the sample and its' characteristics. Nevertheless, we need to address the limitations of the paper in regarding the sample and epistemological standpoint that enabled only an interpretation of the reality of coworking centres experience concerning the development of entrepreneurial spirit without the ability to generalise the phenomenon. Thus, further research will incorporate a survey in order to employ quantitative research design with modelling the role of coworking spaces towards boosting entrepreneurship. Moreover, there are certain prospects for investigating performance of coworking spaces and tackle drivers of enhancing their competitiveness.

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THE RISE OF CREATIVE HUBS IN ISTANBUL

Abstract. This study investigates the emergence and the rise of Creative Hubs (CHs) in Istanbul, which as Turkey's economic capital contains most of its creative workforce and the largest number of its CHs. In the last 10 years, the number of co-working spaces (CWSs), incubation centres (ICs), labs, and makerspaces in the city has rapidly increased, following a global trend. This study aims to better understand the changing working forms of the city by investigating the motivations behind the emergence of CHs. 46 CH examples, consisting of CWSs, ICs, makerspaces, and labs, have been examined for this purpose. The study is structured around the four main categories that highlight the different aspects of CHs: *structure* (establishment structure and community structure), *focus* (sectors and professions), *services* (physical and social facilities), and *values* (motivation). The findings of the study demonstrate that members of CHs are mostly freelancers, entrepreneurs, micro SMSs, and start-ups, consisting mostly of members of Generation Y. They work predominantly in creative sectors and tend to look for flexible and cost-saving solutions, support mechanisms, and new connections for their work. The research revealed that CHs are distinguished through the services that they provide. Having emerged as new forms to respond to the distinctive needs of emerging jobs in the creative economy era, they can be considered a new landscape of the post-industrial city.
Key words: Creative hubs, co-working spaces, incubation centres, makerspaces, labs, creative economy, creative industries, Istanbul.

1. INTRODUCTION

Over the last decade, cities have undergone significant changes in the organisation of workplaces. One of the main reasons for these changes in the urban form is the shift in urban economies. In the 1990s, the effects of the rapid globalisation and advancing technologies led to profound changes in different economic sectors, requiring high level financial services, technology-intensive and knowledge-based

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firms and institutions, and cultural and leisure activities (Gospodini, 2008). The principle resources of this economy became creativity and data. Creativity thus began to be considered the foundation of innovation, which itself was seen as the new primary driver of economic growth. For this reason, creative industries became the key driver of the new economy (Kong, 2014). The rise of such industries in fostering the urban economy led to profound shifts in the populations of cities and in urban morphology, as investment in creative industries also entailed investment in people, business, and infrastructure (Martin and Florida, 2009). The labour force of the creative industry sectors comprises high-tech staff and knowledge workers (Gospodini, 2008) with a high level of education and the knowledge and skills needed to make use of advanced technologies (UNCTAD, 2010). Florida (2002) described such workers as the creative class, as their presence brings economic, social, and cultural viability to the urban environment. As the built environment and social structure are intertwined, urban landscapes are rapidly changing to accommodate the new styles of work, life, leisure, and living forms emerging in cities. In this context, creative hubs (CHs) are a new type of workplace unseen until the early 2000s. With their rapid global ascent, they have become the focus of different disciplines. Governments, local authorities (Greater London Authority, 2014), policymakers (the European Commission, Creative Europe), development agencies (London Development Agency, 2004), and organisations (British Council, 2016) have highlighted the importance of such workspaces and developed policies to foster them. They support and fund CHs, create networks to help them collaborate and connect, and make investments to help them become self-sustaining. However, academic research into CHs is currently nascent and only recently developing.

The relationship between creativity, creative industries, and the concentration of these industries from an urban planning perspective is mostly discussed in the context of concepts such as the creative city (Florida, 2002; Landry, 2008), creative clusters (Bagwell, 2008; Pratt, 2004), cultural clusters (Mommaas, 2004), business clusters (Pratt, 2004), creative spaces (Evans, 2009), creative quarters, and creative districts. There are also comprehensive studies focused on the location patterns of these new working spaces and their urban effects (Mariotti *et al*., 2017), and the relationship between proximity and knowledge exchanged between these spaces (Parrino, 2015). Other studies on CHs essentially treat them as spaces of social entrepreneurship (Toivonen, 2016), social incubators (Nicolopoulou *et al*., 2016), knowledge hubs (Evers *et al*., 2010), smart work hubs (Buksh and Mouat, 2015), innovation labs (Gryszkiewicz *et al*., 2016), creative local production systems (Lazzeretti *et al*., 2008), incubation centres (ICs), and co-working spaces (CWSs), (Fuzi, 2016; Moriset, 2014). Although the concept is discussed by different disciplines and handled from different perspectives, research on the emergence and structure of CHs is sparse. This paper aims to make a useful contribution to the understanding of the emergence of CHs in cities. It seeks to find the motivation

behind their establishment in order to better understand the changing working habits and forms of cities in a globalised world. Accordingly, it comprehensively investigates the core identities of such workspaces from the perspectives of structure, focus, service, and values. It aims to fill a gap in the understanding of CHs in a comprehensive way, which will serve as a foundation for the understanding of the economic and physical changes in the city.

This research is focused on examples of CHs in Istanbul because the city contains the largest number of Turkey's CHs but lacks any specific studies focused on them. By analysing the data gathered from CHs, the research attempts to extract the general structure of CHs through four main categories: values, focus, structure, and services. The overall structure of the study takes the form of four sections, including the introduction, which gives a brief overview of the subject. The second section reviews the definition of the CHs and the different approaches to the term. The third section is divided into four parts. It begins with an overview of the CHs in Istanbul. It then outlines the aim, scope, and methodology of the study. The last part of this section analyses the results of the field study and presents the findings from the perspective of the four abovementioned categories. The fourth section contains concluding remarks and evaluates the results that pertain to the research questions.

2. CREATIVE HUBS

Hubs claim to encourage collaboration between their members and foster the serendipitous knowledge necessary for the stimulation and strengthening of businesses and projects. The term is used interchangeably with other names such as innovation labs, incubators, CWSs (Jiménez and Zheng, 2017), open creative labs (Schmidt *et al*., 2015), start-up spaces, innovation centres, maker spaces, and research institutes (Wagner and Watch, 2017). The broadness of the term has led to other attempts at clarification, such as 'collaborative community workspace,' which was used to consolidate various forms of shared workspace where freelancers, self-employed entrepreneurs, and small businesses operate 'alone together' (Fuzi, 2016). Despite the differing terminology, all these variants of CHs generally have one feature in common: they offer environments designed to suit small and micro businesses with varying levels of business development (Greater London Authority, 2014). Most of the participants in the creative industry are start-ups, freelancers, or creative individuals, whose needs vary accordingly.

While there are certain core concepts universally associated with CHs, such as collaboration, networking, co-working, shared space, entrepreneurship, and incubation, there is no absolute consensus on their definition. One of the first

was attempted in the UK. The London Development Agency (LDA) (2004, p. 33) characterised CHs as "providing a space for work, participation, and consumption". Considering the larger effects of CHs rather than treating them merely as incubators for small business, the LDA described a strategy to support CHs as they help creative industries develop. Similarly, the Greater London Authority (GLA) supports such workplaces as a policy for their socio-economic benefits and impact on business growth. The GLA, focusing on their important role in the provision of workspaces and support for start-ups and small businesses, develop reports and programmes to better utilise these roles in the generation of socio-economic benefits to surrounding communities (Greater London Authority, 2014). Its report highlights that these types of spaces are not always obvious and typically have overlapping features, classifying them as incubators, accelerators, and co-working spaces (IACs). The British Council embarked upon a comprehensive description of CHs (2015), remarking that they come in different shapes and sizes. The CH Toolkit (2015) addressed them as both physical and virtual structures that could be static, mobile, or online and could be described in different ways, e.g. as collectives, co-operatives, labs, or incubators.

The concept of the CH is associated more with its social aspects, such as its user relationships, support mechanisms, and the potential opportunities that it provides than with its physical features. Schuermann (2014), referring to the importance of CHs such as CWSs for young entrepreneurs whose businesses are in the early years of development, claimed that CWSs supported start-ups and facilitated the transition from solo to employer entrepreneurship by opening up opportunities for partnerships, networking, and mutual support within the wider community. The physical dimension of CHs was also discussed as a part of the social infrastructure in CHs. The physical infrastructure and design of these new workplace organisations maximise the opportunities for face-to-face meetings, which enables the exchange of tacit knowledge (Moriset, 2014). Although the users of CHs, who are mostly highly flexible self-employed and freelance workers, have the ability to work from anywhere, they strongly prefer to share the same physical infrastructure with similar people. Specifically, human interaction, face-to-face communication, and serendipitous discovery are critical for such professions and cannot be achieved without a physical structure (Pratt, 2000). Moreover, the opportunity to work from anywhere can easily result in isolation and an inability to build trust and relationships with others (Spinuzzi, 2012). Social and professional interactions in places like CHs reduce these risks (Mariotti *et al.*, 2017). Informal and formal relationships in CWs also provide a basis for organisation (Blagoev *et al*., 2019), providing networking and tacit knowledge opportunities that are as important as the physical facilities in these places. From an academic perspective, Landry (2000) classified these vital opportunities as either 'concrete factors' or 'intangible factors'. Similarly, discussing the services that CHs provide for their members, Virani (2015) emphasised the importance of both hard services (i.e.

physical infrastructure such as desks for rent, online services, studio space, labs, meeting rooms, machinery, and incubator units) and soft services (i.e. informal and formal networking opportunities, knowledge exchange, business support, collaboration, transactional relationships, and participation in specific communities of interest).

3. THE RISE OF CREATIVE HUBS IN ISTANBUL

There is a growing potential in Turkey for creative industries, whose growth rate is increasing faster than that of other economic activities (UNCTAD, 2010). The creative workforce of the country is located mainly in its two largest cities, Istanbul and Ankara, which together host 64% of Turkey's total creative workforce, the majority of which is found in Istanbul, according to 2011 data (Lazzeretti *et al*., 2014). The city also has the highest density of creative industry clustering in the country (İZKA, 2013). Although the ratio of the creative workforce to total population (0.9%) is lower than in Paris (4.7%) or London (3.8%) (Kerimoğlu and Güven-Güney, 2018), Istanbul's creative economy is growing, and the city is Turkey's incubator of creativity and innovation. Over the last 30 years, the economic base of the city has gradually shifted from manufacturing to services, providing growing potential for the creative economy (Evren and Enlil, 2012). As a result of this creative workforce and potential, a new type of workplace is not unexpectedly emerging in Istanbul. In the last 10 years, the number of CWSs, ICs, labs, and makerspaces in Istanbul has rapidly increased, following the overall global trend.

The CHs defined in this study comprise examples of CWSs, ICs, labs, and makerspaces in Istanbul. Of these types of entities, the city hosts mainly ICs, 26 of which have been identified for the purpose of this study. Only 18 chains of CSW exist in the city, with a total of 84 locations. These numbers, while growing, lag behind those of some leading world cities; London has 29 incubators, 81 accelerators (both classified as ICs in this paper) (Bone *et al*., 2017), and 20 makerspaces (classified separately as makerspaces and labs in this paper) (Sleigh, 2015), while Istanbul has only 26 ICs and 10 makerspaces/labs. Since CH statistics are available predominantly on the national level, it is difficult to make comparisons for the same time period between cities at the same Alpha ("GaWC," n.d.) category with Istanbul. Coworker.com ("coworker.com," n.d.), perhaps one of the most comprehensive search engines for finding CWSs around the world, gives 107 results for Madrid, 87 for Chicago, 82 for Toronto, 44 for Milan, and 59 for Istanbul, all in the same Alpha category. However, caution must be taken in drawing conclusions from these numbers, as they are only search engine results and cannot be extrapolated to formal statistical data. And while these results indicate that Istanbul may

not have yet fully achieved the same capacity as other similar cities in its own category, the city has a growing potential for CHs considering their positive trend there in the last 5 years.

3.1. The aim and scope

This study focuses on the investigation of CHs in Istanbul. It aims, through an investigation of the motivation behind their emergence, to better understand the changing forms of work in the city, analysing CH structure through four main perspectives: structure, service, focus, and values. The scope of this research consists of examples of CHs from Istanbul comprising CWSs, ICs, labs (design-based urban labs, living labs, and R&D and Innovation labs), and makerspaces. Istanbul was chosen as the case study area because it is the city with the most urban vitality, cultural diversity, and young and skilled labour force throughout the country (Enlil *et al*., 2011), and thus hosts the most diverse and varied examples of CHs in Turkey. Within this context, a total of 46 CH examples, consisting of CWSs, ICs, labs, and makerspaces in Istanbul, were chosen for the case study. As these 46 CHs have branches around the city, 114 locations in total were included in the study (Table 1).

Table 1. The number of CHs included in this study

Type of CHs	Number of CHs contacted for the study	Number of CHs that participated in the research	
		Number of CHs	Number of all locations (with all branches)
CWSs	18	17	84
ICs	26	21	21
Labs	5	4	5
Maker Spaces	5	4	4
Total	54 CHs	46 CHs	114 Locations

Source: own work.

3.2. Data and methodology

Both quantitative and qualitative data collection techniques were used in this study. In the first stage, examples of CHs in Istanbul were investigated. The list of CHs was identified through snowball sampling supplemented by web searches and investigation of the Istanbul sections of international networks related to CHs. The data could not be collected from the Istanbul Chamber of Commerce or the Turkish Statistical Institute because there is no specific classification of CH in the records of these institutions.

In the second stage, survey questions were prepared. The questions posed to ICs were differentiated, and extra questions were added, to obtain detailed information on their specific cases. For example, ICs have a different application process from CWSs, makerspaces, and labs. Extensions were made to certain questions in light of this situation. The structure of the questionnaire was organised around research questions, each of which applied to one of the main categories shown in the Fig. 1. Originally, the questionnaire contained more questions covering different aspects of CHs, but the questions used in this study were limited to the main categories, and the rest were excluded. Various closed and open-ended survey questions pertaining to each category were prepared to obtain detailed information about the research questions.

During the third stage of the study, meetings were scheduled with CH leaders and comprehensive surveys were conducted. Researcher site observations were performed during these meetings. The research participants were initially selected from the co-founders or leaders of the CHs. When that was not possible, interviews were conducted with managers. If a face-to-face meeting could not be scheduled, the online version of the survey was sent to the participant. Out of the 46 participants, 24 surveys were conducted through face-to-face meetings and 22 were sent online. The data was gathered from participants on a voluntary basis. The numbers of participants contacted and included or not included in the study are specified in Table 1. Site visits and surveys were conducted from June 2017 to June 2019. In the last stage, all the data gathered from the surveys and observations was analysed according to the main categories specified in Fig. 1.

The following definition of CHs was used to select samples from Istanbul: "a CH is a place with physical and social services where freelancers, entrepreneurs, and micro SMEs within the creative, cultural, and tech sectors can work, collaborate, share, experience, network, develop projects together, and create ideas." CWSs, ICs, makerspaces, and labs fell under this definition: CWSs provide space to work, share, network, and collaborate; ICs lend support for infrastructure, mentorship, and networking for projects and start-ups to develop their ideas and businesses; makerspaces are collaborative workspaces with different tools and equipment to create, invent, and learn; and labs provide an environment of collaboration and participation to develop solutions for problems and create ideas. Examples of CHs that could be considered virtual networks were excluded from the study, as one of the main research questions was to identify the physical services that CHs provide for their members. Therefore, only CHs with physical structures were included in the case study. Moreover, the location factors of CHs were ignored, as the study was mainly focused on their social infrastructure.

The research questions that made up the framework of the study were chosen to aid in the understanding of the structure of CHs and the reason for their emergence. The definition of CHs described in this research addresses the support mechanisms,

networking opportunities, and social structures of CHs, as well as their physical structure, for all of which the main categories were selected to cover.

The first category, i.e. structure, contained two subcategories. The subcategory of establishment structure aimed to determine the establishment year of CHs, which would help to clarify when CHs started to emerge in Istanbul (Q1). The subcategory of community structure was meant to illuminate the member profiles of CHs, which would help to ascertain their users (Q2). The second category, i.e. focus, aimed to determine the professions and projects involved in CHs from a sectoral perspective (Q3). Both the physical and social facilities that CHs provide for their members have been taken into consideration in the category of services (Q4). Lastly, questions in the category of values aimed to understand the motivation behind creating a hub (Q5) from their founders' perspective. These main categories and related research questions were described in Fig. 1.

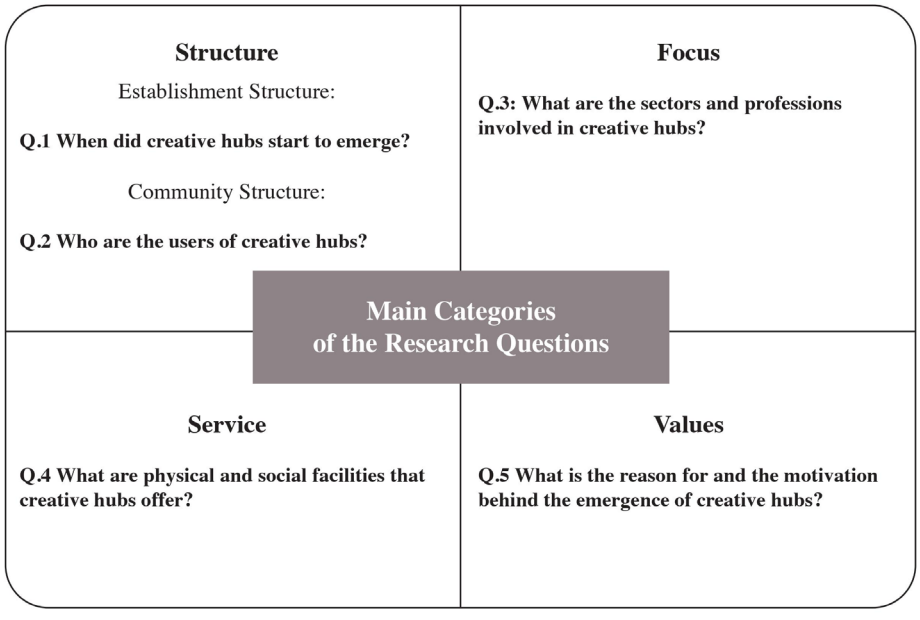

Fig. 1. The Main Categories of the Research Questions

Source: own work.

3.3. Empirical results

As the research questionnaire was organised around the four main topics that address the research questions, the empirical results have been evaluated according to those topics.

3.3.1. *Structure*

Establishment Structure

CHs are an emerging concept in Istanbul. The city's first CH was established in 1999 as a branch of a global co-working and serviced office chain. However, this particular company is well known for its serviced office services, and included a co-working option in its services only in its later operations, for which specific data is not available. Local instances of CHs have risen rapidly, especially in the last 5 years. The years of establishing the CHs interviewed are shown in Fig. 2. Although the numbers of new CWSs spiked in 2006 and 2010, they have had an especially positive trend since 2015. Labs and makerspaces also began to emerge after 2013. Interestingly, the establishment of ICs has begun to rise rapidly after 2011.

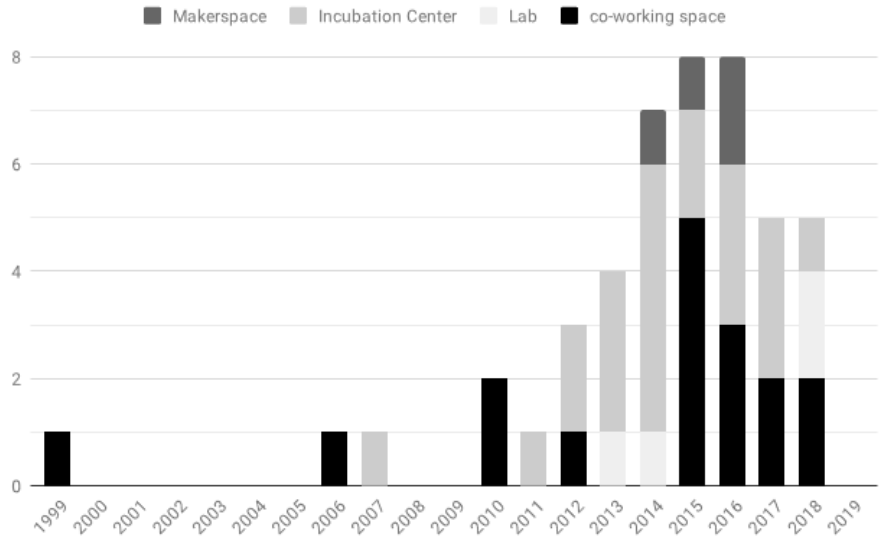

Fig. 2. Year of establishing creative hubs

Source: own work.

The vast majority of the CHs (63%) in Istanbul were established as private sector initiatives, which have focused their investments mostly in CWSs and makerspaces. Almost all of the city's CWSs were established by the private sector, with only one CWS established by a district municipality. All of the makerspaces were also established as private initiatives. The investments of the public sector have mostly been concentrated in ICs, most of which are housed at universities, including 24% of the ICs participating in this study. Outside of the academia, a small percentage of ICs are supported by district municipalities and the central

government. District municipalities have also taken an interest in labs as a part of their local development projects. Three out of the four labs in Istanbul – a living lab, a design-based urban lab, and an R&D and innovation lab – have received investments from the metropolitan and district municipalities.

Community Structure

CHs are mostly structured around registered membership. A significant majority (85%) require membership to benefit from their services. Those that do not require membership are mostly makerspaces and labs. Similarly, CWSs with only a hot desk option have no membership obligations, being based instead on a daily or hourly use. However, the membership process varies between ICs, CWSs and makerspaces. All ICs have application processes for their programmes and require membership. Approved applicants become part of an IC, obtaining access to all services that an IC offers. The membership process works differently for CWSs. Most, however, are based on the membership model in order to build a stable internal community. In queries involving average number of members, only CHs with a membership model were included in the assessment.

The findings, shown in Fig. 3, indicate that CHs are mostly small communities, with most possessing fewer than 50 members. Those with more than 500 members are all CWSs with many branches around the city. The number of branches varies between 6 and 23, with locations in the most accessible areas of the city.

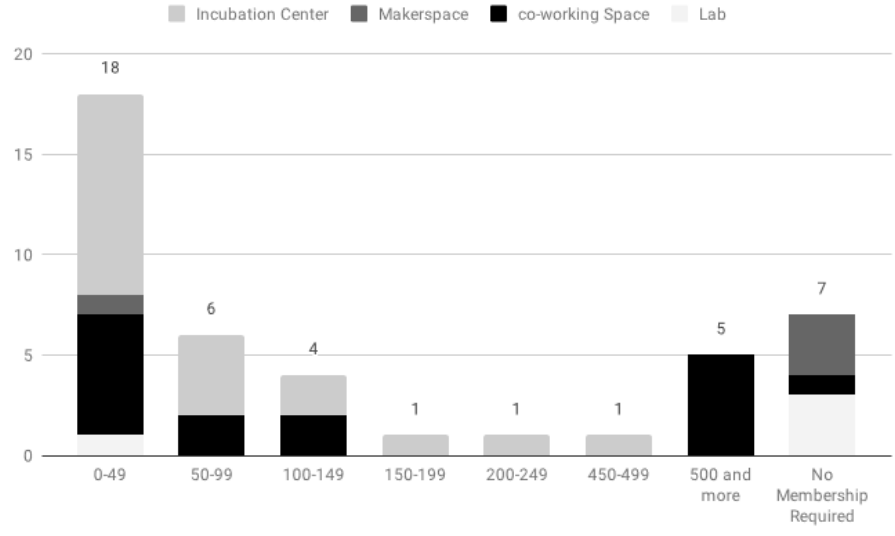

Fig. 3. Number of members in CHs

Source: own work.

The membership application processes generally revolve around face-to-face interviews, with CH leaders deciding on a new members' inclusion according to their potential contribution to the community or rapport with other members.

Research findings concerning age and gender were classified separately for ICs, makerspaces, CWSs, and labs to highlight the difference between their ecosystems. Members of the CHs are predominantly from Generation Y. The distribution of age groups is outlined in Fig. 4.

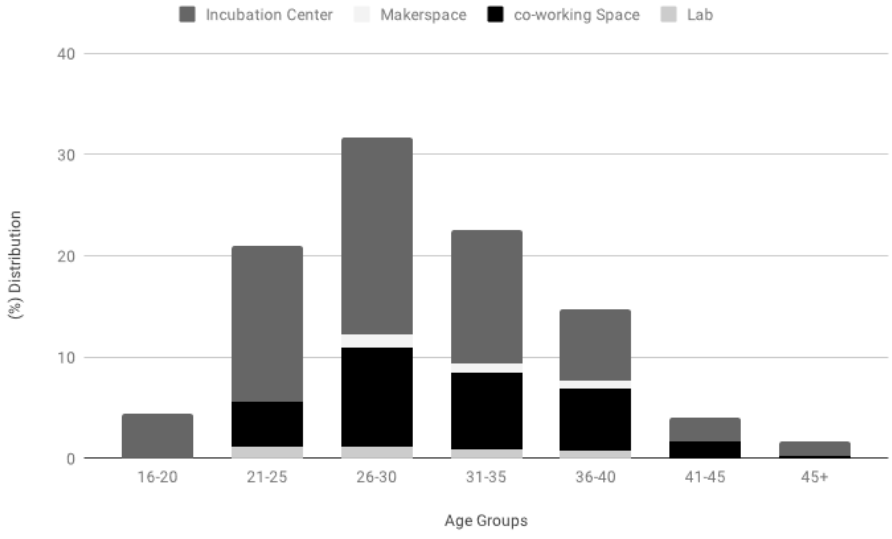

Fig. 4. Distribution of age groups in CHs

Source: own work.

The majority of the members of CWSs, makerspaces, and labs were between the ages of 21–40. Members are mostly from Generation Y, and interviews with IC managers indicated that applicants were mostly young professionals who have decided to focus on their own projects after a period in the private sector or newly graduated young entrepreneurs. CWS managers, who did not keep data on the age groups of their members, shared their own observations that most of their members were under 40 years of age (and, in particular, were between the ages of 31 and 35). Additionally, their members in the 21–25 age range were mostly students or newly graduated young people. Entrepreneurs running their own start-ups generally fell between the ages of 36 and 40.

Gender was evaluated for CHs with a membership option, 78% which kept data about gender. CH leaders generally considered the ratio of women to men

a natural phenomenon, not letting the question of gender influence the member selection process. While there were some CHs more concerned about the distribution of gender that tried to maintain a balance between women and men, they did not significantly influence the numbers. CH members were significantly more likely to be men, with women accounting for 29% of CH members overall, and only 22% of IC members.

3.3.2. *Focus*

The establishment manifestos of many CHs (further discussed in the 'values' section) defined the aim to gather members from different disciplines. The findings of this study indicated that 76% of the participants were in fact multidisciplinary institutions. Sector specific CHs were mostly makerspaces, incubators, and some of the labs. Although focused on specific niche areas, the goals of these more narrowly focused CHs were still connected with the creative industry sector. While all CWSs multidisciplinary places encompassed a wide range of professions, makerspaces were focused on specific areas such as technology education and the DIY culture. Only 24% of ICs were focused on one specific area such as social entrepreneurship, software, health, football technologies, and defence technologies. Although most ICs were not focused on any specific area, they could have priority sectors.

Multidisciplinary CHs, which consist of members from different sectors, comprised the majority of the research participants. As CWSs and ICs are much more commonly interdisciplinary in nature, makerspaces and labs were excluded from investigations of the professions involved in CHs. The results for CSWs and ICs were presented separately (Fig. 5 and 6) to highlight the differences between them. The top 5 professions in CWSs were software development, advertising, web design, consulting services, and digital and other related creative services. According UNCTAD's classification of creative industries (UNCTAD, 2010), 70% of top 20 professions in CWSs belong to creative sectors (Fig. 5).

The results for the distribution of professions in ICs were evaluated from a different perspective. Taking into account the ongoing debate on whether science and R&D are components of the creative economy (UNCTAD, 2008), the main professions involved in ICs were categorised more broadly than in UNCTAD's classification in consideration of science-related sectors. ICs host mostly entrepreneurs and start-ups that operate at higher levels of technology-related services and science. Interestingly, the result for the top sector involved in ICs paralleled that of CWSs. ICT sectors, which include mainly software development related businesses such as SaaS, mobile applications, advertising technologies, industrial software and automation, marketplaces, the development of

e-commerce sites, big data, communication and transportation, fintech, portals, web-based technologies, platforms, VR, and IT, were the dominant professional category in ICs (64.5%). Health and bio-technologies, the next most popular category, covered only 11.1% of the projects and start-ups in ICs. As is shown in Fig. 6, other categories, such as electric&electronics and machinery (advanced electronics, advanced materials, advanced technology machinery and electronics, hardware, machinery, mechanics and electronics, nanotechnologies, and material technologies), nourishment and chemistry, education and governance (education, governance, and social entrepreneurship) and others (finance, accounting, creative and cultural, maritime, textile, defence, and aerospace) constituted only 24.4% of the areas supported in ICs.

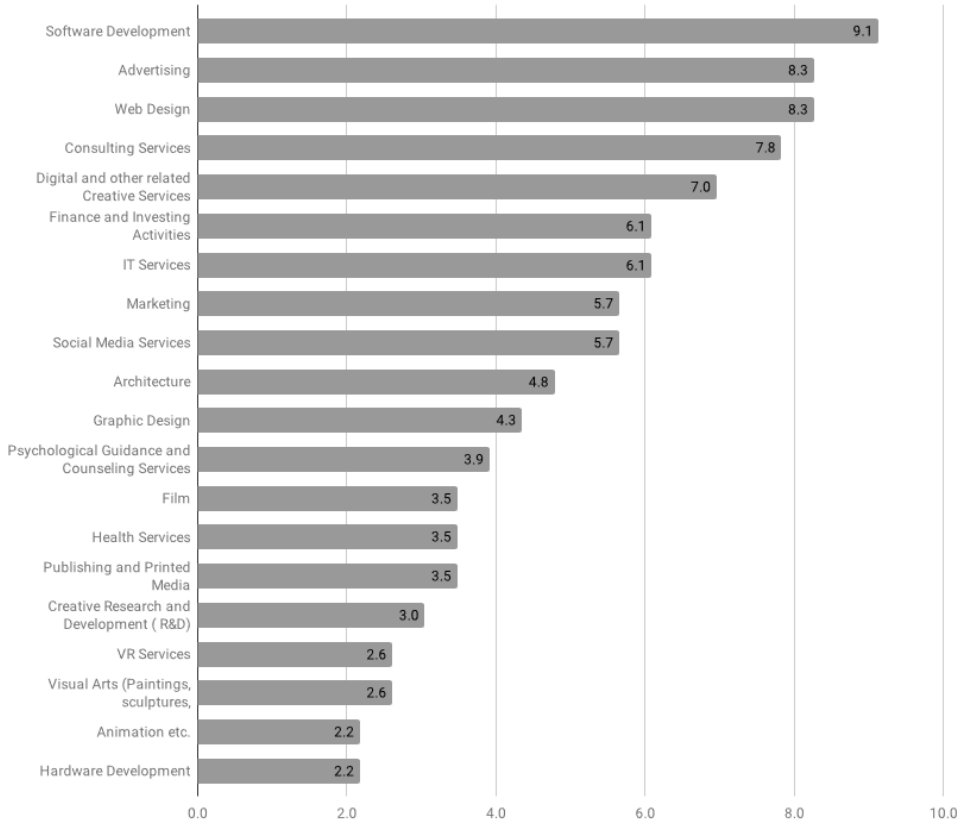

Fig. 5. Distribution of the top 20 professions in CWSs

Source: own work.

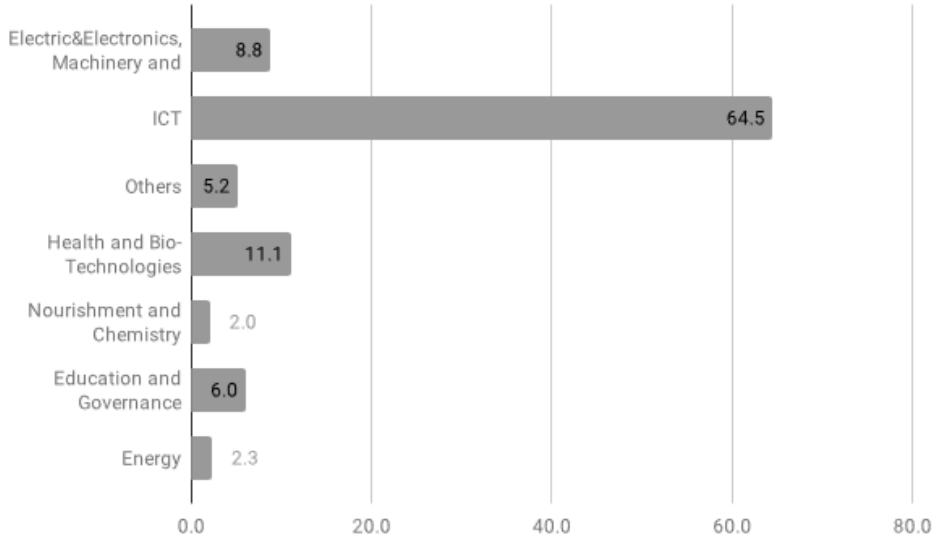

Fig. 6. Categories of supported projects in ICs (%)

Source: own work.

3.3.3. *Services*

One of the main aims of CHs is to build a community among members. Therefore, CHs are dominantly membership-based spaces. Only 15% did not require membership to benefit from their services, almost all of which are labs and makerspaces. All CWSs, except those that offered only hotdesk options, offered inductees different membership options. The membership processes for ICs differed, with an open call over the year or for a limited period of time. After a committee-based selection process, applicants could elect to join an accelerator, pre-incubation, or incubation program. The program provides support in the form of office space (desk and computer), mentorship, training, networking, workshop, or laboratory according to the organisational needs of the applicants. ICs are known more for their support mechanisms, such as mentorship, training, etc., rather than physical support such as office space, though there are examples of ICs in which space is as important as other support mechanisms. Such ICs provide support for projects which require a laboratory or makerlabs for research or prototyping and are generally nested at universities. CWSs also offer varying membership options. The information gathered in the course of the study indicated that the most common option was the flexible desk. Fixed desk, closed office, virtual office, meeting room/venue, hotdesk, and community membership are other options provided by CSWs.

The facilities that CHs offer their members vary widely. Some offer meditation rooms and yoga sessions. They also offer additional services such as access to digital community networks, IT support, childcare, and use of the hub's mobile app. All CHs generally offer the physical office materials that a person needs for office work, such as a desk, printer and coffee.

CHs, however, promise more than physical services for their members. In fact, physical services are just a stimulator of services and interactions. Accordingly, CH leaders consider themselves providers of an environment conducive to the development and implementation of new ideas. Just as Parrino (2015) underlined the importance of proximity for knowledge exchange, this study demonstrates that CHs provide a creative environment through tools such as the physical space itself (the design of the space and the atmosphere) and events.

Most events are organised for the purpose of creating connections between members. ICs organise such events as part of their programmes; other CHs organise events not only as a promised parts of their programmes but also to foster community-building within the hubs. These events can be either member-exclusive or public. Member exclusive events differ between ICs and the other types of CHs. ICs organise events such as training programs, entrepreneurship events, and mentorships sessions, while other types of CHs organise events for skill sharing and brainstorming. Moreover, all CHs emphasise that social interaction events are as important as training, skill sharing, and education programmes. The main reason to organise such events is to create an environment for members to come to know each other better, have a good time, feel at home, and build community through interaction. Public events are an important part of such interactions. In fact, most CHs focus on public events in order to improve their images, reach more people, and create networking opportunities between members and visitors.

Organised events have a significant effect on possible collaboration projects among members. Although some CHs have dedicated events for these purposes, such as feedback and brainstorming sessions, most collaboration arising from events occurs organically. In such cases, ICs should be evaluated differently from the rest of the examples, as the structure of ICs is focused on supporting projects and ideas through mentorship and training programmes when help or collaboration is needed at a strategic point. The drawback to such a rigidly defined structure is that working together with other teams in the same environment or participating in events always offers the chance for future collaboration.

3.3.4. *Values*

A description of the values embodied in CHs is key to understanding the motivation behind their establishment, given their prominence in establishment manifestos. When asked to describe their motivation to establish their hubs, many CH leaders

gave similar answers: building networks, creating multidisciplinary environments, supporting creative processes and entrepreneurship, sharing knowledge, finding solutions to problems together, gathering creative individuals, and participation. In short, they described their hubs as more than regular office spaces, emphasising the importance of network connections and the social environment of their space over the physical environment. Indeed, the concepts used to describe these hubs, often highlighting the importance of social connections within a space, correspond to the reasons behind their establishment. ICs were excluded from queries concerning the motivation to establish a CH, as their reasons are specifically outlined, e.g. the provision of services and environments for start-ups and entrepreneurs. Most leaders of CWSs, makerspaces, and labs (48%) decided to establish their hubs after similar personal experiences of being part of a CH or experiencing the same needs, such as networking, office space, or like-minded people, while they were developing a new idea or business. Their ideas thus formed around people with the same needs. Participation in a CH before forming their own hubs also had a positive effect on their motivation. In this context, CHs themselves can be considered examples of start-ups and entrepreneurship. Similarly, the second most common reason (20%) to establish a CH was to bring similar minds together by creating a physical or virtual place for interaction.

Other motivations behind the creation of CHs were:

– To provide a space and an interdisciplinary network for generating projects and new collaborations,

– To build better collaboration over changing working conditions/systems,

– To find solutions to urban problems with the participation of the local population and decision-makers.

4. CONCLUDING REMARKS

CHs hold a growing importance for Istanbul. The findings of this study suggest that any definition of these cooperatives should highlight that they provide an environment where people can work, share ideas, find solutions to problems, cooperate, socialise, access knowledge, make connections, and create networks. The results of the study are summarised according to the four analysed perspectives in Fig. 7 below.

The aim of the present study was to understand the reason for the emergence of CHs in order to gain a perspective on the changing forms of work in the city. The emergence and the growing importance of these new forms of work are closely connected to changing economic trends, as creative industries, along with the service sector, are driving factors behind economic growth in advanced economies.

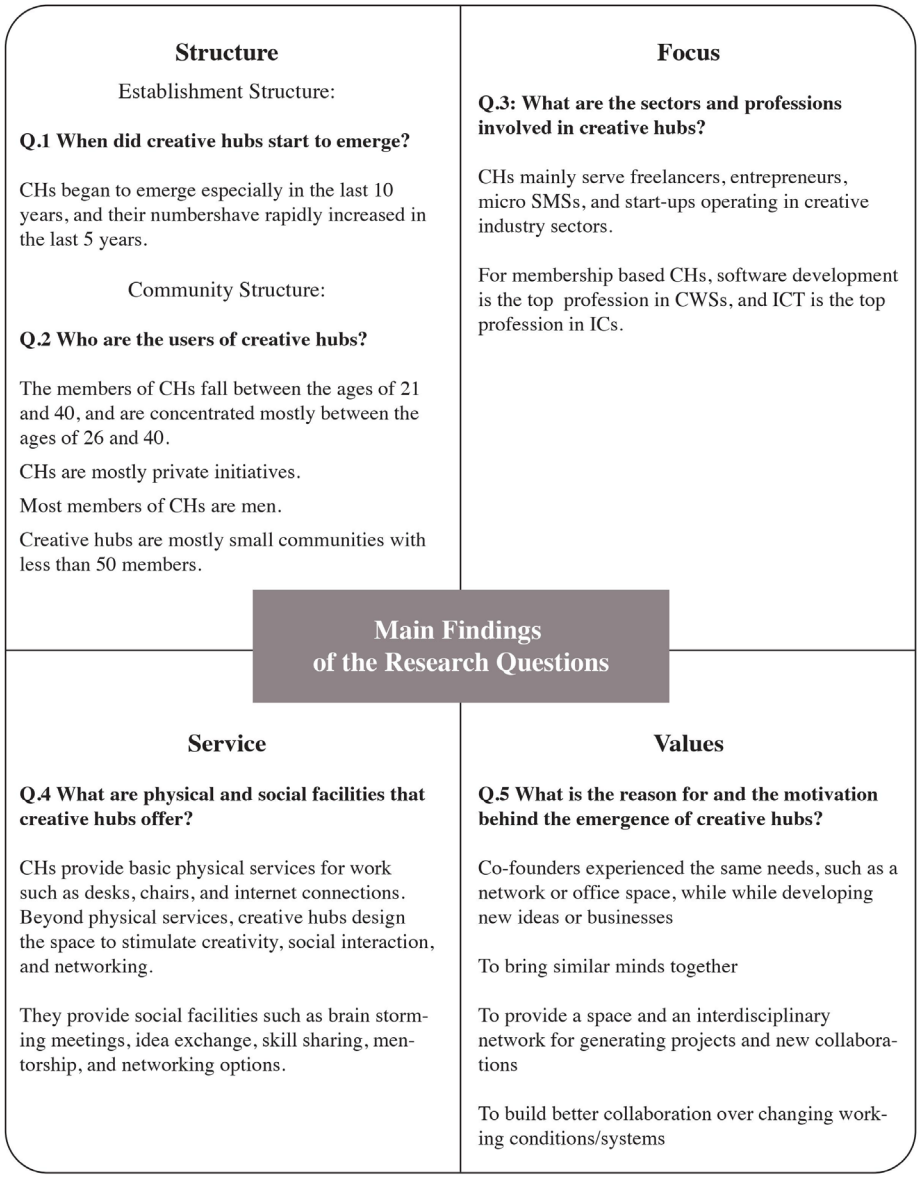

Fig. 7. Research results

Source: own work.

Istanbul has limited data available for the analysis of the creative industry in the city. Despite this lack of up-to-date statistics, the city has experienced a consistent shift in its economic base from manufacturing to services since the 1990s (Evren

and Enlil, 2012). Corresponding to this shift, there has been an emergence of a strong base for most of the creative industry sectors. The city is home to 59% of total employment in the advertising industry, 45% in publishing and printing, 42% of architects, and 47% of the qualified workforce in the software industry (Evren and Enlil, 2012), for whom, in particular, the city shows great potential. From the perspective of economic shares, the software industry has a share of 33.25%, architecture 23%, and advertising 19.76% among all creative industry sectors (Aksoy and Enlil, 2011). The results of the focus category in this study explicitly revealed this trend in Istanbul. Software is the top sector in CWSs, while the most supported project area in ICs is ICT. All of the following most common sectors involved in CHs are also from creative industries. The relationship between the professions involved in CHs and the creative industries also explains the membership makeup of the CHs, who are mostly freelancers, entrepreneurs, micro SMSs, and start-ups owned mainly by young professionals and newly graduated individuals from Generation Y, as discussed above in the structure section.

This study confirms that most of the professions involved in CHs fall under the umbrella of the creative sectors. The main focus of these creative workers is to develop their projects and ideas with effective and flexible rather than rigid and distracting solutions. While the mostly project-based structure of creative jobs provides flexibility for their working conditions, it also causes insecurities in creative labour conditions. The results of this study support the conclusion that firms and individuals in creative sectors tend to look for flexible and cost saving solutions, such as flexible rent options and serviced infrastructure, which is a benefit of sharing the same infrastructure with other members. As discussed in terms of the values category, the main two reasons for establishing a CH from the founders' perspective were illuminated by these needs: CH leaders in their past experiences developing projects or starting a business felt similar necessities (low cost and flexible working spaces and the presence of like-minded people). Moreover, these leaders desired to bring similar minds together by creating a shared physical or virtual space.

These values explain the primary motivation behind the emergence of CHs. Their emergence is also associated with the sectors in which CH leaders and members operate. These new sectors, specified as creative sectors in this study, require new and different forms of work and solutions that cities had not previously required. CHs respond to this emerging need caused by the shift in urban economies. In this sense, CHs differentiate themselves from other workplaces with the services that they provide for their members. Moreover, these services respond not only to physical needs, but also to social needs such as networking and socialising. As discussed in the service section, such social services (i.e. soft services) are the distinctive features of CHs, providing an environment for the exchange of tacit knowledge. CHs also provide physical facilities and the so-called hard services, such as flexible rent options and serviced infrastructure, which offers

the benefit of sharing the same infrastructure with other members, emphasising the importance of the sharing economy. These services are crucial for the users of CHs. Considering all the aspects of CHs (structure, services, focus, values) these spaces have emerged as a new form of workspace and business operation in the creative economy era, taking the form of new landscapes in the post-industrial city (Gospodini, 2008), compact forms that signify the epicentres of activity in the inner city.

The proliferation of CHs over the last 5 years has shown that there is a demand for this new type of organisation in the city. It is also a result of the changes in the urban economy. The number of CWSs and ICs is significantly higher than that of labs and makerspaces in Istanbul. This finding provides insight into the great potential for a creative workforce and the entrepreneurship ecosystem in the city. This information can be used to develop policies aimed at the development of those workplace organisations by local authorities. And even in the presence of government support, more efforts are needed to make labs and makerspaces more accessible to city dwellers. However, considerably more work will need to be done to investigate other aspects of CHs in Istanbul. A greater focus on the location patters of CHs in the city could produce interesting findings that provide a more detailed account of their development. Nevertheless, detailed research on the members of CHs would be a favourable area for further work for a better understanding of these institutions from the members' perspectives.

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HOW INNOVATION DISTRICTS (DO NOT) WORK: THE CASE STUDY OF CRACOW

Abstract. This article is an attempt to answer the question: how one selects a neighbourhood to develop an innovation district, using the case of Cracow. This article mainly refers to the issue of the shape of innovation districts, showing how much the morphology of such spaces and their functions can promote or limit the development of innovative enterprises from the Information and Communication Technologies (ICT) industry. It also refers to our research carried out with quantitative and qualitative methods in Poland, using two locations in Cracow as a case study. In this paper, we focus on the significant restrictions which hinder the emergence and development of such districts. We also indicate the potential solutions to these difficulties such as the temporary spaces of events we mapped and which we called 'totemic spaces'.
Key words: innovation district, ICT, cluster.

1. INTRODUCTION: NEIGHBOURHOODS VERSUS INNOVATION FORTRESSES

In the literature in the field of geography, urban studies and social sciences, there are many concepts emphasising the impact of innovation on the social and spatial environment in which this activity is carried out while appreciating the impor-

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tance of closeness and interpersonal interactions for the processes of inventiveness. One of the latest concepts of this type has been the 'innovation district' (Katz and Wagner, 2014). In general, this concept can be characterised by comparing it to 'innovation fortresses'. For decades, there was a tendency to locate R&D departments of enterprises outside city centres in closed areas, to which the staff commuted from other districts. In such areas, work was carried out within a specified time frame, in physical isolation, and within a closed social environment.

The reverse trend has emerged relatively recently, consisting of locating the headquarters of innovative companies in city centres, not only near the homes of employees, but also the headquarters of other enterprises, often with a similar profile. According to this alternative logic, inventiveness is a deeply social process and as such it can be stimulated by the incidental frequent interaction of actors representing different areas of competence and knowledge, and innovation requires highly diverse resources and the support of specialised complementary entities (Storper and Venables, 2004).

As assumed by their designers, innovation districts were supposed to promote the concentration of the interactions of diverse actors and combining resources by appropriate planning of the space itself and its functionality. They were supposed to be multifunctional (an employee was not only supposed to work there, but also to satisfy most of their and their families' needs) and encourage walking, but also to be well connected with the rest of the city. They were supposed to be spaces attracting not only mature enterprises, but also start-ups and various business environment institutions. At the same time, they have been seen as a method for revitalising decayed districts and, in some cases, have been a catalyst for gentrification processes (Morrison and Bevilacqua, 2019; Mirabal, 2009).

However, it is difficult to say how many districts of this kind have been created in the world since the concept was popularised. This is due to the extraordinary diversity of places that are considered, or which their creators would like to call as innovation districts. Social science and technology parks, campuses for start-ups founded by corporations, coworking spaces and start-up hubs run by their managers within them, districts designed by urban planners, commercial developers' projects, declining neighbourhoods gentrified by the creative class... All of these are sometimes referred to as innovation districts. Although the mechanisms for stimulating creativity and innovation seem similar everywhere, the differences between these places are too clear to attempt to treat them as the manifestations of the same phenomenon.

It cannot be ruled out that the innovation district, in one of the mentioned models, is the optimal environment model for innovation. It is also possible that we are witnessing a convergence and all these spaces are changing towards some common pattern. However, does any of these ways of spatial, social and economic organisation of relations among people and enterprises really work? We ask this question from the Polish perspective. In Poland – like in many other countries –various urban initiatives are being developed to stimulate innovation, often narrowly understood as ICT innovation. Poland is an interesting example as the

import of certain ideas about innovation districts has encountered rigid barriers. Several places of this type were created in Poland, but they emerged not without problems, and sometimes they have little in common with such a model of innovation districts as, for example, 22@Barcelona. In our study, we focus on the largest clusters of innovative industries nationwide. However, we illustrate our findings by referring to the case of one city: Cracow. Three types of spatial concentration, one identified in Cracow, have their counterparts in other cities under the study.

The text has been divided into four parts. In the first part, we refer to the spatial aspects of innovation systems and introduce the concept of the innovation district. We embed it in the context of the issue of the effects of spreading knowledge. Based on our experience with looking for and plotting innovation districts in Poland, we distinguish two types of such districts. In the second part, we present the case of Cracow, at the same time pointing to the methodological difficulties related to the designation of innovation districts. Apart from indicating the methodological limitations, we also draw conclusions regarding other impediments that negatively affect the development of innovation districts in Cracow, and generally in Poland. In the third part, we present three types of concentration which can be found in the case of Cracow, referring to their morphology (in the case of physical spaces) and to the characteristics that ideal innovation districts should meet. In the fourth part, i.e. the discussion, we consider the status of the concept of an innovation district: whether it is a useful tool for scientific analysis, an urban policy tool, or maybe an expression of wishful thinking and the belief that the intervention of developers or urban planners, without wider political, economic or cultural changes can unleash new potential from people and enterprises. As a summary, we also formulate preliminary recommendations on what to do to make them work. We are of the underlying opinion that the innovation districts in Poland do not meet the expectations. This does not mean that the concept itself is wrong. This could only be determined by removing the barriers to innovation districts and then implementing imported patterns. However, what can be seen in the example of Cracow still allows one to draw conclusions about the potential of the mechanisms of creation of invention and innovation, on which the creators of innovation districts count.

2. THE CONCENTRATION OF INNOVATIVE BUSINESSES. INNOVATION DISTRICTS AGAINST THE BACKDROP OF OTHER ATTEMPTS TO CONCEPTUALISE THE PHENOMENON

The spatial concentration of enterprises is a phenomenon that geographers have been observing and studying for a long time (Carlino and Kerr, 2015; Micek, 2017). It does not apply only to innovative industries. In the case of nineteenth-century

industry, this concentration was partly dictated by the availability of mineral, labour and water resources. Although the progress of civilisation has provided many entrepreneurs with greater mobility and freedom in locating their headquarters, they are still forming geographical clusters. Detroit (automotive industry) and Silicon Valley (semiconductor industry) are the classic examples of such clusters (Klepper, 2010). The once announced death of the space to which the ICT revolution was to lead has not arrived (see, e.g. Healy and Morgan, 2012; Morgan, 2004; Rodríguez-Pose and Crescenzi, 2008), or at least it has changed little in the functioning of industries. Although in economic geography specialists write more and more often that spatial proximity is not the only form of closeness important for the functioning of enterprises – other important forms of closeness being cultural, cognitive or social closeness – and in theory they should be somewhat substitutable (Boschma, 2005; Crescenzi and Rodríguez-Pose, 2016), we are still observing the concentration of companies, also in the 'dematerialised' industries offering services and software.

It would seem that for entities in the high technology industry, the fact of having solutions enabling remote work and exchange of knowledge, the decisions regarding geographical location would be guided solely by costs, which would eventually lead to dispersion. In practice, however, they are ready to bear several times higher costs in order to operate in the vicinity of other entities from close and complementary industries (Moretti, 2012). What is most important for them seems to be the concentration of knowledge and competence (Florida, 2010). Innovations in the ICT sector on the global level tend to concentrate in the so-called superstar cities which are highly unequal (Glaeser *et al.*, 2009). By attracting affluent firms and their workers, innovation districts can even increase inequalities within a city (Graham and Guy, 2002). By changing the social-economic landscape they can lead not only to gentrification, but also to its biggest threat – displacement (Morrison and Bevilacqua, 2019).

In economic geography there is a strong belief in the relationship between the proximity of enterprises – in particular, but not only, spatial proximity – and their innovation and productivity. This discipline has long been investigating various industry clusters (see, e.g. Cusmano *et al.*, 2014; Delgado *et al.*, 2014; Eriksson, 2011; Howells, 2002; Porter, 2000). However, there is no agreement as to how to measure spatial concentration, how to conceptualise clusters, or to determine why they arise in these locations. Specialist can neither agree as to why, at some point, entities decide to change their locations, which – as a consequence – may lead to a shift in the grouping of entities in a given industry. Finally, there is a discussion about specific mechanisms that make physical proximity conducive to innovation. As Carlino and Kerr (2015, p. 397) noted: "we still have not opened the black box of how clusters operate. Most of our empirical work has instead been comparisons over places. Better empirical guidance about the microinteractions within clusters with respect to innovation will allow us to differentiate among models and build stronger theoretical frameworks".

From our perspective, the key issue applies to the micro-interactions taking place in the small area of an urban district (often not so much in administrative as in morphological and functional terms). The most common explanations of spatial clustering focus on: (1) the benefits of sharing (division of labour, risk sharing, specialised services maintained by a grouping of similar companies) (Saxenian, 1996); (2) a greater adaptability that is created by a denser market (Moretti, 2012); and (3) the effects of *knowledge spillovers* (Audretsch and Feldman, 2004; Breschi and Lissoni, 2001), in particular the tacit knowledge resulting from the density of interaction between people.

Researchers have long been interested in the urban sprawl. Alfred Marshall wrote about it at the end of the 19th century. The subject literature has discussed the benefits of agglomeration (cf. MAR effect) (Glaeser *et al.*, 1992). These include – apart from the availability of human resources, raw materials, suppliers, etc. – the possibility of a knowledge flow. Thanks to geographical proximity, the 'mysteries of the trade' of various companies can operate on the principle of public good – the closeness is a great advantage, enabling the sharing of knowledge, which leads to the dissemination and expansion of knowledge, the use of new ideas that are simply "hanging in the air" surrounding the participants (Marshall, 1920, p. 225). According to Giacomo Becattini, the main critic of Marshall's approach, this effect is not the result of the accidental concentration of entrepreneurs in one place, but rather the earlier character of the district (Becattini, 1990, p. 40). In addition to the benefits of agglomeration, the benefits of urbanisation were indicated (Jacobs, 2016), which result from the diversity of entities: diverse competences and knowledge foster innovation. Diversity is derived from the sheer size of the urban centre. It seems that the effects of urbanisation are more important at the early stages of innovative processes (problem discovery, inventiveness, etc.), while at later stages (refining innovation, implementation, diffusion, scaling) the effects of agglomeration take precedence (Asheim *et al.*, 2013). While innovative and creative firms usually enjoy the benefits of an urban centre and its diversity, morphological and socio-economic changes together with the accompanying gentrification can paradoxically decrease urban heterogeneity.

Unfortunately, it is not clear how to study such processes at a microscale, for example at the scale of a city. A knowledge spillover is not a phenomenon directly perceptible by geographic methods. Attempts have been made to study it by analysing wages (which are assumed to reflect productivity), and patents and their citing (Buzard *et al.*, 2015; Jaffe *et al.*, 1993). However, these approaches have serious limitations. Patents as the indicator of knowledge-making and innovation processes are problematic for many reasons. Not all knowledge is patentable, nor, out of fear of competition, is every discovery patented. Sometimes patents are even used to deceive the competition. Patent activity is geographically and culturally diverse. The implementation value of the vast majority of patents is negligible, and patents in themselves measure inventiveness rather than innovation

(Micek, 2017, pp. 110–111). From our perspective, what seems most important is that patents do not express tacit knowledge, working hypotheses or loose ideas, which in a dynamic and social exchange seems crucial for creating innovative products and services.

The second important problem is that in terms of grouping analyses, there is an disagreement as to how to understand proximity: increasingly, proximity expressed by physical distance or travel time to social distance is being abandoned (Micek, 2017). In addition, researchers do not know to what extent the spread of knowledge occurs: through one office, quarter, district, city, region, the whole country, or maybe a grouping of several countries? Most often, the research is conducted with a focus on innovative companies at the level of regional innovation clusters (Baptista, 2000; Martin and Sunley, 2003), sometimes including cities, but rarely delving into what is happening inside cities. Finally, many concepts were developed in the course of research into the relationship between concentration and innovation: new industrial districts, innovative milieux, a learning region, learning in space, knowledge cities and districts, regional innovation systems (RIS), and clusters (Micek, 2017; Depret and Hamdouch, 2013).

In the context of the Marshall concept cited above, it is worth referring in particular to the *innovative milieu* (Maillat, 1995). It assumed that innovation stimulated by frequent contacts among individuals, also of a personal nature, requires the input of diverse actors, not only entrepreneurs, but also scientists and the representatives of the authorities and the business environment. It puts particular emphasis on the local culture and customs. *Innovative milieu* should be characterised as a spatially located community with a common culture rather than a geographical creation on a specific scale and with clearly defined boundaries. This has hindered its use in the systematic studies of entrepreneurship. This concept has also posed problems considering non-local flows of knowledge and non-spatial forms of intimacy.

The innovation district is another embodiment of the narrative about the relationships among productivity, innovation and geographical space. Contrary to most of the concepts cited, it already communicates the scale by its name and what innovation processes should take place. It also clearly locates them in the urban environment. According to the original formulation, an innovation district is an area where business clusters, start-ups, business incubators and institutional anchors are located (Katz and Wagner, 2014). It is important that those areas are relatively small and multifunctional: residential premises and commercial and social infrastructure should be located next to enterprises, thanks to which they can operate around the clock and meet the majority of the needs of residents/employees and their families. According to the innovation district concept, this would be conducive to the concentration of random interactions between people with potentially complementary knowledge and competences. Many large enterprises try to achieve this type of effect within their structures. An innovation district is about achieving this effect among companies.

An innovation district can be created automatically, forming what we will call a NOID (naturally occurring innovation district). However, they are often the result of the efforts by public and private entities trying to attract specific entities to a given area, often in order to revitalise decaying urban areas. In this case, they should be referred to as planned innovation districts – PIDs (see Spencer, 2015; see also Markusen, 1996).

Not only are scientists interested in such concepts as the *innovative milieu*, the cluster, or the innovation district itself. These ideas also function, and perhaps primarily, as urban policy tools, and sometimes also as narratives on the possible future of selected urban locations or entire cities. And today, not only researchers but also business advisers and political decision-makers (at various levels) are interested in the spatial concentration of ICT entities. Business representatives and politicians see in such ideas as innovation districts the opportunities for urban development and joining the main bunch in the race of entrepreneurial urban centres. Similarly, in Poland we are also dealing with the emergence of various clusters of innovative companies and attempts to create them. Poland has participated in the rush to build science and technology parks and establish clusters. The interest of decision-makers has turned to innovation districts, which – contrary to the 'inventions' mentioned above – are located in central areas, not on the outskirts of cities. Critics emphasise that the 'innovation district' is a concept based more on highly intuitive arrangements and good will than on strong evidence that would explain the role of the urban context in creating innovation. As Edward Glaeser put it: "Innovation districts are … a hypothesis; they're not a proven strategy at this point in time. I think they're as sensible a hypothesis as anyone out there, but they're merely a hypothesis" (Glaeser, 2014).

3. THE METHODOLOGY

Our study was triggered by the need to conduct contextual research, firmly embedded locally and not based on a benchmarking model or a model of best practices. Innovations are 'rooted' and largely unpredictable: they should be treated as part of a politically structured and dynamic process entangled in specific time-space conditions (Hess, 2004). The concept of our study is based on two important elements: (1) analytical concept of the 'social field', and (2) simultaneous focus on the three units of the analysis of an innovation district, company, and employee. The concept of the 'social field' is less common than the network perspective in innovation analysis (Fløysand and Jakobsen, 2010), but it has significant advantages: (1) it integrates cultural, social and territorial aspects into one approach, (2) it is more effective (despite numerous similarities to network analyses) in the

analysis of social practices and in finding tacit knowledge important in the processes of invention and innovation, and (3) it allows one to capture the dynamics of the relationship between structure and the activity characteristic of innovation processes. By using the 'social field' analytical framework, one obtains contextual knowledge about the functioning of entities within fields on three levels: (i) a grouping of innovative enterprises together with the environment (innovation district), (ii) an innovative enterprise, and (iii) individual employees of the innovative industry.

While focussing on the metropolitan nature of the centres, specific cultural and economic contexts, and the development potential of cities (location of new economy companies), we selected five metropolitan areas in Poland, Cracow being just one of them[1]. In this sense, the results of multiple case studies provide a good starting point for theoretical replication (Yin, 2014) as they are reliable and credible (Eilbert and Lafronza, 2005). The organisation of this type of innovation includes 'knowledge-based' entities in the area of high-tech (here, among others, ICT companies producing and operating software, designers of new drugs, and companies with extensive R&D departments) (cf. Spencer, 2015). In addition, the study includes institutional anchors (support/ business environment institutions) operating at the borderline between the private and public sectors (business incubators, hubs, technology parks creating spaces for entrepreneurs). In this article we focus on a case study of Cracow.

4. INNOVATION DISTRICTS IN POLAND

The starting point for a thorough analysis of innovation districts was the selection of NOID and PID type districts in Poland. So, what does the map of innovative enterprises in Poland look like? Within the cities in the first phase of research, we plotted the potential NOIDs and PIDs, and then select case studies for analysis. In the selection, we adopted the criteria formulated by the Project for Public Spaces organisation (Storing and Walker, 2016): (1) the identity of a place, (2) the diversity of companies, (3) the continuity of the place's functioning, and (4) the degree of concentration of companies. The decisive criterion will be the concentration of companies: choosing places based on the largest number of companies located relatively close to each other within the innovative environment in each city.

Data collected from the National Court Register database from the first quarter of 2018 was used to identify the potential innovation districts by mapping

[1] Other research fields were following: Poznań, the Tri-City [Gdańsk, Sopot, Gdynia], Wrocław, and Warsaw.

innovative enterprises in selected cities. It was downloaded via the Application Programming Interface (API) enabling access to public databases made available by MojePaństwo (mojepanstwo.pl). After cleaning the data (among others, duplicates were removed and companies whose registered office's address was located within the city were selected), they was prepared for further analysis. From among the enterprises we selected those whose PKD (Polska Klasyfikacja Działalności – Polish Classification of Activities) codes of activity given as their main or first PKD code (in the absence of the definition of the main activity) was a code specific for innovative enterprises. These were PKD codes related to activity with software and its derivatives (Section J of PKD) as well as scientific research and development works in various fields (Section M of PKD). It is necessary to consider the functioning of virtual offices, places that allow one to register activities at a given address without actually working there.

The following institutional anchors and business support entities were selected: business incubators (including Academic Business Incubators), technology transfer centres and science/ technology/ science and technology parks. Fablabs and coworking offices were also included as additional business environment entities. The selection of entities and centres was made on the basis of industry reports regarding the location of start-ups and innovation centres in Poland[2].

5. THE METHODOLOGICAL LIMITATIONS OF RESEARCH AND OBJECTIVE BARRIERS TO THE FORMATION OF IDS IN POLAND

The fact that we hardly found any IDs in Poland can be explained either by the limitations of the methodology or by the existing situation. The methodology may have many limitations, but there are objective reasons why it is difficult to group innovative entities.

The obtaining quantitative data at the municipal level is problematic. This is due to, among others, the quality of the censuses held in Poland, where there is no aggregation of data at a level lower than of a *poviat* [county]. There is a major problem in obtaining any socio-economic data for individual cities. Unfortunately, in most Polish cities this data is rarely aggregated for statistical units smaller than the area of a whole city.

In the case of testing the concentration of innovative enterprises, we primarily used point data, which we subjected to spatial analysis. Among the databases which contain data on enterprises we can distinguish, among others, the National

[2] The entities were selected on the basis of reports on the Polish start-up environment and innovation in Poland from 2014–2017.

Court Register (KRS), the Central Register and Information on Economic Activity (CEIDG) and the National Economy Register (REGON). The National Court Register contains information on commercial law companies, while the CEIDG has a registry of the self-employed. We chose the KRS database primarily because self-employed people quite often do not work where they are registered. Moreover, people running a sole proprietorship in ICT often work under the so-called contractual contracts, having *de facto* rights similar to those of full-time employees, and above all they do their work mainly at the headquarters of the company ordering the service. The collection of data for the selected cities was problematic in each database. The data from the National Court Register can be obtained through the MojePaństwo platform, which is significant. Unfortunately, in this case there may be a problem with obtaining data related to the skills needed to download data through the API. In summary, even if data exists, it is not easily accessible.

It should be noted that the enterprises included in each of these databases must be registered. However, it often happens that innovation processes take place even before the official registration of activities. Many innovations happen within informal teams. It is extremely problematic to capture start-ups or other entities that have not yet registered their activities. One example is that of Warsaw's Praga borough, where Google Campus is located – there we are undoubtedly dealing with innovative projects, but still in the planning phase. For this reason, on the map of Warsaw showing clusters of innovative enterprises, the campus area is not distinctive in any way.

Another issue that we encountered was the setting of the border between enterprises in innovative industries and enterprises in creative industries. It is also problematic to decide exactly which innovative enterprises to choose, even within existing databases. The question we faced when deciding which PKD codes to use does not have one easy answer. Although there is a number of definitions of innovation and innovative enterprises, based on them it would be necessary to choose an excessively wide range[3] of codes, while some of the enterprises having these codes as the sole or main activity do not conduct innovative activities in any scope.

In addition, regarding the ICT industry, we focussed on both software and hardware companies, which are usually assigned various PKD codes depending on what they produce. Other challenges are also worth mentioning. Entities of innovative industries can quickly change a product, business model, or their industry. In particular, this applies to start-ups, but not exclusively. For example, it

[3] In many studies, both people associated with innovative and creative work (Florida) are treated as a creative class. As Moretti suggested, there is a need to distinguish between these two groups. They appear in specific areas usually at different times and are often the representatives of gentrifiers in various waves of this process – the arrival of employees and companies from creative industries often precedes the arrival of those from innovative industries.

was difficult for us to indicate a model software house, as entities of this type often try to create their own products, even based on ideas that will arise during the implementation of commissioned work. It is problematic to label companies as start-ups. This is often how mature companies describe themselves. Concentrating on ICT services, it is worth noting that computer scientists, software engineers and software developers are quite commonly distinguished. These are completely different activities, with different levels of required competences and other innovation potential. In Poland, however, such typology is not highly visible.

Although it is possible to pre-determine certain clusters of innovative enterprises in selected cities together with the entities in their environment, without knowledge of a city, its context, or specific areas of potential innovation districts it is impossible to state unequivocally whether and what type of innovation district we are dealing with. For this reason, it is necessary to extend spatial analysis to include field studies, including ethnographic analyses.

Our field studies are based on observations and IDIs. The criteria to be met by the model innovation district were adopted from the Project for Public Spaces. The eight main criteria of innovation districts, according to Nate Storring and Meg Walker (2016), are: identity, diversity, continuity, sociability, proximity, mobility, flexibility, and unity. Based on these criteria, we made observations and opinions about specific places that we visited as part of ethnographic research, and also during the interviews we referred to the categories listed in Tables 1 and 2.

6. THREE TYPES OF SPATIAL CONCENTRATION, BASED ON THE EXAMPLE OF CRACOW

Cracow is a city with many innovative industry entities. There are a bottom-up (NOID) and top-down (PID) groupings of entities. Zabłocie is a place commonly recognised by the residents as a NOID. But does a scientific analysis confirm this? In other words, one should ask whether from the perspective of spatial analysis Zabłocie is characterised by a significantly higher density of innovative entities than other areas in the city and whether there are no other, more important clusters. Here, however, we encountered a number of difficulties with identifying innovation districts both in Cracow and across the country.

6.1. Area 1. Zabłocie

The first example of a concentration of innovative companies is Zabłocie. This area of Cracow is part of the Podgórze district, which delimited from the north and the west by the Vistula River, to the east by the Cracow Zabłocie – Cracow

Bonarka railway line, and to the south by a voivodeship road. While in our research we focused on its western part (delimited by Klimeckiego Street to the north-east and the railway line to the south-west), due to the spatial aspect and its interesting historical background, we will also discuss its spatial scope slightly more broadly. The entire Zabłocie area can be divided into two basic parts: eastern and western. The eastern part consists mainly of family allotments and a small service area with the adjacent port. The western part is a dynamically developing cultural, service and housing space along with a private university located in the north.

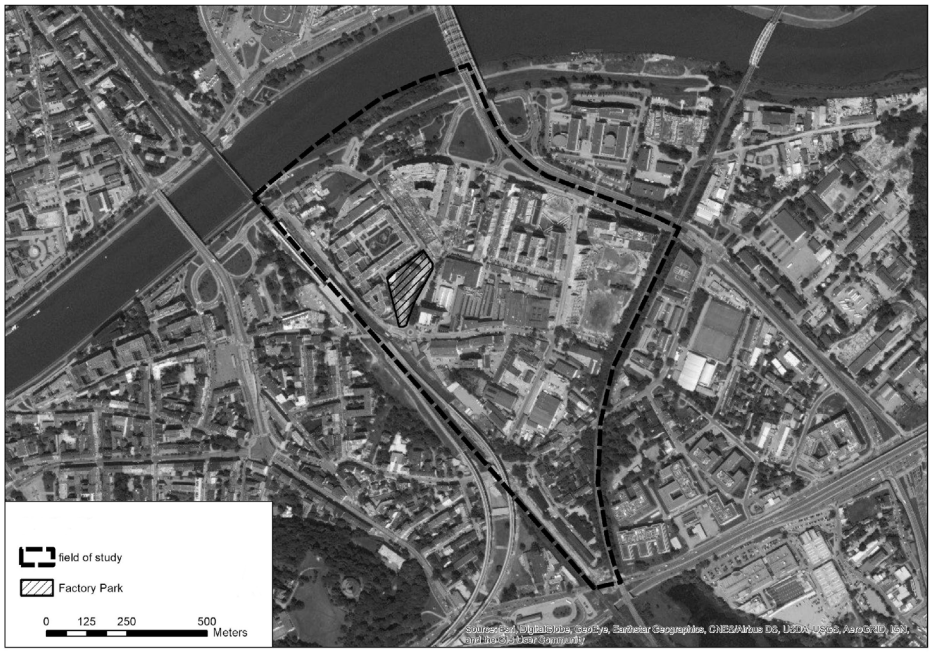

Fig. 1. Zabłocie NOID

Source: own work based on Esri, Digital Globe.

The history of Zabłocie begins around the mid-14th century. Both its history and location in the immediate vicinity of the Vistula were of key importance in the subsequent development of both the spatial and economic district. Before the First Partition of Poland, the riverside part of Zabłocie served as a salt port. In the 18th century an important trade route and in the second half of the 19th century the main Galicia railway line ran there. Then, quite a significant development of Zabłocie as an industrial district took place. Until nearly the end of the 20th century, there were several factories and industrial plants, including the famous Schindler's Factory. The political changes of the late-1980s forced extensive changes,

causing a rather painful collapse of companies, mainly state-owned, located in the Zabłocie area (Wiśniewski, 2011).

A revival, in economic, tourist and housing terms, occurred at the beginning of the 21st century. A number of investments – mainly transport – such as the construction of Kotlarski Bridge and the Father Bernatka foot and bicycle bridge connecting Kazimierz with Podgórze contributed to this. The creation of a large, private academic centre has also had a significant impact on the development of Zabłocie. In 2006, the City Council of Cracow also adopted a resolution establishing the Program for the Revitalisation and Activation of the Post-industrial Zabłocie Area, and Zabłocie itself was entered as a strategic area for the city[4].

A spatial development analysis is an indispensable element of research conducted on the development of a city, but also on innovation districts, both bottom-up and top-down. It is a kind of a "wide window on the physical structure of cities" (Oliveira, 2018, p. 124). The local spatial development plan in the area of our research is referred to as "AREA B – Old Zabłocie". The basic purposes of this area are quite diverse; however, it mainly consists service buildings with a predominance of commercial services. The northern part is primarily of medium intensity multi-family housing where there is the possibility of accommodating services, and areas of housing and services[5]. In the central part of the examined area there is also a section intended for service areas with a predominance of public services.

Zabłocie is an interesting case in terms of morphology: its development and expansion are practically exclusively internal, and it is difficult to observe any manifestations of urban sprawl of the Zabłocie area into neighbouring areas; more often changes in the streets or in the development of individual plots or their quarters can be noticed. This is primarily due to the physical boundaries of the Vistula River, the embankment, and the railway line.

The main transport artery of the analysed part of Zabłocie is Klimeckiego Street, which is part of the 2nd Cracow bypass. The examined area seems to be one of the better locations in terms of transport accessibility: a rich network of bus and tram connections as well as the immediate vicinity of the Cracow-Zabłocie railway station offering connections at the regional level are an important advantage of this location. However, there are no typical parking spaces other than those belonging to residential buildings or owned by existing companies, so many cars are parked on the sidewalks. The northern part of Zabłocie is the aforementioned

[4] The adopted Strategy for the Development of Cracow has set, within sectoral programs, priority tasks and key investment projects for the city's development. Among them there was the construction of the Zabłocie-Krzemionki junction, which is one of the metropolitan tasks, and the revitalisation of the Zabłocie area – as a form of economic activation of the city. The former aims to connect Cracow with Silesia by means of a high-speed railway. The latter works first and foremost towards the revitalisation of degraded areas, which has largely succeeded.

[5] Usually referred to services located on the ground floors of buildings.

multi-family housing, which is characterised in part by a closed spatial structure – there are no typical fences encircling individual or groups of buildings: here a building itself acts as a fortress defending a common space created in the form of a courtyard in the shape of old tenements. Services located on the ground floor are open to both residents and visitors or employees of nearby companies. The second, slightly newer, housing estate, already has typical fences and consists of a complex of several multi-family buildings.

The focal point of the analysed area is the quarter closely related to the cultural aspect and history of the place, as it is home to Oskar Schindler's Enamel Factory, the Mocak Museum of Contemporary Art, and the Glass and Ceramics Centre. To the east of this quarter, in Przemysłowa Street, there is one of the office buildings belonging to Factory Park, a complex of buildings with office space for rent. It mainly brings together companies from the ICT and advertising industries. The office building itself is an example of typical industrial architecture from the 1950s with a recently renovated facade, and its pole structure enables extensive changes in the spatial arrangement inside the building itself.

The western and eastern parts of the study area are marked by the aforementioned railway tracks separating old Zabłocie from Podgórze from the west.

Table 1. Zabłocie as an innovation district

Zabłocie			
Criteria of innovation districts	**meets**	**partly meets**	**does not meet**
visibility of innovation		x	
variety of functions		x	
mobility	x		
social functions of space	x		
continuity / insulation		x	
flexibility and variability		x	
multisensorism	x		

Source: own work.

The analysed part of Zabłocie is distinguished by a very good transport accessibility and a relatively high variety of functions. A strong mix of many forms of spatial development naturally enables the creation of interpersonal interactions, often spontaneous. Diversified, interesting, industrial architecture enables various types of modifications and interference in the development of this area. Also, a multitude of public spaces in the form of, among others, neighbouring cafes and small restaurants enhances the impression of spatial innovation.

6.2. Area 2. Cracow Technology Park (KPT)

Another area serving entities of the innovative industry is the Cracow Technology Park [Krakowski Park Technologiczny] along with an existing complex of service buildings. It is located in the Dębniki district. It is delimited from the north by Podole Street and from the south by Bobrzyńskiego Street and it is located in the vicinity of office buildings of such companies as Shell, Motorola, and Nokia.

Fig. 2. KPT PID

Source: own work based on Esri, Digital Globe.

In the case of the KPT and the neighbouring areas, it is difficult to indicate any place history important for the development of this type of industry. It is a relatively newly developed area, mainly due to the fact that the KPT itself, for example, has had its headquarters here only since 2015[6]. Most companies located in this area have used either free or relatively expensive land or ready-made buildings and space for rent, which could significantly contribute to their density in this area.

The primary purpose of this area in the local spatial development plan is the location of higher education teaching and research facilities. In addition, the permissible

[6] Previously the headquarters were part of the Czyżyny district.

designation makes it possible to build technology centres, business incubators or various types of services, as well as bicycle paths and pedestrian routes. Commercial services areas have been designated slightly more to the southwest where it is possible to establish, among others, office or catering buildings. The area opposite the KPT, in accordance with the current plan and current state, is intended for open areas: with agricultural use and low-growing greenery, with a categorical prohibition on erecting buildings.

To the north of the study area, there are extensive undeveloped green areas mentioned in the context of the local plan. The morphology of space currently slightly limits pedestrian movement. Perhaps this is due to the seemingly endless process of creating space around the park, or maybe it is the result of planned – or just the opposite, unplanned and underestimated – actions. There is also little space here that is conducive to accidental interactions between employees of different companies. The only major communication artery located near the KPT and at the same time leading to it is Podole Street, which additionally generates periodic traffic jams, mainly due to the residents commuting from there and the residential area located to the west. Rows of cars park on both sides of the street in parking spaces designated by the administrator. Transport accessibility is better because the complex is in close proximity to one of the main streets in this part of the city, Bobrzyńskiego Street. Also, in the immediate vicinity there are a tram terminus, a bus station and the Czerwone Maki Park and Ride, with bicycle racks and 200 parking spaces for cars.

Table 2. KPT as an innovation district

KPT			
Criteria of innovation districts	**meets**	**partly meets**	**does not meet**
visibility of innovation	x		
variety of functions		x	
mobility		x	
social functions of space		x	
continuity / insulation	x		
flexibility and variability			x
multisensorism			x

Source: own work.

Considering the presented criteria which should be met by the innovation district, it can be seen that the area of KPT meets them only partially. This is influenced by, among others, slightly more difficult transport options due to the peripheral location or not very pro-social and pro-promotional development of the space

around the park, which is not conducive to people-to-people contacts. Also, there is only minimal availability of catering outlets or lower-order services. The flexibility and variability of space is practically imperceptible: it is the park administrator who determines the location of individual components and equipment and users must adapt to this. The area where the aforementioned office buildings are located is relatively better in this respect, where the space seems to be friendlier and better thought out, developed with employees in mind.

It is worth making some general observations here. Our analysis showed that there are several IDs in Poland, but definitely fewer than we expected. Companies are not only dispersed on a city scale, but also on a national scale. It was only when we went out into the field that we could determine whether an area was an ID. Observations and interviews have suggested that the grouping of innovative enterprises in Poland is limited by three barriers, the first being the generally low spatial mobility of Poles. The employees of innovative industries have relatively better financial conditions, but moving to another city can still be a challenge for them. Additionally, the incentive is rarely strong enough to move between the centres we surveyed. Another barrier is the general acceptance of the activity of real estate developers. even though there are fewer gated estates being built in Poland than a few years back, land purchase for housing investments in possible innovation districts reduces their potential. The third barrier is the lack of availability of premises with adequate space in places properly connected to growing start-ups. For example, many of the entities that took part in the study were located in tenement houses, and each expansion of the company was a challenge. It was necessary to purchase and connect two residential premises, or move to another district, away from the current homes of some of the staff. The spaces themselves are often adapted: companies try to function in spaces which were not designed for office work (suboptimal room arrangement, problems with soundproofing or street access, etc.). All of these barriers can be seen in the example of Cracow. The actions of developers follow the example of Zabłocie. The residential function is dominated by the innovative function, and the low, post-industrial buildings housing the seats of start-ups and other innovative entities are visually dominated by growing blocks of flats and apartment buildings. The area itself is delimited by residential buildings, a river, a campus and a railway embankment, which prevent the district from expanding. At the same time, the very effort of the innovation sector entities to function in close proximity clearly indicates that they define frequent interactions between potential competitors as something beneficial.

6.3. Area 3. 'Totemic' spaces

When considering the innovative environment from a socio-anthropological perspective, a certain paradox can be observed: on the one hand, innovative companies embody the individualist market success of their founders; but on the other,

and not only in the sphere of declarations, they are based on the egalitarian nature of the community.

As proven by various studies (Ko, 2017), as well as our own, an important element of the culture of innovation are references to community ideas, including: open access and exchange of information, and sharing resources and space. These references are not only mythical (not only part of the industry lore), but they are a real and significant element of the living world.

Currently, however, it is the network that is becoming an important 'component' of real spaces. It enables the connection of local communities and geographically distant groups. It might seem that with the emergence of the ICT technologies the importance of physical space has fallen into the background (Löw, 2016, p. 27). However, only hybrid space provides an individual with the opportunity to meet within a group of people with similar interests. Web 2.0 media play a special role in this world. Through them, not only fan and consumer communities are born, but also communities of innovative entrepreneurs. The French sociologist Michell Maffesoli (1995) referred to such communities as new tribes. The members of such a community not only participate in a shared social world, but also decide about the degree of involvement in its creation.

Thus, to complement the image of the reality of innovative companies in the ICT industry, we decided to supplement the PID and NOID model with a third element of the presence of innovation in the city, which can be called – referring to Maffesoli (1995) – totemic spaces. We define totemic spaces, after Maffesoli, as those places and totems that connect an individual with a long series of ancestors (Maffesoli, 1995, p. 136). It is not about the mystical identification known from classical anthropology, but certain, contemporary forms of ex-stasis (going beyond oneself), forms of behaviour related to the group experiencing their identity, as part of meetings of people interested in innovation.

The bond established between members of such a community is based on emotional involvement and on the spiritual basis they share. A bond occurs when there is a transition from individual passion to sharing it with others of one's own kind – socialisation. Neo-tribes are not so much based on the detachment of an individual from everyday problems of the world as on a strong sense of common identity. Within neo-tribal communities, every person determined by their own territory, their own tribe, their own ideology can, though, simultaneously, in a very short time, enters another territory, into another tribe, into a different ideology (Maffesoli 1995, p. 215). To build the image of these totemic spaces, we prepared an analysis of the events related to the innovation industry, which covered the period from 5 January 2017 to 10 August 2018.

The data came from the website crossweb.pl, which collects information on events related to the broadly defined ICT and innovation industry. Based on the data collected in this period, we prepared a map of events concentrated in Cracow. Altogether there were 954 instances, including mostly meetups (725

events), next workshops (108 events), and conferences (77 events). It is interesting that the events we mapped were not only associated with central locations, but some tokk place in Zabłocie, among others. Thus, for the ICT community, places with not necessarily a central location counted, but rather the connection to specific environment, including clubs, spaces, including those of an industrial nature.

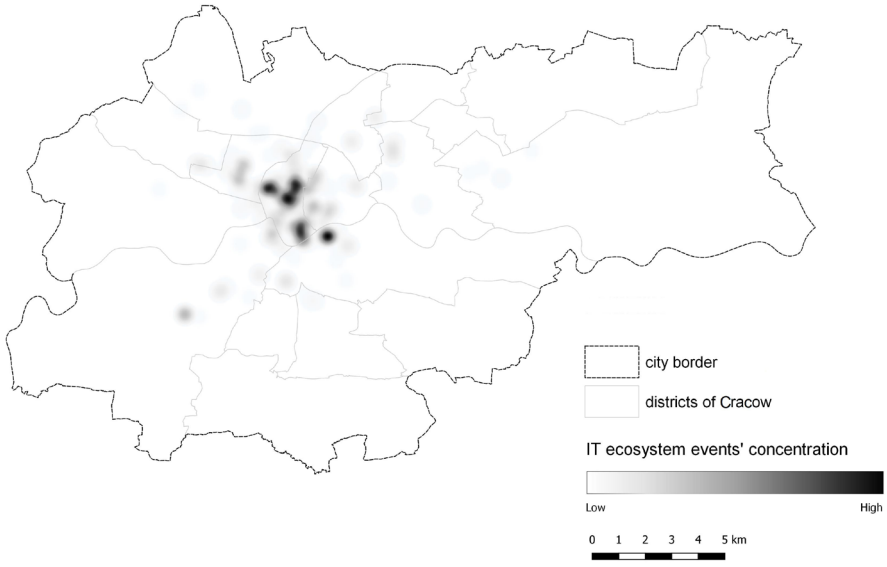

Fig. 3. Totemic spaces
Source: own work.

Maffesoli defined the situation of this type of assembly as polytheism – the gathering of people around many totemic objects (Maffesoli, 1995). However, this community is bound by specific affiliation rituals reminding it that this is 'one body'. Thus, individuals different from each other at different levels produce and share certain common values and meanings. Tribes are also based on the principle of reciprocity, as described by Marcel Mauss (2001). In a sense, such rituals form the bonds of the community, but also teach its members specific behaviours. They also have an additional function, complementing the space of innovation districts, allowing, even if only for a limited time, the concentration of people associated with the innovative community, and thus overcoming the barriers imposed by closed environments of science and technology parks or poorly developed spaces in emerging grassroots innovation districts.

7. CONCLUSION

When undertaking the research into innovation districts in Poland, a number of problems both methodological in nature (e.g. database restrictions and data quality) and conceptual (problems with defining innovative industries and classifying various professions, the dynamics of enterprises themselves) should be considered. This overlaps with the fact that innovation districts are beginning to function as a buzzword. The term is eagerly picked up by various actors who give it various meanings. In some cases, the term 'innovation district' is used interchangeably with such terms as a 'smart city'. Instead of rigorously keeping to the original concept or treating everything that is defined as innovation districts, we try to keep a minimalist working definition according to which an innovation district is a spatial grouping of innovative industry entities in a limited area with an innovative environment. If a rigorous understanding of 'innovation districts' was applied, then not even one such place could be identified in Poland. At the same time, we would be deprived of a conceptual tool that would allow us to capture certain processes. Similarly, it would be useless to use the colloquial understanding of 'innovation districts', that is, to treat every space that could be considered an innovation district. This would lead to unjustified comparisons, and from the perspective of social science, technology parks and districts such as Zabłocie are considered as completely different spaces. This would lead to unjustified comparisons, and from the perspective of social sciences technology parks and districts such as Zabłocie are considered completely different spaces.

For now, our research indicates that innovation districts are not a research artefact. Innovative entities in Poland strive to concentrate in the sense of a trend, but also respondents themselves often express such intentions, treating spatial proximity to other companies as beneficial.

The conceptualisations competing with innovation districts do not seem much more useful, mainly because they focus on the level of interaction on a regional scale, and cities and smaller units remain closed black boxes for them. The fact of opening these and examining what forms of spatial organisation and what interactions actually increase inventiveness seems crucial not only from a scientific but also a practical perspective. The innovation district is another 'invention' which, like the science and technology park before it, is trying to enter Poland without considering the local cultural specificity and understanding the mechanisms of its functioning. It is not enough to draw a quadrant on the map and name it properly for it to start attracting talent and entities that will revive the economy. Surveys of geographical economics impose caution on the value of spatial proximity. It is not the only form of closeness, and incidental encounters with people will not make them start to communicate, trust and cooperate with each other. Our observations on totemic spaces show that the lack of spatial proximity can be compensated for.

To think about one urban model that would be optimal for different cities, industries or economies can also be a trap. Science and technology parks can be socialised, and innovation districts can develop by creating space for various regular events. Generating innovations also requires combining local tacit knowledge with that kind of knowledge that better tolerates movement from place to place. Unfortunately, most of the processes that determine innovation and invention seem to occur as part of micro interactions, and in this case standard geography tools must be supplemented with anthropological analyses.

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PART II

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THE MORTALITY STRUCTURE OF POPULATIONS THE DEMOGRAPHIC AND SOCIO-ECONOMIC SITUATION IN EUROPEAN UNION COUNTRIES: DEVELOPMENT AND DIFFERENTIATION IN THE PERIOD 2011–2014

Abstract. The purpose of the study is to compare the differentiation of the demographic and socio-economic indicators and the structure of mortality of the population in EU countries in the period 2011–2014. The composite indicator of mortality structure revealed the most favourable situation in Finland (134.4%), while the worst situation was found in Hungary (63.8%). The best demographic and socio-economic situation was found in Luxembourg (165.4%) and the worst in Hungary (64.9%), Greece (65.9%) or Lithuania (67.3%). The regression model equation shows that the mortality structure is strongly affected by the variables of life expectancy at birth and education. It is evident that there was a differentiation in the demographic and socio-economic indicators in EU countries in the period 2011–2014, while there was no unambiguous trend of the convergence of the mortality structure among EU countries.
Key words: demographic and socio-economic indicators, cause-specific mortality, composite indicator, European population comparison.

1. INTRODUCTION

The health and mortality of individuals and of the population as a whole is affected by a number of factors to a varying extent and by different methods for conditioning the morbidity and mortality structure (Minicuci *et al.*, 2016). People

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are exposed to a number of health risks over the course of their lives. These have their roots in a number of events, develop over a long period of time, and are influenced by a number of factors. The most important are lifestyle, the level of health care, genetics, and the quality of the environment. However, socio-economic or demographic factors are also very significant (Hübelová *et al*., 2018). The current interest in health, health condition, and the search for causes of disease is becoming more intense, particularly in relation to social, political, and economic changes, but also to changes in the quality of the environment (Tobiasz-Adamczyk *et al.*, 2011). Population health is generally considered to be one of the most important indicators of regional development and the complex interdisciplinary relationships of demographic, socio-economic, environmental, and political processes (Fraser and George, 2015). The importance of health is also underlined by its inclusion in one of the priorities of the "Global Europe 2050" strategy, which aims to ensure a sustainable economic development of Europe (Eurostat's Report for the European Commission, 2017).

Mortality is an important factor in demographic processes. A very important aspect of the mortality process is the so-called main causes of death (mortality structure). Not only does their value provide information on what the main causes of death are, but mortality structure analyses are one of the elementary values which indicate the health and health condition of the population and determine the level of mortality itself (Šprocha *et al.*, 2015; Vilinová *et al.*, 2017). The level of mortality is influenced by mutually conditioned endogenous and exogenous factors (Caselli *et al*., 2006). Demographic and socio-economic indicators, which are differentiated at different regional scales (Fraser and George, 2015), are currently considered an important group of exogenous factors. Different types of risk behaviours (smoking, alcohol consumption, etc.) do not occur accidentally, but are determined by a wide range of direct and indirect factors throughout one's life, including socio-economic and macroeconomic factors. For example, in Western European countries, manual workers show more unfavourable risk behaviours, leading to their shorter life expectancy. Therefore, it can be assumed that a change or a difference in the population composition in terms of the economic structure will also cause changes or differences in behavioural risk factors that will be reflected in cause-specific mortality patterns (Spijker, 2014). At the same time, mortality is seen as a key indicator of the success or failure of each state's development and reflects a society's ability to transform economic capital into the health of its population (Shkolnikov *et al.*, 2004).

Consequently, the main aim of our study is to evaluate spatial disparities in the mortality structure and selected demographic and socio-economic indicators among the EU Member States. The partial intent is: 1) to create a dimensionless composite indicator to determine the ranking of EU Member States according to the mortality structure level and socio-economic and demographic indicators; 2) to determine whether EU countries are converging over time on the basis of the values set by

the indicators (convergence method); and 3) to assess spatial disparity on the basis of a composite indicator calculated from the averages of the values. On the basis of these objectives, the following research questions are identified: What are the mortality and socio-demographic conditions in the European Union? Which states (regions) show a favourable situation and which are lagging behind? Is there a reduction in the differences, resp. a convergence of EU countries over time?

2. DEMOGRAPHIC AND SOCIO-ECONOMIC FACTORS OF MORTALITY AND HEALTH

Western European countries have seen a decline in total mortality since the late 1970s, and this trend will continue in the near future. In most Eastern European countries, the overall mortality rate dropped later, from the mid to late 1990s, and the decline there should continue in the coming years as well. Such a trend can be predicted fairly accurately over a period of 10–15 years for both total mortality and specific causes of death, since there are certain exogenous variables that affect mortality for such a period (Spijker, 2014). Spijker has long been involved in testing time-series models of cause-specific mortality and exogenous variables to assess the importance of demographic and socio-economic factors and the differentiation in mortality patterns in Europe (Spijker, 2004; 2014; Spijker and Wissen, 2010). These studies illustrate the influence of exogenous factors in the context of the varying political and economic histories of Eastern and Western Europe. Within the Eastern Bloc countries, there has been a significant increase in mortality since the early 1990s in the countries of the former Soviet Union, unlike other Eastern European countries. By contrast, Western European countries show greater homogeneity.

The most important demographic factors affecting the mortality of the population include the level of acquired education. People with a higher level of education usually achieve better living standards (Kino *et al.*, 2017), exhibit higher awareness of health risks and the positive effects of a healthy lifestyle, they are able to recognise possible disease symptoms sooner and place more emphasis on prevention (Marmot *et al.*, 2008). The relationship between education and health was investigated by a case study (Albert and Davia, 2011; using 11 developed European countries as an example), which confirmed a positive correlation between these two variables, especially in the case of tertiary education. There is a confirmed relationship between the level of acquired education and mortality (Spijker, 2014), especially mortality caused by cardiovascular diseases, chronic obstructive pulmonary disease and smoking-related tumours (Davey Smith *et al.*, 1998; Lundberg *et al.*, 2008; Khang *et al.*, 2010). The risk of the first myocardium infarction is deepened in connection with lower education levels (Macintyre *et al.*, 2001).

Analytical convergence studies agree in that there are clear differences in the mortality structure between the West and the East, mainly in relation to cardiovascular diseases as the cause of death. The processes of convergence in the EU-28 group in the years 1965–1995 revealed a deepening difference between the East and the West and also mentioned a convergence between the North and the South of the continent (Meslé and Vallin, 2002). In the period 1995–2009, EU-27 countries showed a convergence in the area of health, mainly thanks to the significant reduction of deaths caused by cardiovascular diseases (-1.557% per year). This reduction was most likely a manifestation of the cardiovascular revolutions, which started much later in Eastern Europe. A significant convergence was also demonstrated in the area of deaths caused by neoplasm (-1.934% per year) and median survival (-0.819% per year). Despite this, a considerable heterogeneity of the cohort must be pointed out (Maynou, 2013).

A study by Aktaş (2017) sorted EU countries and EU candidate countries by socioeconomic indicators, which are closely connected to demography, into five clusters. The first cluster was formed by Eastern European countries (Bulgaria, Rumania, Latvia, etc.). The second included countries of Southern Europe, including Estonia and Slovakia. The remaining clusters included Western and Northern European countries, with a separate cluster formed by Luxembourg alone, and another by Finland and Sweden (Aktaş, 2017). Cluster analyses are also used to evaluate the determinants of health in smaller regions, i.e. (micro)regions.

Another important health determinant is represented by unemployment leading to the onset of fatal diseases caused by stress and the reduced overall immunity of individuals (Lemstra *et al.*, 2015). A loss of employment increases the risk of cardiovascular issues by up to 35.1%, with consideration of indicators such as age, education, etc. (Dupre *et al.*, 2012). A Canadian study (Kraut *et al.*, 2001) discovered a large percentage of the unemployed among diabetic patients and a direct proportion between increased unemployment rates and increased mortality (by up to 2.5%). The assumption of the effect of unemployment on increased mortality and the diabetic patient rate was also mentioned by other authors (Limm *et al.*, 2012; McNamara *et al.*, 2017). Unemployment (especially long-term) is also related to poverty and a lower social status. A higher mortality condition was proved among the low-income population, with a significant contribution to this situation again being represented by stress, largely affecting, inter alia, the cardiovascular system and immunity, thus increasing the risk of myocardium infarction and brain stroke (Wilkinson and Marmot, 2003; Galobardes *et al.*, 2004).

Poverty and poor health state are also connected with GDP per capita. The proportion of people with unsatisfied health needs increased after 2009, especially in the lowest income countries (OECD, 2016), but disparities also exist in advanced countries such as the USA, where 2–4 times higher mortality was found in the low-income population group (Winkleby and Cubbin, 2003). These inequalities can also be found in Europe, as the Western population exhibits the chance for

an eight-year-longer survival on average than the population of certain Central and Eastern European Countries (OECD, 2016). The influence of GDP and income inequality on mortality structure has been similar in Western and Eastern European countries, but it is seen to a greater extent in women (Spijker, 2014). The European study of Orwat-Acedańska (2019) used Disability Adjusted Life Year (DALY) as a measure of health. The DALYs level was found to be strongly related to several economic, social and environmental factors, including health care spending, alcohol consumption, and air pollution, as well as GDP growth rates and the length of education. A significant correlation with GDP growth rates has been confirmed, which means that DALYs may be affected by business cycle fluctuations. The significant correlation of DALYs with the length of training confirms the important role of education in improving the level of health in society (Orwat-Acedańska, 2019).

3. THE PRESENT STUDY – INDICATORS, DATA AND METHODS

The input matrix recorded data for 28 EU countries from the period 2011–2014, as in that period data was available for all current Member States. It was necessary to consider the optimum number of indicators (variables) with regard to the number of observations, with the optimum ratio being 1:10 in the opinion of the investigators. In the case of the 28 considered EU countries and data from a four-year period, the resulting matrix included 112 observations. Therefore, the decision was made to use 11 variables with a systematic elimination of non-standardised quantitative data.

The selected health indicators were divided into two categories: a) the mortality structure, and b) demographic and socio-economic indicators. The mortality structure sorted by the most frequent causes of death pursuant to the standardised mortality rate (per 100,000 inhabitants; according to the chosen EU standard; WHO classification; WHO, 2016) included 5 indicators: 1) cardiovascular diseases, 2) diseases of the nervous system, 3) neoplasms, 4) respiratory diseases, and 5) diabetes mellitus. These cause-specific mortality indicators were selected due to their high proportion of total mortality (neoplasms, circulatory system and respiratory diseases) and their dynamics of development (nervous system and diabetes; WHO, 2017). The demographic and socio-economic category consisted of 6 indicators: 1) life expectancy at birth, 2) grey dependency ratio (defined as the number of people aged 65+ per 100 persons aged 15–64), 3) the proportion of people with completed tertiary education in the 15–64 age category, 4) the unemployment rate (the share of the registered unemployed per 100 members of the economically active population, age 15+), 5) the risk of

poverty infliction (the proportion of people living below the 60% median annual national income in the total population), and 6) real GDP per capita. Indicators that reflect quality of life and health care, social and economic level, socio-economic status, etc. were chosen in the group of socio-demographic and economic determinants.

The data came from the ECHI Data Tools and Eurostat databases (2018) and was processed in the STATISTICA 12 software. The analyses were based on the composite indicator method (CI; expressed as an index in %). Two CIs were formed for each of the EU countries: 1) a CI for the evaluation of the standardised mortality structure, and 2) a CI presenting the socio-demographic and socio-economic situation. The use of indicator weights was chosen in the case of the mortality structure CI, since some diseases were considered more serious and their mean prevalence was many times higher than the prevalence of other diseases (applied weights, which were determined by the severity of a disease: cancer 0.25; cardiovascular diseases 0.25; respiratory diseases 0.2; diseases of the nervous system 0.1; diabetes 0.2). Furthermore, the data was standardised so that the originally incommensurable data of the sub-indicators became comparable. The *min-max* method was used to standardise and construct the composite indicator (Hendl, 2012). It was calculated for *max* type indicators as:

$$B_j = \frac{X_j - \min\{X_j\}}{\max\{X_j\} - \min\{X_j\}} \cdot 100 \tag{1}$$

It was calculated for *min* type indicators as:

$$B_j = \frac{\max\{X_j\} - X_j}{\max\{X_j\} - \min\{X_j\}} \cdot 100 \tag{2}$$

The last step in assembling the composite indicator is weighing and aggregation. Weighing takes place on the basis of the specified weights by multiplying the standardised data by a given weight. Subsequently, the values are aggregated. Aggregation was carried out by the weighted sum method. The result of this aggregation is a dimensionless CI, on the basis of which we can determine the order of selected statistical units – EU Member States (Hudrlíková, 2014).

The convergence method was chosen to determine the convergence of EU countries over time based on the values of the set indicators.

Two concepts of convergence were defined: 1) beta convergence, based on the assumption that units converge at a point in time (logarithmic values of the variable at the beginning and at the end of the studied period, their mean growth coefficients subsequently transformed to logarithms; a logarithm was used for

asymmetric data distribution), and 2) sigma convergence for variability measurement with standard deviation application. The convergences were compared both for the mortality CI and for the demographic and socio-economic situation CI. For beta convergence measurements, average growth coefficients were calculated from the variables at the beginning and end of the reference period using the formula:

$$\bar{k} = \sqrt[n]{\frac{y_n}{y_0}} \tag{3}$$

Subsequently, these average growth coefficients were logarithmised and the regression line equation was determined by the least squares method:

$$\log \bar{k} = a + \beta \log y_0 \tag{4}$$

According to the slope of the line β, we determined the prevailing tendency. If $\beta < 0$, a convergence occurs, if $\beta > 0$, the predominant tendency is divergence (Hebák, 2013).

Sigma convergence uses variability to measure values, measured by the standard deviation. This should decrease in case of a convergence over time, but in the case of a divergence the deviation increases. In the case of a sigma convergence, we need data from all sub periods and then we calculate standard deviations from the logarithmic data. According to the resulting values, we determined their tendencies (Hebák, 2013).

Cluster analysis is a multivariate statistical method, working with a large number of variables. It was used for the evaluation of spatial disparities on the basis of the CI indices calculated for the averaged period of 2011–2014. An agglomerative clustering was used, the main task of which was to divide the file into several subfiles containing elements with similar variable values. Inside the clusters, the objects in the values of the variables were as homogeneous as possible, while the differences between the clusters must be as large as possible (Hendl, 2012). The aim is to maximise inter-cluster variability while minimising intra-cluster variability. Every object has to belong to one cluster with certainty. The variables were standardised before their entry into the analysis and their mutual correlation was ruled out. Clustering was carried out as hierarchical, when clusters were created gradually, in individual steps. The total number of clusters was then equal to n - 1 (Hebák, 2013). Distance measurements using a square of Euclidean distance were used to assess the similarities between clusters:

$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \tag{5}$$

Based on this method, a distance matrix was created between objects to allow the closest elements to join in a cluster, and a new distance matrix was created. Thus, it was continued until one total cluster was formed, with a matrix of distances of individual object pairs serving as the primary basis for the clustering procedure. Clusters were created using the Ward method, which uses variance. This was calculated for each pair of elements in each step. Clusters always occur between pairs with the lowest sum of variance. This is done until all objects are merged into one cluster (Hendl, 2013). The optimal number of clusters was determined according to the distance matrix and the graph of the distance of the connection of individual objects (Hebák, 2013).

4. THE RESULTS

4.1. Evaluation of EU countries based on the composite indicator

The formed CI of a standardised mortality structure found the most favourable situation in Finland (134.4%), France (126.5%), and Sweden (120.2%). A very good situation was also found in South European countries: Greece (118.4%), Italy (112.2%), and Spain (111.4%), and countries with strong economies, such as Luxembourg (113.1%), Austria (108.4%), and Germany (108.1%). Countries accessing the EU later above-average CI values included Estonia (109.7%), Lithuania (107.8%), Malta (105.2%), and Cyprus (103.8%). The worst results were achieved by Hungary (63.8%), followed by Slovakia (74.9%), Croatia (76.4%), and the Czech Republic (80.7%).

According to the demographic and socio-economic CI, the best situation was clearly found in Luxembourg (165.4%). This classification was applied to both by dint of the very high GDP per capita and the favourable values of the other individual indicators forming the CI (one of the highest chances for survival, a high percentage of people with completed tertiary education, a low unemployment rate, the grey dependency ratio, and a low rate of the poverty-stricken). A good demographic and socio-economic situation was also found in the Netherlands (CI 137.6%), Great Britain (130.7%), Cyprus (130.8%), Sweden (128.8%), Ireland (128.7%), Finland (128.2%), and Denmark (126.8%). The top ten further included Belgium (124.9%), and France (122.2%). This group mainly included the EU founding states and the countries accessing the EU in the first accession waves. Out of the Central and South-East European countries, a relatively good evaluation existed in Slovenia (107.8%), Malta (106.5%), and the Czech Republic (102.8%), while the worst CI values were achieved by Bulgaria (34.3%), Romania (50.2%), Latvia (53.9%), and Croatia (56.9%). Relatively unfavourable results were also achieved by Hungary (64.9%), Greece (65.9%), Lithuania (67.3%), and Portugal (75.0%).

To compare the results for the two CIs, a ladder diagram was formed according to which the EU countries could be divided into 3 main groups: 1) countries with very similar results (whether favourable, average or unfavourable) of both CIs, i.e. the mortality structure and the demographic and socio-economic situation. In the positive sense, these groups included, above all, Sweden and Luxembourg, but also for example Finland, and France. On the other extreme, negative values of both CIs were achieved by Hungary, Croatia, Slovakia, Portugal, and Poland. Malta and Slovenia showed stabilised average values; 2) countries with an above-average CI index of the mortality structure but a weak socio-demography CI (this mainly applies to countries of Southern Europe: Greece, Italy, and Spain); and 3) countries with a low mortality structure CI but an above-average demographic and socio-economic situation CI (this is mainly the case of the North Sea shore countries: Ireland, Denmark, and Great Britain; Fig. 1).

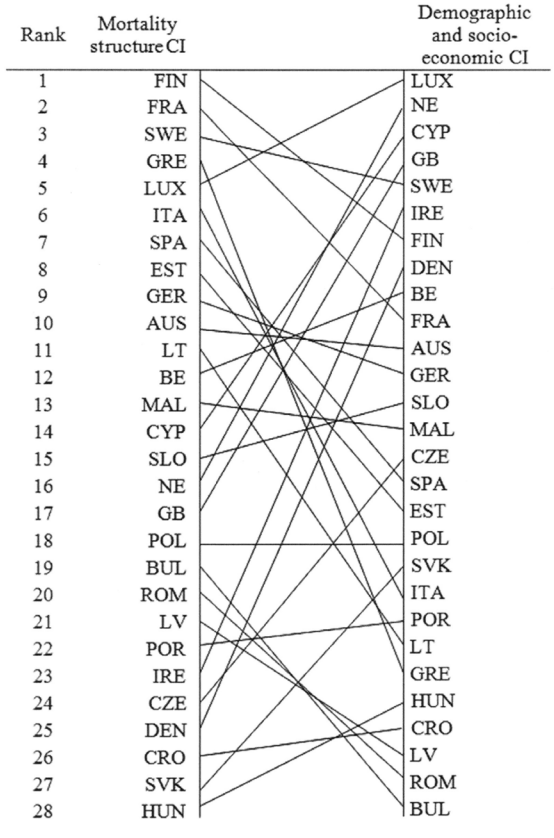

Fig. 1. Ladder diagram of mortality rate CI and demographic and socio-economic situation CI (in the European Union countries, period 2011–2014)

Source: own work based on ECHI Data Tools and Eurostat databases (2018).

4.2. Convergence measurement in EU countries

Although the point diagram line for beta-convergence measurement of the mortality structure CI in the period 2011–2014 was characterised by a negative direction typical of a convergence, the determination coefficient was very low ($r^2 = 0.0298$; $100R^2 = 3\%$). Therefore, the correlation diagram analysis was considered desirable: 1) the first quadrant countries (e.g. Finland, France or Sweden) showed both above-average baseline values of their CIs and the quickest growth rates. In these countries with initially favourable mortality Cis, a further improvement of the mortality condition was observed; 2) the second quadrant countries (Slovakia, Ireland, Denmark, etc.) combined below-average baseline values with a quick growth rate of the measured index. These countries may be said to be quickly improving their initially poor mortality situation; 3) the third quadrant included countries (such as the Czech Republic, Croatia, Hungary, Bulgaria, etc.) with a below-average baseline index showing a further decrease in time, i.e. a worsening of their mortality situation; and 4) and the last quadrant was typical of countries like Greece, Malta, Estonia, etc. where the above-average baseline values decreased over time, i.e. their mortality situation also worsened as time passed (Fig. 2).

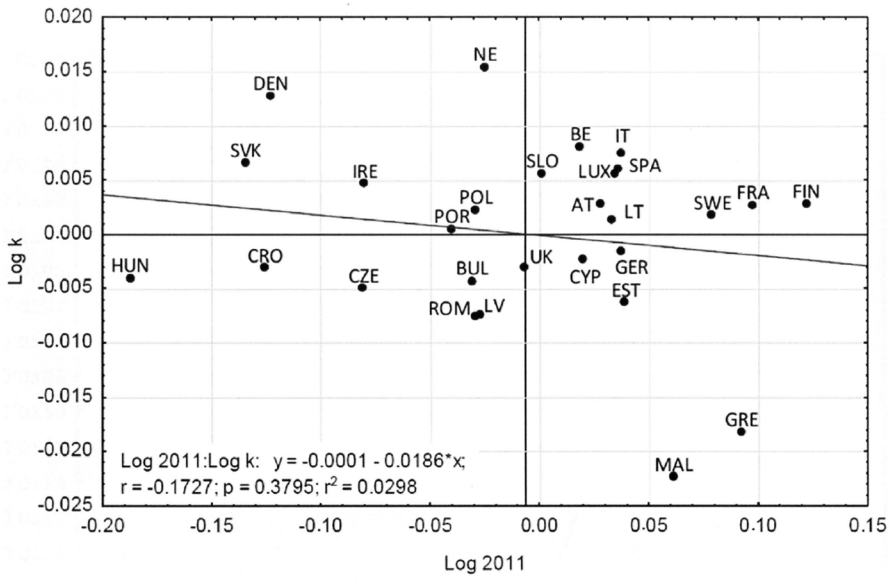

Fig. 2. Graphic representation of beta-convergence for mortality structure CIs (in the European Union countries, period 2011–2014)

Source: own work based on ECHI Data Tools and Eurostat databases (2018).

In the case of the sigma-convergence measurement standard deviations of the mortality structure, CI logarithmic values were calculated for all the studied periods. The standard deviation value progress did not exhibit any clear trend over time, but it rather oscillated. After the initial growth, it dropped again in 2014 with minimum differences between the individual compared years (Fig. 3). It is evident that there is no unambiguous trend of convergence or divergence of the mortality structure CI between EU countries in 2011–2014.

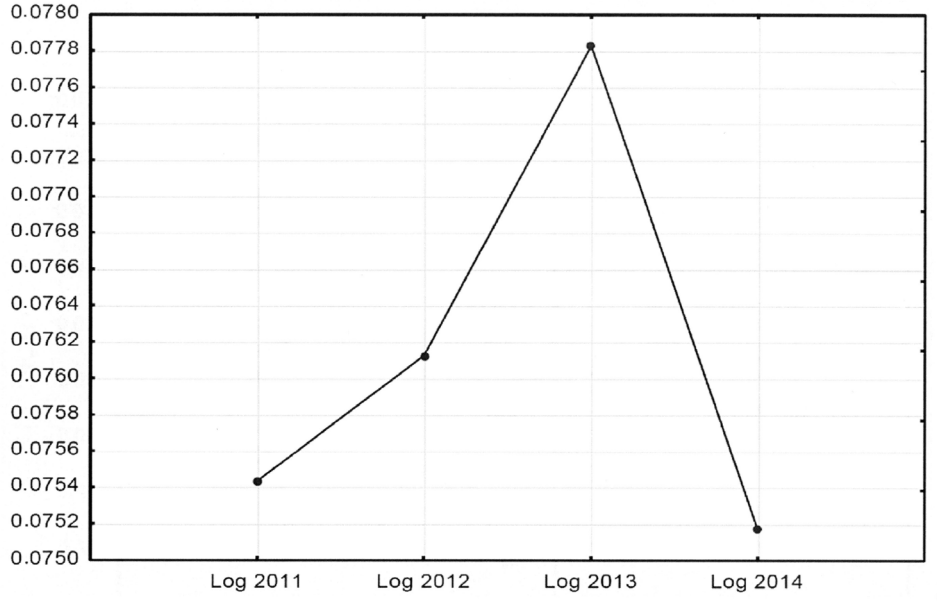

Fig. 3. Sigma-convergence of the mortality structure CI (in the European Union countries, period 2011–2014)

Source: own work based on ECHI Data Tools and Eurostat databases (2018).

The mean growth coefficient of the demographic and socio-economic CI in the period 2011–2014 again showed a negative line direction with a very low determination coefficient ($r^2 = 0.1283$; $100R^2 = 12.83\%$). According to the correlation diagram analysis: 1) the first quadrant countries showed an above-average baseline CI value and above-average CI growth (typical examples include Luxembourg, Austria, Ireland, the Czech Republic, etc.); 2) the second quadrant countries (e.g. Poland, Slovakia, Estonia) showed a below-average baseline value and above-average growth rate of the CI index; 3) the third quadrant was represented by countries (Italy, Greece, Romania, and Portugal) with a below-average baseline index value and a below-average CI growth rate; and 4) the countries located in the fourth quadrant were characterised by above-average initial values

but a below-average growth rate of the measured CI (Cyprus, Finland, the Netherlands, etc.,) (Fig. 4).

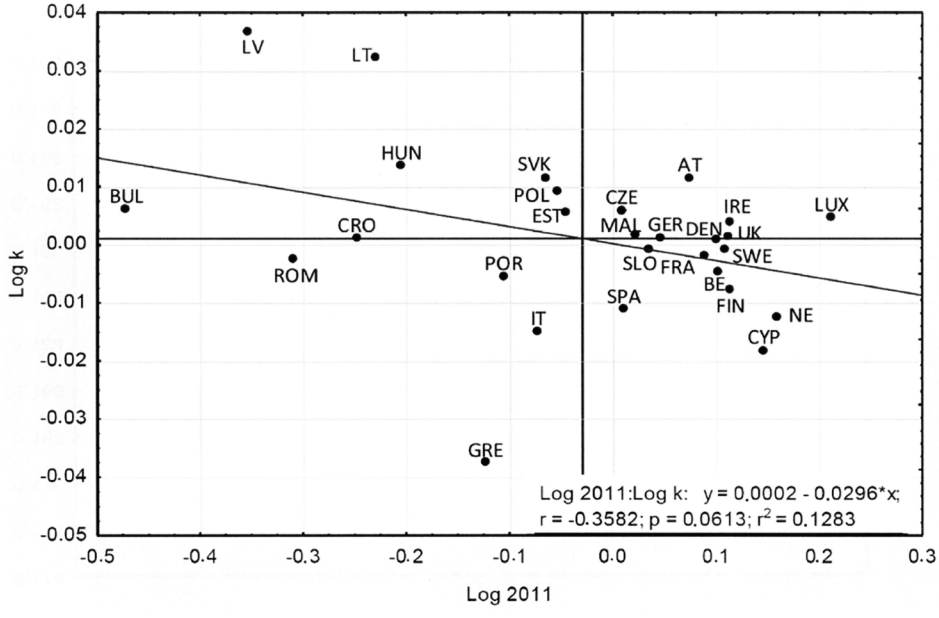

Fig. 4. Graphic representation of beta-convergence for demographic and socio-economic CIs (in the European Union countries, period 2011–2014)

Source: own work based on ECHI Data Tools and Eurostat databases (2018).

The sigma-convergence of the demographic and socio-economic CI did not show any clear convergence trends. In the first years, the standard deviation clearly decreased, indicating a convergence of the countries. In 2014, however, the standard deviation grew again, which reduced the demonstrativeness of the measured model. No clear convergence could be indicated in this case either and in this case the sigma-convergence actually confirms the result of beta-convergence as well (Fig. 5).

According to the beta-convergence results, EU countries and regions wary. There are countries with a favourable and improving mortality structure (Finland, France or Sweden) and countries with an unfavourable and worsening mortality structure (Greece, Malta, Estonia, etc.). This analysis revealed a deepening difference between regions in the EU, especially between the regions of the Northern and Western Europe and the regions of the Southern and Eastern Europe, as is confirmed by earlier research (Meslé and Vallin, 2002). It is evident that there is no unambiguous trend of a sigma-convergence or divergence of the mortality structure CI between EU countries in 2011–2014.

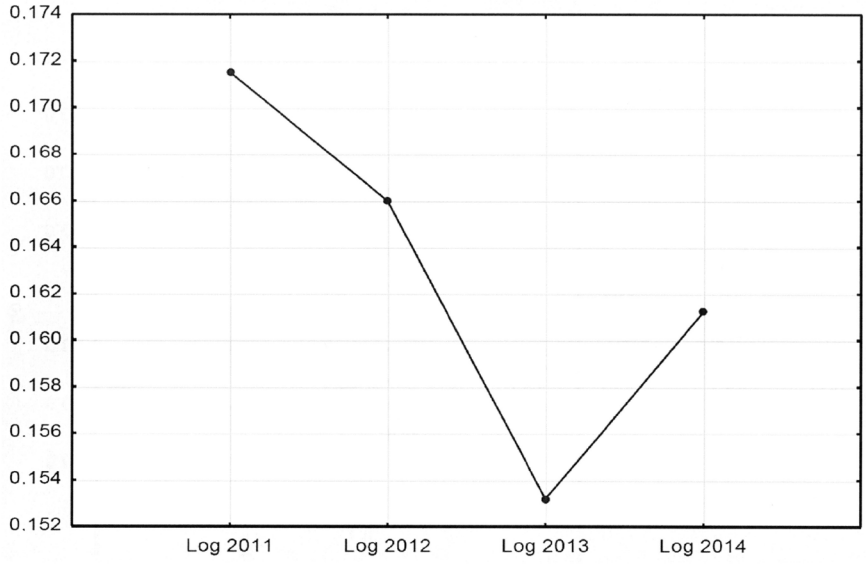

Fig. 5. Sigma-convergence of demographic and socio-economic CIs (in European Union countries, period 2011–2014)

Source: own work based on ECHI Data Tools and Eurostat databases (2018).

4.3. Cluster analysis

The method of cluster analysis offered a spatial grouping of EU countries on the basis of their CIs of the mortality structure and the demographic and socio-economic situation (CI indices calculated for the averaged period 2011–2014). The cluster analysis divided EU Member States into 5 clusters (based on dendrogram analysis, the distance diagram and a subsequent consideration of the possible variants of the clustering process were terminated in step 24). EU countries and their clusters are shown in a point diagram with the *x* axis showing values of mortality structure CIs and the *y* axis representing the demographic and socio-economic situation CIs (Fig. 6).

The CI of the mortality structure found the best situation in Finland (134.4%), France (126.5%), and Sweden (120.2%). The worst situation was found in Hungary (63.8%), followed by Slovakia (74.9%), Croatia (76.4%), and the Czech Republic (80.7%). The best demographic and socio-economic situation according to the compiled composite indicator was found in Luxembourg (165.4%), the Netherlands (137.6%), and in Great Britain (130.7%). The countries of Central and South-Eastern Europe with relatively good results included Slovenia

(107.8%), Malta (106.5%), and the Czech Republic (102.8%). The CI of the demographic and socio-economic situation in Germany (113.4%), and also in Austria (121.7%), was rather unfavourable, although they belong more to the advanced EU countries.

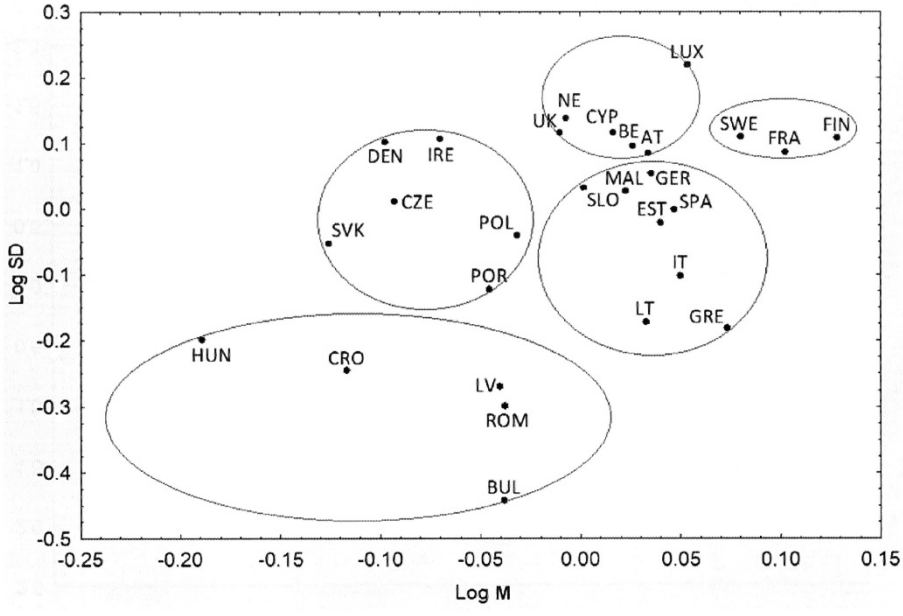

Fig. 6. Point diagram showing the formed clusters (in European Union countries, period 2011–2014)
Source: own work based on ECHI Data Tools and Eurostat databases (2018).

This result was caused by the high grey dependency ratio in the population of Germany and Austria, with a high proportion of individuals above 65. The grey dependency ratio variable, however, did not significantly correlate with the mortality rates in EU countries. Therefore, the process of demographic ageing, more or less manifested in all European countries, does not significantly affect the increase of mortality as a consequence of the most serious chronic non-infectious diseases. Life expectancy increases mainly due to reduced mortality in middle-aged to elderly persons related to reduced mortality caused by cardiovascular diseases. In Central and South-Eastern Europe, life expectancy is lower on average, and yet the cases of premature death form a significant share in the overall mortality. The above presented values of the mortality structure and demographic and socio-economic indicators demonstrate higher mortality related to cardiovascular and neoplasm diseases in these very countries with a lower life expectancy. This trend may be explained by a demographic 'retardation' behind

Western Europe (Rothenbacher, 2013). While population ageing trends and their main causes (low natality and fertility and an increasing life expectancy) are clear, not enough is known about the consequences of population ageing (Börsch-Supan *et al.*, 2013).

The formulation of the qualitative evaluation of the cluster characteristics was supported by Fig. 7 showing standardised values of individual clusters. The 5 clusters were assessed on the basis of the following scale derived from cluster values in relation to the average (Fig. 7): highly above average (cluster 1) – above average (cluster 2) – average (cluster 5) – below average (cluster 3) – very much below average (cluster 4).

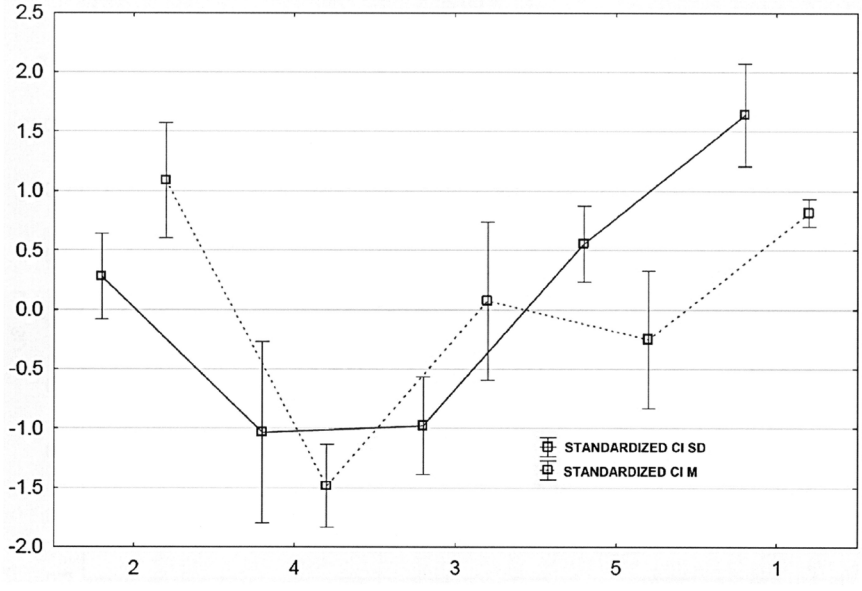

Fig. 7. Standardised cluster values (in European Union countries, period 2011–2014)
Source: own work based on ECHI Data Tools and Eurostat databases (2018).

Cluster 1 – highly above average (Finland, Sweden, France): a high value of the mortality structure index in the EU (i.e. very good situation in the mortality structure). Equally, a very high level of the demographic and socio-economic situation index. Cluster 2 – above average (Belgium, Luxembourg, Netherlands, Great Britain, Austria, Cyprus): slightly above-average values of the mortality structure index. The best or at least positive results of the demographic and socio-economic situation. Cluster 5 – average (Estonia, Lithuania, Slovenia, Germany, Italy, Malta, Spain, Greece): high mortality structure index values (the countries com-

pared very well in the mortality structure with the other EU countries). The demographic and socio-economic situation was rather heterogeneous (the cluster mostly includes countries with below-average values of the socio-demographic index, with the exception of Germany and Slovenia where the value of this index is above-average). Cluster 3 – below average (Denmark, Ireland, Czech Republic, Poland, Slovakia, Portugal): a low mortality structure index (i.e. above-average mortality rates). A demographic and socio-economic situation oscillating around the EU mean (with some countries showing above-average values). Cluster 4 – very much below average (Bulgaria, Romania, Croatia, Hungary, Latvia): low to very low values of the mortality structure index and a very low demographic and socio-economic index (Fig. 8).

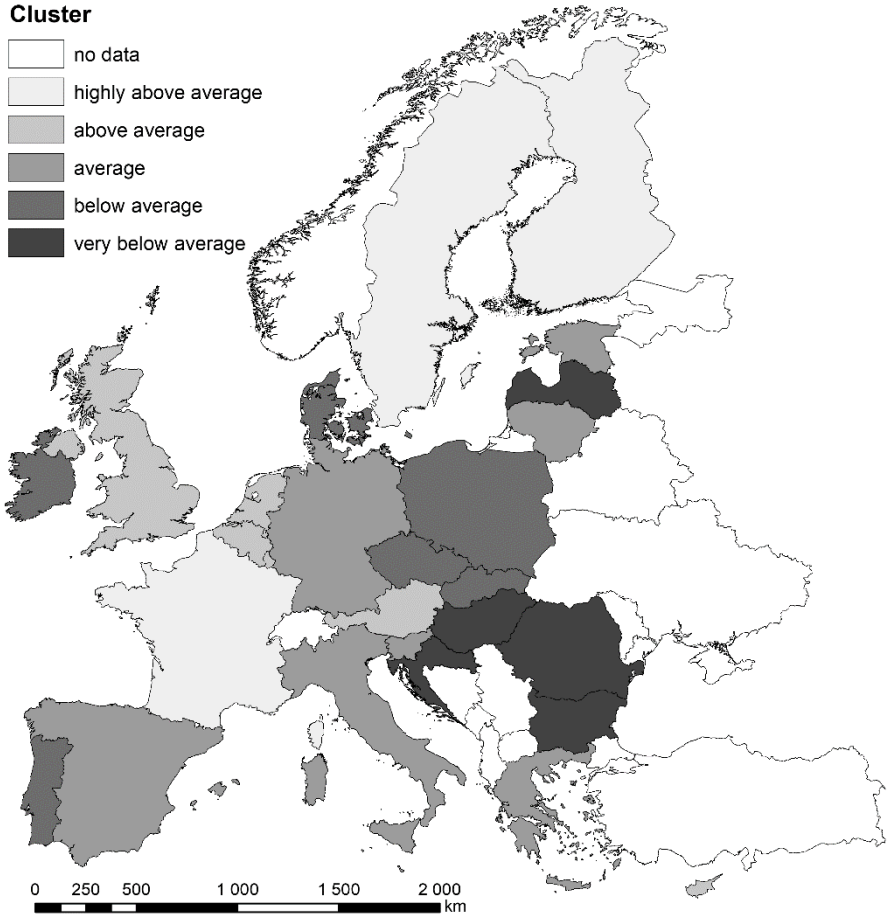

Fig. 8 . Classification and evaluation of EU countries by cluster (period 2011–2014)
Source: own work based on ECHI Data Tools and Eurostat databases (2018).

This territorial structure visibly corresponds to the cluster analysis results for the socio-economic indicators arrived at in the study by Aktaş (2017) and confirms the continuing differentiation between Western (and Northern) Europe and the countries of Eastern Europe (Spijker, 2010; 2014). A major demographic and socio-economic factor conditioning the health of the population also includes education level (Albert and Davia, 2011). The level of education also influences the value of the demographic and socio-economic CIs in our study. Countries with a below-average value of the proportion of people with completed tertiary education were placed in the second half by the demographic and socio-economic CI (Malta, Czech Republic, Slovakia, Italy, Portugal, Croatia, and Romania). These results were also proved by a study on the context of the growth in education and the improvement of mortality in selected European countries and in Russia. Over 80% of the total life expectancy increase is attributable to improved mortality within educational categories (for example, in Finland and the Czech Republic improvements are seen in all educational groups; Shkolnikov *et al.*, 2006). In contrast, the cohort of the analysed European countries showed an increase in, e.g. diabetes-related mortality, in lower-education groups in the study by Vandenheede (2015).

5. CONCLUSION

An OECD report (2016) states that although the quality of health in the EU is generally improving, the differences among EU countries persist, and notes that every year, hundreds of thousands of people in the EU die as a consequence of diseases that could be prevented. Despite efforts to eliminate economic disparities and regional differences, they persist between EU regions, which are reflected in the structure of mortality and the rates of development (Spijker, 2014). In the context of the demographic and socio-economic health determinants, emphasis must be placed on equal opportunities, social justice, and solidarity in the society. Our analysis shows that inequalities in mortality patterns and demographic and socioeconomic determinants are universal in European countries and threaten health inequalities (McNamara *et al.*, 2017). At the same time, social cohesion must be supported along with an improved response to demographic, social and economic changes (Marmot, 2017). In addition, to improve the quality of healthcare and the interconnection to the individual political spheres, it is further necessary to emphasise, for example, the employment policy in the context of which it is necessary to create new job opportunities, support disadvantaged groups on the job market and thus reduce unemployment, and eliminate disadvantageous work conditions. It is further needed to assure the optimum minimum wage level reduc-

ing the risk of poverty among the working population and increasing household income. In the economic context, it is necessary to formulate strategies supporting sustainable economic growth in compliance with health protection guidelines and favourable environmental care (OECD, 2016). Finally, health inequalities are reflected in the demographic structure, geographic aspects and customs and the culture of the population (Brandt *et al.*, 2012).

The critical assessment of the study – the indicator and time period selection might be questioned but both were determined by the limited data availability. For example, there is a short three-year period for convergences, but they still indicate a definite trend of change in development. A certain generalisation of the results cannot be excluded in connection with the investigation of the effects of the analysed determinants either, due to the size of the cohort. The results could be more accurate with a focus on a lower number of countries or case studies of particular countries. The objective of the study, however, was not only to analyse the relationship between the selected demographic and socio-economic factors and human health (morbidity and mortality), but also to apply this relationship to all EU Member States. Another research direction is to expand the study to include environmental factors and to extend the time series with more recent data so that it is possible to assess the convergence of EU countries more objectively and to compare the change and development of the monitored indicators.

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PRIMER ON THE CLUSTER IMPACT ON INTERNATIONALISATION IN THE FORM OF FDI IN THE TIME OF INDUSTRY 4.0

Abstract. The novelty of Industry 4.0 (I4.0) as a research topic means that the literature covering the interrelations between digital business transformation and categories such as internationalisation, foreign direct investment (FDI), or clusters is scant. This paper shows that clusters may contribute to the advancement of I4.0 while at the same time they stimulate the internationalisation of indigenous firms and the inflow of foreign investors. Based on conceptual deliberations it develops a research agenda for exploring how clusters might affect OFDI and IFDI by facilitating the I4.0. It can advance our understanding on the spatial aspects of the ongoing business digital transformation.
Key words: cluster, Industry 4.0, internationalisation, FDI.

1. INTRODUCTION

The recent intersection between international business (IB) and economic geography (EG) or Strategic Management (SM) is still an emerging and rather inconclusive debate (Belussi and Hervas-Oliver, 2016). The novelty of Industry 4.0 (I4.0) as a research topic for international business and economics' scholars means that the literature covering the interrelations between this digital transformation and categories such as internationalisation, foreign investments, or clusters is scant. This paper aims at presenting considerations on cluster's impact on internationalisation, in particular on foreign investment, in the context of the I4.0. First, it presents briefly the main premises of the fourth industrial revolution which is supposed to affect the international business relations, although in a yet unknown way. Next, it shows that clusters may contribute to the advancement of Industry 4.0 (I4.0) while at the same time determining the competitiveness of the region. Thanks to

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the offered scale economies, externalities and other gains, a cluster may not only stimulate the internationalisation and expansion of domestic firms into new markets but also attract foreign investors. This is a result of the shaping of ownership (firm specific) and localisation (location specific) advantages (Dunning, 1980). By compiling these conceptual deliberations, this paper may contribute to the current discussion as it touches upon the so far neglected problem of the differentiation of clusters' impact on both outflowing foreign direct investment (OFDI) and incoming foreign direct investment (IFDI) in the era of digital transformation. It outlines the likely impact of identified channels on ownership and localisation advantages and thus on the capabilities of local firms to outward-looking internalisation and on foreign investors' interests in specific locations.

This paper may add to our knowledge on the role of space in the digital age and contribute to the understanding of the development of the competitive advantages of places and firms in the I4.0 era. Thus, it can also be seen as echoing the issues of "zooming-in and zooming-out", i.e. the multi scale aspects of IB as raised by Mudambi *et al.* (2018). To put the discussion in a broader perspective (Fig. 1), it should be stressed that the analysis zooms in on the indirect role played by clusters in foreign inward- or outward-looking expansion via its impact on Industry 4.0 (thick grey arrow). To the best of the authors' knowledge the available studies only began discussing the impact of I4.0 on broadly understood foreign expansion (Alcácer *et al.*, 2016; Strange and Zucchella, 2016; UNCTAD WIR, 2017; Hannibal and Knight 2018; Laplume *et al.*, 2016) and acknowledge that there are more questions than answers (Chiarvesio and Romanello, 2018). The influence of the fourth industrial revolution on global production networks has been also only recently analysed by researchers including the prestigious EU funded H2020 project MAKERS[1] which covers the general aspects of global value chains (GVC) and industrial districts ID (including clusters) or papers devoted exclusively to mutual relations between I4.0 and clusters (Götz and Jankowska 2017). Against this background, the scholarly work linking clusters with internationalisation – the most advanced form of that, i.e. foreign direct investment (FDI) – is relatively well established (Li and Bathelt, 2018; Jankowska, *et al.*, 2017; Jankowska and Götz, 2017; Pavelková, *et al.*, 2016; Ffowcs-Williams, 2012; Belussi, 2018).

This paper might be classified as a conceptual one – as it seeks to be discursive and cover discussions and comparative studies of other people's work and thinking. As its content is dependent on the author's opinion and interpretation, it might be also categorised as a viewpoint.

By drawing on the critical narrative literature review (Gancarczyk and Bohatkiewicz, 2018) the aim of this paper is to unpack the interdependency between clusters, internationalisation and digital transformation; in particular to recapitalise what is already known in terms of these concepts' mutual relations – i.e. the cluster impact

[1] See more: http://www.makers-rise.org/about/

on internationalisation via fostering I4.0 and to identify the research avenues for further studies in this respect. The considerations presented in this paper may help integrate current research in regional studies with that in international business by incorporating the concept of the fourth industrial revolution.

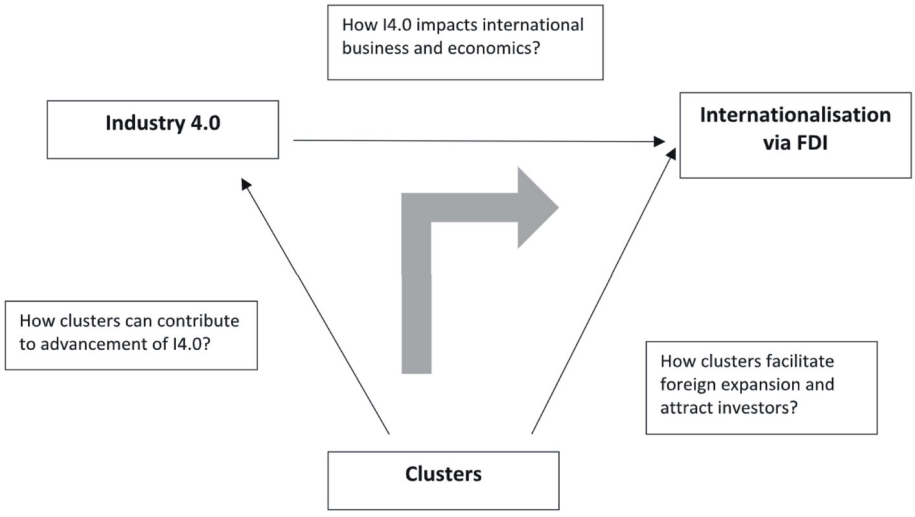

Fig. 1. The analysis triangle: "Clusters-Industry 4.0-Internationalisation"
Source: own work.

Digital technologies can namely have a disruptive impact on the pattern of global and regional production, due to their nature, i.e. the pace, the scope (affecting actually all industries in all countries), and systemic impact (van Tulder *et al.*, 2018; MAKERS). This multifaceted challenge implies high analytical uncertainty. The evaluation of how this impact will proceed eventually can be done only by drawing various scenarios, although, that is burdened with high uncertainty. The final outcome (more polarised world or more dispersed activities) remains unclear, as does the path of the changes – more empowering of small entrepreneurs or stronger MNEs (UNCTAD, 2017; Alcácer *et al.*, 2016). Complex processes associated with I4.0 leading often in opposite directions have their consequences for academics as they result in advancing only highly hypothetical and speculative assumptions.

The available studies indicate the lingering confusion regarding the full influence of I4.0 – understood in terms of both the subsequent new technologies and the organisational changes – on the spatial pattern of economic activity (UNCTAD, 2017; Buckley *et al.*, 2017; Strange and Zuchella, 2017; Hannibal and Knight,

2018; Szalavetz, 2019a, 2019b). In consequence, it remains still open – with new evidence only slowly emerging – whether these processes will reinforce the current regional structure and economic landscape, reconfigure it or rather subvert the existing spatial imbalances (UNCTAD, 2017). In this context, most studies seem to be predicting rather a growth in inequalities and a worsening problem of the asymmetry between the core and the peripheries. That being said, there are also scenarios which assume nimbler and spatially distributed local centres instead of flew large hubs (Strange and Zuchella, 2017; UNCTAD, 2017).

2. INDUSTRY 4.0 WOULD RESHAPE THE INTERNATIONAL BUSINESS

Various concepts and technologies constitute Industry 4.0 (I4.0) or the fourth industrial revolution (Ojra, 2019; Schwab, 2019). They usually encompass: smart factories equipped with sensors and autonomous systems, with the ability to self-optimise and apply autonomous decision-making (Roblek *et al.*, 2016). Industry 4.0 is the embodiment of the fusion of IT and production, of the virtual and the real worlds, a merger of machines, processes, systems and products into smart networks overseeing each other (Kagermann *et al.*, 2013; Hermann *et al.*, 2015). The business digital revolution implies that future manufacturing would be seen as intelligent interconnected technological systems (Brettel *et al.*, 2014; Schwab, 2019; Philbeck and Davis, 2019). The revision of the nature of the competitive advantages of places, strategies of firms, and the architecture and governance structure of IB networks should be anticipated (Alcácer *et al.*, 2016; Strange and Zuchella, 2017). Hannibal and Knight (2018) argued that additive manufacturing (AM) which is inherently related to I4.0 can disrupt the configurations and operations of international business and a specific continuum of households – to global-level manufacturing can be expected. Laplume *et al.* (2016) looked at the impact of additive manufacturing (AM), i.e. 3D printing, on the configuration of GVC arguing that the diffusion of 3D printing technologies may change the role of multinational enterprises as coordinators of GVCs by inducing the engagement of a wider variety of firms, even households. As showed by Buonafede *et al.* (2018), AM has the potential to transform the organisation of GVC forcing MNEs to reinvent their businesses, in particular it could lead to a decrease in a country's participation in GVCs, which demonstrates the likely diminishing reliance on intermediates processed abroad, a falling importance of economies of scale, and (labour) cost-saving strategies. Yet Szalavetz (2018) indicated the impact of advanced manufacturing on the role played by foreign subsidiaries – the production and R&D capabilities and argued that significant upgrading of manufacturing subsidiaries deploying I4.0 technologies would not reduce the gap between lead

companies and manufacturing subsidiaries in terms of value generation (Szalavetz, 2019a, 2019b).

IB research on I4.0 seems to be in its infancy (Chiarvesio and Romanello, 2018) only touching upon some issues, such as the impact of emerging technologies on the structure of global value chains (Laplume *et al.*, 2016; Rehnberg and Ponte, 2016), on the international configuration of companies (Rezk *et al.*, 2016), on multinationals' advantages (Strange and Zucchella, 2017), and on the dynamics of competition (Porter and Heppelmann, 2014). The available studies are often also inconclusive as they cannot identify a clear and direct relationship among investments in Industry 4.0 technologies and international activities (Chiarvesio and Romanello, 2018). The ongoing transformation implies that locational dispersion of activities coordinated by the multinational enterprises (MNE), the competitive advantages of firms, and the structures of IB networks must be adapting. Increasing adoption of modern technology, such as 3D printing enabling additive manufacturing, may at least partially reverse the trend of fragmentation, specialisation and globally dispersed supply chains. Therefore, the GVC's restructuring might result in new geographic landscape rewarding locations close to end-users. On the one hand, new technologies provide new options for dispersed modular activities; on the other, though, they enable the shortening of production stages (Strange and Zuchella, 2017). These processes may increase the power of MNEs as coordinators of GVC, or conversely, empower many small geographically scattered network's or chain's members (UNCTAD WIR, 2017). A certain transition from transactions internalised within MNEs, towards GVC open, international business network structures might be expected. It is reasonable to claim that these fundamental changes and reconfigurations would require and would be accompanied by respective modifications of the antecedents of firms' advantages and localisation attributes. Hence, the fourth industrial revolution would impact the organisation of international business as it would affect the sources of attractiveness of given locations and the roots of firms' competitiveness.

3. CLUSTERS MAY FACILITATE THE DIGITAL TRANSFORMATION AND INDUSTRY 4.0

The findings of previous research demonstrate that despite some perceived incompatibility, clusters and fourth industrial revolution may be reconciled. What is more, clusters can contribute to the development of Industry 4.0 in multiple ways (Götz and Jankowska, 2017). First, our attention should be directed to *knowledge.* The requirements towards cyber physical systems (CPS) which are the backbone of I4.0 are enormous (Monostoria, 2014). These specifications

and properties have obvious repercussions and constitute formidable challenges to scientific and research community. In the light of the complexity of requirements, the knowledge, particularly the uncodified, tacit, available in highly specialised clusters where firms, universities and other entities can work together cannot be underestimated

This importance of proximity – social, cognitive, personal, physical or technological – is further reinforced by the interactive character of learning and idiosyncrasies of knowledge creation, which introduces space as a crucial variable, which must not be neglected even in the era of Industry 4.0 (Leszczyńska and Khachlouf, 2018). The more tacit a piece of knowledge is, the more important geographical closeness and direct interactions become (Cantwell, 1989; Kogut and Zander, 1992). The physical proximity and close multiple interactions, which are characteristic for clusters by dint of to the spatial concentration, can be seen as reflecting the typical for Industry 4.0 merger of stages and functions from R&D to marketing which is facilitated via IT solutions (Kagermann *et al.*, 2013). As I4.0 urges to rethink the current business models, the fractal company offers a promising concept in this respect, which is symbolised by self-similarity, self-organisation, self-optimisation and goal orientation (Warnecke, 1997). A fractal company might be understood in terms of a multi-agent system, where each fractal observes its environment and decides based on the feedback received (Wang *et al.*, 2016). The offers of cluster attributes and coopetition conditions seem to provide the right ecosystem for this kind of interactions (Götz and Jankowska, 2017).

Additionally, it can be argued that clusters imitate also the concept of the connected company which takes form in Industry 4.0. This implies advanced and versatile cooperation of almost everyone with everybody leading to the establishment of a new quality of intertwined relations and vanishing boundaries between firms (Atluri *et al.*, 2017). Experts often stress that the understanding and perception of Industry 4.0 must not be limited just to the digitalisation of production. I4.0 covers the whole ecosystem encompassing people, facilities, machines, technologies, etc. (Agarwal-Brem, 2015; Bharadwaj *et al.*, 2013; Erol *et al.*, 2016) and clusters thanks to the dense web of linkages, spillovers and other externalities may provide such a conducive environment. As the evidence of many clusters show (Bramanti, 2016) clusters can be considered in terms of policy tools organising the pursuit of modern smart reindustrialisation, digital business transformation, and a part of high-tech strategies in many countries (European Cluster Collaboration Platform ECCP).

Summing up, the new advanced technologies facilitating the long-distant communication and collaboration across borders can be reconciled with clusters which can serve as centres of excellence, where the critical for I4.0 knowledge is being developed and perfected. As briefly reviewed by Götz and Jankowska (2017), competence creation, reduced uncertainty or close network relations offered in clusters are just examples of multiple advantages which can facilitate develop-

ment and implementation of the fourth industrial revolution. Clusters can provide a conducive environment which stimulates the discovery, emergence, development and testing of I4.0 technologies. They can act as test beds or laboratories for Industry 4.0 experiments, enabling efficient knowledge creation and dissemination or act as vehicles for the implementation of place-bound smart industrial policies. Clusters can be harnessed as such valuable policy tools with the aim to ensure a smooth implementation of digital transformation, as the Italian law Piano Industria 4.0 or the German leading-edge cluster contest confirm (MAKERS, 2018; Leading-Edge Clusters Competition).

Such initiatives targeting mainly SMEs capitalise on the intrinsic benefits offered by clusters and facilitate more effective employment of the advantages available in clusters in order to foster the business digital transformation. At the same time, they aim to address the emerging I4.0 related challenges such as adequate legal norms, interpretability, skills shortages, unclear and missing definitions or technical standardisation. They also recognise the urgent need of taking into account the idiosyncrasies of domestic companies and acknowledging the territorial specialisations in local context (Cantner *et al.*, 2015). Regardless of the challenges of I4.0, the inherent problems arising due to natural cluster side-effects such as the crowding-out, congestion, members' asymmetry, free riding practices or "job stealing" must be addressed as well (Parrilli, 2019). It should be also noted that the classic concept of a cluster in the I4.0 era seems to face the competition of a new emerging category, i.e. the entrepreneurial ecosystem (Autio *et al*., 2017) which draws on the digital affordances enabling new ways of value capturing and creation. An interesting avenue of study would be, therefore, to investigate the mutual relations between these two concepts.

The distinctive features of clusters and benefits they offer seem aligned with the requirements and challenges posed by I4.0. The following section discusses the role a cluster plays in stimulating the internationalisation processes focusing on the most advanced form, namely on foreign direct investments – both inward and outward (IFDI, OFDI).

4. CLUSTERS CAN INFLUENCE THE FDI AS THEY DETERMINE FIRMS' COMPETITIVENESS AND REGION'S ATTRACTIVENESS

Today, clusters are considered as facilitators of entrepreneurship, creativity, and innovation (Delgado *et al.*, 2014; Florida, 2002; Porter, 1998) and hence as being critical for a country's or region's international competitiveness (Turkina and Van Assche, 2018; Claver-Cortés *et al.*, 2019; Boix and Trullén, 2010; Hervas-Oliver, 2015; Hervas-Oliver and Boix-Domenech, 2013).

4.1. Setting the stage of internationalisation – selected antecedents of FDI

Internationalisation can be understood as an inward and outward involvement in international business (Hessels, 2007; Onetti, *et al.*, 2010). It refers to the adaptation process of the functioning of a firm to the international environment (Chetty and Stangl, 2009). It also manifests itself in the form of resource purchasing as well as selling in international markets (Cassiman and Golovko, 2011). Lam and White (1999) defined internationalisation as a process of increasing a firm's awareness about participation in international activities. Welch and Luostarinen (1988, p. 36) presented firm internationalisation as the process of increasing involvement in international operations. Foreign Direct Investment (FDI) is seen as the most advanced form of internationalisation as it implies the commitment of resources and involves much more risk than other forms of expansion into foreign markets. According to the OECD, FDI is defined as cross-border investment by a resident entity in one economy with the objective of obtaining a lasting interest in an enterprise resident in another economy[2].

The literature on FDI – its antecedents, consequences or models – abounds, and it is certainly beyond the scope of this paper to review even a few selected items. Nonetheless, the seminal contribution to research on FDI was provided by J.H Dunning Investment Development Path (IDP) and Ownership-Localisation-Internalisation (OLI) framework (Dunning, 1993; Narula and Dunning, 2000). The IDP conceptualised that countries tend to go through five main stages of economic development, and these reflect and are closely linked with the propensity of these countries to be outward or/and inward investors (Fonseca *et al.*, 2007). This propensity is related to sets of three advantages: O – ownership advantages of companies, L-location advantages of host economies, as well as on I – internalisation advantages. The empirical elements of conducting FDI and available evidence proved that all three are necessary to explain FDI.

The contemporary literature covers a multiplicity of variations and theoretical considerations as well as empirical evidence on these advantages including further refinements and extensions. Recent papers (Buckley, 2017; Gugler, 2017) clearly indicated the need to expand and develop the research on the role of country-specific advantages and broadly understood home market role in stimulating or preventing the FDI flows via impacting firm specific advantages. The OLI paradigm has been undergoing certain refinements as well. Guisinger (2001) supplemented it to OLMA by adding two more components: *M – mode of entry*, and A – *adaptation* to local environment. Peng (1995) suggested enriching the existing eclectic theory by the so-called learning option advantage.

Besides exploiting the possessed advantages, FDI can be also seen as a vehicle enabling foreign innovations and knowledge abroad and hence facilitating the

[2] https://stats.oecd.org/glossary/detail.asp?ID=1028 [accessed on: 15.08.2019].

learning processes. There are not only refinements of stages of FDI development and diversified relations between the advantages but the importance or even absence of some of them can vary. Cantwell (1989) highlighted that firms start FDI not only with the aim to utilise the capabilities already on hand, but in search of new ones that are not available in their home markets. This motivation has been termed 'technology seeking' or 'knowledge seeking'.

It seems, which available scholarly papers confirm, that the cluster-MNEs relations are very context specific and best when studied when referenced to the method of a case study. In the light of the topic of this paper our further discussion focuses on two advantages, i.e. ownership advantages which explain how a firm's tangible and intangible assets help it to overcome the extra costs of doing business abroad (Reinert, 2012), and location advantages which explain why a home-based MNE chooses to manufacture in a foreign country rather than in its home country. Leaving aside for the brevity of this analysis the multiple interdependencies and intricacies of both advantages, it is necessary to outline the possible cluster's role in shaping them and in consequence the propensity to generate OFDI or attract IFDI in peculiar times of the fourth industrial revolution.

4.2. Internationalisation and clusters

Internationalisation can be broadly defined as "the process through which a firm moves from operating solely in its domestic marketplace to international markets" (Richardson *et al.*, 2012; Javalgi *et al.*, 2003, p. 185). Internationalisation defined in terms of developing links with foreign entities can encompass both the foreign expansion of cluster entities and the attraction of foreign entities into the cluster. While the former from the perspective of cluster inhabitants and a cluster organisation might be labelled as active, outward-oriented internationalisation, the latter can be described as passive, inward-oriented internationalisation (Jankowska and Götz, 2018). The impact of clusters on internationalisation seems to happen via multiple channels (DiMaggio and Powell, 1991; Steiner, 1998; Smith, 2008; Sölvell, 2008; Fornahl and Menzel, 2010; Andersson, 2013; Dohse *et al.*, 2018). Clusters can serve as versatile tools which facilitata both the foreign expansion of domestic firms and the hosting of foreign investors (Gancarczyk and Gancarczyk, 2018; Howells and Hedemann, 2009; Pla-Barber and Alegre, 2007; Zen *et al.*, 2011; Richardson *et al.*, 2012; Dhandapani, *et al.*, 2015; Colovic, Lamotte, 2014). The 'cluster effect' including thick social framework proved to facilitate firm internationalisation, as firms can exchange knowledge and establish close social relationships (Richardson *et al.*, 2012). However, modalities such as the heterogenous type of inventive prowess of firms need to be taken into account when assessing the chances of leveraging the available cluster advantages (Libaers and Meyer, 2011).

Previous studies outlined a simple framework for investigating a cluster's impact on internationalisation (Jankowska and Götz, 2018). They aimed to organise the research on the versatile cluster role in foreign inbound and outbound expansion. It stressed the duality of the cluster concept by highlighting that, on the one hand, these are the natural features of clusters which can facilitate internationalisation of domestic firms, while, on the other hand, it is the dedicated cluster organisation which can foster the foreign expansion of local companies (Fromhold-Eisebith and Eisebith, 2005).

Multiple modes of cluster-related internationalisation could be distinguished. The first channel represents the participation in the internationalisation of clusters as such. These entities often have established brands, they are registered associations or limited liability firms with own management, executive and supervisory boards consisting of representatives of business, R&D sector and regional government authorities. They can themselves be regarded as actors in international relations cooperating with other similar entities. The institutional format may be considered as a proof of the cluster's maturity, though, such official dimension should only complement the natural bottom-up processes leading to cluster emergence and not precede them. The second identified link stresses the internationalisation of cluster members, i.e. its companies. This can be named an outward-looking and active internationalisation as compared to attracting foreign firms from the outside which stands for the inward-looking or passive internationalisation. The expansion of cluster firms into foreign markets might happen indirectly via bottom-up created natural favourable environment or in a more top-down manner by the application of designed and dedicated measures (Nassimbeni and Sartor, 2005; Belussi and Sammarra (eds.), 2010). This assistance might target export or a more advanced form, namely FDI (Gancarczyk and Gancarczyk, 2018; Pavelkova *et al.*, 2016). It is of the highest importance for SMEs and start-ups experiencing the liability of unconnectedness (Baum and Oliver, 1991). A study by Cook *et al.* (2012) demonstrated that clusters do promote OFDI, and the advantages gained in clusters can be the foundations of a successful internationalisation. Clusters can also contribute to the internationalisation processes by attracting foreign firms and their investments – FDI (Malmberg and Maskell, 1999; Guimaraes, 2002; Bekes, 2004; Pandit *et al.*, 2008; Yavan, 2010; Götz *et al.*, 2014; Van den Berg *et al.*, 2001). This pulling effect can be considered in terms of inward-looking, passive internationalisation (more in the following section).

The previous analysis has also sought to determine the antecedents of a cluster's role in internationalisation (Jankowska *et al.*, 2017). It has been argued that the proximity and the critical mass of entities being specialised in a field or industry, in other words, all this what constitutes the backbone of a cluster, enable achieving three main advantages (Götz, 2009), which are: pecuniary agglomeration economies, conducive knowledge environment, and reduced uncertainty. These factors facilitate interactions and cooperation among mainly small and medium firms, tradi-

tionally inhabiting a cluster. More collaboration in turn enables reaching advantages, otherwise beyond the reach for many of these companies due to the their liability of smallness. Knowledge conducive conditions including the spillover processes contribute to innovativeness, whereas pecuniary agglomeration economies and critical mass of specialised entities seem to create the foundations for efficiency advantages (Jankowska *et al.*, 2017). Reduced uncertainty typical for mature clusters with supporting entities such as cluster organisations accompanied by trust relations, mutual understanding, shared values, and norms seem to affect both types of advantages. Therefore, a cluster, by its very nature and idiosyncrasies – specialisation, critical mass, proximity – can offer ecosystem stimulating innovativeness and efficiency, which have an impact on the competitiveness of cluster firms.

Thanks to these advantages, companies are better equipped to internationalise (Humphrey and Schmitz, 2002; Nadvi and Halder, 2005; Bertolini and Giovanetti, 2006; Belderbos *et al.*, 2008; Mudambi and Swift, 2011). If they gain them at home, that fact is regarded as a pre-requisite for a foreign expansion as described in the Uppsala model (Johanson and Vahlne, 2009). The close relationships with other cluster firms additionally shape the advantages, and in the case of internationalisation of one of them, this relationship may work as a springboard for a foreign expansion for other companies (Johanson and Mattson, 1988). This process might be further enhanced by the activities of the cluster organisation, in particular, these focusing on internationalisation (Pavelkova *et al.*, 2016).

Summing up, cluster properties resulting from a spatially concentrated pool of competing and cooperating entities enable achieving concrete advantages. Benefiting from them can materialise via intra-cluster collaboration, which is supported by and also reversely leads to reduced uncertainty, conductive knowledge environment and agglomeration economies. This translates into concrete advantages for SMEs which cannot be underestimated given the liability of smallness from which they often suffer (Aldrich and Auster, 1986; Kale and Arditi, 1998; Hessels and Parker, 2013). The available studies have confirmed that the performance of cluster firms is higher than that of non-cluster ones (Becchetti and Rossi, 2000; Belso-Martinez, 2006) and that such firms internationalise faster (Fernhaber *et al.*, 2007; Zuchella and Servais, 2007).

4.3. Cluster – an attractive place for IFDI

In order to avoid disordered listing of all possible benefits on the one hand, and formulating a statement as unhelpful as "clusters are attractive due to cluster economies / agglomerations form because of agglomeration economies"[3] on the other, three major sources of attractiveness can be distinguished

[3] Actual cit. "So you are telling that agglomerations form because of agglomeration economies" – FUIJTA, M., KRUGMAN, P. and VENABLES, A. (1990), *The Spatial Economy – Cities, Regions, and International Trade*, The MIT Press, Cambridge, p. 4.

(Götz, 2009). As far as the first source is concerned, the need to highlight the agglomeration economies, i.e. the external scale economies accruing to the spatial concentration, is warranted by the fact that they constitute the core of the cluster concept (Porter, 2004) and are the first essential step in a cluster's life-cycle. The theoretical concepts (Marshall's externalities, Porter's competitiveness, as well as the GREMI approach) and the available empirical studies (cluster mapping) confirm the existence of agglomeration economies within clusters. Seen from the perspective of foreign investors, concepts such as efficiency-driven FDI, Knickerbocker's theory of oligopolistic reaction, or Krugman's model of new economic geography can suggest the cluster role in attracting FDI. The benefits of agglomeration economies on FDI are also well documented in many econometrical and statistical studies. It is reasonable to conclude that agglomeration economies present in clusters are of importance for companies pursuing FDI, thus this factor can be perceived as a stimulus for FDI inflow (Götz, 2009).

Broadly understood knowledge as a source of a cluster's attractiveness for FDIs had been distinguished due to the growing role of technology-driven FDIs (Chung and Alcacer, 2002), and an intangible character of this production input including the issue of tacit, sticky, uncodified knowledge (Malmberg and Maskell, 1999; Dunning, 2000; Krugman, 1991; Li and Bathelt, 2018). Theories such as asset-augmenting (exploiting) or knowledge-seeking FDI stipulate the MNEs' interests in gaining access to foreign knowledge sources, whereas Marshall's approach, concepts of regional learning, learning region, or GREMI framework suggest that a cluster may be an environment conducive for knowledge processes. The results of the majority of empirical analyses point to the importance of localised knowledge for foreign investors' decisions (Götz, 2009; Porter, 1998; Storper and Venables, 2004; Belussi and Hervas-Oliver, 2016).

Reduced uncertainty and hence more favourable business conditions can be seen as the third distinct source of a cluster's attractiveness for foreign investors as these suffer the liability of foreigners – they are affected by information asymmetry, higher transaction costs and other problems related to the 'alien status'. This aspect reflects the duality of a cluster's existence – as a 'bottom-up' natural and spontaneous or 'top-down' designed and implemented phenomenon. This source embodies also the idea of 'organising capacity' which as argued by Van den Berg *et al.* (2001) a cluster should provide. This capacity encompassing social support, public-private partnerships, the official strategy, and provided leaderships could alleviate the liability of foreigners experienced by non-local investors and hence contribute to a more friendly business environment.

The reasons of clusters attractiveness for FDI can be surmised as follows. The first factor draws our attention to the financial benefits of an agglomeration of relations between suppliers and recipients and the existence of a specialised labour

market. The second one accentuates the so-called pure technological benefits of agglomeration – the processes of knowledge dissemination. The third one touches upon the issue of the uncertainty felt by foreign investors and the social and institutional dimension of the benefits of agglomeration.

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As it was argued in this section, clusters have the potential to shape the advantages of both – domestic firms (ownership advantages) and hence determine their competitiveness and readiness for international expansion and that of the region as such to attract foreign investors (location advantages). Thus, a cluster can reshape both dimensions of internationalisation – extraversion and introversion aspects of internationalisation processes.

5. DISCUSSION – CLUSTERS IN THE INDUSTRY 4.0 AGE CAN DETERMINE OWNERSHIP AND LOCALISATION ADVANTAGES – ANTECEDENTS OF OFDI AND IFDI

The conceptual consideration presented above confirms the role of clusters for I4.0 and for internationalisation, in particular for FDI (Fig. 2).

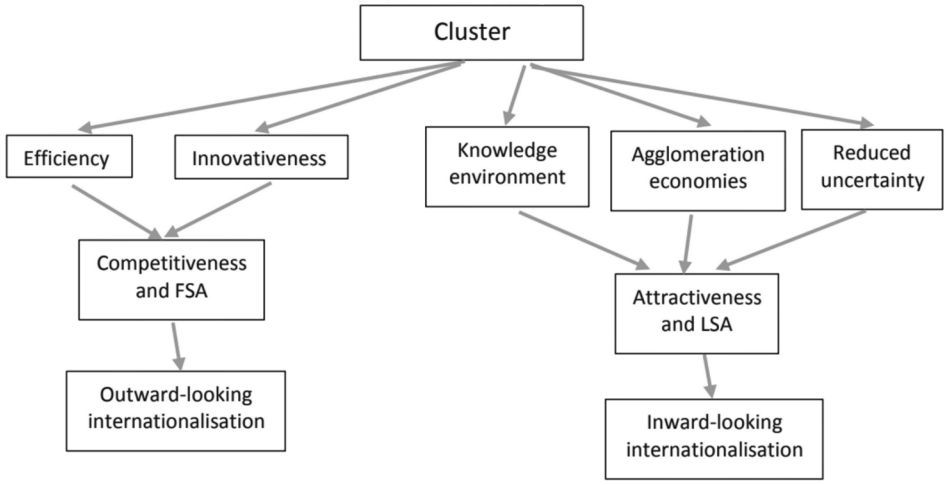

Fig. 2. Cluster impact on internationalisation as diagnosed in earlier studies – summary

Source: own work.

Though, for the moment being as based only on secondary data, it seems difficult to specify the cluster impact on the precise creation of ownership (firm specific) advantages and location advantages separately. Hence, it is difficult to establish the nature or the roots of cluster importance for OFDI on the one hand, and for IFDI on the other hand, during the fourth industrial revolution. As diagnosed in previous studies, clusters can provide a conducive knowledge environment, facilitate the testing of new technologies, and experimenting with new solution by dint of the mutual trust and physical and social proximity. They embody the connected or fractal company characteristic for Industry 4.0 or act as a useful instrument of implementing high-tech strategies of modern, place-bound industrial policies. These findings confirm a cluster's contribution to I4.0 but do not allow to discriminate clearly between creating the ownership or localisation advantages. Thus, it is difficult to distinguish between the impact of the incoming or outflowing investments. The above-mentioned channels seem to shape in the digital era the advantages of domestic companies, members of given cluster, as well as the attractiveness of given region hosting this cluster (see our proposals to be tested – Table 1).

Based on the second-hand data and extant literature one may, however, attempt to specify the channels of influence. It can be speculated that a cluster's diagnosed importance for nurturing the conducive knowledge environment of I4.0 – the centre of competence and the ecosystem of technology transfer – translates into improved innovativeness and hence the competitiveness of cluster inhabitants increasing their specific advantages and thus influencing their propensity of engaging in foreign activities and investing abroad (Zucchella and Siano, 2014; Li and Bathelt, 2018; Mudambi *et al.*, 2018).

Simultaneously, it makes the location more attractive for FDI driven by knowledge-exploring or technology-seeking motivations (Amighini *et al.*, 2013). Recent works not only demonstrated the importance of attracting and absorbing exogenous knowledge, it also stressed the role of anchoring other resources for new path development (Hassink *et al.*, 2019). The fact that clusters epitomise the connected company, or broadly incorporate the merger of functions and blending of activities – so characteristic for digital transformation and vanishing boundaries between sectors – may mean that cluster firms more easily access external scale economies (Marshall, 1920).

Yet a new incoming foreign firm can better benefit from spillovers processes due to lower barriers and synergies effects. The cluster resemblance of fractal company and the provision of coopetition advantages as it seem characteristic for Industry 4.0 may buttress the agility and ambidexterity of domestic firms and by some form of natural selection processes can lead to improved competitiveness facilitating foreign expansion. Such an approach may draw on adaptive processes of internal variation, selection, and retention – VSR (Gong and Hassink, 2019). Foreign investors undergoing the digital transformation when entering clusters can enjoy better takeover options and efficiency gains due to bottom-up rivalry and cooperation, and more flexibility (Fujita *et al.*, 1999; Ando and Kimura, 2003; Mudambi *et al.*, 2018).

Table 1. How clusters might affect internationalisation (OFDI and IFDI) by facilitating I4.0 – research agenda

Channel of cluster impact on I4.0	**Ownership advantage – stimulating OFDI**	**Localisation advantage – attracting IFDI**
Centre of competence and ecosystem of technology transfer	**Innovativeness** and high-tech superiority due to **learning**, shared resources, cheaper access to knowledge base *(increased innovativeness)*	Insourcing, **knowledge exploring, technology-seeking FDI,** leveraging available knowledge, tapping into local know-how *(knowledge environment)*
Connected company and merger of activities	**Externalities** – external scale effects – more easily accessible, flow and exchange of local assets, lower transaction costs, reputational benefits *(increased efficiency)*	**Spillovers** more easily generated and benefited, lower entry barriers, **multiplier effects**, synergies *(agglomeration economies)*
Fractal company and coopetition	Natural selection, solidifying competitive advantages, testing bed for competition oversees, **ambidexterity and agility** *(increased efficiency)*	Better takeover options due to natural selection, **efficiency gains** due to bottom-up rivalry and cooperation *(agglomeration economies)*
Mutual trust, shared norms	**Glue – enabler**, social fabric enabling learning, progress in implementation of risky projects, reduces **liability of smallness** *(increased innovativeness)*	**Social capital facilitates** accessing and sourcing local assets, internalising advantages, assimilating knowledge, impact on **transaction costs and liability of foreignness**_ *(reduced uncertainty)*
Nodes in networks, core of platforms	**Springboard** for expansion abroad *(increased efficiency)*	**Orchestration**, centre of coordination, pool and hub of dispersed activities *(agglomeration economies)*
Tool of regional policy and place bound industrialisation policy	Modernisation, **scale-up**, co-funding *(increased efficiency)*	Assuring **level playing field**, institutional framework guaranteeing some fair conditions *(reduced uncertainty)*

Source: own work.

A friendly business environment in clusters as a result of shared norms, close interactions, and physical and social proximity facilitates the provision and access to many advantages and in fact enables full participation in learn-

ing processes, the implementation of risky projects, reduces the consequences of the liability of smallness, and equips local firms to better venture in foreign markets (Aldrich and Auster, 1986). At the same time this social fabric and reduced uncertainty can help foreign firms entering a cluster to minimise transactional costs and the perceived liability of foreigners and enable them to better internalise the advantages and assimilating the knowledge so crucial for advancing business digital transformation (Zaheer, 1995; Caves, 1971; Hymer, 1976). If one considers clusters as nodes in networks and core of global platforms, then for local firms they can act as springboards facilitating internationalisation (Osarenkhoe and Fjellström, 2019), whereas they help foreign incoming investors orchestrate the globally dispersed yet thanks to information technologies connected activities (Alcácer *et al.*, 2016). Oinas *et al.* (2018) also acknowledged that regions depend on external connections by acting as hosts of economic nodes differently positioned in global industrial systems either as core, intermediate or peripheral nodes. The fact that clusters are often harnessed to pursue a regional development policy and place-bound policy of modern reindustrialisation may enable local firms to engage in the process of modernisation and scale-up and provide them with funding so necessary for expanding successfully abroad (Van den Berg *et al.*, 1997; Richardson *et al.*, 2012). Then again, it ensures for foreign investors a level playing field and can suggest provision of fair institutional framework reducing uncertainty guaranteeing respecting certain rules (Götz, 2009).

The presented and briefly outlined interdependencies are indeed tentative proposals and for the moment being rather speculations requiring further investigations. Diagnosed in the first part of this paper the channels of a cluster's influence on I4.0 cannot be classified as contributing only or predominately 'to' ownership advantages or localisation advantages and hence as being solely or mainly OFDI or IFDI enablers. Rather, each of the identified channels has a potential to influence the skills and capabilities of domestic companies and their readiness for expansion abroad, as well as the pull power of the hosting region and hence the localisation ability to attract foreign investors. And that is particularly true in the light of the nature of "age of temporary advantage" (Fine, 1998).

6. CONCLUSIONS

Our consideration can confirm a cluster's role for both the advancement of I4.0 and for internationalisation, in particular for FDI. Though, it seems difficult to discriminate based only on secondary data clearly between the cluster importance for OFDI on the one hand, and for IFDI on the other, in the time of the fourth industrial revolution. No good justification could be rigorously found which would enable

classifying some identified channels as affecting solely ownership advantages and hence OFDI and some as impacting clearly only the localisation advantages and hence the IFDI. This problem derives also from the fact that while two out of three components of our introductory 'triangle of analysis', i.e. the impact of a cluster on internationalisation and the role of a cluster in advancing I4.0, do not seem to pose much controversy (or remain better explored), the third element, i.e. the influence of I4.0 on internationalisation, is anything but clear. The scant literature indicates there are more questions than answers in this respect and even that development in conflicting directions may happen. In other words, the impact of the fourth industrial revolution on international business is anything vague (Strange and Zucchella, 2017; UNCTAD, 2017).

The scarce research landscape on the spatial aspects of digital transformation is still eclectic and diverse. The conceptual framework presented in this paper and the derived hypotheses certainly need further testing. However, by focusing on the ownership and localisation advantages as coordinates framing the analysis, this paper seeks to address the emerging calls for more crossings between economic geography and international business (Hervás-Oliver and Alcaide, 2016).

Further detailed studies drawing on in-depth interviews with respective investors or well-designed surveys should provide answers to our research questions and dilemmas. They may, for instance, delve more into the subcategories of a firm's specific advantages with relation to digitalisation (Banalieva and Dhanaraj, 2019). It goes without saying that a precise diagnosis of such avenues and establishing clear channels of influence would have practical managerial implications as well as policy-making implications. Despite some shortcomings, this study may enrich the still scant literature linking digital paradigm shifts with clusters (Osarenkhoe and Fjellström, 2017; Molina-Morales *et al.*, 2017). It may be argued, for instance, that the cluster make-up, the size of population, the type of firms included in it – MNEs or SMEs, or maturity as measured by the cluster age – can act as modulators moderating the identified channels via which clusters can contribute to Industry 4.0 development and in consequence can shape internationalisation processes (Fornahl *et al.*, 2015). The information age, digital business transformation and the related fourth industrial revolution is undoubtedly reshaping current structures, relations, dependencies and processes within international economics and business. The full impact remains still unknown. Scholars are now mainly forwarding research proposals and setting hypotheses as to the most likely directions and the scale of the changes I4.0 may bring. Thus, collecting empirical evidence seems essential for properly diagnosing the challenges, for adequately evaluating the impact of Industry 4.0, as well as for designing optimal policies and adopting the right strategies.

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URBAN STRATEGIC PLANNING FROM THE PERSPECTIVE OF WELL-BEING: EVALUATION OF THE HUNGARIAN PRACTICE

Abstract. The present paper evaluates Hungarian strategic urban planning from the perspective of well-being. It conceptualises well-being in line with Amartya Sen's capability approach (CA). We argue that the CA provides a meaningful concept of common good or public interest for evaluation. The open-ended nature of CA allows one to embrace the complexity of strategic planning, but it is definite enough to provide a clear normative framework for evaluation. We base our conclusions on 49 interviews with various local actors in three second-tier cities. We conclude that the CA-based evaluation can supplement the dominantly used conformance or performance-based evaluation approaches. We also found that instead of depicting an unachievable ideal state, the CA is able to provide guidance for feasible steps to further well-being.
Key words: urban strategic planning, capability approach (CA), well-being, agency, Hungary.

1. INTRODUCTION

Strategic planning is a particular and wide-spread way to approach the development of places. Since the 1990s we have witnessed the revival of strategic orientation in spatial planning. This revival follows a former retreat from strategic planning, which was fuelled by post-modern scepticism and the neo-conservative disdain for planning (Albrechts, 2004, p. 743). But by the 1990s, the costs of the neglect of a strategic orientation became obvious (Healey, 2010). The criticism of

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land-use planning, and the acute environmental and social challenges reemphasised the need for strategic orientation (Albrechts, 2004).

Urban strategic planning has also become common in the post-socialist EU Member States. However, these countries followed a different path in this respect. Here the main challenge was to reinvent planning after the era of planned economy and amidst the EU accession process. In the 1990s planners were liberated from the ideological control of the state, which used to degrade planning into a "mere technical discipline" (Maier, 1998), but they found themselves facing new constraints. The rapid increase in the influence of investors and the new-born legitimacy of citizen participation were particularly challenging (Csanádi *et al.*, 2010; Maier, 2012). On top of that, planners also had to navigate the increased importance of EU development funds and the expectations attached to them.

An important theoretical and practical consequence of the revival of the strategic approach is the increased complexity of evaluation. The traditional and more recent evaluative approaches (e.g. conformance or performance-based evaluations) may fail to meet these challenges (Shahab *et al.*, 2019). This resulted in the quest for concepts and principles (substantive normative criteria), on which evaluation could be based (e.g. Alexander, 2002a; Albrechts, 2006). This quest also revived discussions around the concepts of the 'common good' or 'public interest'[1] (Alexander, 2002a, 2002b; Campbell and Marshall, 2002; Oliveira and Pinho, 2010; Murphy and Fox-Rogers, 2015). However, the 'common good' and 'public interest' are highly contested concepts. It is often considered to be difficult or impossible to assign operational meaning to them. Furthermore, they can also function as mere legitimising concepts by power holders (Murphy and Fox-Rogers, 2015).

The present paper attempts to contribute to this discussion. We propose an approach which evaluates urban strategic planning from the perspective of well-being, where we conceptualise well-being in line with Amartya Sen's capability approach (Sen, 1993, 1999). We argue that the capability approach (CA) provides a meaningful concept of the 'public interest' for evaluation.

The capability approach has been used to analyse several local development initiatives, especially in low income settings (e.g. Frediani, 2007; Pellissery and Bergh, 2007; Schischka *et al.*, 2008; Frediani *et al.*, 2014; Gébert *et al.*, 2017). The firsts steps have also been taken in approximating the CA and the planning literature (Fainstein, 2014; Basta, 2016, 2017). As Basta (2016, p. 191) noted: "albeit implicitly, the notion of 'capability' has largely infiltrated contemporary planning discourses." However, the systematic use of the CA in evaluating strategic urban planning has not occurred yet.

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[1] In certain fields of the literature the terms 'common good' and 'public interest' have significantly different meanings. For a detailed explanation see for example Sen (1977). However, in the planning literature they are utilised more or less interchangeably (Murphy and Fox-Rogers, 2015). In the present paper we also consider them as being synonymous.

While there are strong arguments for elaborating on a substantive normative concept, on which evaluation can be based, Newman (2008, p. 1381) reminded us that this endeavour should not result in an excessive attention on ideal solutions. He urged us to shift our attention from the apparent failure to live up to the ideals, and pay more attention to the day-to-day work of actors. This caution is highly relevant for evaluative exercises, where one can be easily tempted to contrast reality with ideals. We argue that the CA provides a promising approach in this respect as well. One of the most important contributions of the CA is indeed bringing actual social realisation in focus, instead of ideals or 'perfect institutions' (Sen, 1999, 2009).

On this basis, we formulate two research questions: (1) how can strategic urban planning in Hungary be judged from the perspective of well-being, where we understand well-being in line with the capability approach? and (2) can the capability approach actually provide guidance in the 'far-from ideal' everyday reality of actors (instead of depicting an unachievable ideal)?

The present paper is structured as follows. In Section 2, we argue for the capability approach as a framework for evaluation in urban strategic planning. In section 3, we discuss the context and the methodology of our empirical analysis. We present our results in section 4. Finally, in Section 5, we link back to our research questions and provide a discussion and conclusions.

2. EVALUATION FROM THE PERSPECTIVE OF WELL-BEING

Evaluation has long been a vital issue in the theory and the practice of planning. However, it is still debated "what should be evaluated exactly" and "what criteria should serve as the basis for evaluative judgements". This issue becomes particularly difficult in the case of strategic planning due to its complexity.

According to Albrechts (2004, p. 747), strategic planning is a "socio-spatial process through which a vision, actions, and means for implementation are produced that shape and frame what a place is and may become". He argued that strategic planning is characterised by the interplay of different rationalities: value (the design of alternative futures); communicative (involving a growing number of actors in the process); instrumental (looking for the best way to solve problems), and strategic (dealing with power relationships). The endeavour of strategic planning is to provide a framework or guidelines for an integrated view on development, instead of controlling or legally binding change.

In the case of legally binding, land-use focused urban planning, the *conformance-based* evaluation of success seemed to be appropriate. Here the success is seen as a plan's ability to fulfil specified policy objectives (Faludi, 1989; Shahab *et al.*, 2019). However, this approach does not fit the complexity and the presumptions of strategic urban planning.

Mastop and Faludi (1997) argued that the *performance-based* approach is more adequate for this purpose. Strategic planning is considered to be a 'social project' (Healey, 2010), where mobilisation, empowerment of citizens and the emergence of networks amongst actors are of high importance (Albrechts, 2006). *Strategic* also implies that some decisions and actions are considered to be more important than others, therefore, much of the process lies in making tough decisions (Albrechts 2004, p. 753). On top of that, planning must face uncertainties: even conceptions about true or false and good or bad may change during the time frame of a plan (Faragó, 2005). Therefore, the success of a plan can be perceived as its ability to guide future decision-making. It is considered successful if it is frequently used or consulted in decision-making processes (Faludi, 1989; Shahab *et al.*, 2019).

However, the interplay of various rationalities, highlighted by Albrechts (2004, p. 752), makes values and power inseparable from what strategic urban planning is. Accordingly, we have witnessed an increased interest in basing evaluations on certain 'extrinsic' *normative criteria.* Various authors put forth normative requirements with regard to the what and how of strategic planning (e.g. Alexander, 2002a; Albrechts, 2006; Oliveira and Pinho, 2010). Shahab *et al.* (2019) argued that neither the conformance-based nor the performance-based criteria are sufficient for the purpose of evaluation. They supplement them by further criteria such as efficiency, equity, acceptability, and institutional arrangements (leaving the controversies of these categories largely unresolved, though).

When searching for normative criteria for evaluation, the concepts of 'public interest' and 'common good' are often emphasised and also critically assessed (e.g. Alexander, 2002b). These concepts continue to play an important role in the practice of planning (for empirical evidence see Murphy and Fox-Rogers, 2015) and evaluation (Oliveira and Pinho, 2010). However, it is often considered to be difficult or impossible to assign operational meaning to these concepts. Their utilitarian conceptualisation is heavily criticised in the planning literature, but several further approaches (e.g. Rawls' theory of justice or Habermas' discourse ethics) are also presented as problematic (Alexander, 2002a, 2002b; Campbell and Marshall, 2002). These considerations often lead to the conclusion that the public interest can be best discovered discursively, through participatory processes (Campbell and Marshall, 2002; Healey, 2010).

Assuming that public interest remains "the pivot around which debates concerning the role and purpose of planning must revolve" (Campbell and Marshall, 2002, p. 164), we believe that it is worth searching for a meaningful and usable understanding of this concept. Further on we argue that the capability approach of Amartya Sen has an added value in this respect:

– On the basis of the CA, planners' criticism towards the concept of public interest can be met. Actually, the CA arose very much from the criticism of utilitarian and rights-based approaches;

– Through Sen's (1977, 1999, 2009) conceptualisation of well-being and social welfare judgement, a clear substantive meaning can be assigned to the notion of public interest;

– At the same time, the open-ended nature of the CA allows one to construct an evaluative space where the various rationalities present in strategic planning can be embraced within a unified theoretical framework.

The CA is a "broad normative framework for the evaluation and assessment of individual well-being and social arrangements, the design of policies, and proposals about social change in society" (Robeyns, 2005, p. 94). It is very much open-ended, and is more of an evaluative framework than a theory with exact definitions (Gasper, 2007). According to Robeyns (2006, p. 371), in contrast to other social studies that use multidimensional frameworks, the CA "offers the underpinnings of a multidimensional empirical analysis, and stresses to a far greater extent the need to integrate theory and practice, and to pay due attention to the philosophical foundations".

On the basis of the CA, an evaluation of strategic planning is similar to the exercise Sen (1977) would call a "social welfare judgement". The aim of such a judgement is to decide whether "a certain change will be better for the society, some members of which will gain from the change while others will lose" (Sen, 1977, p. 53). When comparing gains and losses, the CA builds on a multidimensional understanding of well-being, and emphasises the role of public deliberation in the process of social judgement.

Further in the article we briefly address three features of the CA that are particularly relevant for the evaluation of spatial strategic planning and where the CA may bring new insights into on-going discourses.

First, the CA makes a clear distinction between the *ends* and *means of development*. The CA focuses on human development. It conceptualises well-being as the ability to "lead a life one has a reason to value" (Sen, 1999). *Capabilities* are options, people may choose to do or be.[2] Accordingly, development is the expansion of citizens' freedom to achieve valuable "doings and beings" in life. The CA argues that utilitarian welfare theories, subjective well-being measures (e.g. happiness), and evaluations about primary goods or basic needs are built on an excessively narrow "informational basis" to be able to assess such a multidimensional phenomenon as well-being. Sen (1999) used the notion of *well-being* to indicate its difference from narrower concepts, such as welfare (a core category of the utilitarian philosophy and economics), or standard of living (embracing the material aspects of a good life). This conceptualisation of well-being highlights the inevitable value content of the concept; it shifts attention to the lives people

[2] It is very important to note that the CA makes a distinction between choices (opportunities) and actual achievements. It argues that it is not sufficient to focus attention on the latter, since people may have a reason to value options they do not choose. Hence, the opportunity to choose is an important *element* of well-being.

can actually live (freedom to lead a life); and it connects individuals to the community (talks about reasoned concepts of valuable life).[3]

People's ability to achieve valuable doings and beings in life is poorly indicated by the means (e.g. real income, rights, infrastructure) they possess. The ability to actually utilise those means depends on a series of *conversion factors*: personal heterogeneities, environmental diversities, variations in social climate, differences in relational perspectives, and the distribution within a family (Sen, 1999). Conversion factors characterise the situation in which means are used, hence they are specific to an individual. This brings the diversity of people and their circumstances into the forefront of well-being theories.

This implies that several objectives formulated by urban development strategies (e.g. jobs, income, infrastructure) are actually the means of development from the perspective of the CA. Therefore, the fulfilment of policy objectives (conformance-based success), or a plan's ability to guide later decisions (performance-based success) may have a loose connection to well-being. Conversion factors that reflect the diversity of people and contexts may hinder citizens' ability to actually use the means in order to achieve valuable doings and beings.

Second, the CA explicitly builds on the *diversity of values* and the *diversity of citizens.* It is a pluralist approach in a dual sense (Robeyns, 2005; Gasper, 2007). On the one hand, people may deem different "doings and beings" valuable. This is the point of departure of any collective judgement on community well-being. On the other hand, people are heterogeneous regarding their ability to utilise means.

Third, *deliberative participation* and the *freedom for agency* are central issues for the CA. Agency is understood as a freedom: the freedom to *pursue* one's goals, the freedom to *lead* a life one has a reason to value (Sen, 1999). On the one hand, agency has an instrumental value: it allows actors to bring about more beneficial outcomes. On the other, it has an intrinsic value: it is a valued capability. Therefore, in the CA the process and the outcome of development are equally important for the purpose of evaluative judgements on well-being.

Deliberative participation enables actors to develop an informed opinion about valued capabilities. This is the means for broadening the informational basis of collective decisions and to make collective judgements with regard to development. And it is also the way of creating useful and valid knowledge by considering

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[3] The intention of the CA is to grasp the complexity of a phenomenon instead of reducing it to a single (or few) indicators. *Sustainability*, as something citizens may have a reason to value, can be part of the concept of well-being in the CA. However, we must note that the CA is more equipped to consider the social rather than the environmental aspects of the 'common good'. There have been attempts to better reconcile the CA with the concept of sustainability (e.g. Rauschmayer *et al.*, 2010), but this is rather considered to be a shortcoming of the CA. It is important to be aware of this, since urban strategic planning often takes (at least rhetorically) an integrated approach, where sustainability is one of the core considerations. Accordingly, in the present paper, we occasionally touch upon environmental concerns, but they are not in the focus of analysis. This can be considered as a limitation of our approach.

different sources of knowledge (Bajmócy and Gébert, 2014). Due to its attention on deliberative participation, it is very easy to connect the CA to major discourses around urban planning processes: the importance of collaborative planning, and the theoretical and practical problems around consensus building (Ploger, 2001; Healey, 2003; Hillier, 2003; Innes, 2004). The open-ended nature of the CA also enables one to consider the reality of power relations. It urges one to understand what results in the freedom (or lack thereof) to take part in the development process and directs attention to the removing of the constraints of agency.

To sum up, the CA stresses the diversity of values, objectives, citizens and contexts. Its open-ended nature enables one to embrace such complexity. Yet, it is also definite enough to provide a clear normative framework. Therefore, it has clear implications for strategic planning and evaluation. On the basis of the CA, strategic planning is judged from the perspective of capabilities: citizens' freedom to lead valuable lives. This suggests three main issues for evaluation: (1) how the objectives of strategies fit the set of capabilities deemed to be valuable in a community; (2) how citizens can actually make use of the means of well-being in order to further their ends; and (3) to what extent citizens have the freedom to act as agents during the moulding and the fulfilment of the objectives.

3. EVALUATING URBAN STRATEGIC PLANNING IN HUNGARY

In the following sections, we analyse urban strategic planning in Hungary from the perspective of well-being. We carried out qualitative (interview-based) inquiry in three Hungarian second-tier cities in 2015 and 2016. This period provided special opportunities for two reasons. First, in 2013 and 2014 all the larger cities[4] in Hungary renewed their non-regulatory plans: the urban development concepts (UDC) and the integrated urban development strategies (IUDS). Second, this coincided with the debut of the new procedural requirements of strategic urban planning.

Now we shall briefly demonstrate the context of the analysis; we shall highlight the similarities and the differences among the chosen locations. Then we shall introduce the methodology of our analysis.

3.1. The context of the analysis

We carried out analysis in three cities: Kecskemét, Szeged, and Pécs. All of them are minor cities in global terms, with populations between 110 and 160 thousand people. Regarding urban strategic planning, there are important differences among

[4] Cities with the rights of counties. There are 23 such cities in Hungary.

the three cities, which we will briefly describe later in this section. However, our aim was not to compare the cities, but to gain a detailed understanding of the Hungarian practice. Picking cities with different features allowed us to identify certain commonalities and also helped us compile a more detailed overall picture.

The urban strategic planning in the three cities shares certain similarities that derive from the general Hungarian planning environment. After the regime change, the legal basis for municipal planning was re-created in 1997 by the Construction Act, which focused on legally binding, regulatory, land-use planning. It also mentioned a plan type, which ought to have a strategic orientation and not be focused on land use: the settlement (urban) development concept (UDC). However, the role of the UDC remained marginal. It neither provided a link towards strategic planning at higher territorial levels, nor visions to be considered by regulatory plans (Suvák, 2010).

Following the Leipzig Charter (GP 2007), a new plan type was introduced: the integrated urban development strategy (IUDS). This new plan type was expected to serve as the missing link between conceptual and regulatory planning, and to integrate the economic, social and environmental aspects of local visioning. However, they did not live up to this expectation. Environmental aspects have remained largely neglected (Suvák, 2010), projects outweigh strategies (Barta, 2009), and the potential conflicts among the economic, social and environmental aspects are not identified (Bajmócy *et al.*, 2017).

It is also important to note that in Hungary the spread of strategic orientation in planning is closely connected with the EU accession process and the utilisation of EU development funds, which prevailed among the potential financial sources. Therefore, planning has been totally and constantly funding-oriented in Hungary, which has further intensified since 2008 (Mezei, 2006; Faragó, 2012).

This phenomenon has various consequences. First, strategic planning has become a wide-spread way of approaching the development of places, but its meaning is mostly confined to planning the use of EU funds. Second, the objectives of EU funds and the national strategic reference frameworks (New Hungary Development Plan, Széchenyi, 2020 Plan) reduced the possible scope of bottom-up visioning. Faragó (2012) argued that we cannot even speak about strategic planning in the traditional sense, since the possibilities to carry forward new bottom-up ideas is strongly limited.[5] Third, the uniform EU standards (presumptions about the adequate processes, tools, and meanings attached to concepts such as space, participation, governance or strategic planning) did not necessarily have a good match with the everyday realities of Hungarian actors (Varró and Faragó, 2016). For example, in Hungary the decision-making preferences and the knowledge of urban elites are more focused on fulfilling traditional tasks (asset management,

[5] This has also been supported by a strong re-centralisation process since 2010. However, institutional guarantees of decentralisation had always been fragile (Pálné *et al.*, 2017; Rechnitzer, 2019).

infrastructure-building and public services) and not strategic planning (Mezei, 2006; Suvák, 2010; Lux, 2015).

Apart from these similarities, the three cities represent different contexts for urban strategic planning. Szeged and Pécs are close to the southern border of Hungary. Both of them are strongly shaped by the presence of major universities and research centres, and in the case of both their populations have been shrinking since 1990. The population loss is especially significant in the case of Pécs, which used to be a centre for heavy industry in the socialist era. Kecskemét has a more central location, and its population has increased since 1990.

In case of Pécs and Kecskemét re-industrialisation and foreign direct investment (FDI) have been important elements of urban strategies. In both cases we can detect major events that had significant effect on the local visioning: the European Capital of Culture project in the case of Pécs, and the arrival of a major foreign car producing company in the case of Kecskemét. FDI and re-industrialisation did not play a major role in the case of Szeged. Visioning (but not the actual development projects) has been focused on a 'knowledge-based' economy here. Recently, the foundation of large laser-physics research facility, and the plans of a related science park gave new impetus to the knowledge-based vision. However, it is still too early to assess the effects.

In terms of the process of urban planning, Pécs differs from the other two cities. Participation in bottom-up urban visioning (though mostly confined to the urban elite) has been clearly present here, unlike in the two other cities. In the analysed period Szeged was governed by a party which was part of the opposition in the national parliament.

Based on these characteristics and the prior analysis of the UDCs, IUDSs and the Stakeholder Reconciliation Plans (SRP)[6] we expected to find significant differences in the interviewees' perceptions about the objectives and the procedure of strategic urban planning. This way we intended to gain a more detailed picture of strategic urban planning in Hungary. In the present paper we do not intend to compare the three cities. However, it is worth noting that the patterns we demonstrate in the results were surprisingly similar in all three locations.

3.2. The methodology

We conducted 49 interviews in the three cities in 2015 and 2016. The basic characteristics of the sample are indicated by Table 1. The sample was compiled in two steps. First, we mapped the actors who took part in the planning process,

[6] In the SRP the local governments define the set of actors whom they consider partners (apart from a few public bodies, which are compulsory partners), and the ways they intend to cooperate with them. A communication strategy towards the citizens is also part of the SRP. This plan type debuted in the period of our analysis.

who were mentioned by the documents, or who were active at public discussions in connection with the recent planning process. Second, we supplemented this sample by using a 'snowball method': we contacted actors who were mentioned during the interviews or suggested by the interviewees. We attempted to compile a sample that reflected the diversity of values, interests and opinions.

Table 1. Distribution of the interviewees among cities and sectors

City	Number of interviewees	Sector of an interviewee					
		Civil society organisation (CSO)	Research	Business	Politics	Mayor's office and public sector enterprises	Planning
Kecskemét	15	9	2	4	3	2	1
Pécs	19	2	6	6	3	4	8
Szeged	15	5	1	6	4	1	4
Sum	49	16	9	16	10	7	13

Note: An interviewee may be included in more than one sector. The present table considers 'multiple identities' of the interviewees

Source: own work.

In line with our aim to map the diversity of interpretations, we used a semi-structured 'traveller' interviewing technique, where the topics are basically introduced by the interviewees. The aim was to collect stories and to get acquainted with interviewee interpretations (Brinkmann and Kvale, 2015). The word-by-word transcripts of the interviews served as the basis for the analysis.

We carried out *qualitative content analysis* (Titscher *et al.*, 2000). We restructured the texts into categories derived from the capability approach (Fig. 1). In line with the arguments of the CA, this framework embraced both the outcomes and the process of development (what and how). With regard to the *well-being*, it builds on the distinction between the ends and means and the importance of diversity emphasised by the CA. The main categories of the CA (valuable doings and beings, means, conversion factors) were supplemented by the categories of feedback and the opportunity gap. The former reflects the iterative nature of the planning process (how the experience of former endeavours informs the development processes in the present). The latter refers to the opportunities that are valued by actors, but not brought about or removed by the development (Biggeri and Ferrannini, 2014).

With regard to the *process*, it unfolds the concept of agency. The category of value refers to the inevitable presence of the value choices emphasised by the CA (Sen, 1999). We used Gaventa's (2006) power cube to conceptualise actors'

freedom for bringing about change. Gaventa built both on Lukes' (2005) "three faces of power" and Hayward's (2000) attention on freedom, and highlighted the interconnections of the levels (global, national, local), forms (visible, hidden, invisible) and spaces (closed, invited, claimed) of power. The evaluation of the planning processes usually focuses on the operation of the invited spaces: whether actors have the freedom to participate effectively in that space (e.g. Arnstein, 1969; Maier, 2001) or whether they have the freedom to define and to shape that space (Hayward, 1998; Gaventa, 2006). However, the key for both the constraints and the enablers of agency may be outside the invited spaces, just as it is suggested by Gaventa's (2006) power cube. The last category in our framework attempts to highlight the barriers of participation (not just formal restrictions but all those constraints that may result in the lack of freedom to take part).

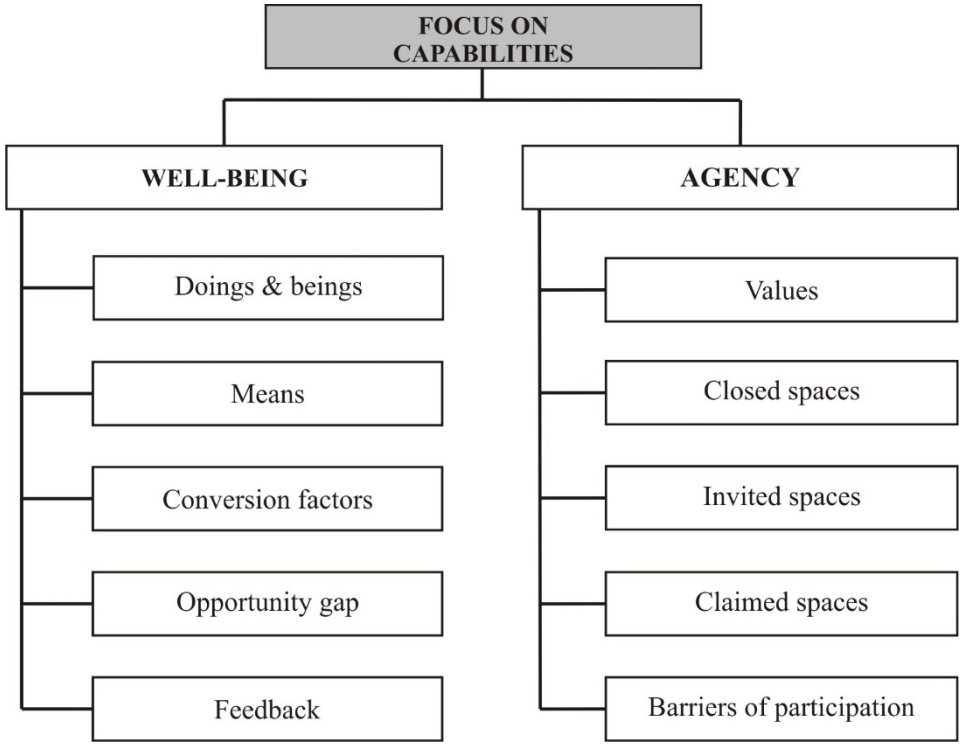

Fig. 1. The analytical framework of the analysis

Source: own work based on Sen (1999), Gaventa (2006), and Biggeri-Ferrannini (2014).

Therefore, our content analysis was primarily based on a deductive coding approach (Titscher *et al.*, 2000); our main categories came from the theory. Then we linked these broad theoretical categories to the reality suggested by the interviews

by splitting them into second and third level 'in-vivo' codes during the qualitative analysis. Each text was coded by two analysts separately, then the differences were reconciled in an iterative process.

We think that the applied method provides certain advantages: (1) the ability to gain insight into the deep structures of a text from the aspect of the CA; and (2) the ability to fill the abstract categories of the CA with context-dependent content. The method also has disadvantages: (1) the deductive logic presupposes the validity and the relevance of the CA in analysing strategic urban planning; and (2) information that does not fit the categories of the CA may remain hidden.

4. THE RESULTS

We concluded in section 2 that an evaluation based on the CA, among other potential influencing factors of well-being, surely embraces the following fields: (1) the relation of strategic aims to the valued capabilities of a community; including the opportunities of actors to actually utilise the means of well-being; and (2) the freedom for agency. In the following paragraphs, we evaluate the Hungarian practice of urban strategic planning alongside these topics.

4.1. Strategic objectives versus capabilities

We found a mismatch between the actual value basis of Hungarian urban planning and the values expected by the interviewees. We also found a mismatch between the objectives of strategic urban planning and the objectives in the sense of the CA.

Several actors criticised the value-commitments of the urban strategies. Numerous civil actors, planners, researchers and some politicians would like strategies to be built on values such as sustainability, human-centred development, social justice or the acknowledgment of local knowledge. At the same time, interviewees generally agreed that the present (and recent) development processes *do not* rely on such values. Should they appear in rhetoric (like sustainability), they are used in insubstantial and inconsistent ways.

> *"The city was thinking big, they were obsessed with large-scale projects." [26; planning]*
> *"They took the weakest definition of sustainability." [21; research]*
> *"Money was pouring to spaces where the children of the local elite spend time […] and the kids from the block of flats: who cares!" [46; politics & CSO]*
> *"I'm not sure that in a Pécs-sized city, when you try to come up with a vision, the most important thing should be an architect having a look at the city map and dreaming big." [23; politics]*

The actual underlying values were manifold. On the one hand, there were pragmatic motivations such as the alignment with the available funds and the directions of national politics, short term political advantages, and individual interests. On the other, we could depict a dominant way of thinking: a quest for large-scale solutions, a focus on major actors, and the priority of economic growth (and competitiveness).

When talking about the objectives of development, interviewees hardly made a distinction between the means and the elements of well-being. When expressing their views on what should be the aims of the strategies, they mostly mention categories such as jobs, favourable business environment, or certain facilities and hard infrastructural elements. These are the *means* and not the *elements* of well-being in the CA. But for most of the interviewees, they seem to be an objective in themselves without considering their allocation, accessibility, or fit to the diverse values and aims of the citizens. Therefore, the belief that the possession of means automatically leads to well-being can be well detected in most of the interviews. When setting the objectives or making evaluative judgments on them, actors tend to disregard the *conversion factors*: under what circumstances do the means actually lead to valuable doings and beings?

The disregard for the conversion factor seems to be institutionalised. According to the interviewees, monitoring and evaluation of the projects did not attempt to gain any sort of information regarding the use (usability) of the end products of the projects and their effects on different local actors. In general, interviewees emphasised a lack of any systematic attempt to learn and provide *feedback* during the strategic planning process.

> *"They built the bike roads, but actually the pedestrians took possession of them and the cyclists can't really use them […] most of the bike roads are useless." [3; CSO]*
> *"They have upgraded the entire square [...] with a pushchair its impassable, the same with a rolling luggage. Practically, they managed to create an inconvenient and useless square. […] This could be prevented; […] it would have come up during joint thinking and planning." [39; CSO]*
> *"The aqua park has been accomplished, it received EU funds, financial reporting was accepted, all's fine; only the citizens can't access." [49; business]*

While most of the actors did not make any explicit references to the conversion factors, they did make an implicit distinction between the means and the elements of well-being. When interviewees talked about the things they lacked or why they regarded certain development initiatives to be unsuccessful (so when they talked about the *opportunity gaps*), they mentioned *conversion factors* and *doings and beings*. They listed several examples where development projects did not lead to the expansion of capabilities (at least for certain citizens): useless bike lanes or bike stands, public spaces or playgrounds without shade, admission fees too expensive for an average citizen or disappearing cultural or natural heritage.

4.2. Freedom for agency

Apart from a few politicians, the vast majority of the interviewees (including the planners) were gravely dissatisfied with the process of urban strategic planning. Almost all the actors highlighted their limitations in acting as agents.

Actors are divided with regard to the value they assign to *participation.* However, this division always refers to the participation of 'other actors'. None of the interviewees declared that their own participation would be unnecessary or valueless. The negative attitude towards wide-range participation is always represented by actors who actively take part in the planning and implementation of development strategies (due to their political, expert or bureaucratic positions).

> *"Lay people, that's a fairy tale. Public debates, CSOs: these are all just political phrases […] That's why we have the representatives in a democracy. […] Voters must put up with what they have chosen, with what is implemented." [43; politics]*
> *"Evidently, we couldn't save the world, […] we considered [participation] to be a point of honour." [21; planning]*

In accordance with the legal requirements, invited spaces were created in all the three cities in connection with the strategic planning procedures. In Pécs, this was also preceded by a series of bottom-up visioning meetings (called the city cooperation). We found that the examination of these invited spaces is not sufficient to understand the opportunities and the barriers of agency. Diversity in value-commitments, and the interplay of different levels (global, national, local) and forms (visible, invisible, hidden) of power, as well as the operation of the formal decision making spaces, influence the freedom for agency.

Invited spaces are basically set up around the ideas of consensus-building, transparency, and the attempt to balance power among actors. However, the everyday reality of actors does not necessarily support these presumptions, therefore the operation of these spaces either becomes irrelevant or biased.

> *"We couldn't implement the principle I wanted. We simply didn't have enough time for that. We had to meet the deadline." [20; planning]*
> *"I simply didn't have the possibility for involving citizens, though, it would have been very important. This perspective was missing from the mind-set of the development agency, […] the political decision makers and also the practitioners." [16; planning]*

The framework conditions of participation, which are set by actors at the national level, are found to be inadequate by local actors (including planners): they are unpredictable, baffling, they do not leave enough time, and they restrict the opportunities for participation in many ways. At the same time, some of the local actors argued that the local power centre whole-heartedly accepted these circumstances and used them as an excuse, while they were interested neither in transparency nor in participation.

For numerous actors, invited spaces of strategic planning were irrelevant. Especially civil actors (but also some politicians, researchers, and entrepreneurs) emphasised that the discussions were narrowed down, and the basic values were pre-set so they cannot really enter the discourse. Interviewees also felt that they could make valuable contributions with their knowledge inputs, but they were only expected to negotiate their interests (and sometimes values). Probably the most severe problem with regard to the invited spaces was the loose (or non-existing) link between the strategic documents and the reality of urban development.

The more we moved towards decision making and implementation, the less importance invited spaces had. Interviewees reported that bottom-up visioning lost its importance even in Pécs. The city-cooperation was co-opted and lost its significance as the legal adoption of the strategic document was approaching. This was very similar to what happened in the preceding planning period, where the bottom-up visioning around the European Capital of Culture was overwritten by the reality of (politically more appealing) infrastructural investments.

"Up until now it's been always the same. The strategies have been compiled and then put in the drawer. No one knew what's in them, and just played by ear. A call was published, there came a politician, a businessman; the businessman talked to the politician; so it goes in Hungary." [20; planning]
"Implementation's gonna be a total disaster. The same as it was in case of the European Cultural Capital. A civil discussion emerged there as well… and then came politics that how can we spend an enormous amount of money on huge buildings […] and similar rubbish." [23; politics]
"Passing them [the UDC and the IUDS] was just one agenda topic out of the 36." [14; politics]
"I don't really come across such [UDC and IUDS] documents. I don't have time to read 50 pages long documents. Neither do my fellow members in the city council. I don't know whom they write these for." [43; politics]

According to the interviewees, urban strategies had limited effect on the actual development processes. What seemed to matter was not the visions and the strategic goals, but the list of development projects. However, the actual project list largely depended on non-transparent deals, hidden forms of power and interventions from the national level. On top of this, the spaces of formal decision making were extremely restrictive due to specific mechanisms in place, such as the alignment to national policy lines, strong party discipline, or the restricted possibilities of gathering information. Members of the city council, according to numerous local actors and even the council members themselves, were almost totally uninformed when passing the strategic documents.

"Processes take place on two levels. There's a visible and there's an invisible process." [31; research & planning]
"The wind evidently blows from Budapest. […] They even add to the wind that is blowing from Brussels. And here, we have to hold on sometimes in a complete windstorm." [28; Public sector]

"Let's revise the IUDC, cause here comes the Mercedes!" [6; planning & research]
"When Mercedes declared they come to Kecskemét, right before that a new IUDS had just been finished […] it had to be re-written immediately." [9; CSO]
"We made an IUDS in line with the concept of sustainable development. […] Recently, I just read in the newspaper […] that the mayor happily announced that they listened to the needs of the experts, and they are going to build an aqua park." [31; research & planning]

Therefore, the actors thought that the influence of the strategic documents on reality was slight. Furthermore, they often encountered major development projects that did not fit the strategic objectives, or led to the re-writing of the strategy. Planners also emphasised that their mandate ended when the plans were passed. They were not commissioned to contribute during the implementation and evaluation.

5. DISCUSSION AND CONCLUSIONS

In this section we link back to our research questions. First, we discuss how local development processes in Hungary can be judged from a well-being perspective. Then we attempt to answer the question whether the capability approach helps us build a bridge between the 'ideal' of local development and the 'far-from-ideal' everyday reality of actors.

5.1. Strategic urban planning in Hungary from the perspective of well-being

The present paper argued for the importance of evaluating urban strategic planning from a well-being perspective and evaluated Hungarian urban planning processes accordingly. We conceptualised well-being in line with Amartya Sen's capability approach (CA). In the following paragraphs we shall demonstrate the added value of an evaluation that is based on the CA.

Our results were rather critical towards the practice of strategic urban planning in Hungary. We must note that the Hungarian urban planning processes could also be severely criticised from other evaluation approaches (e.g. conformance-based or performance-based). According to our findings, the implemented projects did not necessarily lead to the fulfilment of the strategic aims of the urban plans. One of the main reasons for this was the loose connection between the two basic parts of the documents (objectives vs. the list of projects). In other words, severe criticism could be formulated based on a *conformance-based* evaluation.

From a *performance-based* perspective we could argue that the parts of the plans that refer to the visions, principles and aims do not (or hardly) guide decision-making processes, while the project lists do. But basically this means that

the approach of strategic planning is not followed in the every-day reality of urban planning. In other words, severe criticism could be formulated from a performance-based perspective as well.

The CA-based evaluation seems to be able to embrace the arguments that could have been made by conformance-based or performance-based evaluations, but it can also supplement these arguments and provide additional information.

The CA-based evaluation showed that the actual objectives of strategic urban planning in Hungary were actually the means of well-being. Without an increased attention to the actors' ability to convert *means* into *ends* (elements of well-being), the planning endeavour may fail to live up to the expectation, i.e. to "promote better conditions for the many and not just the few" (Healey, 2010, p. x). The *diversity* of actors and their values are largely overlooked. The direct concomitant is the loss of a huge set of relevant information: the specific *conversion factors* (which may result in the outcomes of development initiatives being useless or irrelevant for many actors); *values* that create diverse opportunities and willingness for participation; and the lay / context-dependent *knowledge* possessed by actors.

Our results showed that opportunities for *agency* were gravely restricted for numerous actors. Participation as an element of well-being (a potentially valued opportunity) was not realised. And participation as a means for well-being, which could have helped actors to further more beneficial outcomes, was hardly realised.

The opportunities for *agency* can be better understood when analysing the hidden forms and non-local levels of power than focusing on visible forms and the invited spaces. The main barriers of agency were related to the actors' inability to define and shape the spaces of participation. This also meant that in order to arrive at strategic planning processes that have more potential to lead to well-being and to be elements of well-being, these barriers should be first tackled.

5.2. Towards better strategic urban planning

Unlike certain other normative frameworks that have influenced planning discourses (e.g. Rawls' theory of justice or Habermas' discourse ethics), the capability approach is rooted in a comparative tradition (Sen, 2009). Instead of depicting principles and perfect institutions, it attempts to provide guidance for moving towards better solutions, for example by removing certain barriers of agency or considering additional factors of conversion.

Therefore, the CA does not require actors to act alongside certain strict ideals. This may help one avoid the risk that stems from evaluating planning from a normative stance, i.e. to contrast the always imperfect reality (Newman, 2008) to unachievable ideals. Therefore, the CA may also help one to interpret what actors actually do and provide guidance for their everyday dilemmas.

In this respect we found that the basic categories and ideas of the capability approach do have links to the everyday reality of urban strategic planning. Actors *do* refer to doings and beings and conversion factors when talking about opportunities they lack or assessing the success (or lack thereof) of development initiatives. However, the mind-sets are dominated by the means and not the elements of well-being when discussing the objectives of development. We also found that the value-commitments and the diversity of values are factors that genuinely shape the development processes.

The CA provides strong arguments in favour of deliberative participation. But instead of listing the formal requirements of an ideal process, it provides guidance for furthering well-being by the improvement of the processes. It helps focus one's attention on the factors that result in the *(un)freedom* for agency, and it urges to identify and remove barriers. According to the CA, attempts to remove these barriers would not necessarily result in an ideal process, but would surely result in a better process – one which has more potential to lead to well-being and to be an element of well-being.

This also makes it clear how the real life power relations and value debates are part of the endeavour of planning (i.e. to further the well-being of citizens). An attempt to remove the abovementioned barriers of agency, and to create an authentic dialogue (Innes, 2004) may conflict with values and interests of power holders. Nonetheless, if these circumstances are left unchanged, that might result in planning processes that effectively create legitimacy without actually serving as a space for agency. This would (and does) serve the values and interests of power holders.

The CA does not depict an ideal outcome or a process. However, according to the CA, we have a good reason to suppose that decisions that are better informed in terms of the diversity of citizens and their values (their valued capabilities), and processes that widen the freedom for agency will be better from a well-being perspective. Attempts to make such improvements in urban strategic planning are not exempt from value choices or power struggles. Therefore, they should be subject to transparency and open public debates.

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AN INTEGRATIVE MODELLING APPROACH TO ANALYSE LANDSCAPE DYNAMICS THROUGH INTENSITY ANALYSIS AND CELLULAR AUTOMATA-MARKOV CHAIN MODEL

Abstract. The goal of this study is offer a deep understanding of the landscape dynamics in the Gorgan Township, the Golestan Province, Iran. Landsat satellite imagery of two different time thresholds, i.e. the years 1992 and 2011, was acquired from the US Geological Survey database and the changes were quantified for the Gorgan area covering a 19-year time span. Furthermore, an integrated Cellular Automata-Markov Chain (CA-MC) model was applied to predict future changes up to the year 2030. We used the intensity analysis method to compare the historical dynamics of different land categories at multiple levels. The results indicated that during the 19 years, the built-up and forest areas increased by 2.33% and 0.27%, respectively, while agriculture and remnant vegetation decreased by 2.43% and 0.24%, respectively. The CA-MC model illustrated that in the following 19 years, the built-up areas could increase by 2.45%. An intensity analysis revealed that forest gains and losses were dormant while remnant vegetation gains and losses were active. The built-up area's gains and water bodies' losses were active and stationary during both time intervals. The transitions from water bodies and remnant vegetation to agriculture were regularly targeting and stationary, while the transition from forest to agriculture was regularly avoiding and stationary. Our findings also indicated a heavy systematic transition from agriculture to built-up areas. Regarding the increasing population growth and urbanisation in the region, the outcomes of this study can help make informed decisions for the management and protection of natural resources in the study area.

Key words: landscape dynamics, satellite imagery, Cellular Automata-Markov Chain, Intensity Analysis, Iran.

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1. INTRODUCTION

The concept of land use/land cover (LULC) change indicates the conversion of land utilities and resources (Prakasam, 2010). Change detection analyses are important for studying the linkage between human activities and the changes in the environment (Srivastava *et al.*, 2012). In this context, accessibility to real-time data and updated information on the process of change are key factors for planning, decision making and management. The LULC change process occurs on a large scale and, therefore, we need new technologies in environmental studies to have a detailed, accurate, fast and economical estimation of such changes. Currently, remote sensing (RS) is an efficient technology to access a portion of such data which can also be forecasting and multi-temporal. With a substantial progress in RS and Geographical Information System (GIS) technologies, LULC change mapping is considered a useful methodology for improving land allocation studies for different land categories such as agricultural activities, urbanisation, and industrialisation (Selcuk *et al.*, 2003).

Digital change detection methods applying multi-temporal satellite imagery can assist the interpretation and assessment of landscape dynamics and provide basic data for modelling LULC change processes in GIS environments. Over the recent decades, LULC change studies have played a major role in spatial studies and environmental change investigations (Liu and Deng, 2010) and produced important information for studying and analysing the processes of LULC patterns.

The analysis of the dynamics of LULC arrangements improves our understanding of landscape evolution during a particular period (Warwade *et al.*, 2013). RS has been increasingly applied in updating LULC maps (Lo and Choi, 2004). Landsat images (e.g. TM sensor) have offered valuable and unique observations of the earth's surface over the recent decades (USGS, 2014). Additionally, Landsat images are now freely available to the scientific community and the general public, which means we can obtain plenty of information for land use monitoring and the evaluation of landscape dynamics (Chander *et al.*, 2009; El Bastawesy, 2014).

There are several methods available for monitoring and detecting LULC changes using RS data, yet there is no universal consensus on which model or algorithm is the best in all circumstances (Srivastava *et al.*, 2012). In this case, post-classification change detection methods are known as useful and fast methods that compare bi-temporal images collected by satellites at different times (Abd El-Kawy *et al.*, 2011). The post-classification comparison can supply complete from-to change information but the classification stage of the algorithm is very time-consuming because the accuracy of the classification is very important to achieve an acceptable change detection result (Liu *et al.*, 2004). We used the post-classification change detection method to detect LULC conversions on Landsat imagery.

A wide range of techniques is available to predict LULC changes, each having its own strengths and limitations (Overmars *et al.*, 2003; Verburg and Veld-

kamp, 2005). These techniques include Logistic Regression approaches, Neural Networks, Cellular Automata, Markov chains, Micro-economic, and Multi-agent simulations (Verburg and Veldkamp, 2005). In this regard, Markov chain analysis is a random modelling method that has been frequently applied in the analysis of LULC dynamics at different scales (Muller and Middleton, 1994). Cellular Automata model is a well suited technique for exploring urban growth dynamics (Verburg *et al.*, 2006). Therefore, for modelling future LULC changes, the Cellular Automata-Markov Chain (CA-MC) technique was implemented in this study.

RS and Markov analysis have been applied to predict and model LULC change in many studies over different study areas. For instance, Yuan *et al.* (2005) extended a method for mapping and monitoring LULC changes applying multi-temporal Landsat imagery in the Minnesota metropolitan area in the years 1986 to 2002. Their findings indicated that urban land increased, while in rural areas land use types like forest, agriculture and wetland reduced. Bhagawat (2011) used GIS information to extract land use changes based on statistical analysis of four LULC maps of the Kathmandu Metropolitan area. Gong *et al.* (2015) studied the LULC pattern for the city of Harbin, China. They applied RS, GIS, and CA-MC model to investigate land dynamics between 1989 and 2007. Their results showed that the built-up area increased, while croplands decreased. Halmy *et al.* (2015) studied LULC changes between three dates (1988, 1999, and 2011) in the north-western desert of Egypt using CA-MC integrated approach to simulate future changes. The CA-MC model was applied to simulate LULC changes up to 2023 based on the current trends. Their analysis revealed that an important built-up growth happened in the croplands westward and northward of the landscape, and expansion in quarries, and development in residential centres also occurred in their study area.

The main objectives of the current study are to: 1) provide a map of LULC changes in the study area between 1992 and 2011; 2) apply the CA-MC model to predict potential changes by 2030 based on the existing trends; and 3) employ intensity analysis to calculate the integrity of size and stationarity of land use changes.

2. THE MATERIALS AND METHODS

2.1. The study area

The area of interest spans the Gorgan Township in the Golestan Province, in north-eastern Iran (Fig. 1). The city is the capital of the Golestan Province which is limited to 54° 10'–54° 45' E and 36° 44'–36° 58' N, with a surface area of around 81.16 sq. km. The Caspian Sea and Hyrcanian forests in the northwest

and south of the study area are the main environmental characteristics of this region. The main land uses and land covers are agriculture and forest (Sakieh *et al.*, 2015). The population has increased rapidly in recent years because of high growth rate and immigration in the area (Salmanmahiny, 2013). The growth in the population caused considerable changes in LULC in the study area, and therefore, LULC analysis for sustainable land use has become increasingly important for the government of this region.

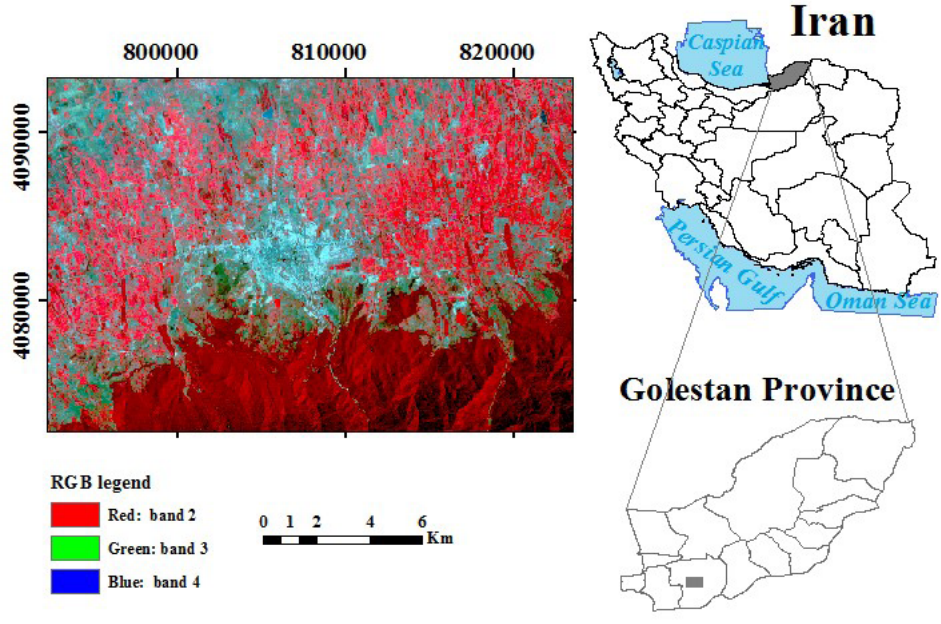

Fig. 1. Geographical location of the Gorgan Township in the Golestan Province, north-eastern Iran
Source: own work based on Landsat satellite imagery.

2.2. Database and Image pre-processing

Landsat TM 5 images with a spatial resolution of 30 m of August 1992 and August 2011 were employed for image classification and LULC categorisation. These images were downloaded from the USGS database (http://earthexplorer.usgs.gov/). The image classification process was conducted in the IDRISI Selva software. For supervised classification of temporal RS data, atmospheric correction step could be relatively safely ignored since separate classification processes can minimise the effect of atmospheric errors (Song *et al.*, 2001). To improve visual interpretation, the ENVI software (v4.4) and the linear contrast

expansion was used (Linear 2%). Then the bands of Landsat 5 were used to prepare spectral bands except for the thermal band (band 6) and the images were cropped for the study area.

2.3. Classification of images

The pre-processed satellite images were categorised applying the supervised maximum likelihood algorithm (MLC) in the IDRISI Selva software. MLC algorithm is one of the most common supervised classification methods utilised for RS images. This procedure is based on the foundation of the probability analysis that a pixel belongs to a specific class (Rawat and Kumar, 2015). The fundamental theory supposes that these probabilities are equivalent for all classes and all input bands have uniform distributions. Among other supervised classification methods, MLC is time-consuming and strongly dependent on the normal distribution of data in entire input bands, and inclined to over-classify signatures with comparatively large values in the covariance matrix; however, the method can also be accurate for LULC classification if training samples were selected correctly (Paliwal and Katiyar, 2015). This classification analyses probability for each cell belonging to a specific land use and allocates a cell to a land use with the highest probability of membership (Rawat and Kumar, 2015).

The Kappa coefficient and error matrix methods were employed to evaluate the mapping accuracy. Five LULC categories including built-up area, forest, agricultural land, remnant vegetation, and water bodies were recognised in the study area. To remove the 'salt and pepper' effect, a mode filter was applied to the resultant classified images (Nahuelhual *et al.*, 2012).

2.4. LULC change detection and analysis

Change detection analyses illustrate changes between images in the same landscape during time intervals. The classified images of different times can detect and reveal temporal LULC changes of a landscape. This analysis is useful to understand changes happening in different classes of LULC such as an increase of urban areas or a decrease in agricultural land (Hegazy and Kaloop, 2015). Post-classification comparison was used to detect and assess LULC changes. A pixel-based comparison was employed in order to produce change information on a pixel basis and make the interpretation of the changes more efficient (from-to change information). The temporal classified images were compared utilising cross-tabulation to distinguish qualitative and quantitative changes between 1992 and 2011. A change matrix (Weng, 2001) was produced in the IDRISI Selva software. Consequently, quantitative information was compiled regarding area extents of different LULC categories and their temporal changes including gains and losses between 1992 and 2011.

2.5. LULC change prediction

There are several methods and analytic tools to predict LULC changes (Overmars *et al.*, 2003). The CA-MC is a projection model which illustrates the probabilistic alterations of a distinct category from one state to another. When applied to LULC layers, the CA-MC often specifies both time and a limiting set of states as distinct values. Transformations between the states of a system are registered through a transition matrix which shows probability of altering from one state to another (Clark, 1965). The CA-MC is a statistics modelling approach that has been frequently employed to analyse the dynamics of the LULC change process at various scales (Muller and Middleton, 1994). Furthermore, The CA-MC model is a powerful technique for predicting a LULC change and was implemented in different studies (Guan *et al.*, 2011; Kamusoko *et al.*, 2009). Further, it can forecast two-way transitions among LULC classes (Pontius and Malanson, 2005). The prediction of future LULC change utilising the CA-MC model can be accomplished in three steps, i.e. by: 1) using the MC analysis between 1992 and 2011 LULC maps to compute transition matrices; 2) computing LULC transition potential maps; and 3) applying the CA model to the transition data (matrices and potential maps) to forecast the spatial distribution of LULC. We used the statistical data of the population to estimate the required area for urban expansion. The population was 418,775 and its growth rate was 1.9 in the year 2011.

2.6. Intensity analysis

The size of an LULC change can be derived from the traditional transition matrix; although to achieve a deeper understanding of the LUC, it is necessary to connect the patterns of changes to processes (Zaehringer *et al.*, 2015). An intensity analysis is a set of relevant methods that facilitates a deeper evaluation of a changing process at multiple levels. This method is an accountancy framework to explain the mechanism of a definite variable within time profiles and to quantify the degree to which LULC changes are non-uniform at different levels of detail (Aldwaik and Pontius, 2012; Enaruvbe and Pontius, 2015). In addition, an intensity analysis (Pontius *et al.*, 2004, 2013; Aldwaik and Pontius, 2012, 2013; Teixeira *et al.*, 2016) substantiates a quantitative framework with a deep analysis of an LULC change, to the former LULC change detection procedure, in connection with either a spatial extension or configuration-based attributes of a landscape (Hasani *et al.*, 2017). An intensity analysis provides an additional level of knowledge since it measures whether a supervised transformation from one category to another diverges from an evidently uniform process (Aldwaik and Pontius, 2012, 2013). Here we present the technical details of an intensity

analysis at three levels of interval, category, and transition. The interval level evaluates how the size and rate of an LULC conversion differs across time profiles. For the corresponding time span, the category level analyses how the measure and intensity of gross gains and losses in each land feature alters across LULC categories. For a specific LULC category, the transition level surveys how the intensity and size of a category's transitions change across the other categories which are available for that transition (Aldwaik and Pontius, 2012, 2013). The uniform change hypothesis value is distinctly quantified for each of these hierarchical levels. In this procedure the uniform change hypothesis is individually quantified for each level.

At each level, the intensity technique searches for stationary patterns across time intervals (Zhou *et al.*, 2014). The interval level analyses the stationarity of landscape patterns and provides a degree of the similarity of pattern changes in different time intervals. The analysis computes the intensity of an annual change in various time intervals and then compares each interval's intensity to a uniform intensity rate of change. The category level analysis gives the intensity of annual gross gains and losses for each category. The stationarity for the annual gross gains and losses means that the intensity of a category's gain or loss is either larger or smaller than the uniform line for all time intervals (Zhou *et al.*, 2014). Therefore, that category is assumed stationary in terms of gains or losses. The transition level calculates the given transition intensity from say category ***m*** to category ***n***. For the transition level of the gains or losses, stationary means that the gain of category ***n*** either targets or avoids category ***m*** for all time intervals, or the loss of category ***m*** either targets or avoids category ***n*** for all time intervals, so the transition from ***m*** to ***n*** is stationary, considering the gain of category ***n*** or the loss of category ***m*** (Zhou *et al.*, 2014; Pontius *et al.*, 2013).

3. THE RESULTS

3.1. LULC cover images

The classified images achieved from pre-processing and supervised classification are illustrated in Fig. 2 that shows the magnitude of change for different LULC categories. These maps show the LULC patterns of the study area. To assess the accuracy of classification, the LULC maps were compared to the reference data created using a collection of 100 sample points (with random distribution) on Google Earth. The results of accuracy assessment indicated the overall accuracies of 96% for 1992 and 91% for 2011. The Kappa coefficients for 1992 and 2011 maps were 0.81 (Table 1). A short description of these results is presented below.

Table 1. Landsat imagery classification accuracy

Variable	Land Use 1992	Land Use Tm 2011
Kappa Index	0.81	0.81
Total Accuracy (%)	96	91

Source: own work

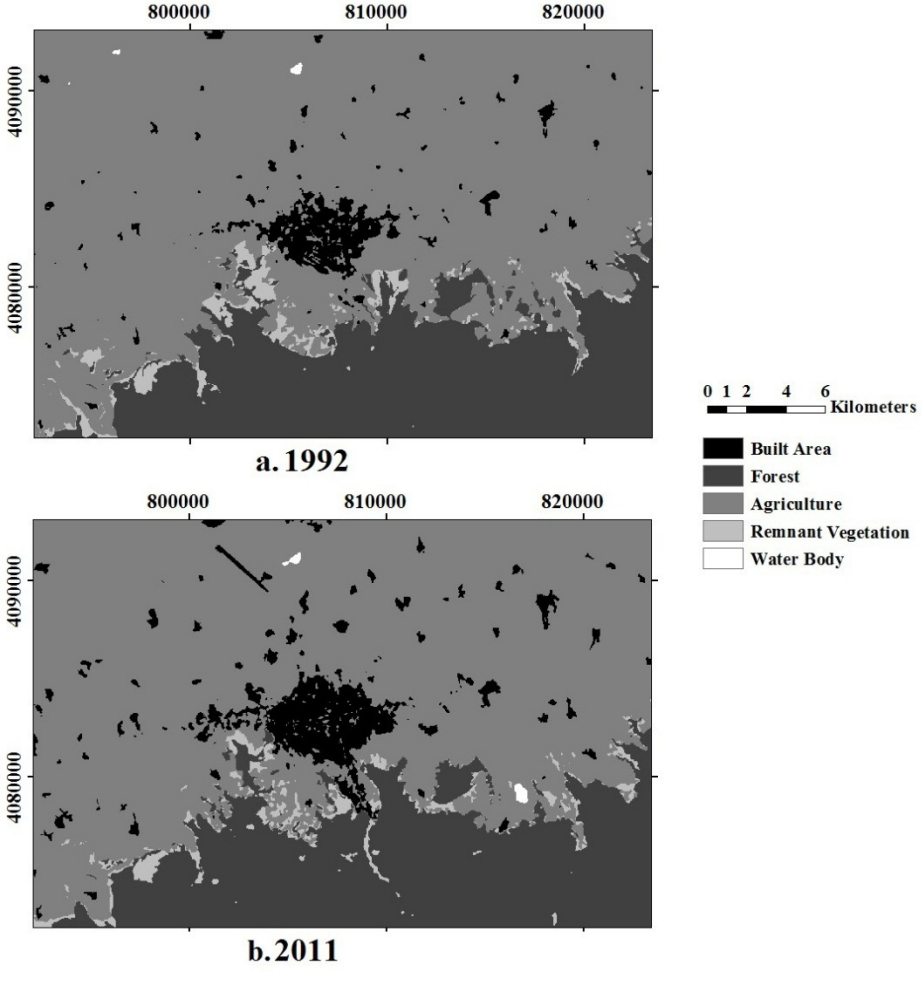

Fig. 2. Temporal LULC layers of Gorgan Township

Source: own work.

3.2. Change detection analysis

Fig. 2a and Fig. 2b portray the LULC spatial distributional pattern of the Gorgan Township area for the years 1992 and 2011, respectively. The main factors of land changes were recognised in the study area and completed using the available technical reports. The principal type of human-caused land alteration was urbanisation (Salmanmahiny, 2013). The LULC variables were calculated to assess land changes by applying multi-date satellite images for the period 1992–2011 (Tables 2, 3 and Fig. 3). These data sets reveal that in 1992 the built-up area covered 3.25% (23,864 cells), forests covered 24.70% (181,308 cells), agriculture covered 69.34% (508,938 cells), remnant vegetation covered 2.66% (19,474 cells) and water bodies covered 0.05% (366 cells). Up to 2011, the built-up area rose to 5.58% (40,983 cells), forest increased slightly and reached 24.97% (183,269 cells), agriculture shrank to 66.91% (491,065 cells), remnant vegetation decreased to 2.42% (17,762 cells) and water bodies changed to 0.12% (871 cells) (Table 3).

Table 2. Change detection matrix of the Gorgan Township in 1992–2011

Year / LULC categories		2011				
		Built-up area	**Forest**	**Agriculture**	**Remnant vegetation**	**Water body**
1992	Built-up area	21,744	0	0	0	0
	Forest	47	174,328	2,581	4,025	327
	Agriculture	19,122	3,043	478,568	7,907	298
	Remnant vegetation	70	5,898	7,676	5,830	0
	Water body	0	0	120	0	246

Source: own work.

Table 3. Area of change in different LULC categories in the Gorgan Township in 1992–2011

LULC categories	1992		2011		Change rate 1992–2011	
	cell	**%**	**cell**	**%**	**cell**	**%**
Built-up area	23,864	3.25	40,983	5.58	+17,119	+2.33
Forest	181,308	24.70	183,269	24.97	+1,961	+0.27
Agriculture	508,938	69.34	491,065	66.91	-17,873	-2.43
Remnant vegetation	19,474	2.66	17,762	2.42	-1,712	-0.24
Water body	366	0.05	871	0.12	+505	+0.07
Total	733,950	100	733,950	100	0	0

Source: own work.

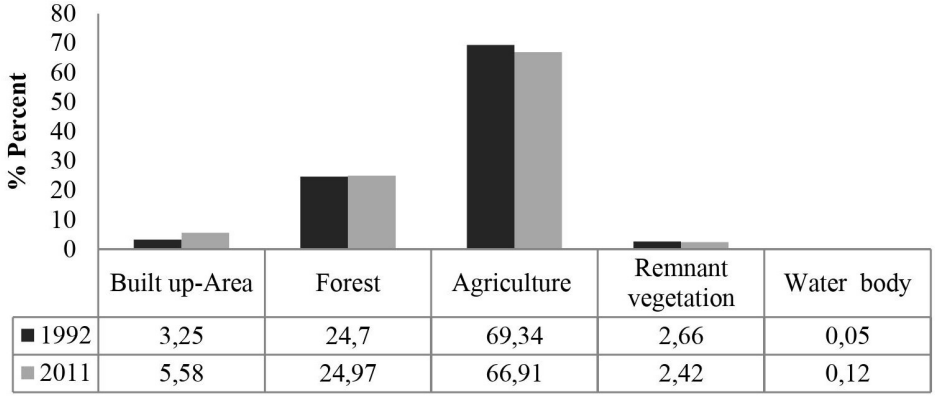

Fig. 3. Illustration of LULC changes in percent (1992–2011) in the Gorgan Township
Source: own work.

3.3. CA-MC model results

An examination of the transition probabilities in Table 4 indicates an increase in the built-up area and a decrease in agriculture during the studied intervals. In each of the study intervals, each LULC category experienced increases in some localities and decreases in others (Table 5). The land cover maps of the years 1992 and 2011 were used to predict the 2030 LULC layer. Future LULC changes and statistics are given in Fig. 4 and Table 5.

Table 4. Transitional probability matrix derived from the land use/land cover map in the Gorgan Township in 2011–2030

Year / LULC categories		2030				
		Built-up area	**Forest**	**Agriculture**	**Remnant vegetation**	**Water body**
2011	Built-up area	29,693	0	0	0	0
	Forest	251	14,0525	14,042	26,386	0
	Agriculture	18,448	0	367,601	0	0
	Remnant vegetation	35	510	8,492	2,725	0
	Water body	0	0	0	0	444

Source: own work.

Table 5. Land use statistics of the Gorgan Township during 2011–2030 time profile

LULC categories	2011		2030		Change rate 2011–2030	
	cell	%	cell	%	cell	%
Built-up area	40,983	5.58	58,994	8.03	+18,011	2.45
Forest	183,269	24.97	183,285	24.97	+16	0
Agriculture	491,065	66.91	473,585	64.52	-17,480	-2.39
Remnant vegetation	17,762	2.42	17,241	2.37	-521	-0.05
Water body	871	0.12	845	0.11	-26	-0.01
Total	733,950	100	733,950	100	0	0

Source: own work.

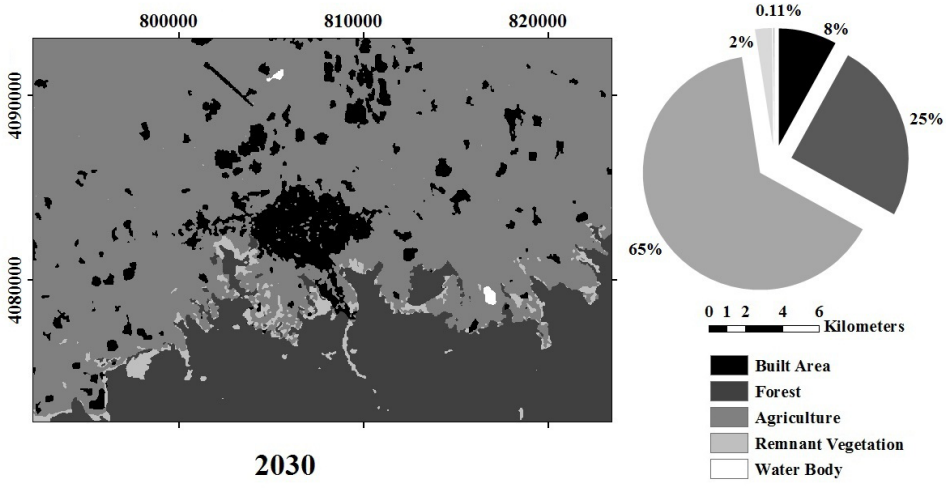

Fig. 4. Temporal and predicted LULC layers for the Gorgan Township in 2030
Source: own work.

3.4. Results of the intensity analysis

The interval level intensity analysis produced Fig. 5 in which bars to the left of the graph display the change areas and those to the right indicate change intensity of time intervals. The left side of Fig. 5 reveals that the speed of change in the first time interval was larger than that of the second time interval. Based on Fig. 5, the uniform change intensity was calculated to be 0.26% of the study area. With

regard to the uniform intensity line, if an interval's bar passes beyond the uniform line, it indicates the change is comparatively fast for that time interval, otherwise, the change is comparatively slow for that time interval. In this regard, change intensity seems to be slowed through the second time interval in which the intensity of the LULC conversions did not exceed the uniform line.

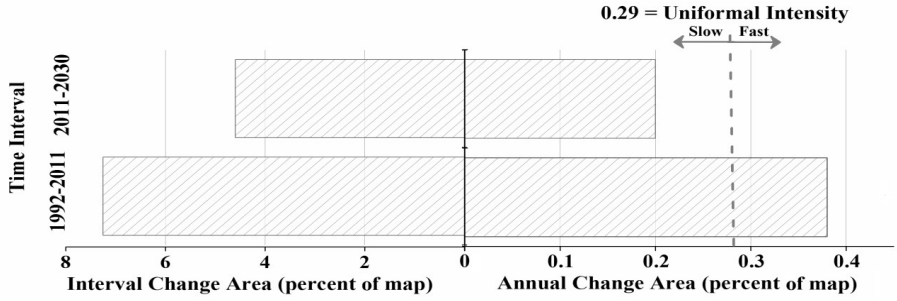

Fig. 5. Time intensity analysis for the periods 1992–2011 and 2011–2030. The hypothetical uniform change intensity at the time interval level is indicated by the dashed vertical line

Source: own work.

The results of the intensity analysis at the category level are shown in Fig. 6. In this figure, each category has a pair of bars that indicates gross gain and gross loss of the corresponding category. The dashed vertical lines display the value of uniform annual change intensity across the study area. If a bar expands beyond the dash uniform line, the change is comparatively active for that category; otherwise, the change is comparatively dormant for that category. Bars on the left-hand side of the graph show gross annual area of losses and gains, while those on the right display the intensity of annual gains and losses for each category in the study area. Based on Fig. 6, the value of the uniform change intensity was computed to be 0.38% (1992–2011) and 0.15% (2011–2030) in both time intervals. Such values indicate that the dynamics of the landscape at an LULC category tended to be more intense through the first time interval. Fig. 6 shows that the built-up area has the largest size regarding annual gains during both intervals. Agriculture has the largest size in terms of the annual losses during both time intervals. Forest gains and losses were dormant for both time intervals while the gains and losses of remnant vegetation were active during these times. The right side of Fig. 6 demonstrates that the bars for loss of remnant vegetation and water bodies expand beyond the dash uniform line in both time intervals, indicating that the remnant vegetation sustained losses more intensively in the landscape compared to other categories.

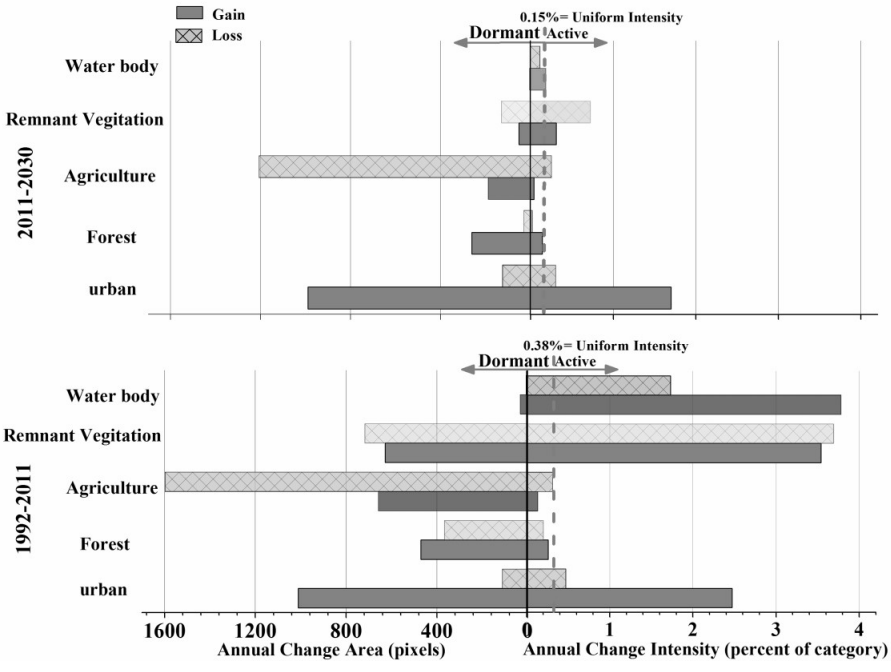

Fig. 6. Category intensity analysis for gross gain and gross loss at the category level for the periods 1992–2011 and 2011–2030

Source: own work.

Fig. 7 illustrates the results at the transition level for the LULC categories. Fig. 7 highlights that the intensity change has slowed through the second time interval at the transition level of the LULC conversions in general. The left side of the graph displays gross annual area of transitions, while the right side of the graph displays the intensity of annual transitions. Fig. 7a illustrates results of the transition level intensity analysis in relation to transitions from water bodies, remnant vegetation, agriculture and forest to built-up area. Fig. 7a reveals that the built-up area gains target agriculture and avoids other categories in the two time intervals. Thus, the transition from agriculture to built-up area is stationary, regarding the gain of the built-up area. Fig. 7b represents the interactivity between the agriculture category and other land features, and shows the annual rate and the transition intensity from other categories to agriculture use. Fig. 7b reveals that agriculture gains target remnant vegetation and water bodies and avoids forest category for both time intervals. Thus, the transition from forest, remnant vegetation and water bodies to agriculture is stationary, regarding the gain of the agriculture category. This exists when agriculture gains, it tends to gain intensively from both

remnant vegetation and water bodies more than from other categories. Based on these results, a series of important systematic transitions in the study area can be identified. In this regard, there are systematic transitions from remnant vegetation to the agriculture category and from agriculture to built-up area.

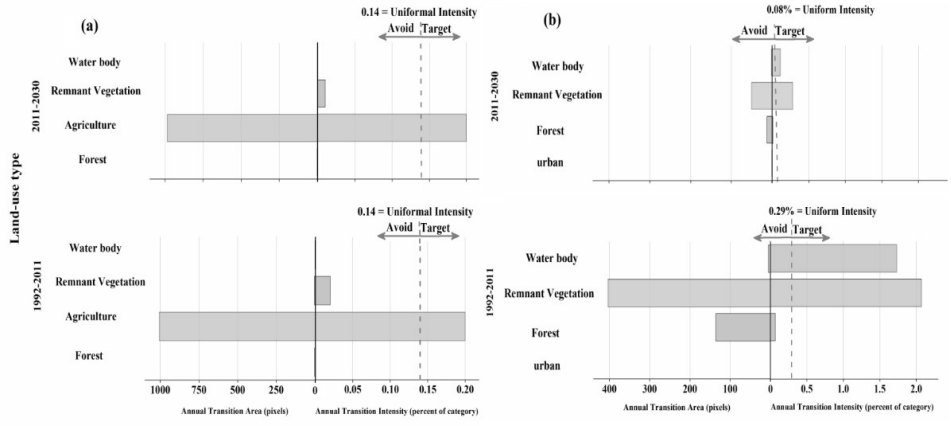

Fig. 7. Transition intensity analysis for two time intervals: 1992–2011 and 2011–2030

Source: own work

4. DISCUSSION

In this paper multiple methods were used to illustrate the dynamics of the study area in terms of LULC features, changing intensities, and predictive CA-MC model. The main findings of the present study are described in the following paragraphs.

Fig. 2 and 4 display how the overall change is accelerating in the two time intervals. Population growth is the major cause of the LULC change process in the area (Halmy *et al.*, 2015, Rawat and Kumar, 2015). A population increase is one of the important issues that exert heavy pressure on land resources by accelerating and intensifying the LULC change process (Nitsch *et al.*, 2012; Sakieh *et al.*, 2015). The data recorded in Table 3 and Fig. 3 indicates that significant changes (increase and decrease) happened in the LULC pattern of the Gorgan Township in the first time interval (1992–2011). Within the initial time interval, the built-up area increased from 23,864 cells in 1992 to 40,983 cells in 2011, which accounts for a 2.33% change of the total study area. Because of the forestry projects in nearby cities, forests increased from 181,308 cells in 1992

to 18,3269 cells in 2011, which accounts for a +0.27% change. The agriculture decreased from 508,938 cells in 1992 to 491,065 cells in 2011, which accounts for a -2.43% change. The remnant vegetation decreased from 19,474 cells in 1992 to 17,762 cells in 2011 which accounts for a -0.24% change. The water bodies developed from 366 cells in 1992 to 871 cells in 2011, which accounts for a +0.07% change. In the same manner, Table 5 illustrates the LULC change pattern of the Gorgan Township in the second time interval (2011–2030). In this time interval, the built-up area increased by 2.45% of the total study area. Regarding conservation policies implemented in this region, the forest area has not changed during this time interval. The agriculture category decreased accounting for -2.39%. The remnant vegetation and water bodies decreased accounting for -0.05% and -0.01%, respectively.

To understand the LULC changes in the different categories during the second time interval, a change detection matrix (Table 4) was prepared, which exhibits that:

I. 251 cells of the forest cover changed into built-up areas, 14,042 cells to agriculture and 26,386 cells to remnant vegetation;

II. 18,448 cells of agriculture transformed into built-up area; and

III. 35 cells of remnant vegetation changed into built up-area, 510 cells in forest and 8,492 cells converted into agriculture.

In our study, the built-up area category is one of the most dynamic land features and the gaining intensities of this land feature are actively targeting the loss of agriculture, forest and remnant vegetation. Urban growth is affecting multiple categories in the study area. Agriculture is most impacted by such a process (Fig. 7a). There are also heavy systematic transitions from agriculture to the built-up area category. This pattern of urban growth is also associated with reduced exposure to natural hazards and decreased values for tourism suitability (Hasani *et al.*, 2017).

Agriculture is another dynamic land feature and the gaining or losing intensities of this land feature are actively targeting the loss of remnant vegetation, forest and water bodies (Fig. 7b). Fig. 7b displays the results for the transitions from other categories to agriculture. It reveals that the largest transition is from remnant vegetation, then forest and also a small transition from water bodies. In particular, this exists when agriculture gains, it tends to gain intensively from both remnant vegetation and forest (more than other categories). In addition, remnant vegetation is mostly interactive with forest category and there are systematic transitions from forest ecosystems into this land feature (Sakieh *et al.*, 2016).

Our study indicated that the LULC change intensities in the second time interval decelerated compared to the initial time interval. Furthermore, the results showed that by the year 2030, residential and urban centres may consume farmlands in the northern part of the study area.

5. CONCLUSIONS

In this research we obtained LULC maps using Landsat TM images of the years 1992 and 2011 and used them to survey the LULC change pattern in the Gorgan Township. The intensity analysis helped us provide deeper insight into the land units discovered in the LULC studies. The intensity analysis approach not only enabled us to study the nature of the LULC classes, but it also supplied valuable information about land-use dynamics.

This study mainly highlighted the mechanism of urban growth in the study area, which is occurring at the cost of the consumption of ecologically valuable land resources. Between 1992 to 2011 urbanisation increased to about 2.33% due to a rapid population growth. Our prediction showed that by 2030 the future urban area may increase up to 2.45%. Our findings also indicated a heavy systematic transition from agriculture to built-up areas. The results clearly indicate an alarming direct relationship between urbanisation and agricultural land decrease, which is also common elsewhere in the Golestan Province. This increased urban growth may have various impacts on infrastructure, land use, natural resources, and the economy of the Gorgan Township. With regards to population growth and urbanisation, the outcomes of this study can provide important information for informed decision making and the protection of natural resources in this area.

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TRANSIT IN REGIONAL ECONOMIC DEVELOPMENT: THE CASE OF THE KALININGRAD EXCLAVE

Abstract. The study analyses the role of the transit function in the development of a regional transport system drawing on the example of the Kaliningrad exclave region (Russia). The article studies the role and extent of the impact of changes in the volume and structure of transit operations on the value-added creation in the regional economy. The assessment of the transit function was conducted using analytical software for strategizing and situational forecasting of the socio-economic development of the Kaliningrad region, the analogue of which is the CGE-model. The article describes the results of the regional value-added modelling based on the integrated index of gross regional product (GRP) and the changing volume and structure of transit cargo. The article explores the transit specialisation options for the Kaliningrad region based on different scenarios of its social and economic development and the changes in external factors. The results can be applied to similar studies on assessing the transit potential of a particular territory and developing measures to support the transportation system development in other regions.

Key words: transit, transportation system, regional economy, situational forecasting and strategizing, Kaliningrad region.

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1. INTRODUCTION

The growing geopolitical and economic turbulence increases the importance of economic enhancement through the utilisation of the territorial potential for any region, including Russian ones (Anokhin and Fedorov, 2018). Transportation is one of the sectors with a significant potential for the transformation of a regional economic development model, as shown by a retrospective analysis (Macheret and Epishkin, 2017) and numerous empirical and theoretical studies (Wang *et al.*, 2018). Furthermore, the importance of transportation for a transit territory increases both as it provides growing regional accessibility, investment and trade opportunities and its active involvement in cross-border processes that opens the possibility of its further integration into cross-border functional (transport) territorial systems (Gumenyuk and Melnik, 2013).

In order to study the role of the transit function in the development of the transport system and regional economy, the article considers the case of the Kaliningrad region. The economic prospects of the transport system of the Russian exclave are primarily associated with its specialisation in transit. The choice of this region as a research object is not trivial. On the one hand, being an exclave territory, the Kaliningrad region is a unique object for regional studies since it is very close to the idealised concept of the region. On the other hand, there are very few economically interesting regions of this type in the world. This puts them into the category of phenomena rather than makes them the research objects requiring close attention (Gareev and Voloshenko, 2015). There is a number of other objective reasons for selecting the Kaliningrad region as a territory for the examination of the transit function. The first one is its geographical location. It has access to the Baltic Sea and through it to the World Ocean. The region is located on the path of global transport corridors that historically played a fundamental role in the development of the Eurasian continent (the route 'from the Varangians to the Greeks', 'The Amber Road', 'The Great Silk Road') and are still actively developing within the "One Belt, One Road" global geopolitical project (Druzhinin and Dong, 2018). Secondly, it is the opportunities for opening the transit in the Kaliningrad region by dint of the existence of several modes of transport and unique infrastructural advantages. For example, it has two types of railway track gauges – Russian (1,520 mm wide) and European (1,435 mm). Thirdly, transit is an important part of the development strategy of the transport system as a sector of the regional economy. The small size of the territory, as well as the limited domestic production and resource potentials, compromises the development of domestic freight transportation, and causes the modest volume of external goods consumed by the regional economy and of goods produced for international or interregional export. In this setting, the transit function becomes essential for the regional transport system development

and its integration into global supply chains (Rutner and Langley, 2000) aimed to increase the regional value-added and economic growth in related sectors and industries.

Contemporary literature discusses transit and in-transit cargo transportation development and support through several lenses. Firstly, it studies it from the standpoint of international trade promotion, simplification of procedures, as well as the implementation of national initiatives, international transit agreements, transport and trade corridors projects (see, e.g. Kunaka and Carruthers, 2014; Button and Button, 2005). Secondly, it views it from the perspective of existing administrative, institutional, infrastructural, technical, informational, and other barriers to the cross-border movement of goods and service ("Protocol amending the Marrakesh agreement establishing The World Trade Organization, decision of 27 November 2014", 2014) which affect trade and transportation costs (e.g. Bernhofen *et al.*, 2016). Thirdly, it studies the impact of supply chain uncertainty and demand uncertainty (Khan and Thomas, 2007) on trade, and, to a lesser extent, the features of value-added generation (Lam, 2012). The key categories are 'time' (Hummels and Schaur, 2013) and 'costs'. They are the most important performance indicators of any transit process for investors, traders, and businessmen (Hansen and Annovazzi-Jakab, 2008). Apparently, there are only a few publications on transit measurement including both case studies and theoretical issues of the value creation. These studies are mainly carried out within the conceptual framework of logistics and supply chain management (e.g. Rodrigue, 2012), as well as the participation of countries, clusters, sectors, and industries in global value chains (Morrison *et al.*, 2008). Researchers primarily focus on the impact of transit on the economies of individual countries, especially of those in the Baltic Sea region (Litvinenko and Palšaitis, 2006; Bulis and Škapars, 2013).

The purpose of this study is to explore the role and influence of the transit function on the additional value creation in the regional economy. The study models the impact of changing in-transit cargo structure and growing involvement of the regional enterprises in the supply chains (cargo carriage services, storage, customs clearance, insurance, etc.) on the added value. The calculations are carried out using the regional analytical software for strategizing, and situational forecasting of the socio-economic development of the Kaliningrad region[1]. Based on the calculations results, the article proposes a package of policy measures facilitating the attraction of high-paying freight to promote the development of transport as an effective sector of the economy.

[1] Certificate of state registration of the computer program No. 2016617454 of 6 July 2016.

2. THEORETICAL BACKGROUND. TRANSPORT STUDY MODELS AND TRANSIT ASSESSMENT

There is a large number of different classes of models used to study transportation (Chow *et al.*, 2010): direct facility flow factoring method; O/D factoring method; truck model; four-step commodity model; economic activity model and their varieties. Tavasszy (Tavasszy, 2006) provided an overview of their different types in the three priority areas of freight modelling: freight – economy linkages (the most commonly used is the spatial computable general equilibrium (SCGE) model), the logistics behaviour (using origin/destination (O/D) tables) and networks (the most commonly used is multimodal network assignment for freight). They include trip generation models, I/O; synthetic O/D models; gravity models; logistics choice models; multimodal networks; agent-based simulation models; land use – transport interaction (LUTI) models and computable general equilibrium (SCGE) models; network assignment and simulation, etc. They are mainly used for addressing the freight modelling and freight forecasting tasks aimed at ensuring transport accessibility and/or reducing transport costs in a particular country, region, city (e.g. freight-flow models and related logistics costs models). The algorithm of each of the known groups of models, ultimately, tackles the issue of freight demand and supply compatibility. The most common spatial interaction models include gravity models, entropy models, and intervening opportunities models.

A special role in the assessment of transit and economic efficiency belongs to Data Envelopment Analysis models and their modifications (CCR, BCC, FDH models, windows model, etc.). Researchers mainly focus on the analysis of the transit efficiency of public and private transport (Chiu *et al.*, 2011). For example, some papers analyse the operational performance of air transport and airline networks (Barros and Peypoch, 2009), and the transit efficiency of international ports and port infrastructure (Brooks and Cullinane, 2007).

Havenga (2018), Tavasszy and De Jong (2013) have noted that the analytical applications of most modern transport models have some disadvantages and limitations. In particular, they do not take into account transportation and logistics as the elements of macroeconomics and public policy. Neither do they link them with other elements of the supply chain or take into account the behavioural and decision-making foundations of actors. Also, the models do not enable one to measure the impact that the achieved results and changes in the industry (infrastructure development, capacity growth, etc.) have on the economic growth and related socio-economic indicators. Researchers pay special attention to model deficiencies (Chow *et al*., 2010) in terms of assessing transit and transboundary effects, as well as trade corridors and border planning. The added value in transport chains is discussed mainly within the framework of Supply Chain Management (SCM) (Chen and Notteboom, 2014).

There are several issues requiring proper consideration in studying the impact of the transit function on the value-added generation in the region. Firstly, it is the ongoing integration of transport chains into production systems with freight transport offering a full range of services that meet cost, time and reliability requirements, and, therefore, playing an increasingly important role in value chains. Here, the geography of value chains is integrated into the geography of transport systems (Rodrigue, 2017). Secondly, given the U-shaped curve (the 'smiling curve') (Ye *et al.*, 2012) of the value chain profitability, it is the highest at the beginning and the end (logistics, sales, after-sales service) (Dementiev *et al.*, 2018). This supports the argument for focusing on high-paying freight and final products transportation in order to increase the added value in the regional transport system. Thirdly, the increase in the added value of the regional transport system implies the search for an optimum ratio between the elements involved in its generation.

The issue of the redistribution of added value in favour of regional companies and organisations requires an independent study using sectoral simulation models developed by the authors of the article (Voloshenko and Ponomarev, 2018). There is a series of publications on the research results being prepared. The applied simulation models provide the opportunity to assess the impact of various regulatory and controlling factors on the added value in different sectors, industries and the economy of a region as a whole. The authors' models, including the ones for the transport system, were developed and tested using the data of the Kaliningrad region in 2014–2016. The application of the author's simulation model to the transport system of the Russian exclave enables one to assess the effect that an increase in freight turnover and the number of operations in the transport services provided has on the added value.

3. ADDED VALUE MODELLING AND THE TRANSIT POTENTIAL THE DATA AND THE METHODOLOGY

The assessment of the region's transit trade intensity and its effect on the value-added generation requires a comprehensive solution to several research tasks. These include: a) the modelling of the influence of transit parameters on additional value-added generation in the region; b) the development of the mechanisms and the selection of measures and projects promoting regional transit trade aimed at the subsequent growth of value-added in the industry; c) the identification of conditions for increasing added value by changing the volume and structure of transit cargo, redistributing added value and chains in favour of regional companies and organisations.

The study tackles the first task and partly the second one. Using the example of the Kaliningrad region and based on the calculations results, it outlines proposals and provides forecast estimates for changes in the regional transit specialisation aimed at additional value-added generation. To select measures and projects promoting regional transit trade in order to ensure the subsequent growth of added value, the authors applied scenario planning. The scenarios consider the probabilistic general changes in the regional socio-economic development, including the implementation of investment transport projects, as well as external geopolitical and geo-economic factors. The scenarios also considered the global economic and infrastructure development trends directly affecting the region's transit trade potential. Ultimately, the formulated proposals aim at increasing transit function of the Kaliningrad region's transport system.

Given the analytical limitations of the existing transport models, it is appropriate to use regional forecast models incorporating transport and logistics as part of the regional economy. Gareev and Voloshenko (2015) in their work examined the advantages and disadvantages of various tools and technologies for forecasting and modelling. For this reason, the simulation of the transit parameters influences on the regional added value is conducted using the regional analytical software for strategizing and situational forecasting of the Kaliningrad region development. This software is based on the 'Region', the RF subject's socio-economic activity model, designed by Prof V.A. Tsybatov (SSUE, Samara) (Tsybatov, 2017). The model has been developed within a class of models regarding economic development as a result of its economic agents' – the main subjects of socio-economic processes – activity. The prototypes of the developed model are Computable general equilibrium models (CGE).

Let us briefly consider the methodological features of the model construction. Agent-based models are presented as control systems based on deviations. Ambition determines the behaviour of each economic agent, as in order to achieve a particular outcome (target) an agent shall follow a particular behaviour (path). An agent monitors the current deviation from the target and generates control actions on its bidirectional generalised production function (GPF) taking into account its environment (market conditions and resource status) and external (scenario) management.

The description of economic agent-based models includes the description of its assets, GPF, and patterns of behaviour within the reproduction process. The economic agent's assets include fixed capital, productive capacity, available funds (cash and bank balances), and the current stocks of intermediate and finished products. The agent's bidirectional GPF, on the one hand, shapes its offer in respective markets and, on the other hand, it generates a demand for intermediate products and production factors in accordance with the agent's technological matrix. Agent-based modelling is a solution to a multi-criteria optimisation problem. This is the problem of finding the optimal control minimising the general frustra-

tion associated with the goals not being achieved by a certain point in the forecast period considering external (scenario) management and resource constraints. Modelling offers a simultaneous solution of interrelated multi-objective tasks for all economic agents.

The generalised economic agents' target indicator vector can be defined as:

$$E(t) = [e_1, e_2, ..., e_m]^T, \tag{1}$$

The target vector expression for these indicators can be defined as:

$$E^0(t) = [e_1^0, e_2^0, ..., e_m^0]^T. \tag{2}$$

The control vectors of economic agents are combined into a generalised control vector:

$$U(t) = [U_1(t), U_2(t), ..., U_N(t)]^T = [u_1(t), u_2(t), ..., u_N(t)]^T, \tag{3}$$

Then, the combined multi-criteria task for all economic agents can be defined as follows:

$$\min_{U \subset D_U} \left\{ \sum_{i=1}^{m} \left\{ g_i \sum_{k=1}^{T} \left| \frac{e_i(U,\ U^{exe},\ t_k}{e_i^0(t_k)} \right| \right\} \right\} \tag{4}$$

Where $e_i(U,\ t_k)$ is the solution to the i-th local optimisation problem ($i \in [1, 2, ..., m]$) at the point $t_k \in [t_1, t_2, ..., t_T]$ that is solved by the corresponding economic agent within its resource constraints; $U^{exe}(t)$– the vector of scenario parameters specified by a researcher at the points $t = t_1, t_2, ..., t_T$ in a forecast period (exogenous scenario); $g_{j,i}$ – significance (weight) of the i-th target indicator. A researcher sets the control solution space $D_U$by setting the control intervals for the generalised control vector elements $U(t)$.

With $U^{(0)}$ being the initial approximation of the control matrix U (baseline scenario), the control matrix U takes the following form:

$$U = U^{(0)} \otimes K. \tag{5}$$

Where $K = \|k_{i,j}\|_{n \times T}$ is a correcting matrix of $n \times T$ dimension;

Where $\otimes$ is the symbol of the element-wise multiplication of matrices.

The correcting matrix, in turn, is the element-wise product of local correcting matrices compiled for local optimization tasks by the number of target indicators:

$$K = K_1 \otimes K_2 \otimes ... \otimes K_m. \tag{6}$$

Formula (5) enables one to reduce the problem (4) to the search for the optimal correcting matrix K^{opt}. V.A. Tsybatov (2017) has developed an effective method for finding the optimal matrix K^{opt}, which enables one to solve class (4) problems or many dozens of local goals m and hundreds of control variables n within a reasonable amount of time. Designed on the basis of the matrix method, this solver automatically builds the optimal control matrix:

$$U^{(0)} \otimes K^{opt} \rightarrow U^{opt}, \quad (7)$$

for which the values of target indicators (1) are as close as possible to the set targets (2), considering the significance of these indicators (g_i weights) and the restrictions on D_U control actions.

The model's database sources include publicly available regional statistics, reports of regional ministries, and departments of the subjects of the Russian Federation.

In this research, the model has been applied for situational forecasting. Its results form the basis for the assessment of the changes in macroeconomic indicators under several transit intensification scenarios, including the changes in the freight turnover structure with the prevalence of intermediate, capital or consumer goods. The scenario comparison enables the identification of the best transit development path aimed at the generation of additional added value in the Kaliningrad region considering external constraints. It also makes it possible to propose institutional and economic measures to support its development.

4. THE RESULTS. TRANSIT MODELLING IN THE REGIONAL ECONOMY

4.1. Transit and freight turnover in the Kaliningrad region

The analysis of the dynamics of freight turnover in the Kaliningrad region (Fig. 1) indicates that in the period from 2003 to 2014 the transit trade volume in the Kaliningrad region increased in response to the growth of the total freight turnover. This was facilitated by favourable macroeconomic and institutional conditions, most of all, by the Special Economic Zone regime in the region. There have been several major investment projects implemented in the region resulting in a significant increase in the commodity flows (international and interregional import/export). However, the global crisis and the unfavourable trading environment in the region (to a large extent associated with the introduction of EU and US sanctions on Russia and its countermeasures) led to a dramatic decrease in both freight turnover and transit in subsequent years. It was only 2017 that saw the beginning of an emerging upward trend.

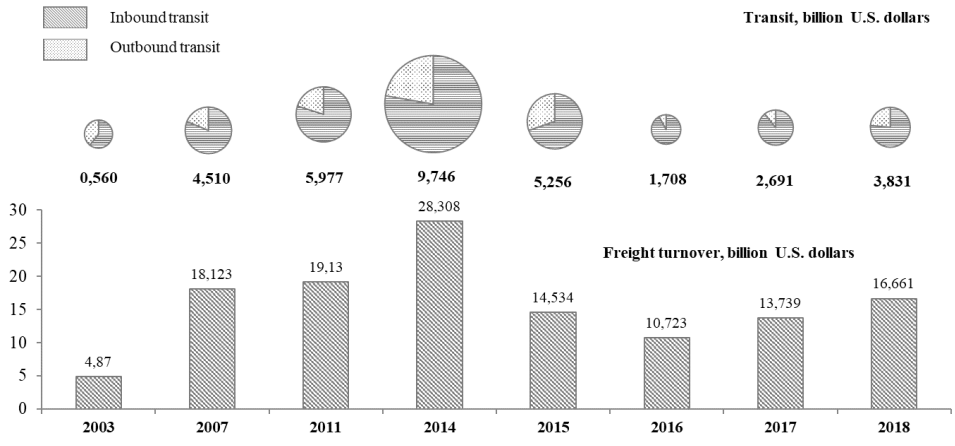


Fig. 1. Dynamics of freight turnover and transit in the Kaliningrad region, 2003–2018

Source: own work based on the data of the Kaliningradstat, Kaliningrad Regional Customs Office made with the "Situational Forecasting and Strategizing of the Socio-Economic Development of the Kaliningrad Region" analytical software (hereinafter the IKBFU AS).

The estimated values for 2014–2018 show the following trends in the structure of the freight turnover and transit in the Kaliningrad region (see Table 1):

– the most common export goods and services (excluding transit) were consumer ones, mainly because of the volume of their export to the regions of the Russian Federation, while the most common international exports were intermediate goods and services;

– at the same time, the most common imports on both international and interregional levels (excluding transit) were intermediate goods and services;

– the most common transit goods and services were intermediate and capital ones, because of their large share in the international imports.

The unfavourable geopolitical situation, the deterioration of the economic situation, accompanied by the fall in the regional production, as well as domestic consumption, led to a sharp drop of 50% in freight turnover in 2015 compared to 2014 (Fig. 2). In turn, the prime cause for a further decline in freight turnover by 26.1% in 2016 was the reduction in transit operations and the decreasing import of consumer goods and services caused by the sanctions and the low real disposable income. At the same time, a minor revival of production in the region led to a slight increase (by 3.7%) in the import of intermediate goods and services. Thus, the reduction in freight turnover in 2016 was caused by a significant drop in transit (from 5.2 to 1.7 billion USD), while the regional consumption has declined only by 3.2% (from 9.3 to 9.0 billion USD). In 2017–2018, growth in freight traffic was caused mainly by the growth in regional consumption.

Table 1. Structure of import, export and transit (percentage)

Name	2014			2016			2018		
	i	k	c	i	k	c	i	k	c
Export (excluding transit) – total	11.7	4.2	84.1	21.3	4.9	73.8	10.6	5.0	84.3
interregional export	3.0	4.4	92.6	2.3	5.6	92.1	4.8	5.3	89.9
international export	57.4	3.4	39.2	73.4	3.2	23.4	40.7	3.8	55.4
Import (excluding transit) – total	71.0	8.5	20.6	78.4	3.7	17.9	79.1	4.4	16.5
interregional import	63.0	2.0	35.1	54.8	10.0	35.2	56.0	6.9	37.0
international import	72.3	9.6	18.0	82.0	2.7	15.3	82.5	4.0	13.5
Transit – total	69.6	23.2	7.2	69.7	14.2	16.1	58.4	25.2	16.5
International imports to the RF through the region	71.4	22.1	6.5	70.9	15.4	13.7	70.2	8.3	21.5
International exports from the RF through the region	60.5	29.1	10.4	56.1	0.0	43.9	54.7	30.3	14.9

Note: m – intermediate goods and services, k – capital goods and services, c – consumer goods and services

Source: own work based on the data from the Kaliningradstat, the Kaliningrad Regional Customs made with the IKBFU AS

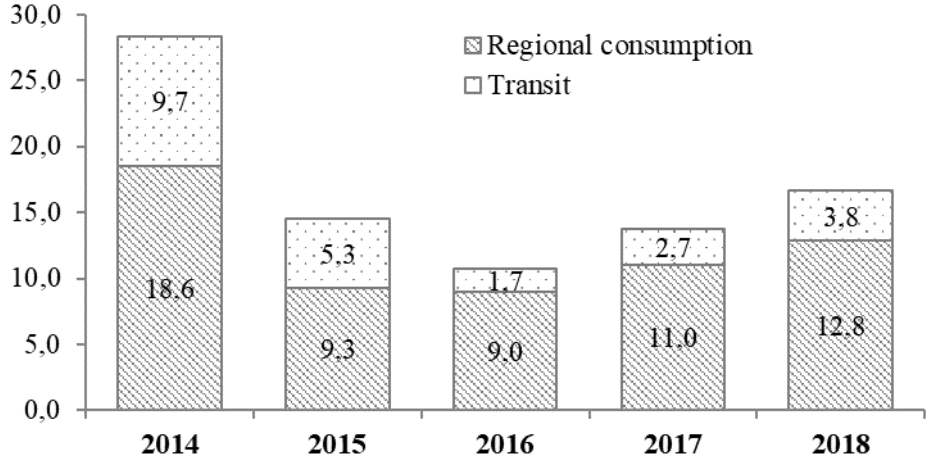


Fig. 2. Comparative assessment of freight turnover in regional consumption and transit of the Kaliningrad region, billion USD

Source: own work based on the data from the Kaliningradstat, the Kaliningrad Regional Customs made with the IKBFU AS.

The total freight turnover was 13.7 and 16.7 billion USD in 2017 and 2018, respectively. The doubling of transit trade in recent years has been the result of the resumption of mineral products import-export traffic in the region.

The analysis of transit indicators shows its profound significance for and considerable impact on the general freight turnover in the Kaliningrad region. The prospects for further transport system development and the growth of the regional economy are directly linked to the change in the structure and volume of transit freight handled.

4.2. Results of transit freight forecast modelling

Despite the decrease in the share of transit cargo in the region in previous years, it is realistic to expect increasing use of its transit potential. The following factors will be the main drivers of this process:

– closer integration of two transcontinental initiatives – the Eurasian Economic Union (EAEU) and 'One Belt - One Way';

– the joint initiative of Russia and China aimed at strengthening the interconnectedness in the domains of logistics, transport infrastructure, and intermodal transport;

– prospects for the implementation of major infrastructure projects: the international transport route 'Europe – Western China' passing through Kazakhstan, Russia, Belarus; the Moscow – Beijing high-speed rail; 'Primorye-1' and 'Primorye-2' transport corridors, and more;

– the joint program of Russia, China and Mongolia to build an economic corridor involving the development of transport infrastructure as well as the construction of checkpoints and control points;

– the possibility of creating a free trade zone between Iran and the EEU with one of its infrastructural elements being the International North-South Transport Corridor linking Iran with Northern Europe.

In the short term, the most significant factor in the development of transit capacity of the Kaliningrad region will probably be the active participation of the region in the implementation of the 'One Belt, One Road' initiative. Within its framework, the region is considering the idea of implementing a logistics project of a dry port for the transhipment and storage of goods on 300 hectares in Chernyakhovsk industrial park.

To measure the impact that the transit structure has on the economy of the Kaliningrad region, the study examined three possible scenarios. The benchmark for comparison were the forecast parameters of the socio-economic development of the Kaliningrad region in 2019–2035 developed and approved by the Ministry of Economy of the Kaliningrad Region. The research considered the influence of geopolitical factors, the potential capacity of the regional transportation system, and the possible changes in the freight structure based on the geography of suppliers.

Baseline conditions: the socio-economic development of the Kaliningrad region for the period until 2035 is characterised by gradually increasing growth rates of the key sectors of the regional economy (industry, agriculture, trade, and services) and a moderate increase in labour productivity.

Conservative scenario (1). It is based on an increase in the utilisation of the existing transport system capacity and the focus of transit trade on the transportation of intermediate goods (m). The region will specialise in servicing domestic industries located in other regions of Russia, as well as it will ensure the export deliveries of Russian raw materials.

Integration scenario (2). This scenario entails the Kaliningrad region playing an active part in global transport corridors with the associated growth of processed consumer goods volume (c) on the APR-EU route.

Target scenario (3). This scenario entails a balanced development of the transport system of the Kaliningrad region including the utilisation of the existing transport and transit potential both nationally and internationally. This implies an increase in the share of capital (k) and consumer (c) goods and services handled in transit with intermediate goods and services (m) retaining a significant share in its structure.

The results of the calculations made using the IKBFU AS show a 25–30% growth of goods and services in foreign trade operations (intermediate ones in scenario 1, consumer ones in scenario 2, capital ones in scenario 3) comparing to the benchmark, ceteris paribus.

Fig. 3 shows the results of the modelling changes in transit and in the Kaliningrad region's GRP in 2019–2035.

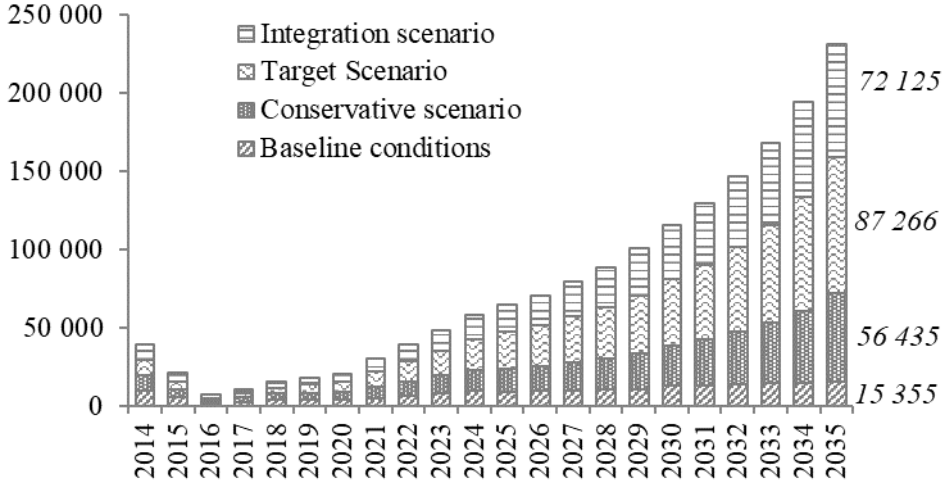
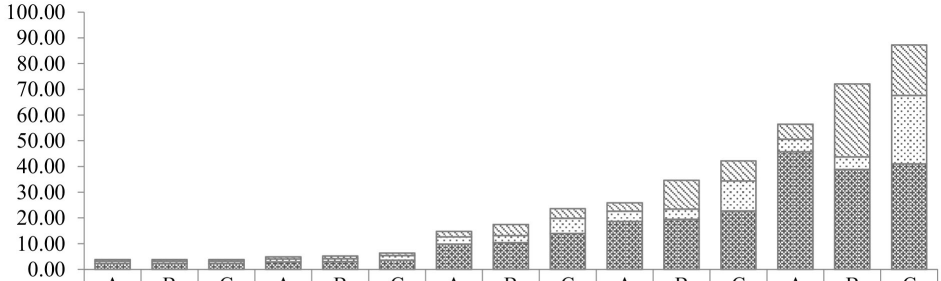


Fig. 3. Transit dynamics in the Kaliningrad region, millions USD

Source: IKBFU AS calculations.

Under the baseline conditions, the GRP is to increase by a factor of 1.56 by 2035 compared to 2014. However, the development of transit specialisation in the region will lead to its increase by 21.3% if it focuses on capital and consumer goods and services (Target Scenario), by 14.3% if it focuses on consumer and intermediate goods and services (Integration scenario), and by 9.6% if the prevailing goods and services will be intermediate ones (Conservative scenario). The largest increase in transit volumes is observed under the target scenario, it is a 5.7-fold increase comparing to the baseline conditions.

Accordingly, the increase in added value, as well as in transit volumes, is associated with a significant share of capital and consumer goods and services in the freight structure (Fig. 4) accompanied by the increase in the share of transit in the freight turnover in the region.



	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
	2018			2020			2025			2030			2035		
c	0.6	0.6	0.6	0.7	1.0	1.0	2.0	4.2	3.6	3.2	11.2	7.7	5.8	28.4	19.6
k	0.9	0.9	0.9	1.1	1.1	1.7	2.8	2.8	5.9	3.9	3.9	11.6	4.8	4.8	26.5
m	2.2	2.2	2.2	2.8	2.9	3.6	9.8	10.3	13.9	18.6	19.4	22.7	45.7	38.8	41.0

Note: A – Conservative scenario, B – Integration scenario, C – Target scenario;
m – intermediate goods and services, k – capital goods and services, c – consumer goods and services

Fig. 4. Forecast for the volume and commodity composition of transit trade in the Kaliningrad region until 2035

Source: IKBFU AS calculations.

By 2035, under the Integration and Target scenarios, the share of transit will be more than 70% of the total freight turnover. Scenario calculations allow us to establish the dependence of the added value on the transit trade in the Kaliningrad region. For example, with the doubling of transit volume, there is an additional added value in the range of 5.8% if the increase is in capital goods and services, 5.0% if it is in consumer ones, and 4.6% if it is in intermediate ones. Thus in order to achieve the greatest impact on the regional economy, it is important to increase in-transit capital and consumer goods and services.

4.3. The development of specialisation in transit

The results of the analysis along with the assessment of the forecast parameters of the economy and the transport system development in the Kaliningrad region enabled us to formulate final proposals. Their implementation shall stimulate the development of transit specialisation of the region.

1. The integration of the Kaliningrad region into international transport corridors through the creation and development of a technically and technologically integrated transport and logistics infrastructure, as well as supply chain management systems. Special attention should be applied to the development of end-to-end services along transport corridors, involving an optimum interaction between all participants in the goods supply process including customs and border services.
2. The creation of institutional and economic conditions enhancing the participation of Kaliningrad transport organisations in the carriage of Russian export and import cargo. It is essential to use the federal support to ensure that Kaliningrad's transport companies work based on the same conditions as other carriers do. This shall cover the issues of tariff policy of neighbouring countries, as well as customs procedures.
3. The consideration of the problems of the Kaliningrad region and the interests within the framework of international integration projects and initiatives. This applies to the agreements reached within the framework of the Common Economic Space, as well as the Commonwealth of Independent States, the Shanghai Cooperation Organization, and the Asia-Pacific Economic Cooperation. It is important for the Kaliningrad region mainly in terms of its possible participation in such projects as 'One Belt, One Road' and Asia-Pacific transport corridors projects.
4. The development of a comprehensive program for the utilisation of the transit potential of the Kaliningrad region. It is advisable for all stakeholders to ensure the elaboration of specific strategic and program measures at the regional level aimed at the development of the transit capabilities of the Kaliningrad region. It is important to ensure the collaborative planning of new and that the existing transport infrastructure facilities are used in a balanced manner and their capacity is utilised. One of the mechanisms for the proposed implementation is the development of a transport cluster in the region.
5. The creation and development of the effective transport monitoring system (domestic and international) and freight and passenger traffic management in the Kaliningrad region using transport and logistics, digital and geo-information technologies.

5. CONCLUSION

The study has revealed the methodological shortcomings of modern transport models in terms of their application for analyses. First of all, there is no toolkit for the study and assessment of the transit function and transboundary effects.

This hampers the identification of the development paths a regional transportation system, and its support measures. This is especially relevant for a territory where, due to its geographical location, transport and transit capabilities play a major role in the regional economy.

The analysis of freight turnover indicators in the Kaliningrad region revealed a high degree of influence of transit on the development of the region's transport system and its economy. Due to the relatively small size of Kaliningrad's economy, in different years, transit formed up to 20–30% of its total freight turnover in the region. The reduction in freight turnover after 2014 was caused not only by a decline in domestic production and consumption but also by a significant drop in the volume of transit goods. In this regard, the prospects for further transport system development and the growth of the regional economy are associated with changes in the volume of transit freight handled. The possible changes in the structure of transit consignments can also have a significant impact on it.

In order to study the effect of the transit function on the regional economy, the authors carried out a set of scenario calculations. There are three possible transit growth scenarios considered and compared with the baseline conditions. Under the first one, the growth results from an increase in the volume of intermediate goods and services. The second is the active inclusion of the region in global transport corridors. The third scenario involves the reduction in the share of raw materials and increased transportation of high-tech goods and containerised cargo. The scenario calculations have indicated a dependence of the added value on the transit trade in the Kaliningrad region. For example, the doubling of the transit volume creates an additional value added of 4–6%, with the greatest growth achieved with the increase in the share of capital and consumer goods and services. If the Kaliningrad region' transit specialisation develops in the direction of increasing high-tech products and container cargo, the added value (GRP) in the region will be more than 20% higher compared to the baseline conditions, while targeting consumer goods and services will result in 14% increase, and a preferential handling of raw materials and intermediate goods will result in an almost 10% growth.

The study results confirmed the assumption that the best option for the development of transit specialisation of the Kaliningrad region is to focus on capital and consumer goods and services. The implementation of this scenario requires the following support measures: an inclusion of the Kaliningrad region in international transport corridors; an inclusion of Kaliningrad transport organisations in the supply chains of Russian carriers of export and import goods; the consideration of the Kaliningrad issue in the framework of institutional and regulatory measures aimed to promote the integration of the Russian Federation into the international transport space; and the creation of appropriate institutional environment, the active use of transport and logistics, digital and geo-information technologies.

The major limitations of the study included the need for additional verification and the evaluation of multiplicative effects formation in the regional economy related to the increase in cargo turnover due to transit traffic growth. This requires a series of specialised studies both in terms of the areas and types of economic activity and in certain categories of consignments. This data would significantly increase the reliability of the findings and would enable researchers to assess industry-specific effects. Despite the identified limitations, the proposed approach to the assessment of the transit function impact of the regional economy shall be recommended as a tool for measuring transboundary and transit effects to be used by other territories.

Further research may include a further study of the conditions for the increase of the transport sector's added value related to the changes in the volume and structure of transit cargo, the redistribution of added value and chains in favour of regional companies and organisations. The model available to the authors enables a further analysis of the process of the creation of added value in transit trade. This would enable researchers to determine what part of the added value remains in the region (since it is created by regional participants in the process of freight forwarding), and what part leaves the region (since it is created by Russian and international companies and organisations in the process of freight forwarding).

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A TALE OF MORE THAN TWO CITIES: DECONSTRUCTING SUSTAINABLE URBANITY

With a review of:

OECD, *Rethinking Urban Sprawl: Moving towards Sustainable Cities*, OECD Publishing, Paris 2018, 166 pages, Nico TILLIE, *Synergetic Urban Landscape Planning in Rotterdam: Liveable Low-Carbon Cities*, TU Delft, Delft 2018, 284 pages and Ashley DAWSON, *Extreme cities: The peril and promise of urban life in the age of climate change*, Verso, New York 2019, 378 pages

THE ISSUE AT STAKE: INEVITABLE SYMMETRIES

Even in the age of planetary urbanisation, cities differ in their status as arenas of facing events, incidents and extremities that all are reflections of the atmospheric – and thus global – change. Cities that receive most of the detailed attention in the three books particularly discussed in this overview are New York (Dawson, 2019) and Rotterdam (Tillie, 2018). However, the books' collective message goes far beyond these cities, and the third one (OECD, 2018) virtually amalgamates the industrialised world's urban data as regards the characteristics of the cities' and urban/metropolitan regions' physical *gestalt*.

All three books deal, in their own particular ways, with the pursuit of sustainability in an urban context. This endeavour requires both integrated policy and planning measures, but also devices, artefacts and social practices that connect the domains and worlds of dispersed groups of actors and organisations (cf. Karppi and Vakkuri, 2019, pp. 45–47). Ovink and Boeijenga (2018) highlight the inherent complexity of this task. As humankind, we are long past the luxury of choosing between actions that aim at energy transition, end of deforestation, sustainable urbanisation, building with nature, a circular economy or planetary security: we have to do it all, now (Ovink and Boeijenga, 2018, 8).

Thus, sustainable urbanity, with all its facets and an overall versatility that defies straightforward definitions calls for a deconstruction. That benefits from a simultaneous look at:

(1) the urban sprawl and how the phenomenon can be reframed and addressed with novel use of data;

(2) solutions that urban design may provide to adjust the fast urbanising planet and its transforming cities to best cope with the other planetary transformations; and

(3) social and societal transformations, predictable given the profound changes that take place in the material basis of our economies and institutions.

These are exactly the topics of the three core books in this overview, and they help us to take apart some elementary aspects of sustainable urbanity even if much of the bigger picture remains beyond their scope. In fact, there is an entire disciplinary approach, nascent and important to complement the three core books. It appears to be most common in Tillie's work with its recognisable landscape urbanist features (cf. Wells *et al*., 2011; Rottle and Yocom, 2010). However, it has obvious theoretical linkages to Dawson and, on a more technical level, even to the OECD sprawl study. This discussion predates the publication of the three books by a few years: in 2016, an influential team of urban ecologists published what McPhearson and his colleagues (2016) called *a consensus to guide future urban ecological research*.

For McPhearson's team, urban sustainability was only one of the features that constituted their perspective on a "science of cities", ambitious even if still pending next step for urban ecology. It regards the urban hybrids with their distinctive human/non-human symmetries (*cf.* Latour, 1994) as complex adaptive systems, highly interconnected yet largely unpredictable, constantly rife with dynamics far from simple equilibria, and for that driven by the need to hoard energy for maintaining themselves (McPhearson *et al.*, 2016, p. 205; Batty, 2018). By widening the box where working for urban sustainability radiates as a crucial theme not only for scientific but also political endeavours (cf. Swyngedouw, 2006), they also provide a glue that helps to keep our three core books with their different approaches together.

What the triplet has in common is the local and regional level as a space of action while pursuing (more) sustainable urbanity. While this is a reasonable point of departure, it is obvious that in the face of an ongoing mega-scale global transformation, any meshwork of local action with its indisputable beacons of climate-related magnificence alone does not suffice. Some form of global arrangement for resource distribution and wealth creation logic is necessary for reaching tangible, actually sustainable outcomes for an equitable and equitably liveable planet. The question is if the market-based liberal democracy can facilitate such a transformation.

One of the three texts studied for this overview (OECD, 2018) avoids questioning this premise while another one (Dawson, 2019) regards revoking the market-liberalist basis as an absolute necessity. The third (Tillie, 2018) does not quite

seem to be aware where it should stand in this respect, mixing the approaches and calling for a profound transformation while resorting to the metrics and mind-sets that at least the more broad-minded pro-marketeers should find worth of a closer scrutiny. As a regional scientist and urban development scholar myself, I feel slightly uncomfortable admitting that action at the local and regional levels, even if reasonable and leading to locally significant and meaningful outcomes, often may be just a climate band aid instead of curing the potentially lethal disease. This is the spectre of a global transformation that casts its shadow over any urban action anywhere. Is there anything left for the localities but to adapt and persist, perhaps to survive?

THE SPRAWLING CITY OF NOWHERE

Let us approach the question with a volume that comes from an institution that not only believes in market economy but downright defines a plethora of public and financial management practices honest to the market. In *Rethinking urban sprawl*, the team of OECD-sponsored researchers makes the world of sprawling cities understandable through the lenses of orthodox economics. For a not card-carrying economist, the reading experience is slightly uncanny. It is, actually, a little bit like delving into a hypothetic statistical/methodological appendix of James Howard Kunstler's (1993) celebrated *Geography of Nowhere*. However, the point of departure is excellent. The OECD team's truly ambitious task was to give a holistic view of how the growth of world's cities and metropolitan areas challenge sustainability.

That task was fulfilled. Data from over 1100 urban areas (that mostly remain anonymous and unknown to the reader) from 29 countries and from three time points, 1990, 2000 and 2014 are compressed in the recurrent graphs that illustrate how different OECD countries relate with each other seen through the different aspects of urban form. The three available time points enable an assessment of a sort of "phase transition" in urbanisation, divided in two steps. The aggregation of data by countries, however, turns a great deal of basically worthwhile empirical data in a form that is not completely illegible but certainly challenging to any decision-maker in search of evidence-based support in the pursuit of most sustainable land-use forms. This obviously is a reflection of the fact that OECD is an organisation with member states, not with member cities or urban areas, and this fact seems to set the spatial scale for its analysis.

Nonetheless, the authors of the report have an obvious mission. They seek to give guidance to decision-makers through cross-country comparisons over time, a big picture that signals the urban reality of highly developed economies and

thus gives an economic theory-grounded menu of policy options based on objective assessments of the sustainability challenge for which the urban sprawl as an urban phenomenon stands. The idea is laudable, but, unfortunately, not without major restrictions – especially when it comes to practical guidance in actual decision-making situations. Detaching sprawl from its causes (and even to some of its consequences) may be good for the attempt of the scientifically objective account of the phenomenon. Yet, it renders the report's approach to the maximisation of its political acceptability. Such an exercise is far from the "science of cities" manifesto by McPhearson and his colleagues (2016) – a manifesto that *does* share the OECD report's belief in abundant data and the big picture.

While it is amply demonstrated that urban form is a major driver for the choice of transportation mode and due greenhouse gas emission and health effects (e.g. Van Dyck *et al*., 2009; Forsyth et al., 2017), the question of sustainability and sustainable urbanity is even more complex. How service provision is arranged or how multimodality and exchanges from one form of transport to other impacts are among the key issues here. These are place-bound phenomena, however, tangled in urban objects that are, in their multitude and myriad cultural entanglements, hard to put in economic models. Yet, they differentiate the innumerable "*Somewheres"* for the sprawl to take place instead of the objectively compiled *"Nowheres"* that we frequently encounter in this report.

What else would have deserved to be taken into account are, first of all, developments within metropolitan real estate and the entire FIRE (finance, insurance, real estate) industry as a holder of financial interests that reflect in the urban structures. Secondly, the report is also missing the question of how differences in income distributions reflect in individual and family-level possibilities to choose how to use urban space. Thirdly, linked to the previous point, gentrification as a change-dynamics, and even as a tool for racial policy still in use, gets no mention in the report. Lastly, the fundamental transformations caused by global climate change and its real and potential impacts on urban space are discussed in rather implicit terms, particularly in coastal areas where the huge majority of the globally most important cities are. To delve into these issues, the report is best complemented with the two other core books discussed here.

Where I found the OECD report a truly worthwhile reading was the discussion and due diagrams that gave the multiple dimensions and drivers of the urban sprawl an expression honest to economic theory. In their technical forms that signalled what the phenomenon does look like in the theoretical city of Nowhere, they actually provided the non-economist reader with the space one craves to do the necessary mind games with the often noisy *"somewhereness"* referred to in the previous paragraphs. And, finally, as the report draws towards its final chapters, it is acknowledged that cities do not stand alone but comprise, together with their neighbouring municipalities, towns, villages or even other cities' systemic wholes that call for regional solutions for curbing sprawl. For the sake of sim-

plicity, let us call them arenas of metropolitan governance. This discussion brings the report closest to the planners' and decision makers' real, actual and endlessly noisy world filled with places in need for action.

LIVEABLE, LOW-CARBON ROTTERDAM IN THE MAKING

Nico Tillie (2018) introduces readers to the theme of his doctoral dissertation by rephrasing an established fact for the purposes of his treatise on urban landscape planning. Indeed, whether we humans, as a species and designers of civilisations, will be wiped out or survive, it will necessarily happen within the ramifications of, and conditioned by, the changing climate. There have been attempts starting from the heights of the current US presidency, to undermine this conviction through a determined denial and outright action such as the abolishment of public expert bodies formed for the guidance in the face of climate shocks (e.g. Flavelle, 2017). The fact that some of such bodies have reassembled, one of them invited to do so recently by the Governor of New York, Andrew Cuomo (Milman, 2019), only underlines the multitude of actors and arenas as well as the depth of determination for fighting the climate war.

If the OECD sought to filter the noise of individual places in its report by focusing on major, partly systemic patterns of urban design and transformations, Tillie does not hesitate to go to the richness of details that Rotterdam, a progressive European city, can provide. If the OECD text gives the reader an outsider feeling with regard to the actual transformations in cities included in the plan, Tillie compels the reader to ponder the financial and social, often also the physical and technical prerequisites for the measures that unfold from his many and indeed layered research questions.

I positively agree with Tillie on the causes and consequences of sub-optimal urban planning, gravely restrained by the missing interconnections on the planning field (Karppi and Vakkuri, 2019, 2020). Thus, whatever planning measures or "smartness" one seeks to build into the planning apparatuses, one needs to consider the capacity of these apparatuses and the entire administrative division of labour that surrounds them to work with a shared overview of the fundamental task at hand. Cities and those in charge of their planning and governance need to do their share in turning out and demonstrably securing more liveable and healthy urban environments to the majority of global population, their own inhabitants. Doing this means integrated energy and resource use/generation, food production and water management in a low to zero to negative GHG emissions setting. The scale of the task and the endurance would be startling, even without most of the world cities being threatened by rising sea-levels and severed storm seasons.

The traditional landscape architecture, transformed to, say, landscape urbanism (Duany and Talen, 2013) with an entire palette of ecological design ambitions has tasked itself with a new mission the world around. It is nothing less than to take a high-profile position among the enablers of the recreation from existing, well established cities to the future liveable non-carbon cities. Some elementary steps that need to be taken on this road is what Tillie demonstrates in his thesis. Here we may stumble into our attachment to places that we have occupied for decades and even millennia. We have done this for a good reason, as the locational amenities of these places have historically helped us to compile the civilisational treasures and often the very building blocks of our identities as nations. Transition of these places to what it will be required from us to survive may mean a costly war with highly unsure outcomes. We may need not only to re-plan and re-organise cities but physically relocate them (cf. McKibben, 2019). The fundamental question here is if we are ready to change the rules of the game, the organising principles of the economic system as we go.

The great game-changer, of course, stems from the need to curb CO_2 emissions, the emblem of the achievements and the entire socio-technical institutionalisation of the industrial era: how to "govern" it and how to settle the cost of this governance? With a slightly apologetic tone, Tillie chooses to operate with the concept of CO_2 neutrality as a target value for the planning system to pursue through the activities he develops and discusses in the thesis. It is highly typical that goals such as CO_2 neutrality are set, wrapped in a belief that some kind of technological and smart city-based gadgetry-driven solution will eventually emerge that does not require – or even leave space – for questioning the fairness or global legitimacy of the prevailing techno-institutional order (Graeber, 2015; cf. Townsend, 2014). This is obviously convenient, as that order is where our established routines for finding solutions to the encountered challenges stems from.

Who should read Tillie's insightful opus, then? Obviously, anyone with a (mis) belief that the global transformations and processes of counteracting them are too complex and too detached from the quite ordinary workings of our existing cities, here and now. As Tillie shows, even if the scale of global transformations is by definition gigantic, they are connected with the various things that urban planning works with and is able to enact (cf. Beauregard, 2015). His text is a practical treatise in urban pragmatism, focusing on meaningful action, that can be made to matter in the complex machineries of urban planning and design. However, the sheer scale of the transformations that the humankind faces *does* set its requirements to the local scene and local actors. Thus, the reader of Tillie's praise for urban situationality (cf. Paans and Pasel, 2014) in acting upon global challenges might well benefit from the more global systemic perspective (and a few hard-nosed realities the economists are sure to serve) that the OECD study reviewed above opens, say, as its companion.

SUPERSTORM SANDY: THE HARD WAY TO LEARN ABOUT EQUITY IN NYC – AND BEYOND

One may, however, feel uneasy with the pro-market approach that the OECD is committed to while doing what is in its powers in raising the awareness for curbing urban unsustainability. If this happens to be the case, a reader can resort to an alternative that helps to balance Tillie's urban situationality with a different broadening perspective. This alternative way of understanding global forces that challenge urban planning and design is provided in the third core book of this overview, i.e. *Extreme Cities* by Ashley Dawson (2019).

Departing from the idea of the prevailing economic order or Market Liberalism, if you will, as an eternally unmatched global "normal", Dawson puts to the foreground issues of equity and justice. These are topics that also appear in Tillie's text but without the prominence that Dawson grantsthem. Operating with the ontological and practical connections between forces and pressures, or drivers, understood as "global" on the one hand and "local" on the other, he directs the reader's attention to issues discussed, in an equally compelling way, by Mimi Sheller (2018) and Peter Moskowitz (2018) in their recent works.

We are not equal in the face of global transformations. Moreover, Dawson claims, forces that climate change sets in motion with their planetary, or truly planet-wide impacts even highlight the inequalities that are built in various socio-economic relationships, institutional orders and "cultural" settings that we live through in our daily practices. Together they both comprise and reveal a multi-scalar system of lacking social justice whose enactment does not require anyone's hostile intentions. Many of the system's key parameters, Dawson maintains, merely reproduce the fundamental flaws of the market mechanism. Thus, due to this basic tenet, they conduct the violating of equitability and social justice almost automatically, working as they are meant to. The cost of such "equitability deficit" is typically borne by the most vulnerable – unless particularly resisted by the rest of us (cf. Segalov, 2018).

But what should one resist and how? Dawson pinpoints several processes and examples of environmental (mis)conduct that have paved the humankind's way to managing and controling nature and its processes with the aim of profiteering, a simple yet complicated endeavour. He takes us from the Mississippi Delta to Jakarta and promises meagre if any success for the human attempts to work with the interface between water and land there. His examples provide a degree of historical depth, but, first and foremost, he casts a look filled with anxiety and anger at our contemporary undertakings with sea walls or artificial luxury island resorts – in a situation where, Dawson (2019, p. 125) instructs us, two billion people already live in the world's densely populated coastal areas that are particularly prone to devastating floods.

This figure of two billion alone gives an indication on the amount of money invested in those areas. Moreover, still more people and capital yearn to get there. Here Dawson finds both the cause, the tools and the location of resistance, and returns to the dramatic opening lines of his book. New York City and the Superstorm Sandy that ravaged it in 2012 is the scene of many of the issues in and symptoms of inequality that Dawson identifies. In the metaphorical sense, Sandy works for him as a generator that, while violating the regular functions of the city, reveals what works and what does not, giving also an indication of why something works, why something else does not, and what there is to be done to close the gap separating these two outcomes.

Paul Virilio (2007) turned to an Aristotelian tradition, explaining how an accident or a disaster could reveal the true nature of a system having encountered a disruption head-on. Dawson shows how Sandy not only exposed the shortcomings of New York City rescue and relief mechanisms in a flooding city, but how these shortcomings reproduced the fundamentals of class, wealth and race-based relations and how they led to different geometries of urgency if not outright selective neglect in responding to mounting human needs. Dawson's heroes come from the *Occupy Wall Street* movement and other civic sources of what he calls *Disaster Communism*, actors that the administration may not have regarded as its preferred partners in getting the city back on track, but that were among the first and, indeed, few to operate in the city's margins far beyond the confines marked by the real estate industry's financial interests.

For those who might find Dawson's points of departure a bit too radical, one might enjoy a parallel reading of Jesse Keenan's (2013) compact analysis of the haziness that the real estate sector itself faced with Sandy – or Lincoln institute's equally compact report on what the public authorities can learn from it (Pirani and Tolkoff, 2014). They, together with most of the books cited here, show the immense complexity and the taunting scale of the task of taking the necessary steps to more sustainable future urbanity, not only in Rotterdam or in New York, but everywhere.

THE TALE OF MORE THAN TWO CITIES

Eventually, there *is* a tale of two cities, too. In Henk Ovink's and Jelte Boeijenga's (2018) fascinating book about one process for supporting communities to recreate themselves from the ravages of Sandy, Ovink discussed his encounter with Shaun Donovan, Secretary of Housing and Urban Development in President Barack Obama's administration. They happened to meet in Rotterdam, and in and

around the city Donovan seemed to had had a crash course of the Dutch practices, institutional tools and mental tunings for working with an extreme abundance, potential or real, of water as a fact with which regional planning and urban design just needs to acknowledge and act. The inspiration derived from the discussions during a road trip across Dutch water landscapes contributed, the documented story goes, to an inception of a multiannual project *Rebuild by Design*. Its aim, in addition to practically and situationally support Sandy-hit areas, was to use the duly created experiences as a trapdoor to expand the bandwidth of American climate-sensitive urban planning, design, and policy mindset.

And here – in the midst of this jubilation for the dawn of a more sustainable urbanism – glimmers a problem emerge. We can recognise a plethora of global issues that are strongly related to climate change and sustainability, such as economic oscillations that threaten institutions and administrations, or demographic transformations and health issues rife with human, societal and financial implications. Most of the discussions that take place in the three core books of this overview and a huge majority of other works cited focus on highly developed economies and their prime urban areas. The most noteworthy exception is Dawson, who includes the Global South in his storyline. Climate and sustainability crises met in the urban settings are customarily portrayed and dissected from the First-World perspective and, more than implicitly, as First-World challenges. Yet, it is the cities of the Global South that grow fastest and often in erratic ways (cf. Brillembourg, 2016) and that may be most perilously positioned as regards next Superstorms, Hurricanes and Typhoons.

The three core books discussed here, and how the challenges of sustainable urbanity are contemplated in them, belong to the expanding body of literature for understanding the layered complexity of a global quest, needed if the cities are to be made more sustainable. However, this endeavour needs to be stretched far beyond the two metaphorical First-World cities for a more profound impact. With strong institutions backed by sound economic systems, accumulated wealth and state systems not annihilated by hunger, corruption and other lethal sources of inefficiencies, they should be best equipped to find and work with solutions even while encountering extreme incidents. For many of the world's mega cities, either existing or those yet to emerge, this is not the case. *Their* tale of finding doable ways of promoting sustainable urbanity in their own terms is only gradually making its way to the global awareness.

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Ari-Veikko ANTTIROIKO, *Wellness City, Health and Well-Being in Urban Economic Development*, Palgrave Pivot, Cham 2018, 159 pages

This small and compact book of 159 pages (including index and references) is an easy to read analysis of why wellness companies, products and activities can contribute to the welfare of urban economic systems. Regardless of the title and the scope of the topic, in its core it is a traditional location study on the effects of the development of one specific sector within an urban system and as such a classical economic-geographical study.

The book consists of eight short and concise chapters, in which the idea of a wellness city is discussed in clear steps. The book starts with a conceptual debate about wellness (including welfare, well-being and health) and the wellness industry and its possible spillover effects. It continues with how this well-being industry fits the urban context. At the same time it argues that the sector is also a regional and even a global industry. The author develops a narrative where this specific sector is described as a long standing and, at the same time, emerging industry offering ample opportunities to have a significant economic impact on local economic development. The book ends with three more holistic chapters where the different dimensions of the industry are discussed, and a suggestion how these can be developed into strategies for 'glocal' economic development: local specific strategies of a global industry and how we can use this in an inclusive policy for all consumers of the city.

Even though the focus is on well-being and on well-being providers and services as a more emerging industry, the book is, in fact, a traditional location study. The sector and its effect on cities are studied using a number of relevant economic-geographic theories regarding these locational issues, e.g. the

export-base theory, Marshallian cluster theory, and externalities, consumption space, and economic multiplier. Hence, the book can be very useful as an example of a more in-depth study of specific sectors and as an exercise of how to use old tools for new topics. As such, the book is of value for students of public policy, city planning, economic development, and those working in the tourism and leisure industry.

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Alex JOHNSON, *Book Towns. Forty-Five Paradises of the Printed Word*, Frances Lincoln, an imprint of the Quarto Group, London 2018, 192 pages

When using public transport – the local bus, the tram or the subway – you do not see many people reading books anymore. Rather, they are watching content on or playing with their smart phones or other electronic devices, with the few exceptions of some elderly ladies reading books. In such an era, a book – rather a guide – about an international trend to install a cluster of shops selling used and/or antique books in little villages might be quite surprising. Is this an anti-trend or just a sentimental compensation or a surrogate for a lost world full of books? After all, we are living in a time in which more and more bookshops, especially smaller ones, have disappeared or have been replaced by mega-bookstores or internet dealers.

From the viewpoint of an urban observer, it is quite apparent that the withering away of shops selling used and antiques books – the latter are the more valuable ones – is not only due to or on account of a lack of interest in them. Rather, it is a combined product of the rise of shop rents in cities and the advance of a 'global' book market via internet trade – resulting in lower prices for used or antique books except those which are really rare or valuable – mostly sold by specialised dealers via catalogues or via auctions. However, the prognosis of the last years that books will soon no longer be printed but rather replaced by electronically distributed texts turned out to be not quite true. Printed books and electronically distributed ones coexist and the former still far outrange the latter ones. And there is even a new trend of distribution of printed books that are not used anymore and that are not accepted by dealers: the free availability and distribution of books via open shelves in many buildings and places ('little free libraries'). This has created not only new channels for distributing books. It has also created new opportunities for social communication in many places.

The continuing interest in printed and used books, combined with an old interest in finding interesting things, seems to be the base for book towns as well. Johnson, the author of *Book Towns*, wrote: "A book town is simply a small town, usually rural and scenic, full of bookshops and book related industries" (p. 7). And the trend of creating and establishing book villages, the topic of the book under review, might be a trend based on different factors: the attraction of specific territories, the opportunity for local book shops to sell books with lower costs, and the attraction for some regions, villages or just nice places to profile them against other ones.

In *Book Towns* you will find a well written and nicely illustrated story about the beginning of this trend. The wave of book towns started in the 1960s with Hay-on-Wye in Wales and is now present in many other European countries. The book also lists some examples from overseas. Just to name a few of over thirty-one examples of book towns: Ascona in Switzerland, Becherel in France, Bellprat in Spain, Borrby in Sweden, Bredevoort in the Netherlands, Damme in Belgium, Fjaerland in Norway, Monterregio in Italy, Selfoss in Iceland, and Wünsdorf in Germany. The book includes examples from Australia, New Zealand, South Korea, and the USA as well.

Book Towns illustrates how in a globalised book market dominated by the internet, there is still room for niches. Remember: Amazon started with selling new books and has 'ruined' many other book chains. It still sells books apart from its complete range of all things or gadgets anyone wants to order. Even in the special market of selling used or antique books, Amazon is now playing a dominant role via its portals – internationally via AbeBooks or for the market of books in German via ZVAB (Zentrales Verzeichnis antiquarischer Bücher). However, the rise and the continuing existence of book villages appears to be an example of the development of local and regional niches in a globalised world, offering interested booklovers the old experience of finding books by looking through a collection of books in shops organised in a way, but still full of surprises and unknown treasures.

In addition, *Book Towns* shows how local and regional development can be supported by innovative ideas, especially pioneering attitudes to develop peripheral places outside urban centres. Insofar this book can be recommended not only for collector booklovers, but it can be also useful for planners in their pursuit of innovative and inspiring ideas for the development of regional peripheries. And let us not forget that this book is well produced and illustrated: it is an informative travel guide for booklovers which indeed offers 'Forty-Five Paradises of the Printed Word'.

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Rachel DODDS, Richard W. BUTLER (eds.), *Overtourism: Issues, Realities and Solutions*, De Gruyter, Berlin/Boston, 2019, 288 pages

Most cities and regions do serious attempts to attract holidaymakers. Especially in places that look for a new economic future, the tourism sector is seen as a useful source of income and jobs. For the past few years, however, interest in the downsides of tourism has been growing. Some commentators even refer to 'overtourism'. Additionally, the World Tourism Organization is concerned about the phenomenon and defines overtourism as '… the impact of tourism on a destination, or parts thereof, that excessively influences perceived quality of life of citizens and/or quality of visitors experiences in a negative way' (UNWTO, 2018, p. 4). Venice is the classic example of overtourism, but also places like Amsterdam, Dubrovnik and Machu Picchu struggle with the consequences of excessive visitor numbers.

How can overtourism be understood, what are the relevant issues and how should places cope with the challenges? With these questions in mind Dodd and Butler, two respected tourism professors, asked a range of scholars from universities and research institutes to contribute to the collection *Overtourism: Issues, Realities and Solutions*. The result is an accessible book of 18 chapters that consider what it means when too many people are visiting the same area. As such, it is the first academic volume on the topic. The book's introduction is followed by a chapter on the enablers of overtourism. Here, the editors highlight a number of economic, technological and strategic factors, such as the fact that more people can afford to travel, the importance of social media as well as a short-term focus and lack of coordination among tourism stakeholders. After this, the book is divided into three parts: theoretical aspects, case studies, and governance challenges.

In Part I, overtourism is positioned theoretically and related to the environment, the concept of authenticity, the role of social media, and the Tourism Area Life Cycle. Wall (chapter 3) and Rickly (chapter 4) suggest that tourist crowds may have counterproductive effects on the natural environment and local culture, thus damaging the very reasons why people visit an area. My favorite chapter in this part of the book is the one by Gretzel on the linkages between social media and overtourism. Obviously, social media has popularised certain destinations leading to touristic herd behavior. At the same time, Gretzel notes that social media can be a useful tool leading to 'responsible Instagramming' and fighting overtourism. In his chapter on the Tourism Area Life Cycle, Butler also makes an interesting point: it is not the number of visitors per se that causes overtourism, but the feeling among locals that 'their' place is overrun and that they have lost control over what is happening.

Part II deals with eight case studies of overtourism across the world. I particularly enjoyed the mix of well-known and rather unfamiliar examples. For instance, most of us know that Thailand, Barcelona, Venice and Prague have been overwhelmed by tourists for some time. Accordingly, chapters 8 (Hess), 9 (Goodwin), 10 (Nolan and Séraphin) and 11 (Rončák) are devoted to these destinations, the

ways in which they are affected by overtourism and how they try to manage it. In turn, chapters 7, 12, 13 and 14 discuss cases most readers might be less familiar with. Cruz and Legaspi (chapter 7) reflects on the temporary closure of Boracay beach in the Philippines in 2018 to stop the island's further environmental decline caused by overcrowding. In his interesting contribution on the Hajj in Mecca (chapter 13), Qurashi describes what it means for a city when it is visited every year during a very short period of time. And chapters 12 (Weber *et al.*) and 14 (Butler) argue that overtourism can also become an issue for smaller places as well as the countryside. Both the Swiss town of Lucerne and the Scottish highlands and islands show how important it is to balance the desire to make money on tourism and the need to respond to local concerns.

In Part III, the challenges of overtourism for policy makers and other stakeholders are discussed. As is often the case in urban and regional development, the key question is how to invent long-term, integral and coordinated solutions to tackle excessive visitor numbers. In chapter 15 Jamieson and Jamieson note that local specificities make it impossible to develop a 'one size fits all' approach that is relevant for every place. However, Becken and Simmons (chapter 16) see cooperation between stakeholders as a universal success factor, although they simultaneously show how hard it is to achieve it in practice. In her contribution on the role of policy, planning and governance (chapter 17) Joppe cames to a similar conclusion: combatting overtourism is difficult, all the more because there are several scale levels of governance (national, regional and local) involved.

All in all, *Overtourism: Issues, Realities and Solutions* makes an important contribution to the understanding of overtourism in cities and regions across the globe. One of the strengths of the book is its unique blend of theoretical reflection, telling case study examples and policy relevance. As such, the volume provides both researchers and practitioners with valuable and up-to-date insights into the phenomenon of overtourism. I am sure the book will appeal to anyone who is interested in geography, planning, tourism, and policy studies. And perhaps the book can even have a wider mission and audience. The fact is that one inevitably starts to think about one's own travel behavior while reading the chapters. Is it really necessary to visit Barcelona, Prague or Lucerne in a world where there are so many other interesting places to see? Indeed, we should first look at ourselves before we point a finger at others. Or, as the editors rightly mention at the end of this excellent book: 'Conclusion: we have seen the enemy and it is us' (Dodds and Butler, 2019, p. 273).

REFERENCE

UNWTO (2018), '*Overtourism'? Understanding and Managing Urban Tourism Growth beyond Perceptions*, Madrid: World Tourism Organization.

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