Physical environment as a source for innovation: investigating the attributes of innovative space

Kaisa Oksanen and Pirjo Stähle

Abstract

Purpose – The purpose of this paper is to investigate how physical spaces intersect with innovation and innovativeness, and what the most relevant attributes of physical space are for innovation.

Design/methodology/approach – The paper reflects the changing nature of innovation, from technological advancements to services and meaning changes, and argues that the development of innovative spaces similarly embodies a diverse set of values such as collaboration, openness, and sustainability. Using a literature review, interviews, and benchmarking data, the paper examines the relationship between physical environment and innovation.

Findings – The findings from both the literature review and the interviews underline innovation as a communicative and human-centred process. As a result five attributes of innovative space are presented: collaboration enabling, modifiability, smartness, attractiveness, and value reflecting.

Originality/value – The results provide perspectives to the challenge of how to support innovation creation by developing physical spaces. The paper adds to the conceptual development of innovative space and outlines physical space as an innovative service.

Keywords Innovation, Creativity, Innovation environment, Innovative space, Physical space

1. Introduction

Innovative spaces may enable interaction, nurture social capital, accelerate start-ups, generate artistic activities, and support the flow of ideas; they aim to be the most attractive workspaces and to promote creativity and collaboration in learning and working practices. However, studies on the physical environment and innovation are fragmented. This paper explores and characterises the relationship between space and innovation. The study is based on interviews with experts of innovative spaces and on benchmarking data about innovative, creative spaces and environments. The analysis is conducted in order to outline the different characteristics of innovative spaces and to elaborate space as an innovative service. The results provide perspectives to the challenge of developing physical spaces that support an innovative culture.

In the age of globalisation, people are not bound to a certain place, but the contributions of the physical environment to innovation are varied nonetheless. In this paper, the effect of physical space on innovation is analysed and, as a result, five attributes of innovative space are presented: collaboration enabling, modifiability, smartness, attractiveness, and value reflecting. The paper reflects the changing nature of innovation from technological advancements to service innovation and value creation and argues that the development of innovative spaces similarly embodies a diverse set of values such as collaboration, openness, and sustainability. The research questions are the following: How does a physical space intersect with innovation and innovativeness, and what are the most relevant elements of physical space for innovation? Using a literature review, interviews, and benchmarking data, the paper examines the relationship between physical environment and innovation.
The results from both the literature review and from interviews underline innovation as a communicative and human-centred process.

2. Literature and conceptual framework

Physical space affects people in many ways. In this section, a review of the literature from the innovation and creativity disciplines attempts to put some clarity to the question of how physical space affects innovation. The existing literature includes both empirical and relevant conceptual and theoretical studies, and it provides an initial impression of the area of space and innovation. This paper both accumulates the knowledge on innovation creation and generates understanding about the role of physical spaces in it.

The basic concepts in the paper consist of physical space, innovation, and innovative space. Physical space in this article refers to the tangible, physical environment, which can interfere with people and their actions, such as social interaction, in various ways. As the authors are trying to find out how physical space interferes with innovation and innovativeness, the authors also use the concept of innovative space, which simply refers to a physical environment where innovation flourishes. By innovation the authors mean a new idea that has been put into practice. Often these terms are used to describe innovative firms, such as Apple, Google, or Facebook, and innovative ecosystems, such as Silicon Valley (e.g. Saxenian, 2006; Munroe, 2009). The authors’ emphasis is on the widening scope of innovation and, as they are studying universities and research organisations as a source of innovation, the examples in this article focus on the innovative university premises. To highlight the importance of a physical environment, a few classical examples about the effects of a physical space on people are explored. Following this, the authors focus on studies about physical space and innovation processes.

A classical study of Ulrich (1984) demonstrated the relation between environment and the wellbeing of people. Ulrich proved that hospital patients who viewed nice scenes such as trees and animals from their wards, recovered faster, spent less time in hospital, required fewer painkillers, and had fewer post-operative complications than those patients whose ward views consisted only of empty walls. Evidence for the effects of environment – especially of nature – on wellbeing and health is strong (e.g. Wilson, 1984; Wilson, 2001). Similar results can be found about the effect of environment on creativity (McCoy and Evans, 2010). Another notable feature of physical environment is its connection to social interaction and collaboration (Strauss, 1978). The physical environment in which people work affects both job performance and job satisfaction (Vischer, 2007). In addition, numerous studies about people’s interaction with the physical environment were conducted in environmental psychology; these generally explored people’s associations and emotional construction of places, behavioural components of space, place dependence, and so forth (Auburn and Barnes, 2006; Gustafson, 2001).

2.1 Physical environment and creativity

The theoretical foundations of creativity, innovation, and environment support the empirical findings. For example, physical environment is recognised as a significant factor for knowledge creation and learning (Senoo et al., 2007; Nonaka and Takeuchi, 1995). Spaces enable the building of a special knowledge available only to the people living or working there – tacit knowledge. This special knowledge emerges from the surrounding social networks and environments. Nonaka and Konno (1998) use the Japanese concept of Ba,
which refers to inclusive places that enable the creation of shared contexts and the knowledge-creation process. Fundamentally, the concept refers to a shared space for emerging relationships, and the space itself can be physical, virtual, or mental (Nonaka and Konno, 1998). The concept of creative space is useful in understanding the diverse processes of knowledge and technology creation (Wierzbicki et al., 2005). Generally, it is assumed that organisations can generate more new ideas by using the physical space more diligently. Fostering creativity is also a critical aspect of innovation as innovations require ideas. By using the choice of place and space, creative processes may be facilitated. The creativity literature (e.g., Csikszentmihalyi, 1996; Sternberg and Davidson, 1995) presents many good examples of people’s creative habits and validates the general argument that space effects widely on people’s emotional well-being, which in turn is taken as fundamental for creative work. People tend to create microenvironments, personal spaces that one creates to feel comfortable, safe, or cozy (Csikszentmihalyi, 1996). People need supportive, symbolic environments to proceed with the tasks of life and work.

In Sternberg and Lubart’s investment theory of creativity, environment is listed among the six important sources that creativity requires (Sternberg, 2006). The other sources include intellectual abilities, knowledge, styles of thinking, personality, and motivation. Environment here refers to the surrounding ecosystem with physical, mental, and social dimensions, but the physical environment has some specific features that the authors want to underline.

To sum up, most of the theories on creativity, on innovation, and on creative industries acknowledge a relationship between place and creativity. Without the support of environment, innovations and innovativeness might never be displayed, and, as noted previously, spaces provide knowledge and experiences available only to the people who are physically in attendance. This article utilizes the theories of knowledge creation and creative space as a background but concentrates on analyzing today’s innovative spaces, their characteristics and effects on innovation capital. The chosen approach emphasises innovation as a social process and not the relationship between knowledge and technological innovation, thus the authors analysed the spaces for how they support innovation from a human-centric perspective.

### 2.2 Physical environment and innovation

The article addresses the changing nature of innovation from the application of new technology to the delivery of meanings, values, and solutions, and it also addresses the role of physical environment in innovation. The defining element of innovation is shifting from maximizing profit to solving wicked problems and positively effecting society as a whole (Chesbrough, 2003; Von Hippel, 2005; Benkler, 2006), and the authors argue that the spaces of innovation both reflect and support this shift.

Fundamentally, innovation means introducing something new (Nordfors, 2009), and innovativeness refers to the virtue and ability of introducing and refining new ideas. Introducing new ideas requires creativity, which can be supported in various ways. Generally studies on the physical environment and innovation are fragmented. Moultrie et al. (2007) explored the role of physical environment in innovation and divided the development into studies that looked more widely at how the workplace influences work performance and studies that concentrated explicitly on innovation. The first category includes considerations of the spatial structuring of workplaces (Allen, 1966), investigations about the impact of physical environment on employees and customers (Bitner, 1992), and analyses of how office design and new technology is changing the ways of working (Myerson and Ross, 2005). Also architectural literature provides examples of workspace design and innovativeness but theoretical foundations are limited. The way in which workspaces generally are changing has been reported in several books that illustrate developments in style, configuration, and technology (e.g., Zelinsky, 2004, in Moultrie et al., 2007). Some studies stress the relationship between physical environment and social and environmental psychology and indicate that the conceptions of space and time are fundamental to the manner in which organisations and workplaces are managed and organised (Inalhan, 2009; Carr and Hancock, 2006).
The studies related more directly to innovation processes include cases about innovative and creative spaces and “laboratories” (Lewis and Moultrie, 2005; Wycoff and Snead, 1999) and about considerations on how the wider implications of how workspace design influences innovation (Kristensen, 2004).

Global trends in development of innovative environments are varied. In regional development, Etzkowitz and his colleagues presented an institutional framework of Triple Helix spaces that consists of Knowledge, Innovation, and Consensus spaces (Etzkowitz and Leydesdorff, 2000; Etzkowitz and Ranga, 2011). The Triple Helix spaces provide insights to the process and mechanisms by which the institutional actors interact and co-evolve over time, and these spaces provide an interesting approach to localised innovation processes and to the use of regional resources. Another significant approach to innovation and spaces can be found in a development of both formal and informal collaborative spaces, a shrinking individual work space, an increasing use of collaborative technology, and the growing importance of 3rd places are found (Ouye et al. 2010).

In communication literature, some researchers argue for communicating in issue arenas, which function as spaces for enactment and discussion, where different players come together to discuss a central problem or issue (Luoma-aho and Vos, 2010). Such arenas are stages or platforms in virtual or tangible surroundings; in them the scenery changes continuously as a result of the interactions between the players and the developments in the social environment (Goffman, 1959; Luoma-aho and Vos, 2010).

A special issue that affects innovative spaces is the continuous movement of ideas and people, re-cycling. As the innovation ecosystem runs by official and unofficial value networks between the actors both locally and globally, people are not bound to a certain physical space (Hautamäki, 2010). There are claims that the processes of globalisation and digitalisation are causing the spatial dimensions of economy to completely lose their importance (Morgan, 2004). People move easily between companies and from research institutions to business and vice versa, and innovation processes increasingly are distributed across the globe. Innovation is conducted in global networks with partners situated practically anywhere. A new knowledge is emerging in collaborations between people and organisations situated in different locations. However, from the point-of-view of space, it is important to understand that physical space enables the emergence of tacit knowledge that is available only to the people present in the space – physically or virtually. That special knowledge is emerging from the surrounding innovation ecosystem and creating unique historic, geographical, and planning conditions.

To sum up, the importance of physical environment is recognised both in the theoretical and empirical studies on innovation. However, there is a need for greater clarity on the characteristics and components of such spaces and on how they actually support innovation. Experts have argued that there is a gap in current literature for understanding how the environment actually impacts innovative and creative performance and for how this performance matches the underlying strategic intentions of the organisation (Moultrie et al., 2007). Kristensen (2004) concluded that knowledge on how the physical space enhances creativity and innovativeness is limited. In this paper the authors further elaborate the special characteristics of space that enhance innovation and innovativeness. The paper adds to the understanding of innovation environments and provides a framework from which one can consider the development of innovative spaces.

“Innovative spaces are to be seen as catalysts for an organization’s ability to, for example, improve communication, reconfigure resources, attract and retain talent, or reflect values.”
3. Research material and analysis

The article uses a cross-disciplinary approach to explore creative spaces and adds to the understanding on how environment supports innovation. The analysed material consists of seven semi-structured interviews and in-depth discussions with experts, developers, pioneers, and users of creative and innovative spaces and learning environments. The interviews were qualitative with open-ended questions about the relationship between physical space and innovation/innovativeness; they lasted from one to two hours and revealed information on what constitutes an innovative space. Some interview sessions included explorations of creative physical premises and provided complementary qualitative data about the attributes and functions of innovative environments. The interviews took place in university cities in Finland, and the selection is focused, thus, on modern university and research premises. The choice is rationalized by the growing importance of universities and research organisations to innovation ecosystems and processes (Etzkowitz and Leydesdorff, 2000). Traditionally in the innovation process, universities have a central role as creators and transferors of new knowledge, but today it is more and more important that universities also utilize and commercialize the scientific knowledge they create (Christensen and Eyring, 2011; Berman, 2012). Within this process, the development of innovative spaces within universities has proved essential.

In addition to interviews, and to complement the views from only one country, benchmarking material from various locations is utilized. The emphasis of benchmarking has been on innovative university campuses and on learning and research environments, but the material includes also examples from creative business environments and other workspaces. Furthermore, in many places, the creative platforms host students and researchers as well as entrepreneurs and industry representatives. The benchmarking data consist mainly of researchers’ and some of the interviewees’ articulated experiences from the places visited, communication and promotional material from and pictures of the places, a few reports about development projects (e.g. Björlund et al., 2011), and discussions and short time collaboration with the people working in the places. In the paper, the chosen real-life examples illustrate and characterise the nature of today’s innovative space and environment. The benchmarking data were partly visual (including pictures of innovative spaces), and its role was supportive (reflecting the relationships between people, space, and innovation).

The authors investigated spaces are from different locations such as libraries at several universities in The Netherlands (Amsterdam University College, Rotterdam University, and Delft University), spaces in Aalto University (e.g. Aalto Design Factory – one of the main physical manifestations of Aalto University and its innovative spaces), various premises of the University Properties of Finland Ltd. (e.g. Tampere Technical University); Entrepreneurship Centres of Excellence of the Finnish Universities of Applied Sciences in Jyväskylä and Tampere (Team Academy and Pro Academy); TILLT, a Swedish producer of artistic interventions in organisations; and the National University of Singapore (e.g. Interactive and Digital Media Institute), and various innovative locations used by creativity pioneers from the US (WeWork, IDEO, General Assembly, etc.). Benchmarking was applied to spaces enhancing new kind of learning, working, and innovation; and the places and facilities that the authors studied generally represent successful examples of a nonconventional work and study environments.

The analysis was performed in two steps. In step 1, the authors selected the key narratives from existing literature and the interviews, and, from the chosen key narratives, the authors determined preliminary categories for mapping innovative spaces. Step 2 provided a qualitative insight into the material. In this stage, the authors evaluated the mapping and separated the material first into themes and later into dimensions of an innovative space. The Table I displays the research framework and the preliminary findings.

First, the literature review presented in the previous chapter laid the foundations for analysis. The literature supported the connection between space and innovation and presented various findings on how physical space affects people and their behaviour.
Next, the authors categorized the data from interviews and benchmarking in order to identify the important features of innovative space. The general attributes (facilities, aesthetics, distances, etc.) of physical environment were varied so special attention was paid in order to identify and highlight the attributes linked specifically to innovation and innovativeness. Similarly the general themes around innovation (social dimension, service dimension, and changes in the concept and practices, etc.) were wide-ranging but in the end the analysis showed how the innovative space generally is defined and how physical space is utilized as a source of innovation. The preliminary themes were further separated into detailed characteristics of innovative space that are presented in the next chapter. The key narrative from the existing literature and from the interviews is presented in Table II.

Table II embodies simple classifications from the research material. The first theme, the desirable attributes of physical space, concentrates on the elements that the interviewees highlighted when asked to describe the value and relevance of physical space in today’s work and study life. The design in the benchmarked premises also highlighted these desirable attributes for example by various open space solutions and by modifiable units. The second theme is presented in the sense of preoccupation with today’s innovation and its importance in all sectors of society, not only in business. The third theme centres the rhetoric about what an innovative space is and how it is created. The interviewees represent innovation experts with experience working and/or studying in various creative spaces, and their expert knowledge proved to be valuable.

4. Results: space and innovation

The study illuminated the relationship between physical environment and innovation and, as a result, the authors provide the determining characteristics of innovative spaces. Results from studies examining components of innovative or creative spaces showed a connection between physical environment and innovation, and interviews and benchmarking further indicated that certain features of a physical space foster innovation. With this research, the authors are not trying to prove that certain elements of a physical space inevitably produce...
more innovations, but, rather, that a physical space both supports innovation and reflects the changing nature of it. The spaces characterised here tend to be populated by people and firms working within the wide field of innovation, but, more significantly, these spaces represent the changing drivers of innovation such as openness, collaboration, sustainability, or wellbeing. Innovation policies and processes all over the world need new approaches to more fully tap into the undiscovered innovation potential, and innovators need to develop new capabilities covering the entire innovation chain, from conducting preliminary research through to taking products and services to users.

How can a physical space support innovation? As a result of the research, the authors present five characteristics of innovative space – collaboration enabling, modifiability, smartness, value reflecting, and attractiveness – and the authors further elaborate on the service element of spaces. The results suggest that the physical space is among the required sources of innovation.

4.1 Collaboration and communication enabling space

The view of innovation as a social process is one of the guiding principles in building innovative spaces, and all the locations studied have been actualizing this view intensively. Innovation is collaborative work (e.g. Nordfors, 2009), and an ideal working environment encourages and enables fruitful interaction between different actors such as students, researchers, and professional practitioners. Similarly, the focus in creativity theories is usually on creativity as a collective or social process, with some concentration on the relationship between place and individualized creativity (Drake, 2003). The collaborative element is therefore one of the main requirements of innovative space. All the benchmarked and analysed innovative spaces highlighted collaborative and communicative attributes. The interaction between people, enterprises, and institutions is the core of the innovation system (Lundvall, 1992). Collaborative spaces are linked also with other spaces locally and globally.

Social capital generally refers to the overall pattern of connections between different actors (Nahapiet and Ghoshal, 1996), and spaces can be designed to support its development in many ways. Space design aiming at greater innovativeness supports people’s motivation, ability, and opportunity to share knowledge and experiences. According to a research report on Aalto University Design Factory platform and community, having a common physical space and spatial arrangements that promote interaction (such as having shared rooms in which you work next to other community members, rather than working in separate rooms) were perceived to enhance getting to know other members of the community. Being able to use the space actively in one’s own work and able to participate in activities organised by others were seen as critical for entering the community, as well as for getting new information, potential contacts, and feedback (Björnund et al., 2011). This, naturally, has also some challenges. One recognised issue is that spaces that facilitate interaction and collective activities sometimes make it hard to focus on individual work. That is why innovative spaces need to be modifiable.

4.2 Modifiable space

Innovative work and learning requires flexible ways of doing. In the learning and research environments of the study (e.g. Aalto Design Factory, Team Academy, and Pro Academy), the facilities were built to support a versatile range of activities and new collaborative ways of studying and working. The flexibility of the space provides possibilities for the use of a wider scale of modern and interactive teaching and research methods than are available in the majority of the spaces normally used by educational institutions. The varied and flexible spaces can facilitate a wide range of experimentations and can provide an important home base for interdisciplinary and inter-organisational work and learning groups. These kinds of views were shared across all spaces studied.

Senoo et al. (2007) studied the effects of workplace reformation on BA and on the knowledge creation process and found that physical workplace reforms have resulted, most notably, in improving direct communication. Modifiability is one of the factors that enables the
organisation to make the most of the existing workspace. In the end, modifiable spaces provide an experience of being allowed to, or empowered to, act differently and innovatively. Successful innovative spaces are responsive to the needs of their users. Modifications vary from different lighting options to moving walls and fluid seating arrangements, but it also includes intangible changes. Modifiable space changes such that the same space can serve totally different purposes at different times. By modifying the physical space, the varying needs of users can be fulfilled.

4.3 Intellectual space

Intellectuality as a feature of a space is naturally linked to certain key technologies, such as wireless communication, various sensors and user interaction methods, and intelligent objects, but it is more than just technology. The often used term smart space refers to spaces such as offices, schools, malls, university campuses, and outdoor areas that are enabled for co-operation of smart objects and systems and for ubiquitous interaction with different users. Smart spaces are being developed in many locations all over the world. One interviewee highlighted the importance of the development of smart collaborative spaces that support innovative learning within universities:

Smart spaces within our campus are designed based on the knowledge triangle. The knowledge triangle is an old concept used, for example, within the European Union strategies to strengthen interaction between research, innovation, and education. These modern, urban research and learning spaces are also interfaces to the newest knowledge – in this smart solutions are required.

Intellectual spaces are spaces equipped, for example, with visual and audio sensing systems that can perceive and react to people and have “memories” about previous users. It also can include augmented reality solutions such as meeting room tables and walls that act as computer displays. But intellectuality means more than technological solutions; intellectual space is a part of a socio-technical ecosystem and a platform on which people will build various meanings. Technology also has its limitations, for example, the variety of augmented reality applications have not been widely accepted as a part of peoples’ everyday use (Azuma et al., 2001). However, smart space is an active and evolving field of study and development, and the authors believe that future research will provide solutions to the challenges in the human-computer interaction, in managing the variety of technology, and in understanding and utilizing the changing contexts present in spaces.

4.4 Attracting space

“Interesting space attracts interesting people”, said one of the interviewees. It is claimed that especially creative people resent living or working just anywhere. Studies on environmental psychology support the claim and indicate that people need to be more than simply healthy and safe in the spaces they occupy (Vischer, 2007). Instead, creating a space at school or at work that people feel comfortable with is extremely important (e.g. Florida, 2002). Thus attractive space is comforting. Once basic needs are assured, people need environmental support for the activities they are to perform, that is, they need environmental comfort (Vischer, 1989).

Attractiveness of a space is also related to the wider concepts of milieu used in the studies concerning creative cities, urban areas, and regions. Attractive milieu is described with the concept quality of place, which includes a range of qualities and features stretching from bike tracks, meeting places, and art and music venues to tolerance (Florida, 2002; Landry, 2000).

In practice interior design, ergonomics, art, and so forth are well distributed complements to the creative and innovative work life. Attractiveness of a space also includes elements such as location, architecture, or services; and attractiveness consists of a combination of other important attributes, such as the earlier mentioned modifiability and collaboration. In innovation the key to environmental comfort and attractiveness is in how the space supports the flow of ideas; for example, by making new ideas and knowledge visible and accessible. The flow of ideas is partly enabled by the intangibles of innovative space. Intangibles such
as creativity or aesthetics are hard to define or measure, but their value is recognised and supported in many ways. For example, the city of Delft in The Netherlands has invested in creative city policies, and the city is now known for attracting creative talents and innovative entrepreneurs.

4.5 Value reflecting space

As noted previously, today’s innovation includes a variety of elements. As a result of innovation, new value and meaning are created. Innovative spaces similarly can represent different values. For example, in environmental psychology concepts and values such as privacy, safety, and identity are generally recognised as central in the construction of the meanings of different spaces. Spaces can be viewed as a continuation of one’s identity, and the meanings and values attributed to spaces are often mapped around self and others (Gustafson, 2001). Quoting our interviewee, “What the best companies have in common spatially? Their spaces provide a message or a story about the organisation. Space is full of symbols, and, if utilized wisely – for example, through art – the space can have wide psychosocial impacts on their users.”

The defining elements of innovation today are getting more versatile and include values such as openness, sustainability, or collaboration, and the authors can see that the attributes of creative and innovative spaces intersect with these changing values and attributes of innovation. For example, the design pioneer firm IDEO embraces values such as creativity, playfulness, open mindedness, and collaboration; similarly their physical workspaces express these values. IDEO’s environment is aimed at helping the creative process and contributing also to the values of wild ideas, action, chaos, and barrier breaking. The IDEO space consists of team project rooms, an open studio for the designers and programmers, a prototyping workshop, a café, a community garden, and so forth. The variety of spaces supports the firm’s values and working life and inspires people.

4.6 Space as an innovative service

The new concepts of learning and working spaces such as collaborative workspaces or community spaces resemble the idea of space as a service. Spaces include a variety of services, from basic office infrastructure, such as an internet connection, to unique co-creation experiences. Many traditional spaces such as libraries and museums are going through a significant change as they are no longer single static locations but a space with services through which users locate, use, and create various learning and research materials (Pritchard, 2008). The space-as-a-service approach emphasises human-centred space planning and requires a flexible mindset.

Various services help in keeping the innovation process simple and flowing. Services help to build relationships with peer innovators; to clarify IPR processes and contracts, to utilize design, and so forth. Space or location as a service for innovation takes a wider perspective where space acts as a suite (or a unit) for a system of services. For example the newly developed Urban Lab, a platform for urban research in Otaniemi, Finland, is one manifestation of a space as a service. The Urban Lab complex acts in a framework of social learning and social cohesion; it brings together researcher and developer communities around the chosen theme, builds a common action culture, and supports collaboration between and within the different communities working in the area.
Spaces as an innovative service mean intuitive platforms that offer resources that users can select, utilize, modify, and create. For example, IDEO in Palo Alto introduced an action model where people work in a common space with social interaction, and separate rooms are meant for working with the current topics and projects. In IDEO, every project proceeds in a space reserved specifically for it, and new ideas and outcomes are similarly developed in the chosen space.

Effective utilisation of socio-cultural contexts and tacit knowledge requires personal contact and regular interaction (Schmidt and Hunter, 1993). This paper argues that these spaces have a special role. Spaces help to capture and refine the cultural and social knowledge that is important to innovation creation – even more important if aiming for radical innovation. As both innovative business and innovation researchers need to explore the society around them, physical spaces have a special role as platforms for enactment and discussion where different players come together to discuss and work with common challenges and goals.

5. Conclusions

Innovation requires a variety of resources such as new knowledge, motivation and collaboration. This research explored the physical environment as one of the resources. The research question about the most important elements of physical space for innovation was answered by a literature review, by interviews, and by investigating benchmarking material on innovative and creative spaces. In summary, the research strengthens the link between innovation and physical space. As a result, a characterisation of an innovative space was presented. The five characteristics include communicativeness, modifiability, smartness, attractiveness, and value reflection. In practice, innovative space consists of a combination of these attributes, and, depending on the case, some elements will prove to be more important while others fade to background. These dynamics need more study in the future, and there are limitations to this research. The characterisation is a simplistic description but it provides a framework from which one can consider the development of spaces that enhance innovation. Given the data limitations, the examples are also a little unbalanced towards universities’ and research organisations’ premises but by this choice the authors wanted to demonstrate the growing importance of universities in innovation processes and ecosystems. The results are by no means an exhaustive representation of an innovative space, but the presented attributes are interesting and add to the works that have identified and classified the relationship between innovation and physical environment.

The results have implications for innovation practices and studies as they underline the importance of physical space for innovation and provide insights into the design of innovative space. In practice, the results can help innovators, developers, and decision-makers to create innovative spaces. Innovative spaces are to be seen as catalysts for an organisation’s ability to, for example, improve communication, reconfigure resources, attract and retain talent, or reflect values. From a strategic perspective, the physical characteristics of the environment should be connected with the strategic goals of the organisation (see, e.g. Moultrie et al., 2007). However, to successfully utilize physical space in innovation processes or strategies, certain challenges need to be addressed and further studied. More research is needed especially on the capacities needed to create innovative spaces. The authors need more information about how to develop physical space in order to affect the general rules of the innovation game (technological possibilities, market demands, competitor/customer behaviour, political/social context, etc.) but designing spaces that breed innovation also requires careful study about cultural contexts, people and their beliefs and values.

Possible future research could address the multidimensional relationship between physical space and innovation. First, there are the dimensions of innovation including the changing drivers of innovation from product innovation to service innovation, the changing customer needs, and new innovation management and policies. Second, along with the attributes explored in this paper, there are many aspects to spaces to explore, such as the balance between the technical and socio-cultural dimensions of a space.
References


Drake, G. (2003), “‘This place gives me space’: place and creativity in the creative industries”, Geoforum, Vol. 34 No. 4, pp. 511-524.


Lundvall, B.-Å. (1992), National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, Pinter, London.


**About the authors**

Kaisa Oksanen PhD (Public and Social Adm.) is a Research Coordinator at the Agora Centre, University of Jyväskylä, and at the time of this research, a visiting researcher at Aalto University School of Engineering, Finland. Her main area of expertise is innovation research. Her background is in social and political sciences, systemic innovation and democracy development. She took her PhD in the City University of Hong Kong (2005-2009) and in recent years she has been working in Agora Centre, Finland with projects concerning, e.g. regional development and innovation ecosystems, service innovation and wellbeing. Agora Centre is a special unit of the University of Jyväskylä acting as a platform for interdisciplinary research in the field of human technology. Kaisa Oksanen is the corresponding author and can be contacted at: kaisa.oksanen@jyu.fi

Pirjo Ståhle PhD (Educ.) is a Professor at the Finland Futures Research Centre, University of Turku and a visiting Professor at Aalto University School of Business, Finland. Her main area of specialisation is the measurement of intellectual capital and Innovation. Professor Ståhle is often mentioned as a pioneer of Knowledge Management and Intellectual Capital in Finland: she was the country’s first-ever Chief Knowledge Officer (Sonera 1998-2001), first Professor of Knowledge Management (Lappeenranta University of Technology 2001-2007), and her book on Knowledge Management (together with M. Grönroos) was the first Finnish book on this subject. She has published several books and more than 100 articles in popular and scientific publications and given numerous lectures and presentations on themes related to organisational renewal, innovative leadership, and knowledge-intensive economy.

To purchase reprints of this article please e-mail: reprints@emeraldinsight.com
Or visit our web site for further details: www.emeraldinsight.com/reprints