THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

Office Landscapes for Well-being
Interrelations between employee, activities, spatial attributes and context

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Cover: Vattenfall office in Solna (Sweden) by Tengbom Architects. Photograph by Björn Lofterud.

Abstract

The study of employee well-being in relation to office landscapes has gained greater interest in the recent years, although research on the construct of well-being has been increasingly developing in the field of Positive Psychology since the 1960s. However, the impact of office landscapes on employee well-being has often been addressed from perspectives such as health, satisfaction, happiness, comfort, etc. This has turned well-being into a popular and fuzzy term that numerous office studies use with diverse results, but fewer address it in detail. Furthermore, the prolific research in Positive Psychology lacks consensus on what characterises the construct of well-being and a unified criterion for its operational definition.

In this thesis, a hybrid approach to hedonic and eudaimonic well-being theories has been chosen to study in depth the interrelations between employee well-being and office landscapes. Besides, these interrelations emerge from the use that employees make of their office landscapes to carry out their daily activities. Thus, employee well-being is studied in the context of office landscape use. For this venture, Activity Theory has been chosen as the complementary framework that enables an explanation of the role of office landscapes in mediating employees' activities and subsequent influences on well-being.

The research presented here comprises two literature reviews and an in-depth case study in which a mixed method research approach with emphasis on qualitative data was adopted. The findings show that spatial attributes of the office landscape influenced employee hedonic and eudaimonic well-being by enabling or hindering uses of the landscape. Likewise, the use, disuse or misuse of spaces was influenced by employee perceptions on what was pleasurable and supportive, or not, for carrying out their daily activities. In this sense, the experiences of use and well-being overlap and are central to explaining the results, but contextual aspects such as former employee experiences at different offices, relocation processes, social environment, and employees' activity patterns also influenced employees' insights.

As a result of integrating well-being theories and the principles of Activity Theory in my research, a tentative framework is proposed for the study of employee well-being in relation to office landscapes. In addition, the weight of employee environmental mastery in the overall experience of well-being suggests that further research exploring design opportunities to improve the mastery over office landscapes has a great potential to enhance employee well-being at work.

Keywords: well-being; activity theory; office employee; office landscape; office evaluation; spatial attributes; qualitative study; case study; literature review.

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This is also yours!

Appended publications

Paper A
Cobaleda Cordero, A. and Babapour, M. (2017). *Discrepancies between intended and actual use in Activity-based Flexible Offices - A literature review.* NES 2017. Joy at work. 20-23 August 2017. Lund University, Lund. Sweden.

Cobaleda Cordero planned the paper, executed the database search, reviewed the literature, wrote the paper and presented it at the conference. Babapour contributed to the planning, review of literature, writing and provided feedback.

Paper B
Cobaleda Cordero, A., Babapour, M. and Karlsson M. (2019). *Feel well and do well at work. A post-relocation study on the relationships between employee well-being and office landscape.* Journal of Corporate Real Estate, https://doi.org/10.1108/JCRE-01-2019-0002

Cobaleda Cordero planned and designed the study, collected, processed and analysed the data, and wrote the paper. Babapour contributed to the analysis, the writing and provided feedback. Karlsson provided feedback.

Paper C
Cobaleda Cordero, A., Babapour, M. and Karlsson M. (Submitted). *-Title hidden while the paper is under review.-*

Cobaleda Cordero planned and designed the study, collected, processed and analysed the data, and wrote the paper. Babapour contributed to the writing and provided feedback. Karlsson provided feedback.

Additional publications

Cobaleda Cordero, A., Rahe, U., Wallbaum, H., Jin, Q. and Forooraghi, M. (2017). *Smart and Sustainable Offices (SSO): Showcasing a holistic approach to realise the next generation offices.* Informes de la Construcción, 69(548): e221, doi: http://dx.doi.org/10.3989/id.55278

Cobaleda Cordero planned the paper, collected the project's material and references, and wrote the paper. Rahe, Wallbaum, Jin and Forooraghi contributed to the writing in different sections of the paper. Rahe and Wallbaum contributed to the planning and provided feedback.

Contents

Chapter 1
Introduction

1.   Introduction

From office types to office landscapes

Contemporary offices as a formal typology of space emerged in the beginning of the 20th century from the need to manage the burgeoning production of goods and the administrative work that this generated (van Meel, 2000, p.25). Since then, numerous changes on technological, economic, social and normative levels stimulated a significant evolution of office design and the implementation of several office types over time. Examples of these different office types have been referred in literature as: cell-office, shared office, open plan office, activity-based flexible office and combi office (Bodin Danielsson and Bodin, 2008); lean office, green office (Nieuwenhuis et al., 2014); bull pen office, cubicle farm (de Bakker et al., 2019); 'bürolandschaft' (Sundstrom and Sundstrom, 1986, pp.36-39), etc. Contemporary office design has been progressively embracing the idea of offices for flexible working, appearing in the 1990s and 2000s as so-called Activity-based Flexible Offices and Combi Offices (Brunia et al., 2016; van der Voordt, 2004). Both office types enable employees to choose among a diversity of spatial settings that give specific support to different activities: desks zones for individual work, secluded rooms for concentrated work, open areas for collaboration, shared spaces for socialisation, relax or contemplation, phone booths for phone calls and teleconferences, meeting spaces of different sizes and functionalities, etc. The main difference between these two office types is that employees at Combi Offices have assigned desks as in more traditional office types, while those at Activity-based Flexible Offices share the desks. This difference is based in the assumption that not everyone will need a desk simultaneously due to, for example, meetings or remote work. Hence, Activity-based Flexible Offices can allocate part of the space usually occupied by desks to other uses, or simply reduce the total area occupied by an organisation (Brunia et al., 2016; Lanks, 2014; Parker, 2016).

In most of the cases, the term 'office type' refers to a common set of architectural and functional attributes of the space, such as layout, number of workstations per room, degree of spatial seclusion, etc. Therefore, studies evaluating and comparing offices from an employee perspective often take the office type as the object of analysis (Brunia et al., 2016; de Croon et al., 2005). In this regard, previous studies have addressed issues such as employee productivity (e.g. Haynes et al., 2017), satisfaction (De Been and Beijer, 2014), welfare (e.g. Bodin Danielsson, 2016), cognitive load (e.g. Kaarlela-Tuomaala et al., 2009), privacy (e.g. Kim and de Dear, 2013), behaviour (Babapour and Rolfö, 2018), etc. in relation to different office types.

However, not all office types are unequivocally distinguishable by the same set of spatial attributes. For example, the main characteristic of lean offices is that they prescind any unessential element that could distract employees from their work in order to support productivity (Knight and Haslam, 2010); green offices either refer to workspaces that

implement profuse nature references, for example, to reduce stress (Nieuwenhuis et al., 2014), or spaces designed to minimise the carbon footprint (MacNaughton et al., 2016); activity-based flexible offices and combi offices refer instead to ways of working, for instance, the use of different workstations for the activity at hand (Babapour, 2019a). Moreover, context-specific spatial attributes, such as lighting, furniture, temperature, acoustics, etc. have not been used in order to define an office type, although studies described in the literature show that each of these attributes has an impact on the experiences that employees have at the office (Haapakangas et al., 2017; Lahtinen et al., 2015; Lamb and Kwok, 2016). Accordingly, the notion of office type as a basis for evaluation and comparison would not be enough to capture case-specific particularities, which may result in conflicting conclusions about offices of the same type. This calls for office studies at a lower level of abstraction than the 'office type'. Such a level of abstraction is denominated in this thesis as **'office landscape'** and refers to a concrete constellation of spatial attributes that materialise as a unique 'office environment'. This implies that variations between office landscapes can be studied in detail regardless of whether they denote a concrete office type or not.

In the case of this thesis, the research focus is on the interrelations between employee well-being and office landscapes.

Well-being at office landscapes

Well-being as a research topic has been gradually gaining interest due to its relevance in multiple domains of human lives (Linton et al., 2016). In the particular case of office design, a growing body of literature shows that office landscapes influence physical and psychosocial well-being of employees (Chu et al., 2000; Clements-Croome, 2018; World Green Building Council, 2014). For example, the concept of well-being has been repeatedly addressed in connection to indoor environmental qualities (i.e. temperature, air quality, odours, lighting, noise), ergonomics, or biophilia and nature references at offices (e.g. British Council for Offices, 2016; de Croon et al., 2005; Al horr et al., 2016). Besides, the WELL certification system (International WELL Building Institute, 2018), which is a tool to assess the impact of buildings on human health and wellness, illustrates the relevance that well-being is gaining among different stakeholders in the building sector, also beyond commercial offices.

However, recent literature reviews by Groen et al. (2018) and Jensen and van der Voordt (2018) conclude that there is limited research on the influence that offices have on employee health and well-being. The reasons are, according to the authors, a narrow focus on few topics, such as the ones exemplified in the previous paragraph, and a tendency to emphasize the negative influences of the built environment over its potential benefits. Moreover, studies addressing well-being at different office types often rely on quantitative evidence (Bridger and Brasher, 2011; Haapakangas et al., 2018; Windlinger, 2013) that allow to generalise conclusions, but provide limited

rationale on the reasons underlying the results reported or cross-case differences. More qualitative and holistic approaches seem pertinent to cover this gap.

Well-being has been often utilised as a buzzword to refer to other terms such as happiness, satisfaction, comfort or health (Linton et al., 2016). This lack of consistency in the conceptualisation of well-being complicates the understanding of the actual effects of office landscapes on employee well-being and the comparison of results between cases. Additionally, the assessment of well-being at offices cannot be studied isolated from contextual aspects such as the social work environment and organisational policies (Clements-Croome, 2015; Sjögren-Rönkä et al., 2002; Wells et al., 2007), or employees' activities, needs and preferences (Greene and Myerson, 2011; Mateo-Cecilia et al., 2018; Seddigh et al., 2014). Hence, a more detailed understanding of the well-being construct and its pluridimensional implications in the study of offices seems also necessary. In this regard, a literature review on well-being has been included in the third chapter of this thesis.

A greater level of detail in the study of well-being and office landscapes could contribute to a better understanding of the effects that offices have on the employees working in them. Details could also contribute to more sound explanations of the discrepant results reported in literature, for example, regarding social interaction between cases that were a-priori equivalent, such as between open plan offices (Bernstein and Turban, 2018 vs Kim and de Dear, 2013), or offices for flexible ways of work (Bodin Danielsson and Bodin, 2009 vs. Morrison and Macky, 2017). Furthermore, the study of office landscapes at the level of spatial attributes, provides a more universal basis for comparison irrespective of the archetypical office types.

1.1. Aim & research questions

The purpose of my doctoral studies (initiated in 2017) is to provide office planners and decision makers with scientific, evidence-based, design criteria on how to design office landscapes that enhance employee well-being. Nonetheless, to achieve this prescriptive level in research, the work presented here concerns earlier stages of research development, that is to first describe and explain the problem studied.

Therefore, the **aim** of this thesis is to gain a deeper understanding of the interrelations between employee well-being and the design of office landscapes. Given this background, the first research question relates to the concept of well-being in the office domain.

RQ1: How is employee well-being influenced by the spatial attributes of office landscapes?

Influences potentially occur when employees make use of the office landscape. In using it, they judge it and form an opinion about it. One could argue that forming an opinion or making judgements would not require to use a particular office landscape, but this is only partially right. The use of an office landscape implies that employees purposefully

interact with it during the course of the activities that they carry out at work. In such use, the spatial attributes of the landscape mediate those activities.

A deep understanding of the interrelations between employee well-being and spatial attributes is enabled by studying the context of use in which employees fully immerse and experience situations that otherwise would not arise. It is in this context that employees can capture the most information about the spatial attributes of a landscape through their senses. Therefore, a more comprehensive answer to the first research question also demands to answer the following research question.

RQ2: What is the role of spatial attributes in the use of office landscapes?

There is an assumption underlying these two questions that concerns the experiences of employees at office landscapes. Both, employee well-being and the use of office landscapes are explainable in terms of positive and negative experiences. Therefore, the joint study of these experiences represents an opportunity to bridge insights from different perspectives and further investigate the problem studied. Accordingly, a third research question has been formulated for this thesis.

RQ3: How do the employee experience of well-being and the experience of use of office landscapes relate?

1.2. Scope

The study of office landscapes in this thesis is carried out considering offices from a socio-technical system perspective (Davis et al., 2014). Accordingly, I acknowledge that the office landscape is a subsystem of a bigger and complex office system, in which several other subsystems (e.g. management, social environment or work processes), suprasystems (e.g. organisation or productive sector), and bordering systems (e.g. regulations, trends or societies) interact in manners that are not always predictable. In this regard, the individuals and the permanent influence of the context play crucial roles. That said, the research work presented in this thesis is delimited by the physical boundaries of the office landscape and the activities carried out in it, meaning that related systems are here taken into consideration, but are accounted to be part of the context.

1.3. Research rationale

The rationale of my research is supported by diverse matters of relevance: the long-term perspective on the effects of office landscapes, the ethics of managing people as a monetary resource and the implications for environmental sustainability.

Long term effects

According to Clements-Croome (2015) the physical office environment affects employees' well-being, which in turn influences productivity, health and staff retention as well (ibid). The World Green Building Council (2014), report on existing

relationships between the well-being of employees and the support that the office environment provides to carry out their activities (pp.20-49). The International Well Building Institute developed the research-based WELL certification system (International WELL Building Institute, 2015) for diverse types of buildings with the aim of improving human health and wellness through design. Higher levels of well-being at work are claimed to provide the preconditions for increased productivity, happiness, talent retention and easier return of investments in facilities (ibid). In addition, employees spend a significant amount of time in their lives in a constrained environment where architectural features, artefacts, climate conditions or office proxemics among many other spatial attributes are experienced continuously and profoundly while carrying out a range of quotidian activities. Thus, research on office landscapes for well-being has the potential to produce positive long-term effects on employee well-being and organisations.

The ethics of people as resource

Different studies show that the growing trend of flexible office landscapes responds in theory to cost savings, productivity gains and higher employee satisfaction (Appel-Meulenbroek, Kemperman, van Susante, et al., 2015; Hirst, 2011; de Kok et al., 2016; Voordt, 2004). However, in numerous cases the intended results for productivity and satisfaction are far from the reality (Appel-Meulenbroek et al., 2011; Brunia et al., 2016). This indicates that short-term economic gains may have been prioritised over the long-term impact on employee well-being, health, performance or staff retention among other aspects. In such cases, employees are implicitly considered as one more asset with an instrumental value subjected to an economic end (cf. utilitarianism in McFarland, 2012).

It seems too obvious to say that organisations must pursue profitable businesses, but the financial implications of weak well-being strategies on office design and management are less obvious; including salary and benefits, staff represents approximately 90% of the operating costs of an organisation (World Green Building Council, 2014, p.6). Hence, disregarding whether organisations have the information or competences to make the best possible decisions when planning an office intervention or relocation can cause anything but minor consequences (Figure 1).

Connection to environmental sustainability

According to BPIE (2011), European offices represent 23% of the total non-residential floor area (p.8) and 26% of the total energy use in non-residential buildings (p.52). Additionally, office landscapes hindering well-being trigger occupants coping behaviours that can be highly energy-reliant. For example, increasing comfort by opening windows, blocking doors, manipulating climate controls, covering sensors or ventilation outlets, or using personal devices such as heaters. Those interventions,
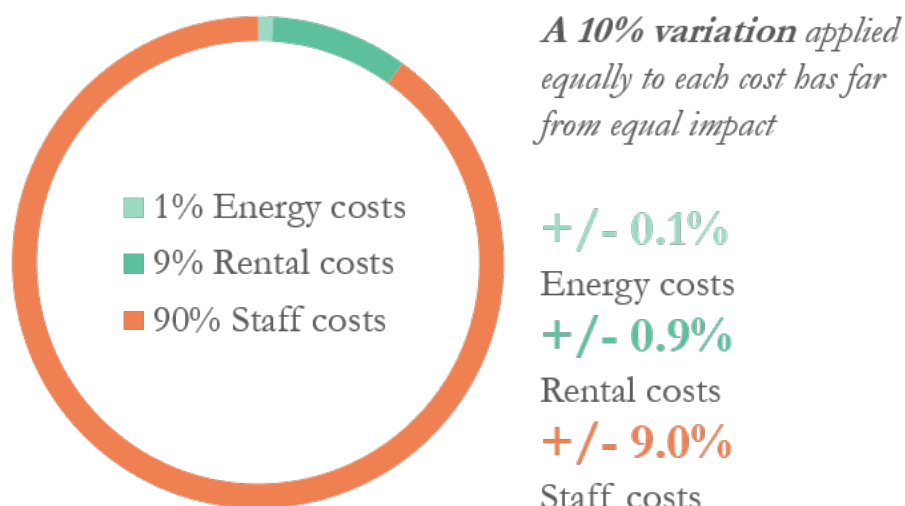
A **10% variation** applied equally to each cost has far from equal impact

+/- 0.1%
Energy costs
+/- 0.9%
Rental costs
+/- 9.0%
Staff costs

Figure 1. Source: World Green Building Council 2014; Health, Well-being & Productivity in Offices.

aiming to correct deficiencies, can cause important differences in energy consumption (Hong and Lin, 2013).

In comparison to a standard workstyle for a given individual office room, austere workstyles save up to 50% of the energy consumption, while wasteful workstyles consume up to 90% more energy (ibid). Remarkably, using more energy is not directly related to higher levels of well-being (Steemers and Manchanda, 2010), and buildings certified as green often underachieve their estimated energy performance when their consumption of energy is measured in the operation phase (Majcen et al., 2013). Hence, even small changes in employees' energy-related behaviour can lead to large carbon footprint reductions with no harm to employee well-being. This is of extraordinary relevance in a context in which the planet's capacity to assimilate the emissions caused by human activities has already been exceeded by far.

Thus, research on employee well-being at office landscapes has the potential to contribute to the betterment of people's lives, effective business gains, and lower lifecycle costs and carbon footprint of office buildings.

Chapter 2

Research Approach

2. Research approach

The second chapter of this thesis elaborates on the underpinnings of my research work and the steps taken along the way. This includes my background, the scientific approach, the research context in which my research topic originated, and the motivations for the specific research topic addressed.

2.1. Background

My fascination with inventive and creative disciplines led me to a career in Industrial Design Engineering. Over time, I developed a great interest in product design and development, the experiences that these provide, and their potential to positively contribute to people's lives. Likewise, my personal and professional experience in a diversity of sociocultural and productive contexts broadened my awareness of my role as design engineer in societal progress, in particular, my responsibilities towards a society that is facing major sustainability challenges.

I strongly believe that those challenges are the result of a highly anthropocentric model of development, and possibly the lack of a deeper knowledge of its implications. A symbolic example is provided by the 17 Global Goals for Sustainable Development promoted by the United Nations (United Nations, 2019). While strong emphasis is put on economic indicators and the flourishing of human societies according to the standard of so-called developed countries, milder efforts are devoted to stop the depletion of the irreplaceable natural capital of our planet in the achievement of those goals. As a doctoral student, I cannot simply ignore this, but have to question it.

Evidently, to question these goals does not necessarily mean that I disagree with their underlying idea of sustainable development. The well-known 'Brundtland report' titled *"Our common future"* (United Nations, 1987) emerged from the World Commission on Environment and Development of the United Nations and popularised a definition of sustainable development in the following terms: *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (p.41). Slightly differently formulated, but still pointing in the same direction is the definition by (Thorpe, 2007): *"development that cultivates environmental and social conditions that will support human well-being indefinitely"* (p.7). It is implicit in these definitions that economic and social structures are dependent on the natural resources and ecosystems of our planet to support human needs and well-being indefinitely.

When I decided to focus my research on employee well-being, I had this idea of sustainable development in my thoughts. The possibility to make a real contribution on a societal level reaffirmed my choice: (i) there is a relationship between the support that office design provides to peoples' activities and their experience of well-being at work (World Green Building Council, 2014, p.2); (ii) limitations in the model of the happy-productive worker suggest that further research is needed to understand the complex relationships between levels of well-being and productivity at offices (Peiró et al., 2019);

and (iii) higher levels of well-being at offices reduce the necessity of occupants to intervene in their work environment conditions, which ultimately has an impact on energy consumption and occupancy-derived costs (Hong and Lin, 2013).

2.2. Scientific approach

Critical thinking and an open mind to varied approaches to knowledge have been fundamental ingredients of my pragmatic view of research and the world. From this perspective, human development has been very much dependent on the dominant ontological assumptions and epistemological boundaries of each time. With this I mean that we, human beings, have been seeking the understanding of the nature of our own reality by attributing meaning to what we perceive. To thrive as species, whatever works best for explaining such human reality is presumed to be 'the truth'. Hence, I am inclined to understand cultures, values, laws, science, religions, lifestyles, etc., as products of social experiences, and collective agreements and disagreements (cf. constructivist worldview by Creswell, 2014, pp.8-9). For the same reason, it is hard to defend that we can carry out research completely detached from our own context and background. Moreover, these socially constructed 'truths' occasionally experiment transitions towards updated versions of themselves, a new 'truth' that provides a more coherent and comprehensive explanation of human reality. In this regard, I see research as a tool that actively contributes to triggering these transitions that are systemic and require our collective efforts at multiple levels: technology, markets, industry, policies, culture and society (Geels, 2012).

Within this systemic context, the work of researchers are niches that approach complex problems by breaking them down into manageable and concrete research questions (Geels, 2012). This holistic, yet specific viewpoint, allowed me to set clear boundaries for the scope and limitations of my research, and my contribution to the research community.

In the case of this thesis, the niche is human well-being, more specifically, the study of employee well-being in relation to their office landscape. To this endeavour I adopted a pragmatic approach (cf. Creswell, 2014, pp.10-11) defined by: (i) a system perspective on offices, with a focus on the subsystem 'office landscape', (ii) an emphasis on office employee perspective, (iii) case studies at real offices, and (iv) triangulation of qualitative and quantitative data collection methods. Implications of choosing this research approach are: (i) it is necessary to develop a wide research expertise to successfully cover diverse methods for data collection; (ii) extensive data collections and qualitative analyses are time-consuming; (iii) inputs from diverse sources might converge, diverge, contradict or correlate to each other. Therefore, a sound ability to cross-interpret data is required.

In addition to the pragmatic approach to case studies, specialized literature has been continuously reviewed to better understand the existing approaches to well-being and office evaluation, as well as the positioning of my research.

2.3. Research context: Smart and Sustainable Offices.

The departure point of my research journey was the project Smart and Sustainable Offices (SSO), in connection to the EIT Climate KIC. The aim of this project was to assist practitioners and decision makers in the building sector in the design of healthier and more sustainable workplaces that promote employee well-being and productivity (Cobaleda Cordero et al., 2018). The research work was focused on the development of a multimethod model for office planning, evaluation and intervention. The project built on studies initiated in 2010 in Switzerland, where 27 office buildings were analysed by researchers from the ETH Zurich and the Zurich University of Applied Sciences. The data collected involved more than 6000 responses to a questionnaire and over 200000 measurement points for parameters of indoor environmental quality (IEQ).

The SSO project had the ambition to expand the methodology of the Swiss studies with new tools for data collection, as well as widen the scope of it by conducting case studies in Northern and Southern Europe. The choice of those regions had the goal of complementing the database from the Swiss studies with data from two other European regions of a different cultural background and climate context. To this enterprise, two research groups were set up for collaboration; one team located in Gothenburg, Sweden, consisting of researchers at Chalmers University of Technology, and the other team in Valencia, Spain, consisting of researchers and practitioners affiliated to the University of Valencia and the Valencian Institute of Construction (IVE).

Both groups jointly built on the methodology of the Swiss studies and developed this further, taking advantage of their multidisciplinary background (Psychology, Architecture, Civil Engineering and Industrial Design Engineering). Additional methods for data collection were incorporated: a diary that participants would fill in twice a day during the studies, semi-structured interviews, observations of the office space in the context of use, and workshops, programmed along different stages of each case study. The questionnaire was revised in depth and, together with the diary, redesigned as web-based survey tools. Preparatory meetings with the management and visits to the office to be investigated would serve to gather additional information on organisational goals, sensitise the staff with information on the SSO project, and collect documentation on the building and the energy consumption.

The data collected in the project concerned employee satisfaction, work conditions, personal life and preferences, activity patterns, indoor environmental quality, building characteristics, energy consumption and demographics. With this data it would be possible, in theory, to identify employees needs and requirements in detail, and the in-depth analysis would result in a report with recommendations for the intervention of each of the landscapes studied. Follow-up studies were also aimed at studying the effects of interventions and the need for further interventions.

In practice, the ambitious collection of primary data at real offices required significant efforts, and convincing organisations to share that much data or allocate resources for

the studies proved to be a big challenge. This circumstance became evident in the planning, execution and analysis phases as well, but the project resulted in very valuable learning experiences. Moreover, both the Swedish and the Spanish teams agreed to replicate their studies in their respective regions to allow comparability, but finally different versions of the SSO methodology were created, tested, and outcomes were reported separately.

The research activities carried out while participating in the SSO project, and afterwards, have been fundamental in my process of learning and skill training as a doctoral student. During the course of the project, a number of case studies were carried out. Each of these was unique, and circumstances changed between cases. Hence, the studies had to be designed to match time and resources availability, office type, number of participants, involvement of management, employees' attitude, productive sector of the organisation, etc. The multiple tools for data collection developed and utilised allowed the collection of large datasets, while collaboration was close and intense discussions were possible. All this contributed directly or indirectly to the research work presented here. Figure 2 shows the mentioned research activities along a timeline.

2.4. Research work included in the thesis.

The work included in the thesis corresponds to the period between spring 2017 and summer 2019, and includes two literature reviews, one case study (illustrated as Case 4 in Figure 2), and the corresponding papers appended to this thesis. The main reason why I included only one of the case studies conducted within the SSO project is that it was the one that I could design to answer my research questions. Other case studies were excluded mainly for three reasons: (i) some cases were planned and designed prior to the formulation of my research questions, which implied that part of the data collected was irrelevant to my research and not fully able to answer my research questions; (ii) relevant changes were introduced to the survey tools up to 2018; and (iii) the validity and reliability of the data collected in one of the cases (planned as a pre-relocation study) was compromised by the organisation studied, since the permission to carry out the data collection arrived too late and the move-out process started during the study.

The **first literature review** resulted in Paper A. It provides an overview on the work conditions of employees relocated to activity-based flexible offices and the use that they make of the landscape. The review contributes with findings on inconsistencies between studies at offices of the same type regarding work conditions, and a low compliance with flexible working policies, due to a majority of employees who consistently used the same workstation(s) on consecutive days. This highlighted the need for more in-depth approaches to understand the interrelations between office landscape use and employee work conditions, needs, preferences, job characteristics and relocation context.
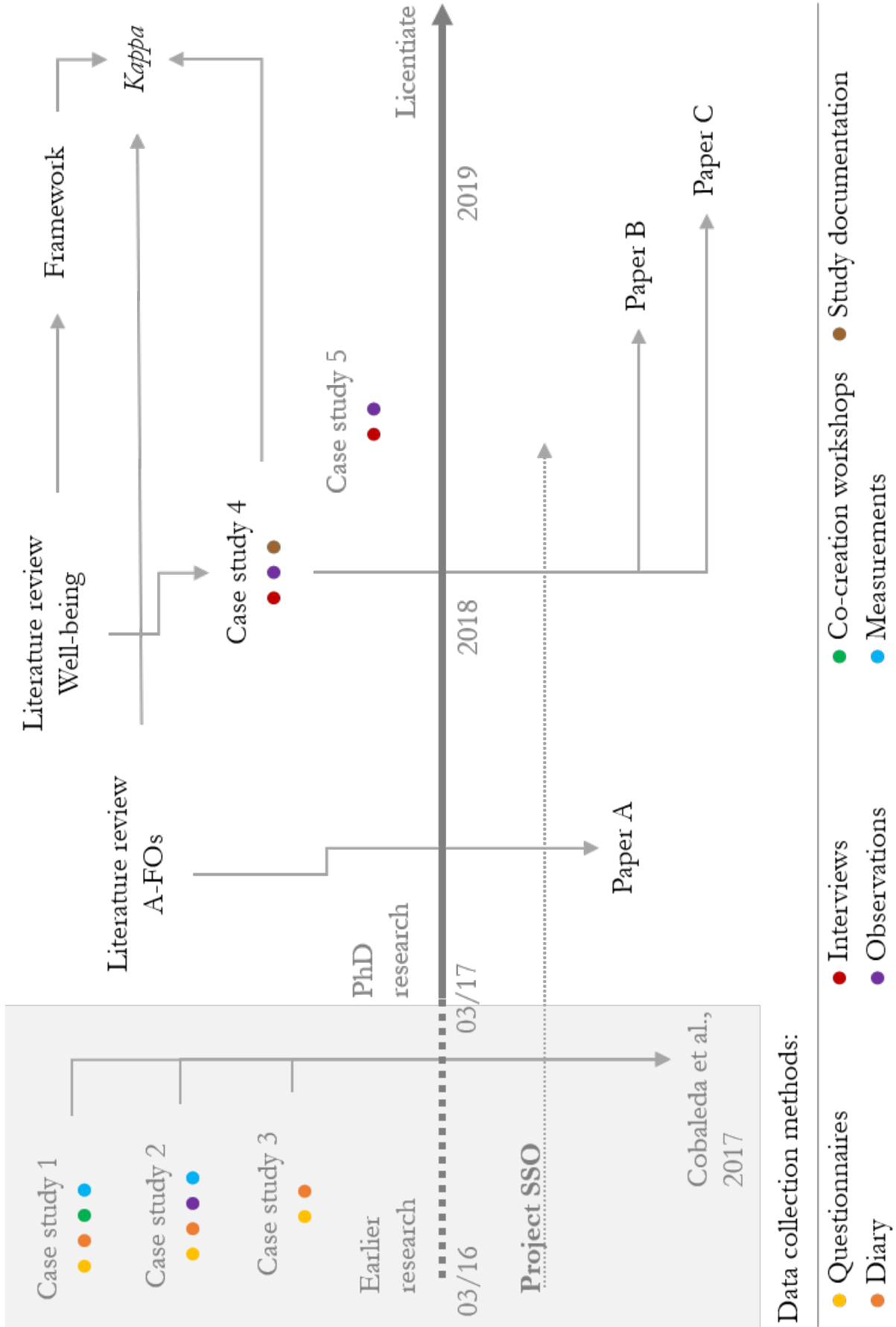
Figure 2. Research work timeline.

The **second literature review** resulted in the framework presented in paper B and in this thesis. The review focused on well-being at three levels: (i) theoretical perspectives, (ii) models and scales, and (iii) application in office evaluation. The literature studied showed a growing body of research that could contribute to explaining how supportive and pleasurable an office landscape is for the employee, and how this is related to the choices made for its use. This review also evidenced the lack of consensus in the approaches to the construct of well-being, its characterisation and operationalisation. Moreover, in-depth studies of offices from a well-being perspective were evidenced as an opportunity to build on the extensive statistical foci describing the impact that office landscapes have on employee work conditions.

Regarding the **case study**, I planned and designed this in accordance with the aim of the thesis. This case study concerns a division of a university department that relocated to a new office landscape six-months before the data collection took place. A total of 36 employees from that division were working at the new office on a regular basis. Other employees were part-time employees or were sitting in remote locations. The 16 informants corresponded to almost 45% of the population studied, job positions were proportionally represented, and the saturation point was reached in the interviews. The data collection involved:

(i) Individual semi-structured interviews with 16 employees.
(ii) A semi-structured interview with the architect responsible for the renovation of the new office building.
(iii) Observations of the office environment in the context of use.
(iv) Study of documentation related to the building and the relocation process.

The findings from the data analysis were presented to the employees in order to collect additional feedback and get confirmation. The overall quality and relevance of the study met the standards for publication. This case study is addressed in detail in the appended papers B and C, and the main findings are reported in this thesis.

In summary, the research work presented in papers A, B and C contributed to answering the research questions formulated for this thesis as shown in Figure 3.
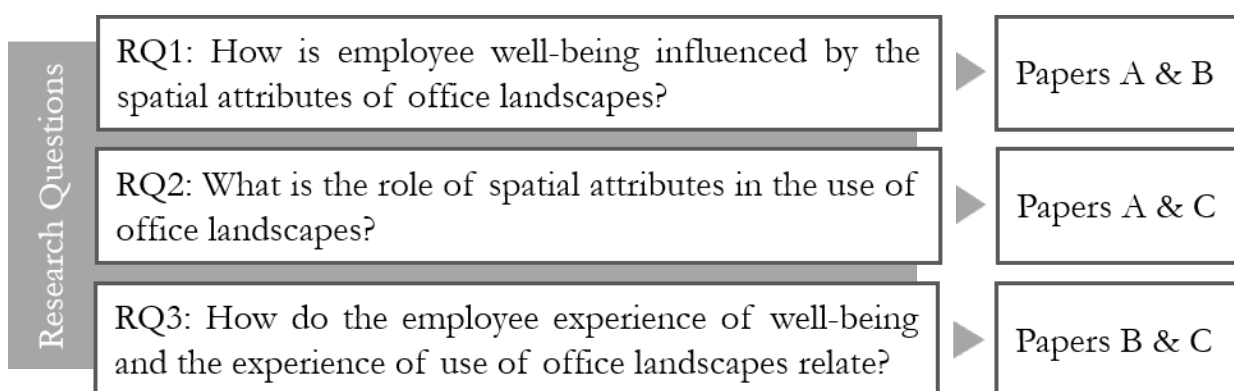

Figure 3. Correspondence of research questions and appended papers.

2.5. Analysis

The literature review published in paper A comprises case studies at real offices, with first-hand data, and indexed in Scopus and Web of Science. In total, 30 papers fulfilled the inclusion criteria for exhaustive review. The findings of the reviewed papers were compared, contrasted and inductively compiled in the following categories: (i) territoriality, (ii) switching patterns among shared/non-assigned workstations, (iii) health and well-being, (iv) productivity, communication and concentration, (v) privacy, and (vi) facilities.

In the case study both quantitative and qualitative data was collected, although the overall research work has a qualitative emphasis. The content of the interviews was analysed at individual level and in an aggregated manner, to understand both the experiences of people as well as the general themes and trends within the studied population. Given that only the informants are able to provide rich information on their own experiences, the qualitative approach was necessary to achieve the depth required for my research. Quantifiable responses and scales from questionnaires are simply unable to capture the complexity of personal insights.

The dataset collected with the interviews and observations was analysed from a two-fold perspective: well-being and Activity Theory. A first analysis focused on the interrelations between spatial attributes and employee well-being. In this case the qualitative data from the interviews was fundamental, not only to describe but also to explain the problem studied. Thus, a diversity of spatial attributes was identified that influenced employee well-being to different extents, and the underlying reasons for that influence were unveiled. The observations served in this analysis to support the findings. This first analysis corresponds to the work published in paper B.

A second analysis focused on the use of the office landscape in relation to employees' activities, needs and preferences. In this case the quantitative data from the observations was mainly used to describe the occupancy of the office landscape and served as a basis to examine the data from the interviews. Matches and mismatches between employees, their activities and diverse spatial attributes were identified that explain the use that employees made of the landscape. This second analysis corresponds to the research work published in paper C. Figure 4 illustrates these two analyses.

The analyses were further complemented with the study of documentation on the building and the relocation process for the validation and contextualisation of findings. Both analytical perspectives made possible a more in-depth understanding of employee well-being in relation to the office landscape, and the interrelations between the degree of well-being supported by the landscape and the use that employees made of its different spaces.
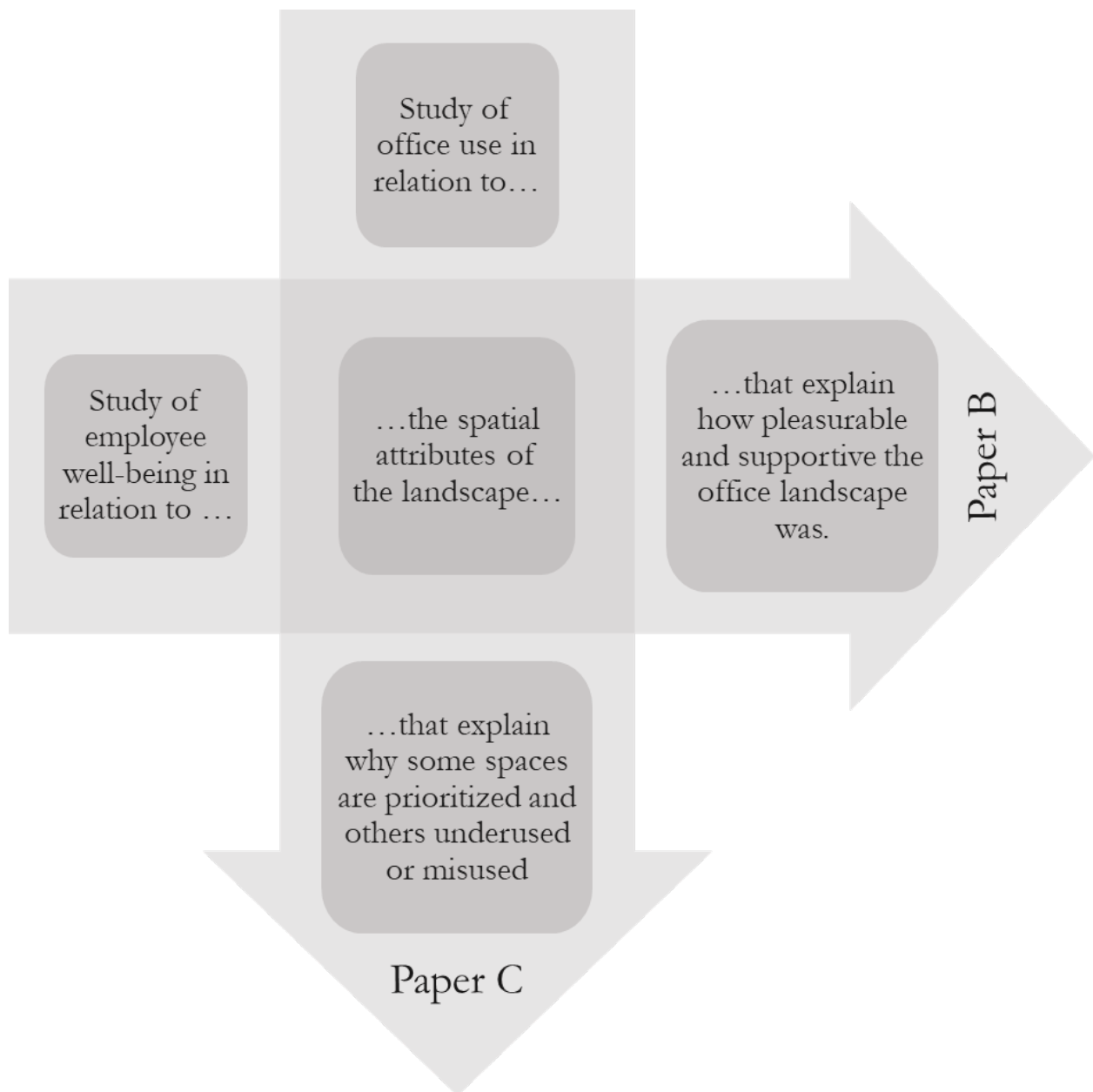
Figure 4. Two-fold analysis of the case study reported.

Chapter 3
Framework

3.   Framework

Doing research, or merely reviewing literature on well-being as such, can easily become an incommensurable enterprise. For example, searching 'well-being' in the database Web of Science instantly retrieves nearly 90K references. In this chapter, the construct of well-being is first reviewed from its popular meaning in everyday language, to its scientific conceptualisation in the field of Positive Psychology. Then, an overview of its utilisation within the context of office landscape evaluations is provided. Finally, a tentative framework is proposed for the study of well-being at office landscapes from a system perspective that integrates concepts and fundamental ideas from Activity Theory.

3.1. What does well-being mean?

According to the Oxford English Dictionary, well-being is: *"1. With reference to a person or community: the state of being healthy, happy, or prosperous; physical, psychological, or moral welfare. 2. With reference to a thing: good or safe condition, ability to flourish or prosper. 3. In plural. Individual instances of personal welfare."* The Merriam-Webster Dictionary defines well-being as "*the state of being happy, healthy, or prosperous.*" However, the Cambridge Dictionary introduces a significant difference when it states that well-being is "*the state of feeling healthy and happy.*" So, it is not 'or', but 'and', signifying that well-being is more than just happiness, and more than just health. This is important, because happiness and health are not synonyms, although one could easily find correlations between them; not being healthy can make someone feel less happy or being extremely unhappy can degenerate into a pathology such as depression.

Many other words are pointed out in the dictionaries as synonyms or terms associated to well-being. For example: wellness, pleasure, success, hygiene, fortune, fitness, robustness, soundness, wholeness, bliss, felicity, joy, content, or satisfaction. On the other hand, antonyms of well-being are: ill-being, unhealthiness, unsoundness, misery, sadness, suffering, unhappiness, wretchedness. These definitions and related terms perfectly exemplify the breadth of the construct. Nonetheless that seems to be the key; the state of being well in many senses: mentally, emotionally or physically, on the abstract paths of happiness or wealth, on individual or social levels, and even referring to animals as sentient beings. Subsequently, well-being is a holistic concept that seamlessly fits in innumerable contexts. Even so, when approached on a more scientific level, this construct gains extraordinary complexity.

The construct of well-being in research is addressed differently by multiple disciplines, and traditionally from two differentiated perspectives. One of these perspectives is the well-being of communities and societies, which has usually been related to macro-studies and composite indices. These indices measure aspects such as health condition, housing, incomes, education, equity, safety or natural resource use among many other indicators (Chaaban et al., 2016; Durand, 2015). They also attempt to provide a more accurate picture of a population's quality of life and their environment than, for

example, Gross Domestic Product (GDP). The Human Well-being Index (HWI) (Prescott-Allen, 2001, pp.13-19) and the Human Development Index (HDI) (Chaaban et al., 2016) are relevant examples.

A recent and representative case is the framework for measuring well-being and progress developed by the Organisation for Economic Co-operation and Development (OECD) (Durand, 2018). This particular case attempts to provide a comprehensive picture of the living conditions of populations by focusing on three domains referred to as material conditions, quality of life and sustainability, each with corresponding subcategories estimated as essential for the well-being of current and future generations (Figure 5).
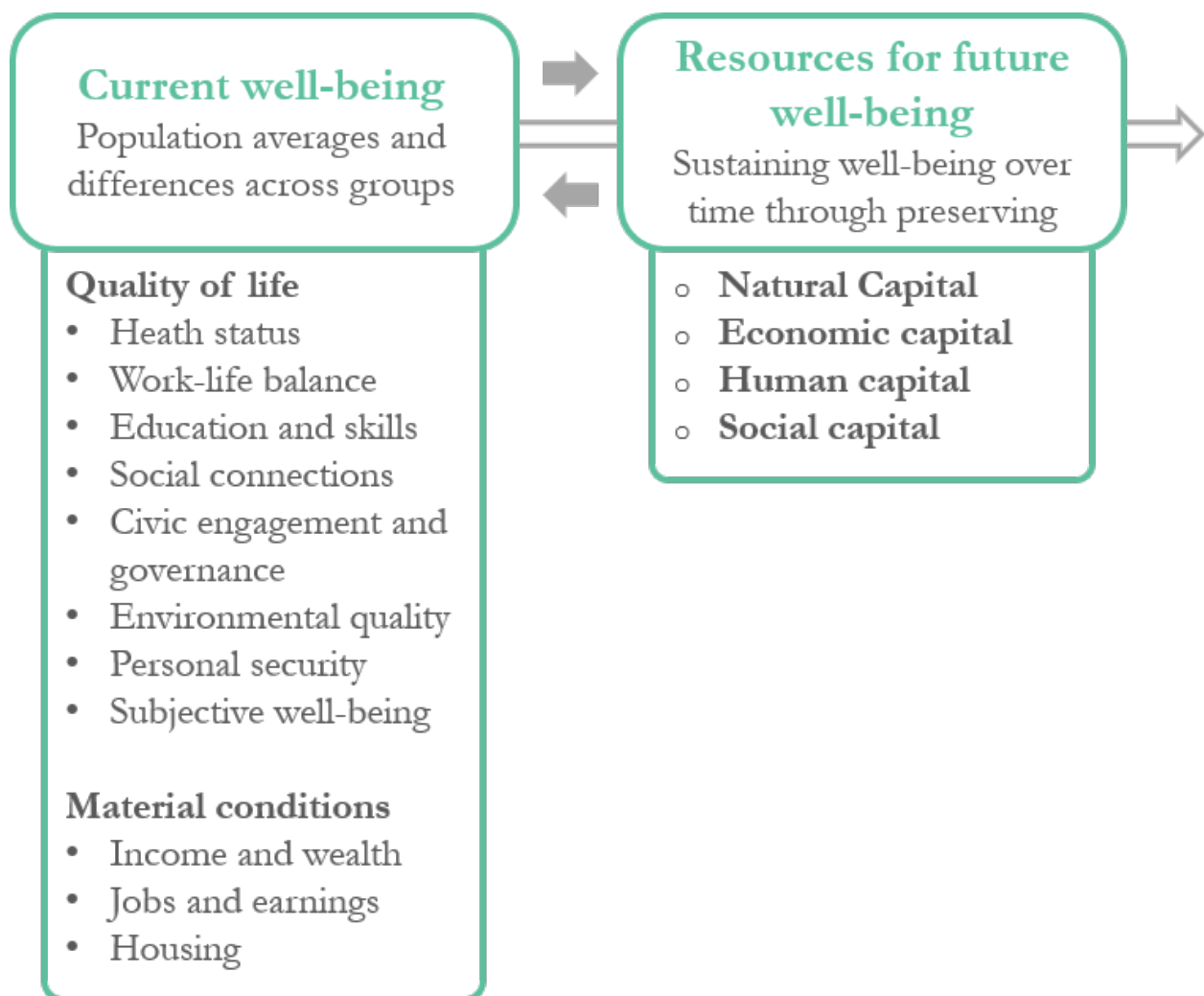
Figure 5. OECD conceptual framework for measuring well-being and progress.

The other perspective is the well-being of individuals, which has been recurrently associated to physical and mental health, or the evaluation of happiness from a subjective perspective. Yet, concrete characterisations of well-being differ between disciplines, and the large number of available theories and instruments to measure it evidence the lack of agreement in its conceptualisation and operationalisation (Linton et al., 2016). The OECD framework cited above, also includes one dimension on the

subjective well-being of individuals, although its operational definition is based on three components: (i) life evaluation, concerning satisfaction levels with reference to individuals' lives or a particular aspect of it; (ii) affect, concerning affective states, feelings and emotions with reference to a situation or experience; and (iii) eudaimonia, concerning a good psychological functioning and the sense of meaningfulness with regard to what individuals do or achieve (Durand, 2015). This example represents an effort to create some consensus in the field, although its abstract and generic character responds to the traditional scepticism about the validity of subjective data in statistics (OECD, 2013, pp.28-54).

In this sense, in recent decades researchers in the field of Positive Psychology have been leading the development of well-being theories, models and scales, and today it is clear that the well-being of individuals comprises more than just health, happiness or the fulfilment of material needs (Ryan and Deci, 2001; Seligman and Csíkszentmihályi, 2000; Watson, 2018).

3.2. Well-being in Positive Psychology

Positive Psychology was born in the 1960s from the need to investigate human beings beyond the clinical and behavioural approaches in psychology, putting emphasis instead on what enables individuals and communities to flourish (Seligman & Csikszentmihalyi, 2000). According to this discipline, the construct of human well-being refers to all circumstances in which individuals 'feel well' and 'do well' in life, implying their optimal functioning and the occurrence of positive life experiences (Baumeister et al., 2013; Grant et al., 2010; Huppert and So, 2013; Ryan and Deci, 2001; Tov, 2018). Again, this is a broad and multifaceted definition open to debate and myriad interpretations on what it is to feel well, do well or function optimally.

Over time, the topic of human well-being has gained in interest and complexity, resulting in a growing body of literature in which the two main approaches have been identified as hedonic and eudaimonic (Deci and Ryan, 2008; Keyes et al., 2002; Linley et al., 2009; Linton et al., 2016).

Hedonic wellbeing

The hedonic well-being approach, often referred to as subjective well-being, is commonly depicted in terms of satisfaction, frequent positive affective states and infrequent negative affective states (Deci and Ryan, 2008; Diener, 1984). Satisfaction is the cognitive component of hedonic well-being and entails personal judgements about one's life or specific aspects of it, for example, overall life satisfaction or satisfaction with employment conditions. The affective states refer to feelings and constitute the affective/ emotional component of hedonic well-being, for example, the feelings of joy or anxiety triggered by life experiences, that indicate how pleasurable those experiences are for an individual (Ryan and Deci, 2001; Tov, 2018). Thus, while affective states are associated with concrete events in time, satisfaction implies a longer-term perspective.

From a hedonic perspective, well-being is associated with pleasure, the avoidance of pain or happiness, and indicates the prevalence of positive affective states and life satisfaction (Diener et al., 1999; Kahneman et al., 1999). This has made it possible to utilise well-being as an umbrella term to also refer, for example, to health, wealth or comfort from diverse interpretations (Chaaban et al., 2016; Dolan et al., 2008; Huppert, 2009; Smith et al., 2006). Experiencing unpleasant situations and dealing with negative affective states, such as disappointment, pain, boredom, dissatisfaction or grief are however also part of the normal functioning of a person (Huppert, 2009). Therefore, a high degree of well-being in the long term does not mean that someone will experience a continuous state of happiness.

However, the hedonic well-being approach does not cover all aspects of optimal functioning and positive life experiences, such as identity, engagement, purpose or relatedness (Ryff and Singer, 2008). In this regard, researchers from the hedonic tradition are progressively addressing eudaimonic aspects of well-being in their investigations (Diener et al., 2010; Tov, 2018).

Eudaimonic well-being

The eudaimonic well-being approach, also referred to as psychological well-being, is associated with the individual's self-realisation, life purpose, virtuous living, living a meaningful life and the process of fulfilling one's true nature (Deci and Ryan, 2008; Ryff, 1989; Vittersø, 2016). From this perspective, individuals pursue experiences aligned to their values, their cultivation of personal strengths, their self-expression or a greater purpose, that contribute to their well-being but may not be pleasurable (Huta and Waterman, 2014; McGregor and Little, 1998; Ryff and Keyes, 1995), for example, the feeling of self-realisation when helping someone or achieving a life goal. Still, the more recent eudaimonic approach to well-being is subject to discussion due to a less consolidated theoretical ground (Kashdan et al., 2008; Ryan and Deci, 2001; Waterman, 2008) and competing standpoints with varying constructs on what is a well-functioning individual (Linton et al., 2016). Moreover, further discussions allude to personal versus social components of well-being that make it harder to reach a common theoretical ground around the eudaimonic components of well-being (Morin et al., 2017).

In this situation, Ryff's six-factor model (Ryff, 1989) has become one of the most prominent standpoints in the eudaimonic approach to well-being. It describes the positive functioning of individuals in relation to: *"positive evaluations of oneself and one's past life (Self-Acceptance), a sense of continued growth and development as a person (Personal Growth), the belief that one's life is purposeful and meaningful (Purpose in Life), the possession of quality relations with others (Positive Relations With Others), the capacity to manage effectively one's life and surrounding world (Environmental Mastery), and a sense of self-determination (Autonomy)"* (Ryff and Keyes, 1995). This model has its roots in Aristotelian traditions and humanistic theories that emphasize the actualisation of one's human potential and existential matters (Dolan and Metcalfe, 2012; Huta and Waterman, 2014; Ryff and Keyes, 1995),

for example, the conception of the fully functioning person proposed by Roger (1961), or Maslow's (1968) well-known hierarchy of human needs, among others.

Hybrid approach to well-being

The hedonic approach to well-being has traditionally been characterised by a wider consensus around its cognitive and affective components in comparison to the eudaimonic approach, and it has also received more attention from academics (Bryce et al., 2009; Tov, 2018). However, there is evidence that these distinguishable approaches to well-being correlate and complement each other (Huta and Waterman, 2014; Ryan and Deci, 2001; Ryff and Keyes, 1995). In this sense, researchers in the field are increasingly proposing constructs of well-being that combine hedonic and eudaimonic aspects. A few relevant examples of hybrid approaches to well-being are, among others, Keyes' (2004) concept of flourishing, Huppert and So's (2013) conceptual framework of flourishing, Seligman's (2011) PERMA model, or Csíkszentmihályi's (2008) notion of flow.

Keyes (2004) defines the concept of flourishing as *"a state in which an individual feels positive emotion toward life and is functioning well psychologically and socially"* (Keyes, 2002, 2004). Keyes's definition has its origins in the concept of mental health and elaborates on a mental illness continuum of which the negative end is the concept of languishing (Keyes, 2002). Positive emotion toward life alludes to hedonic well-being, and good psychological and social functioning alludes to eudaimonic well-being. Thus, high levels of hedonic and eudaimonic well-being equivalate to flourishing and indicate the presence of mental health, while the absence of mental health equivalates to an individual that languishes.

Huppert and So (2013) also elaborate on the concept of flourishing and define it as the condition of feeling good and functioning psychologically well. They present a conceptual framework derived from the examination of mental illness symptoms, and the definition of the opposite for each of these. The initial list of illness symptoms departed from the most common mental disorders, depression and anxiety, identified in the international classifications DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) of the American Psychiatric Association, and ICD-10 (International Classification of Diseases) of the World Health Organisation. The list of opposite symptoms defining positive mental health were clustered in ten categories that were finally proposed for the definition of well-being: competence, emotional stability, engagement, meaning, optimism, positive emotion, positive relationships, resilience, self-esteem, and vitality. These refer to components of hedonic well-being, such as positive emotions, and eudaimonic well-being, such as positive relationships.

Seligman's (2011) PERMA model defines well-being according to five elements: positive emotions, engagement, relationships, meaning and purpose, and accomplishments (p.12). According to the author, individuals must pursue these

essential elements contributing to well-being in order to flourish in life. Moreover, Seligman (2018) acknowledges his model as a starting point and an ongoing work to define the elements of well-being, and adds that health, vitality, and responsibility could be further elements to consider as essential for individuals' well-being. The similarities between PERMA and Huppert and So's framework are evident, since the elements defined by Seligman are also found in Huppert and So's work. Again, components from the hedonic and eudaimonic traditions on well-being are here brought together.

Csíkszentmihályi (2008, p.6) introduces the concept of flow as a state of well-being in which individuals experience an optimal balance between personal skills and challenging but doable activities. This balance is fragile, since too challenging activities can lead to negative affective states, such as stress, anxiety or frustration, while challenges that are too easy can lead to boredom (Bryce et al., 2009). Being in flow makes it possible for individuals to fully engage in activities slightly over their current skills that are not necessarily pleasurable, but enable them to develop their own skills if the challenge is fulfilled (Tov, 2018). Accordingly, individuals' experiences of self-development are related to the eudaimonic component of personal growth (Huppert and So, 2013; Tov, 2018).

My standpoint

The extensive literature review carried out by Linton et al. (2016) compiles many other models of well-being and lists a total of 99 instruments to measure it from a subjective perspective. This list provides a broad overview on the practical approaches to the study of well-being and clusters the instruments around seven themes: mental well-being, physical well-being, social well-being, spiritual well-being, personal circumstances, activities and functioning and overall well-being.

However, the many instruments listed in this review illustrate a greater challenge. The vast range of theories, models and disciplines contributing to the study of human well-being suggest that a universal conceptualisation or standard operational definition may be too ambitious (ibid). It seems clear at least that well-being can be studied and understood at different levels (Sun et al., 2018); as a single holistic entity, (Disabato et al., 2016), as the hedonic-eudaimonic bidimensional construct (Keyes et al., 2002; Ryan & Deci, 2001), or as a hybrid set of components describing well-being (Seligman, 2018, 2011).

In this thesis, a hybrid conception of well-being has been chosen for different reasons:

- It integrates the uniquenesses of each approach as well as their overlaps (cf. Deci and Ryan, 2008).
- It provides a sounder explanation of the subjective well-being of individuals, not being limited to the hedonic nor eudaimonic traditions only (cf. Keyes et al., 2002).

- It helps to understand more in detail the experience of pleasurable and meaningful lives, according to specific well-being components pursued simultaneously and in different proportions (cf. Peterson et al., 2005; Seligman, 2011).

3.3. Research on well-being in relation to office landscapes.

The study of well-being is a relatively recent phenomenon, as illustrated in the previous paragraphs, and its utilisation in diverse disciplines is nowadays expanding faster than ever before (Clements-Croome, 2018; Linton et al., 2016). Office landscapes are not an exception to this trend. Organisations such as the World Green Building Council (2014, pp.20-49) and the British Council for Offices (2016, pp.9-18) report on the existing influence of workplaces on employee well-being. Moreover, new certification systems, such as the Well Building Standard version 2 (International WELL Building Institute, 2018), illustrate the relevance that well-being has gained in the commercial development and operation of the next generation of office landscapes.

The WELL standard is intended to provide guidance on best practices to create spaces that promote the health and wellness of the occupants, and it is oriented to stakeholders in the building industry, property owners, facility managers and occupants (ibid). For example, to certify an office, the WELL standard establishes 10 concepts or areas of action: air, water, nourishment, light, movement, thermal comfort, sound, materials, mind and community. Within those concepts a total of 117 preconditions and optimisations that need to be fulfilled are specified. Examples of the optimisations listed in the standard are operable windows, mindful eating, active furnishing, sound barriers, or occupant surveys. Other widespread building standards such as LEED, BREEAM or DGNB have their main focus on the building instead of the occupant, and concern issues related to environmental sustainability, energy-related behaviour and energy consumption (Zeinal Hamedani and Huber, 2012). Hence, in the latter cases, well-being is not a main objective, but a side outcome.

These standards and certifications are usually grounded in research, and research claims that the built environment influences our health, mood, concentration, creativity, motivation to work, etc., and occupant well-being (Clements-Croome, 2015). However, many studies in the literature refer to the concept of well-being by talking indistinctively about health conditions (Bluyssen et al., 2016), satisfaction with an array of factors (Kim et al., 2016) or comfort (Al Horr et al., 2016), for example. This conceptual breadth and sometimes fuzziness can also be appreciated in the WELL standard. Well-being is even used in titles, abstracts and keywords as some sort of bait, but it is often the case that it is not addressed as a central matter, nor studied in detail (Felstead and Henseke, 2017; Liebl et al., 2012). This situation makes it hard to find a common ground for discussion and comparison of approaches, their operational definition of the well-being construct, and their contributions to the study of the matter in the office domain.

In this regard, the two comprehensive reviews by Clements-Croome (2015, 2018) provide an overall perspective on the different aspects of the office landscape that have been investigated in relation to well-being. In both reviews it is argued that occupants experience the built environment through their senses, and therefore buildings should be created as a multisensory experience with the ability to impact, among other crucial aspects, human well-being.

The main area of interest for the study of well-being at offices has been the indoor environmental qualities, i.e. temperature, air quality, odours, lighting, and noise (Bluyssen et al., 2016; Clements-Croome, 2015; Haapakangas et al., 2017; Al Horr et al., 2016; Lamb and Kwok, 2016; Menzies et al., 1997; Windlinger et al., 2012). These and other studies relate poor indoor environmental qualities with dissatisfaction, discomfort, distractions, difficulty to recover the concentration, exhaustion and health symptoms such as stress, body stiffness, irritation in the eyes, nose or throat, among others. On the other hand, abundant daylight with no glares, acceptable noise levels, proper insulation from outdoor pollution and noise, fresh and airy environments with acceptable CO_2 levels and low levels of particles, VOCs, etc., or personal control over temperature are related to outcomes such as better health, mood, satisfaction, higher staff retention and productivity (Ornetzeder et al., 2016; Windlinger, 2013; World Green Building Council, 2014).

Another area of study is the relationship between well-being and office type, mainly in relation to its layout (e.g. de Croon et al., 2005; Hirst, 2011). For example, open-plan offices are reported to influence negatively the ability to concentrate or the perception of privacy, but facilitate interaction between employees (Bodin Danielsson and Bodin, 2008; Seddigh et al., 2014); cell-offices instead allow better control over climate or noise, but make it more difficult to interact and find social affinities (Bodin Danielsson and Bodin, 2009).

The choice of colours, the available nature references and greenery, the access to views, spaces for diverse activities, the possibilities to personalise the space, or the aesthetics of the office landscape are other aspects of influence commonly reported in the literature (Clements-Croome, 2018; Gensler, 2016; Gray and Birrell, 2014; Haapakangas, Hongisto, et al., 2018; Kim et al., 2016; Mateo-Cecilia et al., 2018; World Green Building Council, 2014). For example, Dolan et al. (2016) and their SALIENT framework (Sound, Air, Light, Image, Ergonomics, Nature and Tint) report, among other aspects, on an existing relationship between colour choices and mood, performance or creativity; the interior design choices can influence employee productivity and happiness (British Council for Offices, 2016; Leesman, 2016); and office landscapes with plants are coupled to reduced stress and fatigue (Gray and Birrell, 2014; Kamarulzaman et al., 2011).

Different activities at the office require different landscape settings, so the individuals get an optimal amount of stimuli, ergonomic support, comfort, etc. (Boge et al., 2019;

Clements-Croome, 2018; Soriano et al., 2018). In this regard, the furniture supporting ergonomic postures and posture changes, or spaces that enable less sedentary work routines are highlighted as central for office employees' well-being (Feltner et al., 2016; Foley et al., 2016; Puig-Ribera et al., 2017).

The increasing technologization of office landscapes settings has caused greater exposure to, e.g. incessant notifications from cell phones and computers. Likely, more stimuli from information and communication technologies (ICTs) will result in more difficulties to concentrate and scattered attention spans. Nevertheless, their impact on office employee well-being has received little attention. Examples found addressing the impact of technologization on well-being mostly focus on health-related aspects and refer to a general context (e.g. Umeh et al., 2016). In addition, extreme cases of prolonged exposure to undetermined negative influences of the built environment, can cause occupants to experience sick building syndrome (Al horr et al., 2016; Neuner and Seidel, 2006). Staff can manifest this condition with respiratory problems, headaches, sleepiness, fatigue, irritations, or body pain (Abdul-Wahab, 2011, p3).

Previous literature on well-being suggests that age, gender, cultural background or personality have a significant influence on how different individuals experience a given environment or situation (Grant et al., 2010; Ryan and Deci, 2001; Ryff, 1995; Sun et al., 2018). These perceptual differences are also reported in the particular context of office landscapes. For example, in relation to gender, women have been found to respond with higher dissatisfaction than men to noise (Bodin Danielsson and Theorell, 2018; Kaarlela-Tuomaala et al., 2009) or to a cooler indoor climate at offices (Karjalainen 2007; Haynes et al., 2017); in relation to age, senior employees report higher dissatisfaction than younger employees with flexible work environments (De Been and Pullen, 2014), and the different age groups attribute dissimilar importance to the services available at their offices (Rothe et al., 2012).

However, studies on well-being at offices tend to focus more on the negative influences of the landscape than on its potential benefits (Groen et al., 2018; Jensen and van der Voordt, 2018). Most of these studies investigating well-being in relation to the office landscape also do not make distinctions between well-being components or narrow down the scope to the hedonic components of satisfaction and affective states (e.g. Ter Hoeven and Van Zoonen, 2015). Other studies such as Thatcher and Milner (2016), adopt well-known and validated tools such as the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) to evaluate the levels of well-being in different buildings. However, scales like this are generic and detached from the context in which they are used. Consequently, they are not designed to provide insights, about the underlying reasons for behaviours to cope with specific attributes of the office landscape. Such explanations require more qualitative and holistic approaches to capture rich insights about individuals' well-being and the context in which this is studied. By doing it that way, it would be possible to understand more precisely how and why the landscape

influence the experience of well-being, and its relation to employees' needs, preferences or contextual aspects. Practitioners could also take advantage of that deeper analysis to better tailor spatial interventions.

3.4. Tentative framework for the study of well-being at office landscapes.

The review of literature on well-being summarised in this chapter helps to contextualise my personal stance on the study of well-being in office landscapes. The hybrid approach to well-being chosen in this thesis, takes as references two models: the tripartite model (satisfaction, frequent positive affects and infrequent negative affects) of hedonic well-being by Diener (1984), and the six-factor model (self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery and autonomy) of eudaimonic well-being by Ryff (1989). Both models have been reinterpreted (see Figure 1 in paper B) so that their diverse components can be linked to the insights of employees in an office context. This approach, first outlined in paper B, contributes to the literature reviewed in this chapter with a novel proposal for the in-depth understanding of how pleasurable (hedonic well-being) and supportive (eudaimonic well-being) the office landscapes studied may be.

However, office landscapes have to be studied in the context of use, and the well-being theories and models chosen for this framework are not enough to explain how office landscapes are used, as they mainly concern the perceptions of individuals in relation to life experiences. As a noun, use can be defined as the purpose for which something is employed. As a verb, use can be explained as employing something for a given purpose. Karlsson (1996, p.18) describes use as a process in which an artefact is employed (by someone) in order to reach a goal. Thus, the integration of a theory that elaborates on individuals as users (e.g. office employees) using artefacts (e.g. an office landscape) with a purpose (e.g. to produce something or earn a living) seemed necessary. Also, from the applied research perspective of this thesis, the utilisation of a hybrid theoretical model of well-being for the evaluation of office landscapes would benefit from a more systematic approach to the explanation of the research problem studied.

Activity Theory (Engeström et al., 1999, pp.19-37) is such a theory. According to this theory, individuals (referred as subjects) carry out activities with a specific objective (or purpose) mediated by instruments (i.e. the artefacts which the individuals use in such activities) (Kaptelinin and Nardi, 2006, pp.8-13). These four elements, individual, instrument and activity + purpose are the basis of a so-called activity system, in which the unit of analysis is the activity (ibid.). Then, the interaction of these elements transforms the object of the activity into an outcome of the activity.

The activity as a unit of analysis is also hierarchical (Bødker and Klokmose, 2011). According to this hierarchy, activities are performed by a series of goal-directed actions that respond to a topmost goal or motive. This motive concerns the *why* of an activity and it is what allows to discern one activity from another. Actions are performed by a series of operations oriented to an immediate and conscious goal, and concern *what* the

subject does to achieve the goal. Operations are carried out on a subconscious level, respond to the varying conditions and structure of activities, and concern *how* activities are performed (ibid).

Engeström (2000) expanded the definition of activity systems by introducing other elements such as community, rules or division of labour that enable both a micro and a macro perspective on the study of an activity system; individual or collective activities, an activity or a string of actions and operations. Figure 6 shows Engeström's view on human activity systems.
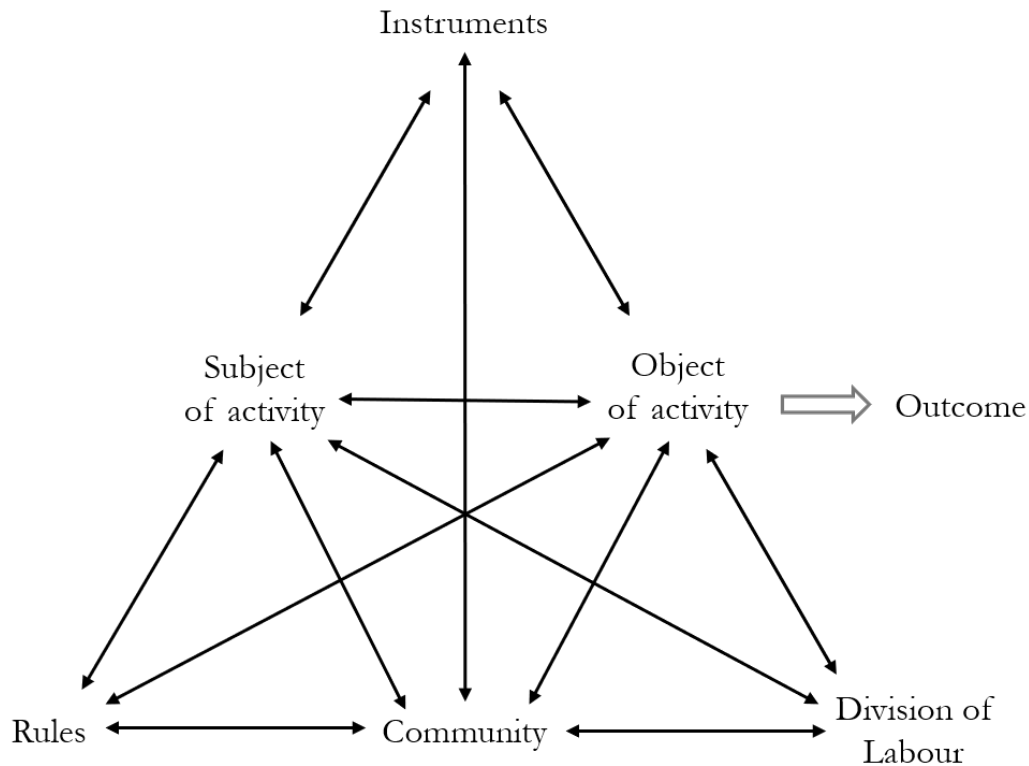

Figure 6. Engeström's (2000) expanded definition of a human activity system.

Utilising this activity-theoretical perspective in my research required first to clarify and delimit my view on 'office activity systems'. Accordingly, in the activity system that I investigate the individual is the employee, the instrument is the office landscape, and the object is any that motivates an activity within the physical boundaries of the office landscape.

Other elements that contribute to frame employee activities at office landscapes but are not explicit to the problem studied (i.e. the interrelations between the office landscape and the well-being of individuals), are here considered to be part of the activity system context. Therefore, the elements of the activity system introduced by Engeström are contextual elements of the 'office activity system'. Figure 7 shows how Engeström's model has been interpreted to define the 'office activity system' in this thesis.
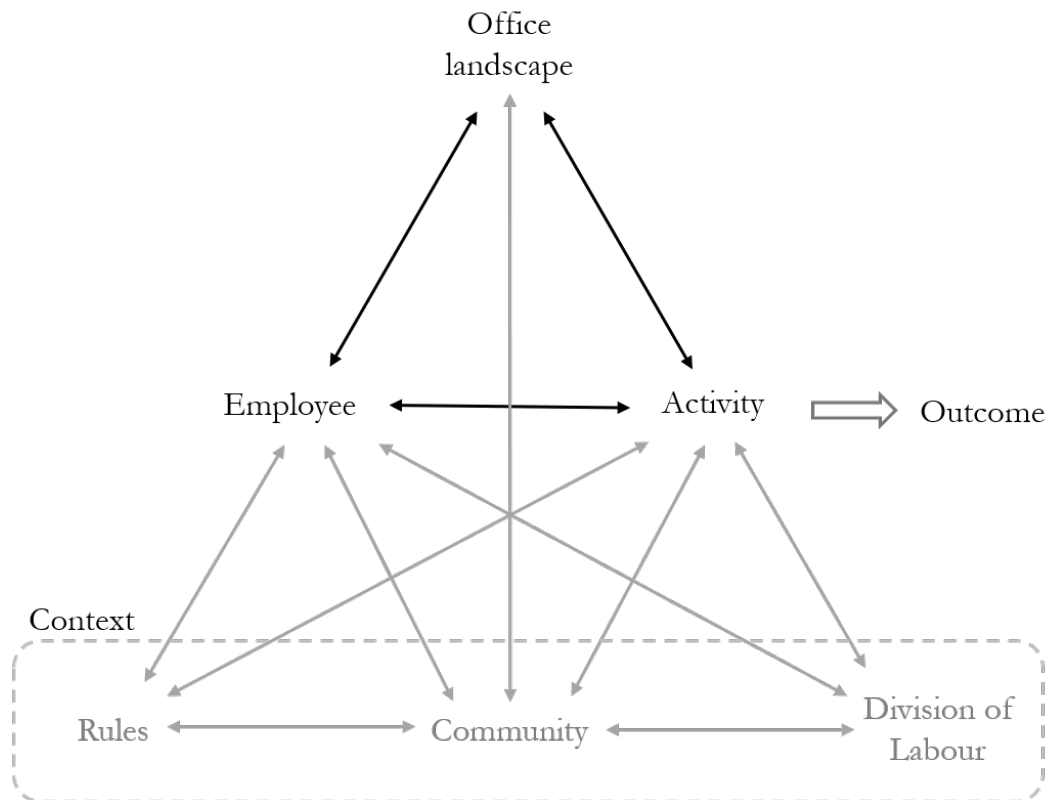
Figure 7. Interpretation of the Engeström's (2000) activity system representation.

Existing Activity Theory frameworks have been visited and taken as references to further define my view on the 'office activity system' and distinguish between different levels of abstraction (or hierarchies) within the elements of the system studied.

In this regard, Bødker and Klokmose (2011) indicate that activities may be mediated by one or more instruments, while Karlsson (1996, p.38) distinguishes between a system of instruments, a single instrument, and properties of of an instrument to signal how activities can be mediated by instruments at different levels. My definition of the 'office activity system' adopts and adapts this multi-layered notion of the instrument, in order to distinguish between constellations of spatial attributes (note that the office landscape represents the biggest possible constellation), particular spatial attributes and properties of spatial attributes.

Regarding the subject of the activity, Engeström (2000) distinguishes between the individual and the collectivity. Karlsson (1996, p.38) adds a layer of complexity by considering the properties of individuals such as age, weight or height in the interaction of individuals and instruments in the course of activities. Again, my view on the 'office activity system' acknowledges different levels of abstraction noted in existing frameworks to define, in this case, the employee. Thus, the employee can be studied at the level of concrete personal characteristics, individuals as a whole or a collective of individuals (see Figure 1 in paper C for a representation of this reasoning).

Following this logic, all the elements addressed as context, can be grouped as a single element of the system and studied at different abstraction levels; for example, within

the department of an organisation, the whole organisation, the productive sector and beyond. Figure 8 is a visual representation of the 'office activity system' as conceptualised in this thesis.
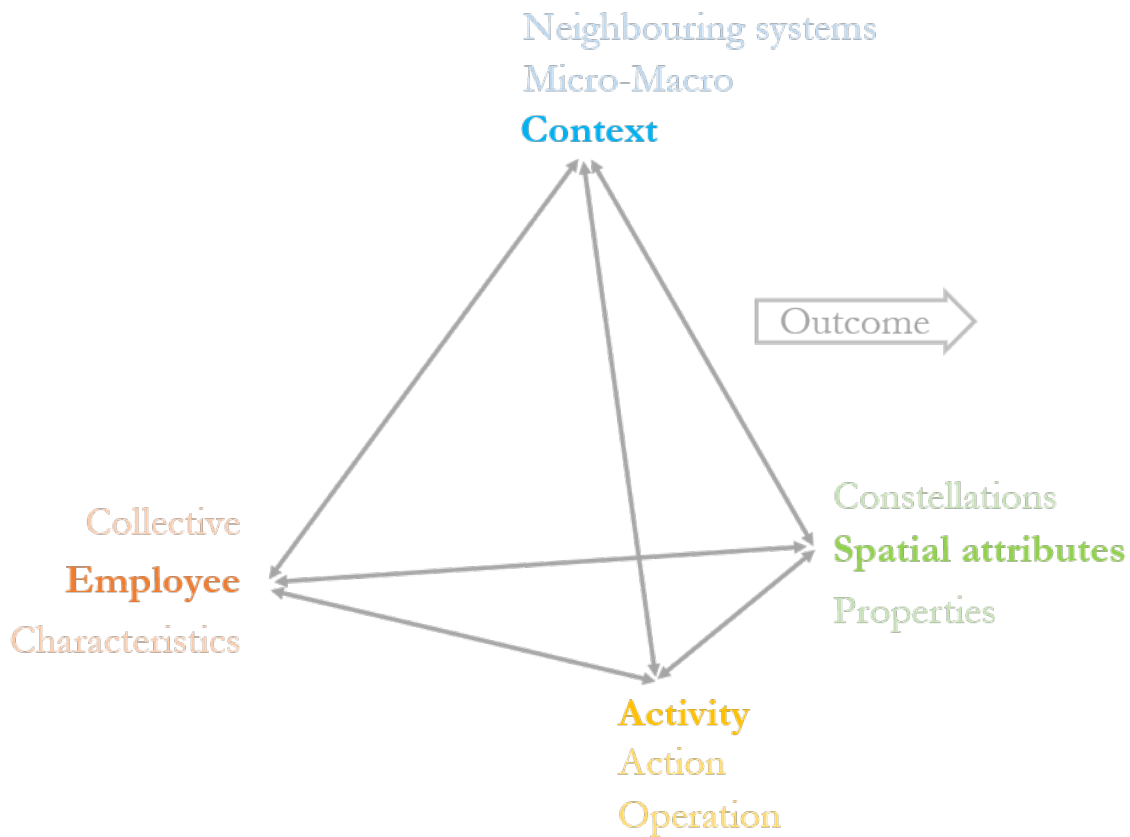

Figure 8. Elements of the 'office activity system'.

According to Activity Theory, the interactions between the activity system elements are dynamic and matches or mismatches may occur between these in the course of activities (Bødker and Klokmose, 2011; Engeström, 2000). Individuals experience matches when the interactions between the system elements lead to a purposed outcome, and mismatches when these interactions lead to breakdowns (Bødker and Klokmose, 2011). Breakdowns occur, for example, when the office landscape mediating an activity does not enable the intended activity to be carried out or implies unexpected and unwanted extra actions for the individuals; or, when the landscape does not meet individuals' repertoire of action possibilities, needs or preferences. Breakdowns also occur with the introduction of new mediating instruments in the activity system that the individuals need to learn and appropriate (ibid). In the case of an office relocation, the office landscape itself is an entirely new constellation of mediating instruments that employees need to become familiar with by using. Yet, these are just a few representative examples that also illustrate the possibilities for the subjects to develop their repertoire of action possibilities via cycles of expansive learning (Engeström, 2000); the outcome of an activity is an input for learning. This also explains how actions performed by the subject are learned with the practice and deeply internalised over time, so that at some point they become operations executed without conscious thinking.

A similar approach that incorporates the principles of Activity Theory into the analysis of office landscapes has been recently published by Babapour (2019b, pp.9-17). Still, Babapour focuses on activity-based flexible offices, while the case study reported here and in paper C builds on her work by analysing a combi office. The tentative framework proposed in this chapter aims to develop this theoretical approach beyond offices for flexible working, emphasizing instead the particular spatial attributes of landscapes regardless of office archetypes. Furthermore, the representation of the 'office activity system' in the form of a tetrahedron intends to denote the possibility to analyse the 'office activity system' from different perspectives by rotating its viewpoint; different studies may find more relevant to place a specific system element in the center of the approach (Figure 9).
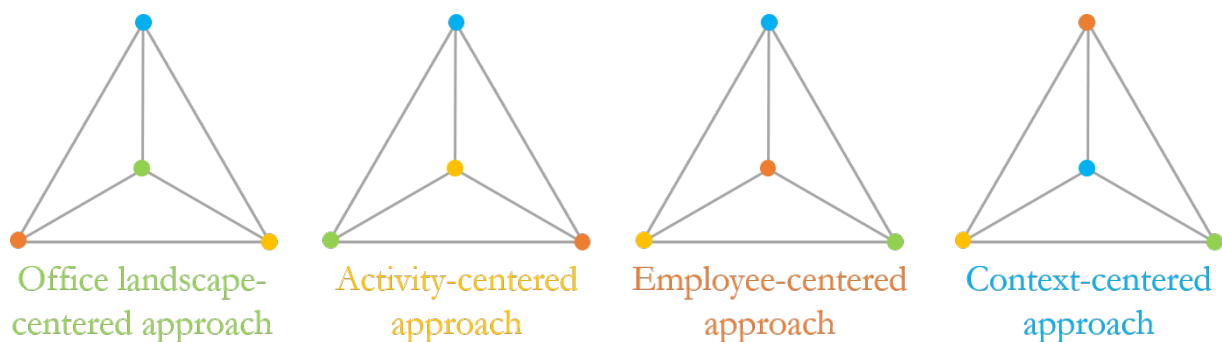

Figure 9. The different viewpoints to study the office activity system.

In this case, employees are placed in the centre (Figure 10) because their individual insights are fundamental to understanding how and why they experience matches and mismatches and use an office landscape in the ways they do.
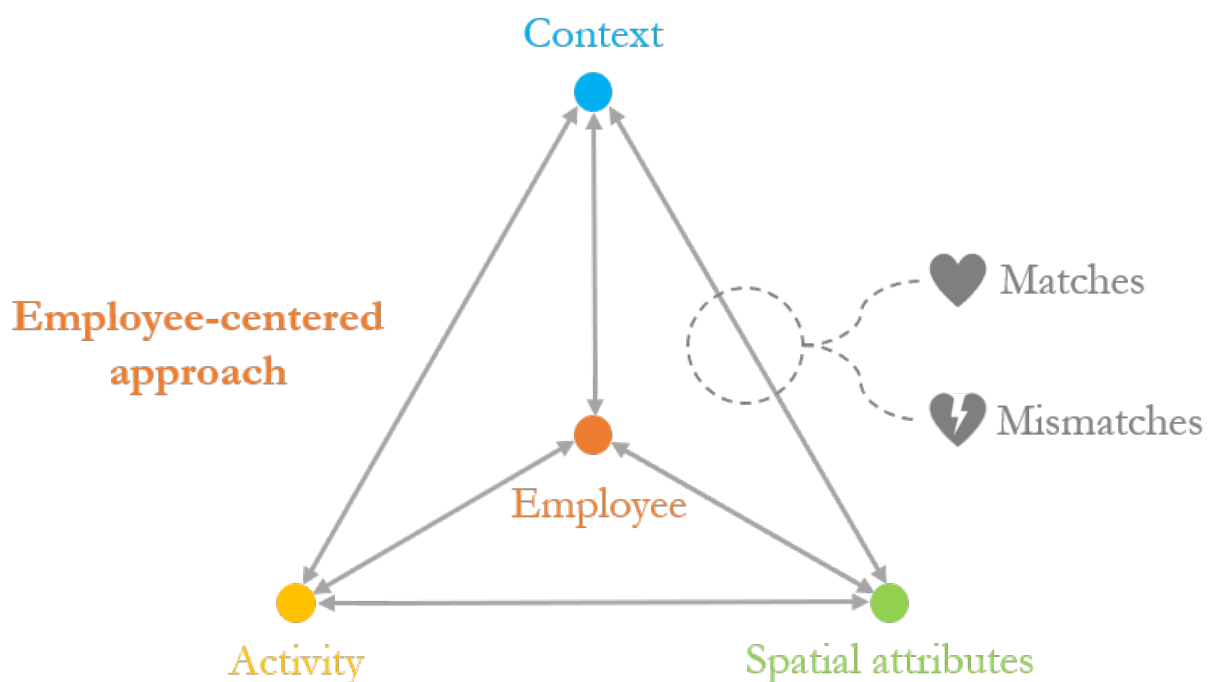

Figure 10. Study of the office activity system from an employee perspective.

In this way, matches leading to aimed outcomes can be bridged to positive experiences with the potential for positive influences on well-being, while mismatches can be bridged to negative experiences with the potential for negative influences on well-being. Subsequently, the positive and negative influences on well-being can be addressed in detail via the hedonic-eudaimonic hybrid approach to well-being. Figure 11 illustrates this reasoning.
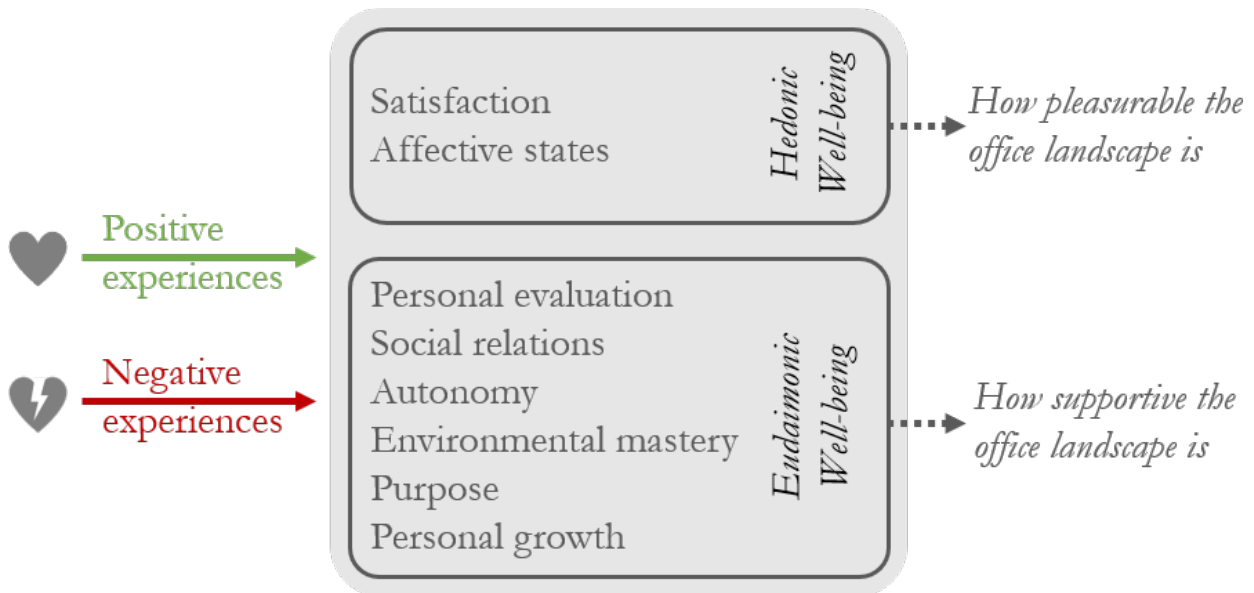
Figure 11. Thinking bridge between matches/mismatches & well-being

The adaptation of existing approaches to Activity Theory into this framework is justified by the need to understand the interrelations between employee well-being and the landscape in the context of use. Activity Theory provides the consistency of a systematic theoretical approach and consensus on a systemic view, its elements and interactions that the literature on well-being lacks. Well-being theories and models add a new layer of complexity to the explanation of matches and mismatches.

Figure 12 is a graphical representation of the tentative framework unfolded in this chapter for the study of employee well-being in relation to office landscapes.

Figure 12. Framework for the study of employee well-being in relation to office landscapes.

Chapter 4
Findings

4. Findings

The research work on the interrelations between employee well-being and office landscapes, in the context of use, departs from the study of what office landscapes enable. The literature reviewed evidenced the need for a deeper understanding of the differences observed between offices of the same type, in relation to employee work conditions and the use of office landscapes. The case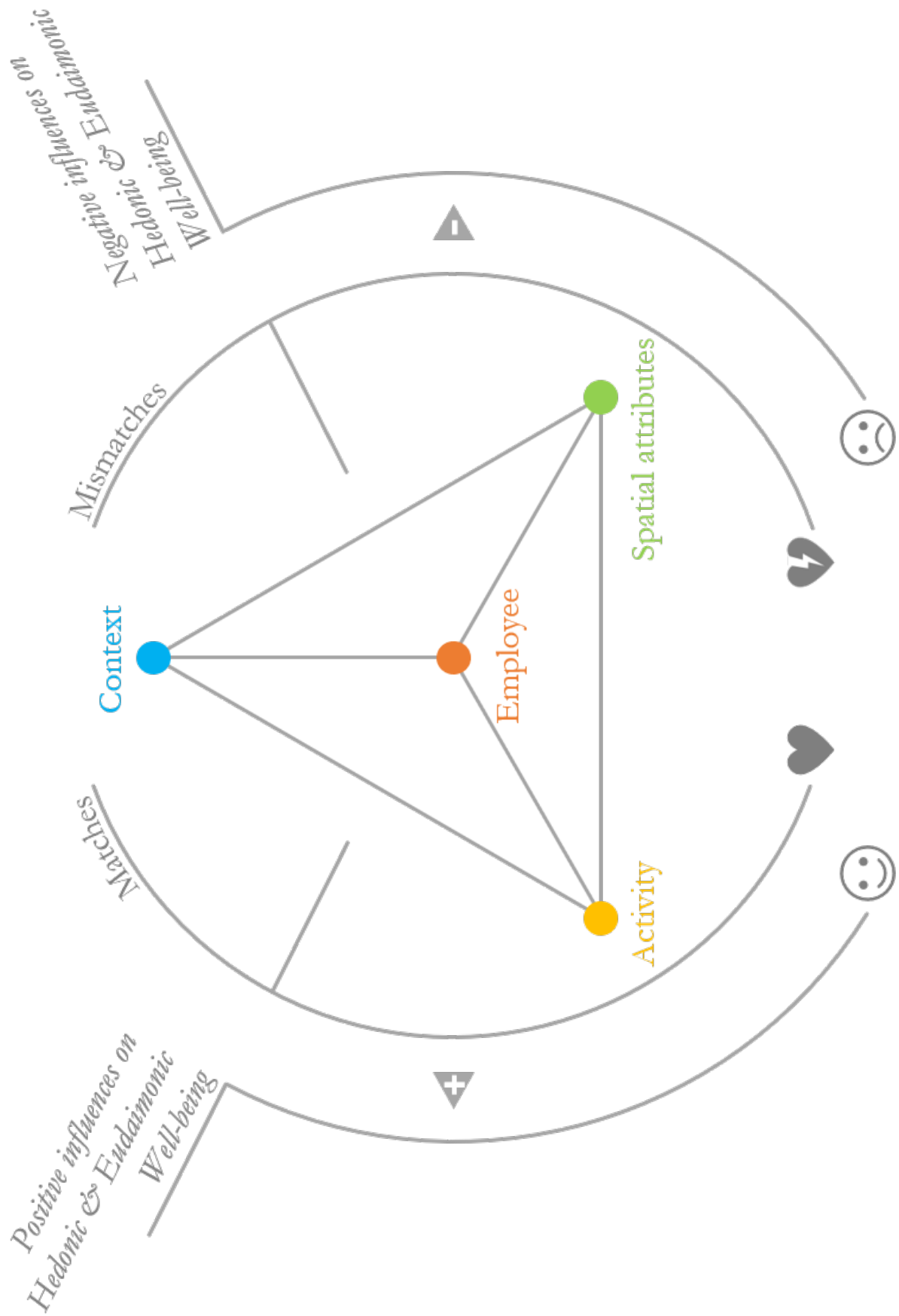 study provided the opportunity to build on that evidence and further address the research problem portrayed in this thesis. Findings from the literature review (published in paper A) and the two-fold analysis of the in-depth case study (published in papers B and C), are presented in this chapter in order to answer my research questions.

4.1. Research question 1

The first research question focuses on the influence that spatial attributes of the office landscape have on employee well-being. Papers A and B address this question, although at two different abstraction levels.

On a more general level, paper A reports on employee work conditions after relocating to activity-based flexible offices. Among the factors evaluated, several of the studies reviewed reported on well-being and/or health-related questions. Overall, results indicated slight or no significant changes in employee health and well-being after relocation.

However, the review showed notable differences in, e.g. perceived productivity, concentration issues, and satisfaction with privacy and facilities. Some of these differences were associated with aspects in which the office type played a role, while others were independent from the office type. For example, indoor climate, spatial subdivision, comfort of furniture, organisational management or the relocation process were highlighted as critical factors that were not necessarily related to activity-based flexible offices. Conversely, the impossibility to personalise spaces, visual and auditory exposure, limited storage and the perception of increased job demands due to the shared desks were factors associated with the office type.

These findings evidence that case-to-case office evaluations are worth the attention of researchers and practitioners due to the discrepancies found between offices of the same type. These differences also indicate that a particular office type might not be 'good' or 'bad' in itself; other factors such as the relocation to a different office, the activities carried out at work, or individuals' needs and preferences were central to the results. Additionally, the review shows that satisfaction or the lack of control over indoor climate conditions, for instance, were not considered part of employee well-being in the reviewed literature. Instead, well-being was understood as some sort of health-related parameter. Therefore, a more in-depth study of the interrelations between employee well-being and office landscape was necessary.

In this regard, paper B reports on the interrelations between the well-being of a group of employees and the spatial attributes of the office landscape where they relocated six months before the case study took place. The framework of this paper is based on well-being models and theories originated in the field of Positive Psychology. An interpretation of the construct of well-being was proposed for the analysis of the data collected. The findings show that, overall, the office landscape after the relocation was perceived as a thorough upgrade, despite a few shortcomings.

Spatial attributes were identified that positively influenced both hedonic and eudaimonic well-being. For example, abundant daylight enabled by large window surfaces and glass partitions between spaces was an attribute that contributed to a higher satisfaction and positive affects such as feeling *"energetic"*, *"happier"* or *"alive"*. Furthermore, the visually open landscape created by spacious rooms and glass partitions made colleagues more accessible and easier to socialise with than in the office landscape pre-relocation. It also made a better visual control of the environment and what was happening around possible and allowed daylight to reach further inside. These positive influences were found to be related to satisfaction, affective states, social relations and environmental mastery.

Spatial attributes with a negative influence on employee well-being were also identified. For example, the same visual openness responsible for the accessibility to colleagues was also reported to increase employee exposure to visual distraction and an overall feeling of limited control over it. This was found to negatively influence the well-being components of environmental mastery, satisfaction and affective states. Additionally, the exposure to glares caused by malfunctioning automatic blinds negatively influenced employee satisfaction, affective states and environmental mastery, mainly due to discomfort and distraction, and the impossibility to operate the blinds or the controls manually.

Other spatial attributes, such as climate (and lack of control over it), level of seclusion in relation to privacy, or noise, had variable influences on the hedonic and eudaimonic well-being of employees. For example, some informants were less sensitive to visual or noise exposure, some were getting used to it, and others reported coping strategies such as the use of noise-cancelling headphones to be able to concentrate. Furthermore, some office rooms were reported as *"quiet enough"* despite the lack of behavioural rules, which helped to keep distractions at a more manageable level. The main well-being components influenced were affective states, satisfaction, environmental mastery, autonomy and social relations. Table 1 provides an overview of the main spatial attributes identified in the case study analysis that were found to influence components of hedonic and eudaimonic well-being.

Table 1. Influence and recurrence of spatial attributes on employee well-being

		Hedonic Well-being		Eudaimonic Well-being					
	Spatial attributes	Affective States	Satisfaction	Personal Evaluation	Social relations	Autonomy	Environmental Mastery	Purpose	Personal growth
Office Landscape	Daylight	+	+				+		
	Accessibility to colleagues	+	+		+		+		
	Meeting rooms (size, type and number)	+	+				+	+	
	Spaces for breaks (size and type)	+	+		+	+	+		
	Aesthetic design	+	+					+	+
	Spatial diversity for different activities	+	+			+	+		
	Exposure to visual distraction	-	-				-		
	Exposure to glares	-	-				-		
	Challenging indoor navigation	-	-				-	-	
	Lack of division-specific coffee space	-	-		-				
	Power outlets (number and place)	-	-				-		
	Climate (thermal comfort)	±	±			±			
	Auditory exposure	±	±			±	±		
	Personal storage	±	±				±		
	Level of seclusion (visual privacy)	±	±		±	±	±		
	Equipment and furniture	±	±			±	±		
	Customisability of spaces	±	±			±	±		
+ Mostly positive insights; - Mostly negative insights; ± Positive and negative insights									

Contextual factors were identified that further explain why the new office landscape was experienced as it was. The main factors were related to the planning process and the former office landscape. Regarding the planning process, employees had a limited influence on the decisions made for the new office landscape; the overall result was

positive, but informants acknowledged certain frustration or dissatisfaction with this situation. Moreover, informal discussions following the relocation were ongoing with ideas to repurpose some of the spaces for which they could not made decisions initially. Regarding the former office landscape, they were sitting in cell office rooms and small shared office rooms before the relocation. These rooms were distributed along a corridor, in which partitions were all brick walls and most of the doors were closed the entire day. Moreover, the building itself was in need of updates.

4.2. Research question 2

The second research question concerns the use that employees make of their office landscapes and the role of spatial attributes in that usage. Several aspects were identified in my research, and reported in papers A and C, that explain the 'how' and 'why' of the landscape use. Paper A revealed that a majority of employees working in flexible office landscapes, with non-assigned desks, tended to settle at a preferred workstation and claim it with a diversity of strategies. For example, arriving early at the office, leaving personal belongings behind, or repeatedly using the same desk on consecutive days. In some cases, these patterns became non-written agreements, so other employees avoided using the desks that 'belonged' to someone else. Common reasons for such behaviour were personal preferences, the need to sit close to other colleagues, or avoid wasting time on setting up and clearing different workstations. The perception of identity threats or the lack of available workstations due to high ratios of employees per workstation (up to 10:6.5) were additional reasons reported in some of the reviewed studies. The minority who regularly switched between different workstations mainly did so to find an appropriate setting for the activity at hand.

However, the non-compliance with the desk-sharing policies was not paralleled by satisfaction, nor work conditions, which raised questions about how the different aspects evaluated interrelate. Moreover, the shared desks were only one piece in a complex puzzle. Hence, the need to understand the influence that other spatial attributes (other than shared desks) could have in the use of office landscapes called for further studies with first-hand detailed information.

In this regard, paper C address the use of office landscapes and the influence that spatial attributes have on that use. The paper specifically reports on the case study in which the use of a combi office is analysed in depth from an Activity Theory perspective. The findings show that the overall occupancy of the office studied was low (e.g. office rooms had an average occupancy of 31.4%) and particular spaces, such as quiet rooms, were barely used. The general perception of the informants, six months after their relocation, was that the new landscape was more flexible and more able than the former landscape to host the diversity of activities that they carried out.

Matches and mismatches were identified between the employees, their activities and the spatial attributes of the office landscape, that explain why the employees were using the landscape as they did. For example, matches were identified between the attributes of

assigned and height-adjustable desks, and informants' preferences. Another match was identified between the diversity of meeting rooms and the different types of meetings carried out by the informants. Other spatial attributes of the landscapes, such as the varied spaces for breaks and the glass partitions between spaces supported a more active social life at the office, since they made encounters easier and more frequent than at the landscape pre-relocation.

Examples of mismatches were identified between activities requiring concentration and the glass partitions or the landscape's ability to accommodate more colleagues per office room, since both spatial attributes exposed them to more visual and auditory distraction. Quiet rooms were an alternative setting for work requiring concentration, but they remained underused due to diverse mismatches, for example, between individuals' needs for personal storage and the lack of storage units in those rooms, between individuals' preferences and non-bookable workstations, or between the need for comfort and the poorer ergonomic equipment of these rooms compared to regular office rooms. Also, the use of back-up spaces such as quiet rooms implied carrying belongings around, and this was identified as a mismatch between individuals' preferences and activities in the form of unwanted extra actions.

Thus, spaces with most matches and least mismatches became popular over time. On the other hand, those spaces with least matches and most mismatches remained barely used or empty. In some cases, employees prioritised a space of their preference and compensated occasional mismatches via coping behaviours. For example, using headphones to concentrate at their assigned desks, instead of moving to a quiet room. For them, remaining at their desks seemed more convenient than moving somewhere else in the office. Few informants even preferred to work from home more often than working on tasks requiring concentration in, for example, quiet rooms.

Matches between employees/activities and…

- Flexibility to host diverse activities
- Small coffee lounges
- Lounge 5th floor
- Variety of meeting rooms and their equipment
- Height-adjustable desks
- Assigned desks
- Glass partitions
- More colleagues per room
- Daylight
- Layout (proximity)
- Two screens
- Views from balconies
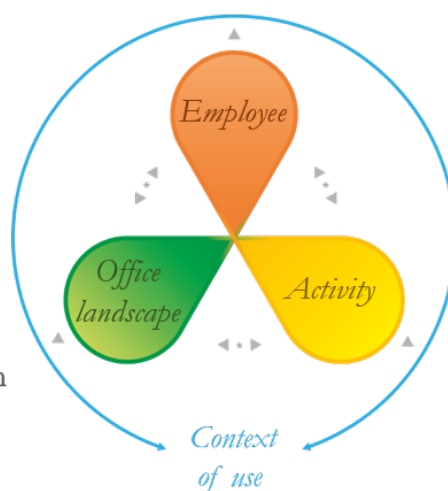
Mismatches between employees/activities and…

- Quiet rooms x6 desks
- Quiet rooms with sofas
- Size of phone booths
- Aesthetics of phone booths
- Glass partitions
- More colleagues per room
- Lack of windows at small meeting rooms

Employee

Office landscape

Activity

Context of use

Figure 13. Main matches and mismatches between the employees, their activities and the office landscape.

Contextual aspects of the relocation also helped to explain the use, misuse or underuse of spaces reported in paper C. For example, planners and decision makers agreed as a common goal to increase collaboration by opening up spaces, sitting more people per room and enabling more personal encounters in shared spaces. However, informants reported working mostly individually at their desks, on topics unrelated to their colleagues' topics. Moreover, no complementary changes were made regarding work protocols or policies to trigger that collaboration. In consequence, employees did encounter each other more frequently, but to socialise. Figure 13 provides an overview of the main matches and mismatches identified between the employees, their activities and the office landscape.

4.3. Research question 3

The third research question investigates relationships between the experience of employee well-being and the experience of use in relation to the office landscape. A joint analysis of papers B and C contributes to answer to this question.

The reported perceptions that informants had about positive and negative influences of the landscape on their hedonic and/or eudaimonic well-being further explain the usage of the landscape. For example, experiences associated to positive affective states and satisfaction (i.e. hedonic components of well-being) and positive social relations (i.e. a eudaimonic component of well-being), such as a friendly conversation in a comfortable and good-looking space while having a tasty coffee, caused coffee lounges to be reported as pleasurable and popular among employees. On the other hand, small meeting rooms in the corridors without windows were identified as displeasing and pointless spaces, even being described as *"dungeons"*, and therefore were associated with negative influences on well-being components such as affective states, satisfaction or purpose. This explains why these rooms were avoided for any type of activity. Moreover, there were better alternatives for meetings available all the time.

Other spaces, such as the quiet room with sofas, were a priori attractive, generated interest and most of the informants had tried it. However, once experienced, informants perceived spatial attributes such as the sofa stuffing or the temperature as uncomfortable. From a well-being perspective, this was interpreted as a negative influence on employee hedonic well-being; from an Activity Theory perspective this was read as a mismatch between the attributes of the quiet room and employee needs and preferences. Thus, both approaches are complementary and serve to explain more in detail, for example, why employees informally discussed alternatives to repurpose this quiet room and other spaces into a library, TV room, yoga/stretching room, etc.

The relevance and recurrence of the reported influences on well-being further contribute to explaining why informants preferred some spaces over others. Similarly, the matches and mismatches between the office landscape, employee and activities help to explain positive and negative influences on well-being. When the informants experienced mismatches with the attributes of a concrete space in some manner, they

reacted by either avoiding its use, misusing the space, or intervening in the space. That way, they could compensate for stress factors, imbalances, etc. as if they were adopting some kind of homeostatic behaviour, i.e. responses of living organisms triggered to maintain or restore their biological balance and allow them to thrive in a given environment (Sandler and Tsitolovsky, 2017). Figure 14 revisits the tentative framework proposed in this thesis to illustrate one example from the findings.

In conclusion, **the design of the office landscape did influence employee well-being by enabling or hindering uses of the landscape, and the usage of the landscape was influenced by what spatial attributes were experienced as pleasurable and supportive for carrying out a diversity of activities or not.** In this sense, the experience of use is key, but contextual aspects such as the office landscape before the relocation, the planning and change process, the social environment, and the activities of the employees also influenced informants' insights and the overall results of the case studied.
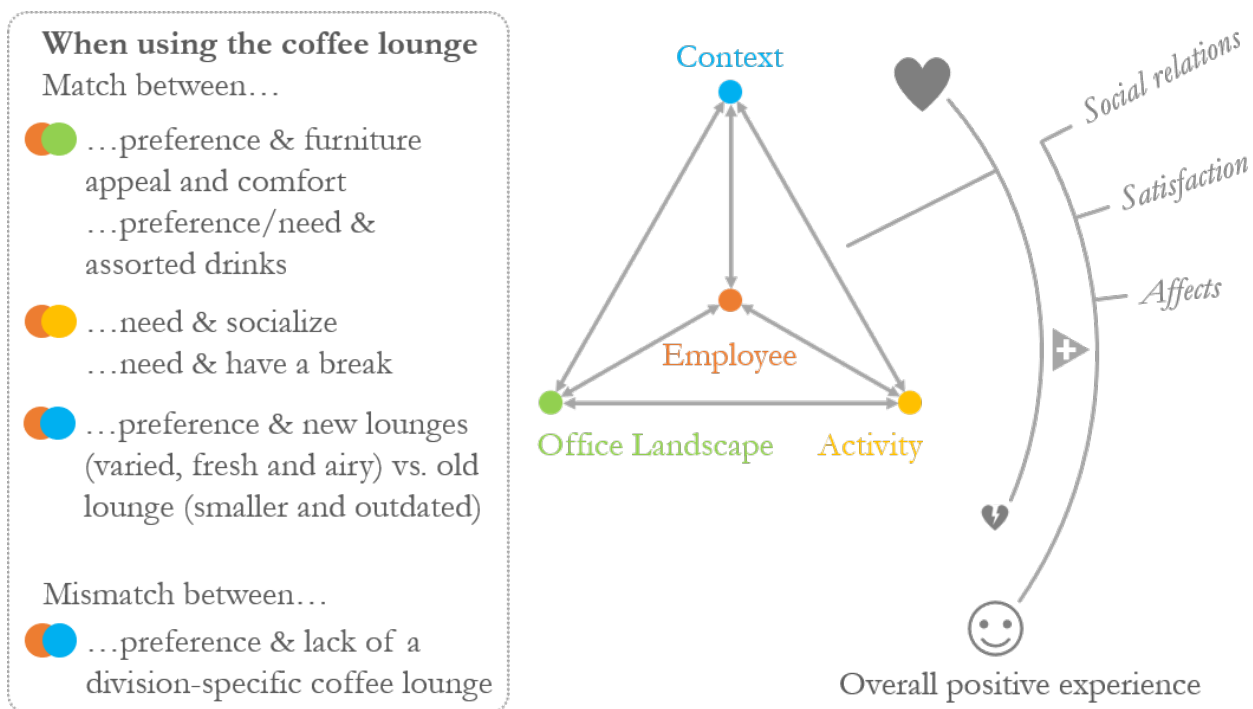

Figure 14. Tentative framework in relation to the findings.

Chapter 5

Discussion

5. Discussion

This thesis contributes to a better understanding of office employee well-being in relation to office landscapes in the context of use. Related to the findings reported in this thesis, there are some themes and ideas that I have found relevant for further discussion. These are:

- The role of occupancy
- The role of former experiences
- Desk ownership
- Underuse of quiet rooms
- Environmental mastery
- The productive sector of the organisations matters
- Employee involvement in relocation processes

The role of occupancy

The overall occupancy of the combi office studied was low and some of the spaces remained barely used or empty during the entire data collection period. Despite this fact, a majority of informants reported a feeling of increased exposure to distraction in comparison to their former cell-office; a distraction that was mainly visual, but also auditory. Spatial attributes responsible for the increased distraction were the ability to sit more people per room than in the landscape before the relocation and the visual openness created by glass partitions.

A higher occupancy would likely imply an even worse impact on e.g. employee affective states, satisfaction or environmental mastery, due to more frequent distractions and the same limited control over it. On the other hand, some informants reported that rooms were quiet enough and behavioural rules were not needed, partly because of the low occupancy. Studies reporting on different office layouts relate spaces shared by more people with lower levels of overall satisfaction and higher incidence of distraction than in office spaces shared by fewer colleagues or cell-offices (Bodin Danielsson and Bodin, 2008, 2009; Otterbring et al., 2018; Seddigh et al., 2015).

In fact, the occupancy factor itself could explain some of the differences in employee satisfaction observed in the literature review published as paper A regarding aspects such as concentration or privacy; it could be argued that having more colleagues around makes it harder to control visual exposure and distractions produced by irrelevant stimuli. Unfortunately, data on occupancy that could enable this analysis was lacking. Therefore, including occupancy rates in the data collection for office evaluations seems of central relevance to determine how much worse the negative influences can get as spaces fill up. Future studies and office developments would benefit from greater detail in this regard to limit the costly impact of stressed or unproductive employees due to distraction issues.

The role of former experiences

Another aspect to take into account in office evaluation derives from the previous discussion point, and it is the influence of former experiences at other office landscapes in the perception of a new one. I found this relevant for two reasons.

Firstly, in the case study addressed in this thesis, informants explained that, despite some downsides, the new combi office was much better overall than their old cell-office. In this regard, a number of deficiencies experienced in the office pre-relocation might have influenced informants' perception and overall level of expectations for the office post-relocation. An analogy to this can be found in the study by van der Voordt (2004), where employees relocating from a cell-office to an activity-based flexible office were dissatisfied with the higher exposure to distraction, while those relocating from an open-plan office to the same type of flexible office were satisfied with the possibility to withdraw to a quiet room. Consequently, the criteria for judgement by informants may vary notably from more benevolent to more unforgiving depending on their previous experiences.

Secondly, people develop habits and work routines at the office over time as part of a learning and adaptive process (Babapour et al., 2018). These routines and patterns remained practically invariable in the case study after the relocation, according to the informants. Their work was the same, although no training or instructions were given on how to work in a completely different office landscape, and no changes were reported in the organisation's working protocols. Therefore, the theoretical advantages of the flexible office landscape were not fully exploited, and the underuse of some back-up spaces could also be a consequence of employees reproducing the same activity patterns they had prior to the relocation.

Desk ownership

The main difference between combi offices and activity-based offices is the attribute of having assigned desks or shared desks. In the case study, the low occupancy of spaces suggests that shared desks could have been an option to reduce occupancy costs and increase the use rates of available resources.

However, the heterogeneity of informant activity patterns was generally low, and they would often spend all their time working individually at their desks. Few studies have investigated in more detail the effects of having or not having assigned desks, with varying approaches and results (e.g. Babapour and Rolfö, 2018; Hirst, 2011; Kim et al., 2016). Thus, further evidence is needed on the influence that desk ownership has on how flexible work arrangements are experienced, not only in relation to productivity or well-being, but also regarding different activity patterns. Previous studies highlight the importance of analysing activity patterns of employees for the success of an office intervention (Boge et al., 2019; Bruyne and Beijer, 2015; Greene and Myerson, 2011; Soriano et al., 2018). Practitioners and decision makers would benefit from more

informed decisions on the degree of flexibility required in each case, so that offices landscapes can be efficiently and effectively designed according to actual requirements.

Additionally, some informants were reluctant to the idea of carrying belongings to other workstations, and frequent positive comments were made about having their own desks with everything they needed and wanted. In fact, informants' own workstations were recurrently designated as their favorite place in the office. This is consistent with the review of the literature on activity-based flexible offices, which reports on a majority of employees who tended to claim a specific desk based on their needs and preferences. Thus, overcoming the resistance to switching workstations require strategies beyond the implementation of shared desks and back-up spaces. Further design efforts could be done, for example, on rethinking artefacts of the landscape for their shared use as pointed in Babapour (2019b, pp.90-91), or making it easier to switch by reducing the need for carrying belongings or the need for adjustments every time employees set up a different workstation. Currently office artefacts remain practically the same as they were before the advent of flexible working (ibid).

Underuse of quiet rooms

Having assigned desks could be another reason explaining the underuse of quiet rooms. Nevertheless, such supposition lies on the surface of more complex interrelations between the employee, their activities and the office landscape. The findings of the case study show that different spatial attributes in office rooms, such as the height-adjustable desks, the two big screens per workstations and the ergonomic chairs, did match employees' preferences and needs. Quiet rooms were simpler versions of the regular office rooms, since they were less equipped, less comfortable and had no storage. In addition, the quiet rooms were not bookable and the level of seclusion or privacy was comparable to any other room.

The quiet room with sofas offered a completely different setting that generated interest initially. However, over time it became underused as well due to mismatches between informants' preferences and the design of the sofas (too stiff and formal), the cool temperature or the glass openings that exposed occupiers to the corridor and other rooms. Consequently, informants perceived these rooms to be disadvantageous in comparison to their own office rooms, where they dealt with sporadic distraction by using headphones, for instance. Remarkably, this contradicts the studies reporting on flexible office landscapes that often stress the importance attributed to quiet rooms by employees (De Been and Beijer, 2014; Haapakangas, Hongisto, et al., 2018). A learning outcome of this is that quiet rooms should offer a truly bespoke experience that matches the needs, preferences and activities of the employees, and persuade them to leave their desks. In the case studied, higher comfort, seclusion or extra functionalities (a library for instance) would have been the key to making these spaces attractive enough, according to several informants. Besides, Activity Theory considers the event of matches and mismatches in the course of activities (Bødker and Klokmose, 2011;

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Engeström, 2000), but considering informants' choices concerning the uses of the landscape, it could be argued that some choices may have been made in anticipation of matches and mismatches; for example, avoiding a room without windows in anticipation of a mismatch between lack of daylight and preferences, or choosing to use a fancy seat in a coffee area in anticipation of the experience of comfort and self-expression. Hence, anticipated matches and mismatches between artefacts, individuals and activities could supplement the current development of Activity Theory, so that certain aspects of artefacts that are known but not available for use, can also be evaluated. Furthermore, anticipated matches and mismatches can contribute to the development of office products from early design stages.

Environmental mastery

The data collected in the case study was analysed from two perspectives, of which well-being was one. Findings show that environmental mastery (i.e. individuals' perceptions of the ability to control their immediate environment and take advantage of what it offers to fulfil personal needs and values) was by far the eudaimonic component of well-being most influenced by the spatial attributes of the office landscape (e.g. glass partitions, automated blinds and climate system, or diversity of spaces supporting a variety of activities and preferences). This is logical considering the focus on the physical work environment. Studies relate high personal control over the indoor environmental qualities with comfort, health, productivity gains and energy savings (Bluyssen et al., 2016; Boerstra et al., 2012; Melikov, 2016). In this regard, Clements-Croome (2018, p.16) alludes to the poor design of interfaces between users and controls as a key attribute that manufacturers should pay attention to, so that artefacts mediating environmental mastery are usable and reliable (ibid.). Furthermore, attributes such as automated blinds or visually open spaces proved to be a double-edged weapon. For example, the automated blinds were supposed to benefit employees' comfort and the building's energy performance but their malfunctioning and the impossibility to hijack the system manually caused discomfort, distractions and a feeling of lack of control. In the case of visually open spaces, informants experienced positively the opportunity to socialise with more colleagues than before, but the same circumstance affected their control over distractions and privacy negatively. Overall, informants' experiences were more positive than negative in this case. Other eudaimonic components of well-being, such as autonomy, social relations and purpose, were also influenced by the landscape, but to lesser extents. Consequently, office planners and decision makers should not underestimate the spillover effects of, a priori, advantageous spatial attributes, since few spatial attributes can mark the difference between successful and problematic relocations.

According to the review by Clements-Croome (2015), an office landscape that promotes health and well-being should have the following attributes: *"a fresh thermal environment; ventilation rates sufficient to provide fresh air with good distribution and acceptable levels*

of CO_2; *good natural lighting; acceptable acoustic climate; no lighting glare; spatial settings to suit various types of working; ergonomic workplaces that have been designed to minimize musculoskeletal disorders; the landscaped surroundings should be properly considered as part of the design; minimum pollution from external sources, including noise.*" Moreover, the importance of personal control over the immediate physical environment is highlighted by this and other frequently cited authors (e.g. Ulrich, 1991). The research presented in this thesis covers all of these, plus other landscape attributes and contextual factors. So far, my findings point in the same direction as the reported in Clements-Croome's review. Still, my findings emphasize the relevance of enabling the environmental mastery of office employees beyond the cited attributes and also include, for example, the mastery over social interaction, privacy, self-expression, indoor navigation or storage.

The productive sector of the organisations matters

The case study reported here refers to a group of university employees. This means that their activity patterns, duties and needs may differ significantly from other organisations such an architecture studio or a manufacturer in the automotive industry. In the case studied, the planners and decision makers set up the goal of increasing collaboration between employees and with visitors. In this regard, diverse design features of the landscape, such as bigger shared rooms and visually open spaces, were purposely introduced to foster that collaboration. The result was instead an increase in socialisation but not collaboration, according to informants. The main reason was that informants were working mostly individually on unrelated research topics, unlike development teams in industrial projects for instance. Moreover, the social atmosphere rated very positively within the group, so the new landscape where everyone was findable was a lure for socialisation. In any case, Brunnberg (2000) relates an exposure to interaction that exceeds the real needs of employees with distraction and lower effectiveness at flexible work environments. Therefore, the assumption that a particular landscape solution will achieve the same result with different populations of occupiers seems misled and even naïve (cf. preferences for flexible offices of employees with diverse backgrounds and tasks in Rolfö et al., 2019). Besides, generic landscapes might not provide enough support to specific needs derived from a concrete productive sector (ibid.). Consequently, the productive context matters, and the goals for both planners and organisations must be aligned with such reality when making decisions over an office intervention or relocation; even more in the case of flexible working landscapes, due to their impact at different organisational levels, e.g. leadership, management, work protocols or communication technology (de Paoli et al., 2013).

Employee involvement in relocation processes

Beyond the success or failure of a relocation from an employee perspective, office landscape developments represent costly investments for organisations (Appel-Meulenbroek et al., 2015; Cobaleda Cordero et al., 2018) that have an impact on employee working experiences (Hongisto et al., 2016; Vischer, 2008). The perception

of informants and the architect interviewed in the case study coincided in the limited ability of employees to influence decisions during the planning process of the relocation. A consequence of this, despite the overall positive result of the relocation, was that informants found some spaces to be pointless and suggested options to repurpose their function that were aligned with their needs and preferences; for example, turn a quiet room into a library or a yoga/exercise room. In this sense, studies indicate that the participation of employees in the planning and development processes can reduce the risk of misfits between the landscape and employees needs and preferences (Gorgievski et al., 2010; Hongisto et al., 2016; Lahtinen et al., 2015; Rolfö, 2018; Vink et al., 2006). This also means that fewer changes are needed posteriori, although follow-up studies and interventions would help to improve the alignment of the landscape with the needs and preferences of organisations and employees. The case study presented here (Paper B), as well as other studies (Bozkurt, 2017; British Council for Offices, 2016; van der Voordt, 2004) show that faulty office landscapes are one more reason for low staff retention, resulting in extra costs for organisations associated with the loss of talent, high staff turnover and the continuous need to train new employees. Moreover, considering the influence on employee well-being of concrete spatial attributes that do not necessarily denote an office type, the often-heated discussions about the pertinence of certain office types over others are not fully justified.

5.1. Limitations

The research work presented in this thesis is not exempt from some limitations. Firstly, each organisation and office landscape is unique, and the conclusions of the case study reported here may not be representative enough of larger populations. The number of participants, the emphasis on qualitative data and the high level of detail pursued in the analysis also limit the possibility to generalise the findings of the case studied. In any case, studying similar cases in such level of detail could provide valuable knowledge on tendencies and comparable outcomes, for example, regarding the experiences with back-up spaces in offices for university employees.

Secondly, given the lack of consensus on the tools to study individual well-being in general, and office employee well-being in particular, a pragmatic research approach was adopted. This implied that theory references from Psychology and Design were combined to best serve the aim of my research in the specific context of the problem studied. Thus, the theoretical approach may not be as transferable to other research contexts as the research approach, although it enables the in-depth study of employee well-being in relation to office landscapes.

Thirdly, the methodology of this thesis does not allow an establishment of cause-effect relationships between variables in a general sense. This would require building evidence on a wider sample and a greater emphasis on quantitative data. Instead, this research

complements the existing statistical evidence by addressing different layers of complexity in employee experiences with office landscapes.

Fourthly, in-depth office evaluations require an important amount of time from the workforce to provide the necessary data, and case-specific circumstances (e.g. high work-loads or fear of lacking secrecy) might affect people's willingness/availability to participate. This means that as a researcher I am constrained to work with what is feasible in each situation and implies that in some cases a convenience sampling may be the only option. In the case studied, all potential participants were invited, and to limit the risks of sample bias, the representativity of the participants in relation to the whole group was ensured.

Fifthly, my thesis is framed in the physical office domain, although I regard offices as a complex socio-technical system. This implies that I address a set of variables of an office subsystem in my research. Surrounding subsystems and variables, together with circumstantial aspects of the relocation, job conditions, organisation or personal relationships were consciously kept out of the research scope. These constitute cofounding variables that were anyways covered in the data collection in order to judge and limit their impact on the validity of my findings, as well as to gain a better understanding of the case context.

Chapter 6

Conclusions

6. Conclusions

This thesis has shown that the study of well-being in office landscapes is far more complex than it seemed from the available literature on office evaluations. Whether the construct of well-being is associated with satisfaction, prosperity, happiness, health, welfare or a diversity of other concepts just illustrates the breadth of it and the lack of consensus around its precise definition. The research presented here embraces such complexity and proposes a tentative model to study the interrelations between employee well-being and office landscapes in the context of use.

Two reviews of the literature were the starting point for this thesis; one about office landscape use and employee work conditions, and the other about the construct of well-being. The first resulted in paper A and highlighted the need for a deeper and more explanatory approach of the matters addressed. The second literature review focused on well-being, from its most popular connotations to the richest scientific elaborations in the field of Positive Psychology, and its application in the evaluation of office landscapes. The latter review is the basis of the framework of this thesis and evidenced two relevant facts:

(i)   The construct of well-being transcends the above-mentioned concepts of satisfaction, prosperity, happiness, health, welfare, etc. For example, the World Health Organization (1948) defined health in its constitution as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity",* (p.1) but well-being also comprises personal preferences, values or the pursuit of a life of purpose and meaning.

(ii) Office evaluations often address well-being from a less detailed, mostly hedonic view, which tends to emphasize the negative impacts of office landscapes on employees over the positive ones; for example, addressing employee satisfaction, mood or occurrence of ill-health symptoms.

In addition to the reviews, the case study reported in this thesis enabled an in-depth investigation of the influence that the design of office landscapes has on the hedonic and eudaimonic well-being of the employees who use them. This investigation contributes to previous literature on office landscape evaluations from an original, two-fold, analysis perspective built on a hybrid interpretation of well-being theories and Activity Theory. Moreover, the mixed methods approach adopted, with the emphasis on qualitative data, provided rich insights for the study of employee well-being in office landscapes, regardless of the office type.

The case study successfully explains the positive and negative influences that concrete spatial attributes of an office landscape have on its employees, in a post-relocation scenario. Overall, the landscape post-relocation was positively experienced and perceived as a comprehensive upgrade in comparison to the employees' former office landscape. Shortcomings were also identified. From a well-being perspective, the hedonic components of satisfaction and affective states, and the eudaimonic

component of environmental mastery, were the most recurrently influenced by the office landscape. The eudaimonic well-being components of autonomy, social relations and purpose were also influenced, but to lesser extents. This evidenced that the level of well-being experienced by the office employees was closely related to the perceived pleasurability of the landscape and the experiences of mastery over it. From an Activity Theory perspective, the matches and mismatches identified between employees, their activities and the office landscape were fundamental to explaining the use, disuse or misuse that employees made of their landscape. Contextual aspects were also considered that further explain how and why employees experienced and used the office as they did.

The joint analysis of the findings reveals how the study of matches and mismatches is useful to discriminate positive and negative influences on employee well-being. Furthermore, it allows the finding of relationships between the level of well-being that an office landscape enables and the efficiency with which a building is used, or the extent to which an office landscape performs as intended. Moreover, the findings stress the relevance of employee job contexts in the use that employees make of the space for the activity at hand, as well as the impact that previous experiences have on employees' perception of their current landscape. It is also of common sense that pleasurable and supportive spaces are prioritised over those that do not support, or hamper, well-being.

This thesis and its more in-depth qualitative approach to employee well-being at offices, represents a practical and valuable contribution to previous quantitative research work by proving that office landscapes do have an important impact on employees. Considering that employees are the most precious and costly resource of organisations, office landscapes for employee well-being are crucial in the long-term success of a business. Moreover, employees do play a key role in the financial and environmental performance of office buildings. Therefore, office landscapes for employee well-being also have the potential to generate positive changes on a societal level.

Chapter 7

Future work

7. Future work

My future research work will continue to develop the topic of well-being at office landscapes with a research-through-design approach. The focus will be on the eudaimonic well-being component of environmental mastery. In particular, I want to investigate **design opportunities for enhanced environmental mastery at office landscapes**.

The eudaimonic well-being component of environmental mastery played a central role in the overall well-being experience of employees, which makes sense given the research focus on the office landscape. Moreover, the hedonic well-being components of affective states and satisfaction mirrored the positive and negative influences of the landscape on eudaimonic well-being. In this regard, previous studies have found that changes in eudaimonic well-being are correlated with changes in hedonic well-being, but not necessarily vice versa (Burns and Ma, 2015; Waterman et al., 2008). This means that by prioritising employee environmental mastery in office landscapes, the most effective overall enhancement in employee well-being in office landscapes could potentially be achieved. Therefore, a 'Pareto' approach to office landscapes for well-being could be further investigated by focusing on environmental mastery, similarly to other examples in the literature of 'Pareto' strategies for building design and operation (Grierson and Khajehpour, 2002; Victoria and Perera, 2018).

According to Rawlings et al. (2015) *"just 29.7% of employees in the Leesman database are satisfied with noise levels in their workplace and a dissatisfaction with noise is statistically the strongest likely indicator of poor perceived productivity"* (p.10). The same report indicates that satisfaction with temperature control at flexible offices is among the lowest rates in the database (27%) (p.7). These examples show that further research on the specific topic of environmental mastery is necessary and has great relevance for the design and operation of office landscapes that enhance employee well-being.

A relevant factor to consider in the experience of environmental mastery is personality traits, as they influence the overall perception of well-being (Burns and Ma, 2015; Ryan and Deci, 2001; Ryff, 1995; Sun et al., 2018). The so-called 'Big Five' personality traits (Neuroticism, Extraversion, Openness, Agreeableness, Conscientiousness) are found to be related to differences in the perception of well-being. These differences appear to be stronger in relation to eudaimonic well-being (of which environmental mastery is a component) than in relation to hedonic well-being (Grant et al., 2010; Sun et al., 2018). Moreover, Ryff (1995) reported that the feeling of the individual concerning eudaimonic well-being components such as environmental mastery and autonomy improve with the age, while personal growth and purpose decrease from midlife to seniority.

Differences in the perception of spatial attributes that can influence environmental mastery, such as noise, have been studied in offices and correlated to personality traits (e.g. Oseland and Hodsman, 2018; Seddigh et al., 2016). Nonetheless, fewer studies

have investigated these differences in relation to other spatial attributes highlighted in this thesis, such as glass partitions or assigned desks. Also, the effect of personality traits in well-being is estimated to be larger than, for example, than demographic factors such as age or gender (Sun et al., 2018).

In the research work presented here, the influence of personality has not been considered, but I acknowledge the value of digging deeper into this in my future research work. It may help to explore new opportunities to optimise, for example, the experience of control (or mastery) over privacy or social interaction according to personality profiles.

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