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Nature Assisted Workplace Environments - Collaboration, Creativity & Restoration

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Thank You

It takes a village...
to write a thesis.

My village consists of a patient family and
good friends but above all
the very accommodating people
who are part of this study.

Interviewees at IKEA who took their time
and who really tried hard to answer all my questions.

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took great care in explaining strategies
and hopes for the future.

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Abstract

This study investigates what collaborative, creative and restorative areas look like in a work environment and if workplace greenery and/or access to nature like environments have an impact on these areas. Semi-structured interviews were carried out with representatives from three different companies to understand the strategic incentives for their workplace design and development and a more in-depth work place study of one company interviewing four employees about their preferences and habits for collaborative, creative and restorative places in the office environment. The results from the interviews were analysed, using a summary of multiple studies of the perceived sensory dimensions framework, to understand how the framework formulated for an outdoor nature environment, could be used in an indoor workplace environment.

Collaboration and collective creativity require open, inviting and flexible spaces, these are also the areas getting most attention at the workplaces studied. Individual creativity and restoration demand quiet and calm places away from distractions and seem to be somewhat neglected in the workplace development efforts. The spaces identified by the interviewees were made attractive by their proximity to greenery, window views and daylight. Although more research is required, establishing a framework based on the perceived sensory dimensions could be a pathway for workplace development to not only include collaboration and creativity but also restoration.

Sammanfattning

Denna studie undersöker hur samverkande, kreativa och återhämtande arbetsmiljöer kan se ut och om grönska på arbetsplatsen och/eller tillgång till naturlika omgivningar har en inverkan på dessa områden. Semi-strukturerade intervjuer genomfördes med representanter från tre olika företag för att förstå deras strategiska incitament för arbetsmiljöutveckling och design. Dessutom gjordes en mer djupgående arbetsplatsstudie av ett företag där fyra anställda intervjuades om deras preferenser och vanor vad gäller samverkande, kreativa och återhämtande platser i kontorsmiljön. Resultaten från intervjuerna analyserades med hjälp av en sammanfattning av ett flertal studier av de åtta parkkaraktärerna för att förstå hur detta ramverk, formulerat för en naturlig utomhusmiljö, skulle kunna användas i en inomhusmiljö.

Samverkan och kollektiv kreativitet kräver öppna, inbjudande och flexibla utrymmen, det är också de platser som får mest fokus på de undersökta arbetsplatserna. Individuell kreativitet och återhämtning kräver tysta och lugna miljöer utan distraktioner, denna typer av platser verkar vara något eftersatta i utvecklingen av nya arbetsmiljöer. Platserna som de intervjuade identifierar verkar vara attraktiva på grund av sin närhet till grönska, utsikt och dagsljus. Även om mer forskning krävs, skulle upprättande av ett ramverk, med utgångspunkt i de åtta parkkaraktärerna kunna vara en väg för arbetsmiljöutveckling att omfatta inte bara samarbete och kreativitet utan även återhämtning.

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Introduction

What makes an employee perform at her best? In the field of Human Resource management this is a question on many people's minds and it has been my area of work for many years. Most companies I have worked with have some form of a performance management system in place to make sure employees are able to perform to a certain standard.

Performance management is often described like this:

"Performance management is an ongoing process of communication between a supervisor and an employee that occurs throughout the year, in support of accomplishing the strategic objectives of the organization. The communication process includes clarifying expectations, setting objectives, identifying goals, providing feedback, and reviewing results." (University of California, Berkely, 2016)

In my experience successful performance management is based on three underlying principles of employee performance.

1. Competence - employees' knowledge and strengths are matched with their work tasks
2. Capacity – employees' capacity to manage and cope with the workload and potential stress in order to maintain performance and creativity/problem solving
3. Social needs – employees' sense of inclusion, respectful treatment and sense of fairness

In other words, does the employee have the knowledge and experience to carry out the work he or she is given? Does the employee have the capacity to handle the workload and deal with the complexity of the tasks and is he or she able to work together with colleagues to produce the best possible results for the company?

While there are many components influencing employee performance such as organizational structure, culture and politics, I wanted to take a closer look at how the physical work environment may affect restoration, creativity and collaboration, hence affect performance.

Background

Having worked on several continents and in various industries I have seen a recurring pattern; technology development resulting in constant connectedness wherever and whenever places new demands on coping strategies for the same. Corporate employees need to handle a steady stream of information and communication, yet stay focused on results.

Stress-related illnesses are on the rise in Western societies (Lai, Saradikis, & Blackburn, 2015; Mellor, Smith, Mackay, & Palferman, 2013) and the World Health Organization (2014) reports that mental health disorders are among the leading factors of the global disease burden and are projected to increase. While there may be a number of reasons for stress-related illnesses the demands at work play a major part. "Excessive work demands have become the single most potent source of performance pressure for all groups of professionals." (Chan, 2007, p. 6).

Increasing stress causes problems for society and companies not to mention the personal cost for the individual affected. “Workers who are stressed are also more likely to be unhealthy, poorly motivated, less productive and less safe at work. Their organizations are less likely to be successful in a competitive market.” (Leka, Griffiths, & Cox, 2004, p. 1). 25% of European workers are reportedly experiencing stress for all or most of the working day (European Agency for Safety and Health at Work, 2014). As a result of rising stress related illnesses countries increasingly legislate to make sure employers take action to prevent occurrence of these illnesses (Arbetsmiljöverket, 2015; Agerberg, 2007).

There is growing evidence that spending time in nature or nature like environment helps a person de-stress and restore mental capacity and executive functions. This type of nature encounters also facilitates open and flexible forms of interaction which can be beneficial for creative problem solving. While there is research focusing on people and nature such as town dwellers and the specific effects of parks and play environments (Mårtensson F. , 2012) not so much has been studied about nature or nature like environments at work (indoors and outdoors) and how it impacts employees.

A work environment conducive of creativity and collaboration could also be favourable for attracting talent. A study among 200 000 students worldwide (van Mossevelde, 2014) shows that a ‘creative and dynamic work environment’ is one of the most important factors for choosing a company to work for. Companies like Google and Apple consistently rank among the highest when it comes to attractive work places, both these companies are in the process of building new global head offices. When announcing the building of the new site Google described it like this: “With trees, landscaping, cafes, and bike paths weaving through these structures, we aim to blur the distinction between our buildings and nature.” (Radcliffe, 2015) Apple’s new campus for its corporate headquarters is a doughnut shaped building with a circular park in the middle, 80 percent of the total site will be green when finished and the campus will include native plants, fruit trees for harvesting and bike and jogging trails (Thompson, 2016).



Figure 1 The relationship between nature and restoration and instoration.

Most adults spend a considerable amount of time at work every day. Creating opportunities for and access to restorative areas at or in association with the workplace may be valuable to both employers and employees.

Nature has been credited with both restorative and instorative qualities. The restorative elements of nature are attributed to its ability to decrease stress, both mentally and physically, and increase health and feelings of well-being (Ulrich, 1984; Kaplan S. , 1995). The instorative qualities of nature, although less researched, are associated to strengthening of capabilities one may experience in nature such as increase in confidence,

creativity and social belonging (Roe J. , 2008; Grahn & Stigsdotter, 2003; Hartig, Böök, Garvill, Olsson, & Gärling, 1996).

Research aim and objectives

This study aims to investigate corporate indoor and outdoor work environments and how these environments support restoration, creativity and collaboration.

The objectives for this study are:

- To understand what restorative, creative and collaborative areas may look like in a work environment
- To explore the impact of greenery on restorative, creative and collaborative areas in the work environment
- To apply the Perceived Sensory Dimension framework (Grahn P. , 2005) to indoor workplace environment in terms of restoration, creativity and collaboration

Theoretical Framework

The intention of this review of relevant themes in current research is to connect the established link between nature and health to workplace environment and its potential effects on restoration, creativity and collaboration. If there are restorative and instorative benefits of nature even in small urban green areas, what is the effect of greenery at or in association with the workplace?

Restoration

Nature's health benefits have a long history. Sanatoriums for patients with tuberculosis were located in places with fresh air and beautiful green views and mental institutions used to have large gardens and or greenery at their doorsteps providing restoration from illnesses. Research in this area has in recent decades taken its departure in nature's health benefits in association with both physiological and cognitive recovery (Ulrich, 1984; Kaplan S. , 1995). While the two theories used to be seen as conflicting, a more recent approach is to view them as complements and a comprehensive starting point for studies in the area (Hartig T. , 2005).

The stress reduction theory has an evolutionary perspective, the physiological benefits of nature are associated with a reduction of the stress inducing hormone cortisol when exposed to nature or nature like environments (Ulrich, 1984; Roe, et al., 2013). Virtual greenery may also have an impact on the levels of the stress inducing hormone cortisol, clinical studies show that persons exposed to stress recover quicker in a virtual green environment compared to a work desk environment after the stressful event (Annerstedt, et al., 2013).

The cognitive impact of nature is explained in the Attention Restoration Theory (Kaplan S. , 1995) where nature provides restoration from mental fatigue caused by too much directed attention. This sort of attention is required to, for example, sort through the complex flow of information in our daily lives (Adevi & Mårtensson, 2013). Crossing a heavily trafficked road or shutting out urban noise are also examples on what may need directed attention (Stack & Shultis, 2013). Nature that feels safe gives an opportunity for what Kaplan (1995) calls soft fascination, an undemanding involuntary attention providing respite from the directed attention which is at a constant risk of being depleted. Ottosson (2001) describes nature as being fair, it treats everyone the same, something which aided his recovery after severe brain injury. A walk in an urban setting have no restorative effects on healthy humans while a walk

in a nature setting is associated with positive change in mood (Roe & Aspinall, 2011; Bratman, Daily, Levy, & Gross, 2015; Berman & Kaplan, 2008).

While nature may be associated with forests and endless green pastures there is a growing body of evidence showing that urban greenery has health benefits for city dwellers. Urban green spaces are often defined as managed greenery such as public parks, greenery on buildings (walls and roofs) as well as roadside greenery - as opposed to secondary or primary forests that are largely unmanaged (Yok Tan, Wang, & Sia, 2013). Urban green areas have an impact on quality of life in terms of both physical activity and social cohesion, this seems to be independent of socio-economic status (van den Berg, Maas, Verheij, & Groenewegen, 2010; Grahn & Stigsdotter, 2003). A research review spanning several decades of studies (Lisberg Jensen, 2008) shows that the more time spent in urban greenery the less affected people are of stress amongst a variety of different age groups. Green spaces on 'one's doorstep' such as private gardens and workplace greenery can be seen as a buffer against stressful events (van den Berg, Maas, Verheij, & Groenewegen, 2010). The closer to a green space, the higher likelihood of a visit, a distance of more than 300 meters from a green space is associated with higher odds of experiencing stress (Grahn & Stigsdotter, 2003; Stigsdotter, et al., 2010).

Creativity & Collaboration

Knowledge workers or 'the creative class' (Florida, 2003) need creativity and collaboration for many areas of work including problem solving and innovation. "By its very nature, knowledge work is both highly cognitive and highly social" (Heerwagen, Kampschroer, Powell, & Loftness, 2004, p. 511). Collaboration can be defined as simply working together, while creativity may need a more in depth definition; "At its heart, creativity is simply the production of novel, appropriate ideas in any realm of human activity, from science, to the arts, to education, to business, to everyday life" (Amabile, 1997, p. 40). Intrinsic motivation, the drive, curiosity and interest for a task, is essential for creativity (Amabile, 1997; Hoff, 2014), but could an organization attract the creative class and enhance creativity and collaboration by providing a work environment supporting the same? The place and environment, both psychosocial and physical, play significant roles in the creative process and for collaboration; an appealing environment increases well-being and supports well-functioning groups (Hoff, 2014). Cities and places that are open and diverse attract talented and creative people who in turn boost innovation and economic development according to Florida (2003). Ling & Dale (2011) found a link between natural landscapes, attraction of a diversified creative class as well as community creativity and collaboration in a study including three communities in Canada. A study by Plambech & Konijnendijk van den Bosch (2015) shows how nature enhances creative thinking and inspires new ideas among creative professionals in Denmark. Nature's role in restoration from directed attention also impacts the ability to develop ideas as showed in this study. Mårtensson (2012) shows how a green environment facilitates social interactions and decreases the element of competition among children.

Both effective collaboration and creativity are dependent on the opportunity to carry out individual tasks as well as qualitative teamwork (Hua, 2007; Bryant, 2012). While creating collaborative open spaces in the workplace organisations need also provide appropriate spaces for the individual to focus and concentrate (Heerwagen, Kampschroer, Powell, & Loftness, 2004).

Workplace Greenery

Feeling stressed at times at work when stress hormone levels increase to solve a complex problem or to deal with a disappointed colleague or customer is part of the workday. The challenge seems to be how to counteract the stress levels to prevent permanent negative stress and ensuing problems (Skärbeck & Grahn, 2015). Creating a restorative zone at the workplace may be one way of supporting micro recovery for employees, Öberg (2015) discusses how such a zone should be encouraged to include opportunities for both relaxation and movement in an environment with nature like elements.

Many employees feel they are too busy to go outside despite having immediate access to green areas at the workplace. It is also not encouraged or part of the company culture to do so (Lottrup, Stigsdotter, Mellby, & Sola Corazon, 2012). Time spent in outdoor areas were reportedly associated with breaks such as having lunch outdoors or socially as in talking to colleagues. Encouragement either from colleagues or managers increased the time spent outdoors significantly. In another study Lottrup et al. (2013) found that access to outdoor greenery and views of greenery from the workplace had positive results on levels of stress for employees and attitude towards the workplace. This particular study showed differences between men and women and their respective benefits of the greenery. Kaplan (2007) finds in a study of employee preferences when it comes to natural scenes that prairie like and less groomed landscapes are preferred over groomed lawns and that cars and car parks have the most negative impact on preference. In an overview of restoration at work, Korpela et al (2015) discuss the stress reducing qualities of outdoor and indoor greenery. Spending time in natural environments has greatest impact on an emotional level, where it reduces negative feelings and enhances positive moods. Another study shows that increased nature contact decreases stress and increases perceived health and may be a way of promoting healthy workplaces (Largo-White, Chen, Dodd, & Weiler, 2011). Encouraging nature contact and restorative breaks during the workday and bringing nature indoors to the office and break areas are some of the advice in these studies, as well as increasing greenery in and around car parks and surrounding areas. (Kaplan R. , 2007; Korpela, DeBloom, & Kinnunen, 2015; Largo-White, Chen, Dodd, & Weiler, 2011; Lottrup, Stigsdotter, Mellby, & Sola Corazon, 2012).

A window at work may provide, daylight, sunlight and even fresh air, but what about the view? As with Ulrich's (1984) early research, a view from a window may have beneficial effects depending of what the view is. A study by Shin (2007) found that office workers who had a forest view showed less stress and higher job satisfaction than those in the study who did not have the same view. In another study, similar conclusions were drawn where view satisfaction was compared to work ability and job satisfaction. The preferred window views in this study were also associated with natural elements as opposed to views of buildings (Lottrup, Stigsdotter, Mellby, & Claudi, 2013). Views of green roofs are becoming increasingly popular in down town areas, not only because of their environmental qualities. A study of office workers' perceptions of green roofs in central business districts in Toronto and Chicago, (Loder, 2014) shows that 'wilder' roofs such as prairie style roofs may stimulate fascination and creativity.

Studies carried out in different parts of the world seem to point in the same direction, indoor landscaping with plants have a positive effect on most task performance. A Japanese study showed indoor plants at the workplace have a higher positive impact on more complex

association tasks than sorting tasks and affect men more than women (Shibata & Suzuki, 2002). In a Norwegian study randomly selected students performed a cognitive task better when surrounded by plants than those who did the same without plants present (Raanaas, Horgen Evensen, Rich, Sjøstrøm, & Patil, 2011). Field studies in Holland and the UK reveal similar results, commercial offices enriched by plants were associated with higher work satisfaction and productivity (Nieuwenhuis, Knight, Postmes, & Haslam, 2014). In a research review Bringslimark (2007) discusses how most studies show statistically reliable but small association between indoor plants, decreased sick leave and increased productivity.

Perceived Sensory Dimensions Framework

Eight park characteristics or perceived sensory dimensions (PSD) have been identified as a way of describing what people sense, see, hear and experience in nature such as a garden or a park (Grahn P. , 2005). These characters can be seen as the foundation of a green space, making up a series of different rooms or experiences for visitors of the same (Stigsdotter & Grahn, 2003). The eight PSDs are; Nature, Serene, Space, Refuge, Species, Wild, Social and Culture - they have been used in multiple studies, for different purposes providing a common denominator and language for researchers both in Sweden, where it was developed, and internationally (Peschardt & Stigsdotter, 2013; Rydell-Andersson & Skärbäck, 2010; Stjärne & Eriksson, 2015; Skärbäck, Wen, Aleksandrova, & Grahn, 2015). The characters have been identified with different values depending on the context. Studying urban green spaces Grahn & Stigsdotter (2010) found that people experiencing stress were mostly attracted to the PSDs Nature & Refuge, while as people in general preferred Serene the most followed by Space and Nature. Peschardt & Stigsdotter's (2013) study of small public urban green areas in the city of Copenhagen, Denmark showed that the average user preferred Social and Serene but for the more stressed users the PSD Nature became more important. Plambech and Konijnendijk van den Bosch (2015) show in a study among creative professionals that the PSDs Nature, Space and Serene enhance creative ways of thinking. From the above it seems as if the park characters can be applied even if the area studied is not a typical park, forest or nature area. Stjärne & Eriksson (2015) have brought the perceived sensory dimensions indoors in an effort to see how work places can be designed to be restorative.

In the following I have summarized and interpreted a variety of sources to try to describe and capture the essence of each PSD in relation to nature, urban greenery and indoor environment based on different interpretations of the eight PSDs (Grahn, 2005; Grahn & Stigsdotter, 2010; Peschardt & Stigsdotter, 2013; Stjärne & Eriksson, 2015; Plambech & Konijnendijk van den Bosch, 2015; Skärbeck, 2015)

PSD	Nature	Urban Greenery	Office environment
Serene - for a calming sensation	Silence & peace Sounds of wind, water birds No rubbish No people	Silent & calm No traffic noise Clean & well maintained Not crowded	Small rooms, intimate feel Private outdoor green alcove – on a roof top or similar Calming water feature Safe & clean
Nature - for fascination & undemanding attention	Untouched by humans Moss & old paths Immersion in wild nature	Nature quality Free growing lawns Undemanding surroundings	Indoor lush plants Greenery hanging from the roof Moving forest projections on the wall
Rich in species - for stimuli & discovery without pressure	Species diversity Wild animals and plants Small brooks	A variety of natural plant & animal populations Native plants Seasonal changes	Multitude of indoor plants Green walls Nature, forest & greenery window view Contrasting materials – visually and tactility - changes between spaces
Space - for reflection and meditation	'Another world' - getting away A coherent whole Sense of a never ending space	Small world in itself Lots of trees Sunny & shady areas Not crossed by too many paths	Space with a certain focus Light and bright Focal gazing point/view Sense of being part of something bigger
Prospect - to develop thinking	Central green open space/field Place for playing, sharing a pick-nick Expansive views	Open grass lawns Ball pitches Vistas	Welcoming public area Inviting & accessible space Choice of participation or observation
Refuge - for fueling imagination & empathy	Enclosed & safe place where children and families can play & interact Plant, grow and build in natural setting	Many bushes Play equipment Tables & benches Safe	Rooms for focused work - smaller projects and meetings as well as individual spaces Balconies/Terraces
Social - for relaxation & enjoyment	Space for gathering and pleasure such as music and performances Amusement parks	Entertainment Restaurants & rest rooms Many people Sheltered places	Town hall gatherings Spontaneous open spaces Canteen & break rooms Kitchen area
Culture - for appreciation of passage of time	Historical heritage & human culture Monuments & statues Symbolic places	Contains core of human culture Ponds, fountains & canals Flowers	Business identity & history Listed buildings Preservation of historical features Core values Founding fathers (& mothers)

Table 1 Summary of perceived sensory dimensions studies (Grahn, 2005; Grahn & Stigsdotter, 2010; Peschardt & Stigsdotter, 2013; Stjärne & Eriksson, 2015; Plambech & Konijnendijk van den Bosch, 2015; Skärbeck, 2015)

Methodology

There are three parts to this study, an overview of relevant literature in the field – the theoretical framework, an investigative, empirical part consisting of interviews with representatives for workplaces with a reputation of being in the forefront of workplace environment as well as a workplace study where employees have pointed out places in the workplace perceived to have restorative or creative/collaborative qualities for the person in question. The third part is an analysis of restorative, creative and collaborative spaces identified by the employees in the workplace study, using the Perceived Sensory Dimensions framework.

Literature study

I reviewed literature in two parts, a generic overview of nature and its health benefits and studies done in the workplace forming the theoretical framework. I wanted to describe how it has been established how nature helps to reduce stress and increase both perceived and actual health. My aim was to narrow down the benefits of nature from forest and pastures via parks, gardens and small urban green areas to greenery at the workplace. I wanted to establish an understanding both for myself as the author and the reader regarding these matters. Furthermore, I wanted to make the connection between both the potential restorative properties of a work place environment as well as potential enhancing effects for creativity and collaboration.

Workplace examples & workplace study

In order to further my understanding of workplaces that are conducive to employee performance I wanted to explore companies with a reputation of being progressive in terms of work place environments and who had workplaces designed with a specific purpose to enhance the employee experience of working there. I contacted five companies based on reputation and recommendations and visited two companies, Inter IKEA Systems B.V (IKEA) and Microsoft based respectively in Delft and Schipol in the Netherlands, and carried out a telephone interview with Google in Oslo, Norway. I interviewed persons with an understanding of the strategic direction of the company and the desired benefits of the workplace environments. Please see appendix 1 for the interview questions.

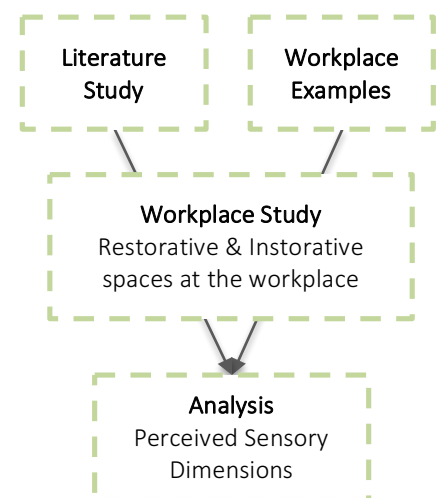


Figure 2 Study elements

To create an in depth understanding of what kind of places/spaces employees actually go to (if any) for their restorative qualities as well as spaces especially beneficial to creativity and collaboration I chose one workplace to focus on. The selection criterion was a company with a view to enhance the work environment for employee performance and well-being. IKEA turned out to be the best candidate in terms of interest, availability and fit.

Data collection

A qualitative approach was chosen for this study as I was interested in visiting the workplaces thus being able to observe what they looked like and evaluate the spaces discussed. Semi

structured interviews were carried out with the representatives at the workplace examples and with the employees in the workplace study at IKEA. Semi structured interviews allow for flexibility and follow up questions depending on the answers received yet some structure in order to be able to analyse the total material (Bryman, 2001).

In the workplace study, the target employees were knowledge workers who had worked in the company for at least one year and had responsibilities which included a creative mind-set. The selection was made by an IKEA representative in the Human Resources department with an aim for me to meet employees from different departments and with different gender. I interviewed during a three-week period, with time in between to be able to analyse and digest the information collected and ensure separation between the data collected from each interview. The aim was to get an in-depth insight to the interviewees' experiences in the work environment and to be able to compare their preferred spaces with a specific framework. In the interviews I asked about specific places at work where the employee would go to restore depleted energy or de-stress as well as places which they regarded as especially beneficial to creative and collaborative activities. Please see the interview guide for the specific questions (appendix 2). The semi structured interviews were followed by a tour of the office space guided by the interviewee. This was a version of a walk through evaluation where the aim is to create a dialogue in direct association with the places you visit, as you experience them (De Laval, 2004). The interviews were carried out in IKEA's office space at a location chosen by the interviewee. The conversations were recorded on a smartphone and later transcribed.

For the employees at IKEA I had an introductory letter as to inform regarding consent and the use of the data collected (appendix 3). For the interviews at the workplace examples an e-mail conversation had taken place with each interviewee informing them about the study and its purpose.

Data analysis

Qualitative data based on interviews often generates a lot of information hence is time consuming to transcribe and analyse (Bryman, 2001) something that became evident in this study. The interview transcriptions were analysed using a method referred to as coding, a process which includes a systematic review of the materials looking for themes and concepts which are subsequently compared to find similarities and differences (Bryman, 2001). While the broad categories are collaboration, creativity and restoration the underlying topics and what the employees do and how they relate to the categories are what I have searched for in the data. The themes and concepts are supported by highlighting quotes in the results section. I analysed the employees' preferred indoor places in terms of restoration, creativity and collaboration using the perceived sensory dimensions framework as summarized and epitomized in the theoretical framework (Grahm, 2005; Grahm & Stigsdotter, 2010; Peschardt & Stigsdotter, 2013; Stjärne & Eriksson, 2015; Plambech & Konijnendijk van den Bosch, 2015; Skärbeck, 2015). This framework was chosen for its opportunities to assess work environments on multiple dimensions which is what I believed was essential for its appeal to corporate environments. During the walk through evaluation (De Laval, 2004) I photographed the employees' preferred places to aid memory during the application phase. In addition to the actual places identified by the interviewees I looked at their expressed dislikes and desires for collaborative, creative and restorative spaces. The findings were compared to the framework and labelled with the corresponding dimensions.

Results

The results chapter is guided by the objectives of this study and separated in to three sections, results from the workplace examples, results from the employee interviews at IKEA - the workplace study - and an analysis of the results based on the perceived sensory dimensions framework. The framework is applied to collaboration, creativity and restoration respectively and based on the places discussed and pointed out in the interviews.

Workplace Examples

Many companies have moved on from cubicle centric workplaces to more flexible and collaborative office spaces. Technology makes it possible to work remotely and travel is an integral part for many employees. Appealing offices may also attract talent. But what makes an office space attractive and what is the motivation for creating a new workplace environment? I studied three companies, IKEA, Microsoft and Google, known for their office spaces either in Netherlands and/or abroad, companies that are considered to be attractive employers and portrayed to be in the forefront of workplace development. IKEA is also the office space where I chose to carry out the employee interviews.

At IKEA and Microsoft I visited the offices and had a tour and a conversation with a company representative about their intentions for their workplace design and I had a phone interview with a representative for Google. Microsoft's Dutch head office, located just by Schipol airport in Amsterdam, was completely revamped in 2008 and became known for their unique office space. In the first three years they had 1000 visitors per week interested in learning about the design and functionality of their offices according to their company representative. In April 2016 IKEA moved in to a new office space in Delft Netherlands, rebuilt and refurbished in its entirety. Google, although not in new offices, are well known for their unconventional and playful offices. The office discussed is located in Oslo, Norway. In the following I have summarized the main points of these discussions.

Strategic direction & culture

Making sure that the office environment reflects company culture and strategic direction seem to be the most important incentive for the companies in this study. For IKEA and Microsoft, the revamped office space was part of a bigger push to change culture and ways of working in the companies. The intention was to not only update the office environment but to make a real shift towards more transparent, collaborative and open companies both internally and in association with customers. Google also states collaboration and creativity as a main motivator for their office environment. Workforce diversity and talent attraction and retention are also part of what the companies have experienced or are hoping to get out of their respective office overhaul.

Open plan office design

At Microsoft the office lay out is completely open plan where the employees have no fixed work stations and all belongings are kept in a locker. Each employee is free to choose where to sit and work on a daily basis. At IKEA, also in an open plan office, employees belonging to a specific department have their own 'neighbourhood' but no dedicated desks within the area. There are multiple meeting rooms, some bigger some smaller and the open plan areas are created to invite opportunities for spontaneous meetings.

In both offices there are multiple areas dedicated to creativity and collaboration, the meeting rooms are equipped with whiteboards and easy to use technology solutions. Most of the rooms are light and some have windows and views.

Outdoor & indoor greenery

At Microsoft there are no indoor plants and the views from the windows are mainly urban as the offices are located within the airport area. The interior designers service level agreement for employee satisfaction did not include plants or greenery, “it did not fit the concept” according to the company representative. Access to outdoor greenery is limited, the green area/small park in association to the office is rarely used, the airplane fumes are too overpowering most of the time. Restorative areas within the office are not needed, it is said, as work flexibility allows for each employee to decide over their own time. If they need a break or a run in the forest they are free to do so. As long as deadlines are met it is up to the employee to choose where and when to work, which has put new demands on leadership and induction procedures. Since they moved in to the new office environment employee satisfaction ratings have gone up and sick leave numbers are well below average for the Netherlands and attracting talent has become easier according to the company representative.

IKEA’s philosophy is different to Microsoft when it comes to restorative zones and greenery. There are dedicated areas for quiet work and greenery is part of the space, although not a large amount. There are two green walls, floor to ceiling with plants, one as you enter the offices and one by the library which is supposed to be a quiet place for focused individual work. The view from the library is towards the big parking lot in front of the IKEA store. Had the library been placed in the opposite direction it would have faced a large green area.

Just behind the building, which includes the IKEA store, the landscape opens up into a vast green space, with canals, wildlife and greenery. It is part of a big arboretum, built in the 1960’s to offset the urbanisation of the city Delft. Despite having access to a nature area in direct association to their workplace few people use it. Using the outdoors for work related activities is the next phase of work development according to the company, to try and blur the boundaries which today is very much work indoors and free time outdoors. This plan includes an outdoor terrace with direct access from the office space.

Part of Google’s strategy to encourage innovation and work satisfaction is to play a lot, “we actually play” says the Google representative, ping pong, pool or something that will remove people from their normal state of mind and to foster collaboration and innovation. Healthy food is important and should not be far away, many Google products are born in the cafeteria according to their representative. In the Oslo office they have plants with air cleaning properties as well as daylight devices placed between desks. Access to outdoor areas depends on office location but in Oslo the employees have meetings outdoors on a regular basis.

Workplace study

For an in depth view of what environments employees prefer for collaboration, creativity and restoration four employees were interviewed at the IKEA office in Delft. This is where the furniture retailer has its corporate head office and their concept store, the ‘know how and

show how' for franchisees but also an ordinary IKEA store full of visitors. Established in Sweden in 1943 the global head offices relocated to Delft in 1992.

The offices are on two levels with open plan solutions throughout. Different departments are gathered in 'neighbourhoods' where there are flexible workspaces for the employees. There are lockers where personal belongings can be left during the workday. Focus is on open space and common areas that can be used for larger and smaller meetings. There are also a number of meeting rooms and glassed in semi see-through 'cubes' for one on one meetings or private conversations. In keeping with the products sold in IKEA stores the new office space has a Swedish name; Tulpanen ('The Tulip'). The interviews were all conducted in the office space and the interviewees decided where to sit, all but one chose to sit in the open office landscape. The employees had spent about two months in the completely renovated offices and were still in the process of settling in.

The floor plan for the IKEA offices (below) show the lay out, bar the cubes – these are small meeting rooms scattered in the office landscape. The three most mentioned areas are the studio for collaboration and creativity, the library for creativity and restoration and the canteen where there is room for both breaks and relaxation as well as meetings and discussions.

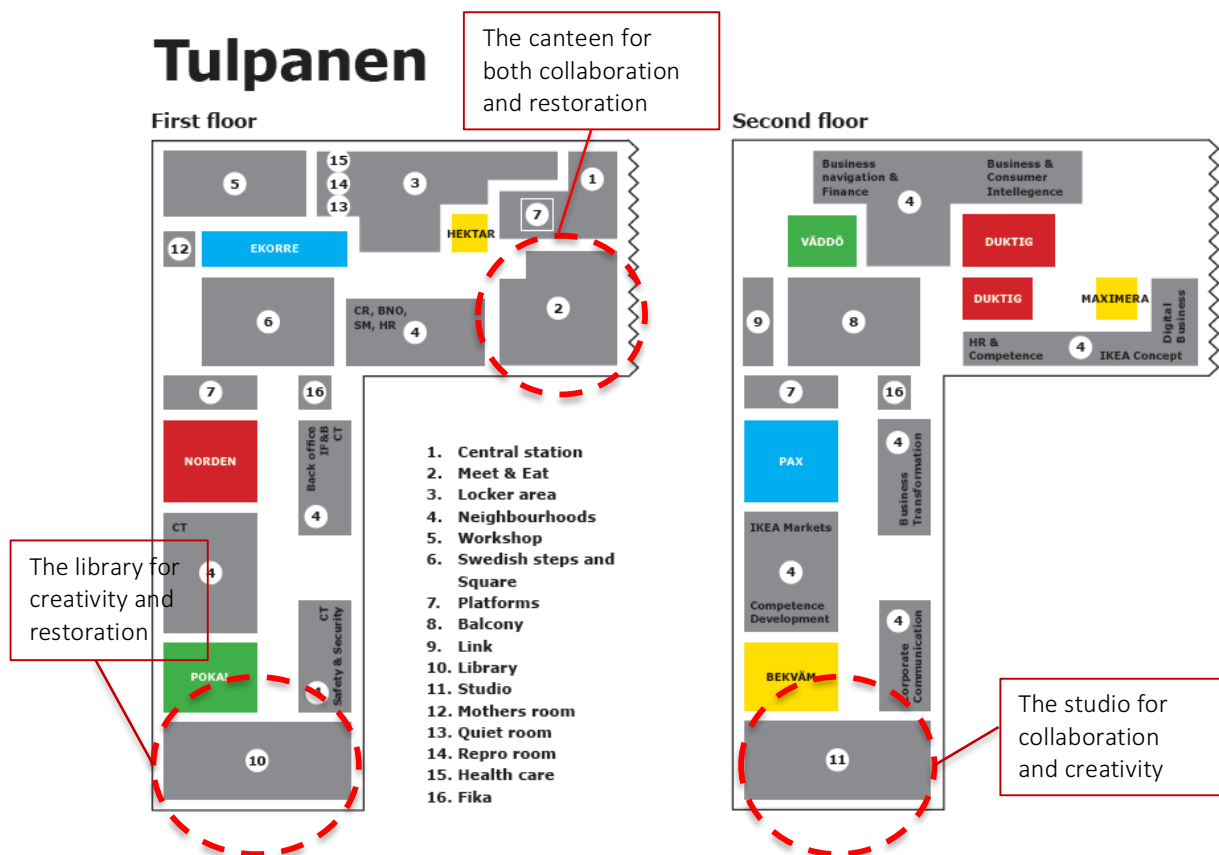


Figure 3. Floor plan of the IKEA office in Delft, Netherlands. Provided by IKEA.

Collaboration and creativity - essential elements of daily work

Most aspects of the work the interviewees carry out are collaborative and creative and it is regarded as crucial to be able to be productive. They agree that the new office space is dedicated to this and that there are numerous opportunities throughout the office which encourage meeting with others, formally or informally. What they need for successful collaboration and creativity is determined by the purpose of the activities and group size. It appears spaces that are informal and spacious yet with options to capture shared information, solutions and ideas are the most popular.

"I think for me the idea is that this is supposed to be collaborative all the time. For me that only works if you also have tools to physically write things down."

"I think you could say there are many different styles and colours so the rooms in themselves are creative. This space is definitely built by people with a very creative mind."

"I look around and I think we have gone from a lot of sharing digitally and more back to collaborative work."

People matters

The people create the culture and the working habits, collaborating with colleagues and feeding off each other's energy inspire creativity according to the interviewees. A flexible and open office space creates the opportunities but it is the people that matter.

"There is a sense of creativity but encompassed by the culture, the people and the way we are used to working."

"But even if you did not have the spaces and you would have the person, that would do."

Lunch time is an important part of the day and the company canteen is a popular place among the interviewees. Along with the offices it has been renovated and includes a variety of dishes and healthy options at a discounted price. At lunch they catch up with colleagues and/or have work meetings over lunch, it is an area which they all seem to appreciate and use for collaboration, in a more casual way.

Flexible and inviting spaces

In the new office environment there is a dedicated brainstorm area, it has been named the 'studio' but is called many different things by the interviewees. It is however the preferred place to go for collaborative and creative meetings. Because it is flexible and well equipped it invites group work according to the interviewees, the space is open and light, the tables are movable and all materials needed are present. This space is also made attractive by access to daylight and windows facing greenery.

"Open space, daylight, a variety of seating options. Just a variety and you can pick and choose depending on the group... the flexibility is key."

"A brainstorm area, facing the green area, it has got everything. Papers and pens and as long as you are not too big a group..."

There is also a large workshop area for group work, with walls that are retractable to configure the space according to group size. It is flexible and well equipped although only one wall has windows. When using the retractable walls all other rooms are without daylight, something that make them less attractive.

"The workshop rooms without the windows are awful."

Natural sunlight and the big windows are appreciated, there is a marked difference working in the store environment which has no windows or natural light and the new office space according to the interviewees.

"But at least here you can see the outside. If you work in the store you are completely isolated from daylight. We have store days here and you come out of that and it's like whoa - there is a sun in this world!"

Thoughts need physical and mental space

Finding spaces for larger groups in the offices is challenging according to the interviewees. For more strategic larger issues involving many people the interviewees sometimes leave the offices and go off site.

"Problem solving requires space. And air."

Being able to take a break and move around when working on solving complex problems seems to be key to the interviewees. The open plan office space invites movement.

"Last week we had a tough meeting, not so comfortable, but we took 2-3 breaks and walked around and did something else together. A walk around the store and around the office to put ourselves in a different mental space."

"So human beings want to move. What I like, it (the office space) gives you the opportunity to move around."

What is needed to be creative depends on if the complex task is solved individually or together with others. Individual creative work looks different from collective creativity. It seems it can be difficult to find a private space despite the small 'cube rooms' that can be found throughout the office space. The frosted glass walls are not considered private by all the interviewees. The solution for many seems to be to stay at home for uninterrupted work and to create the mental space required which may be an indication that the existing rooms are not adequate for this purpose.

"Complex on more individual to individual to find a private space... which is very difficult around here."

"If it is a really complex problem I would rather work from home."

"Being at home makes me focus and concentrate."

Restoration - incidental element of daily work

While creativity and collaboration are considered obvious and natural parts of everyday work, restorative activities appear to be more random and rare. Although the interviewees recognize a need to sometimes recover from feelings of stress or stressful situations, taking a short break is associated with leisure not as a potential opportunity to become more productive.

Quiet places

It seems like the first thing that comes to mind when feeling overwhelmed is to find a quiet place. It can be in the library, which is a designated quiet zone or stepping out of the open plan office into one of the small rooms to have time on their own and not to be distracted or seen by colleagues.

"There is the rooms with just one chair. Because the offices are open there are always people around..."

"I have sometimes gone in the small padded room and turned the chair... ...to create some kind of privacy, people walk by constantly looking and feels like you are in a fish bowl."

While the small cube rooms are intended to be private, the sense among the interviewees is that these rooms do not entirely provide privacy.

Seeking out the green

Another strategy to handle stressful situations is to seek out greenery or nature, indoors or weather permitting outdoors. In the library there is a large green wall and outside, behind the building is a path through nature with canals, wildlife and greenery.

"Green spaces restore your soul."

"We are so fortunate, there's a paved area where it is the countryside, another world, on the other side of this building, pheasants and all. I think we forget that it's there, now that you ask the question I would say go outside."

"The other thing is to go outside if the weather is appropriate, just being in nature putting the feet on the ground."

Several interviewees mention an upcoming outdoor terrace which is planned as part of the new offices. This outdoor space on the roof is supposed to be accessed directly from the office space.

"...eventually there will be an outdoor area, (where we can) get some fresh air."

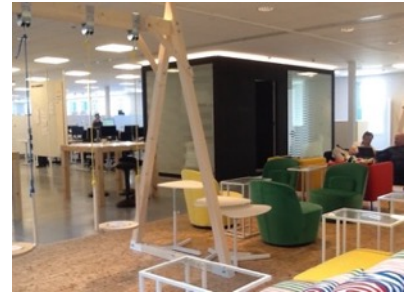
"There is also talk about them creating an outside area and I think I would go there..."

Figure 4 Images of the IKEA offices

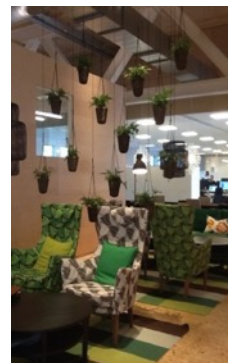
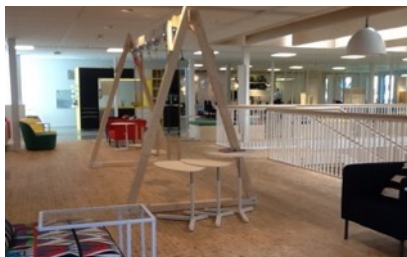


The studio area

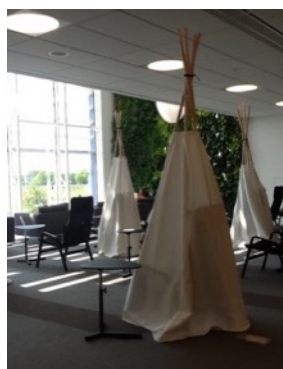
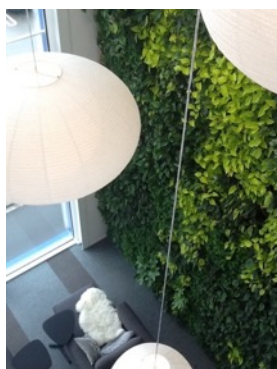
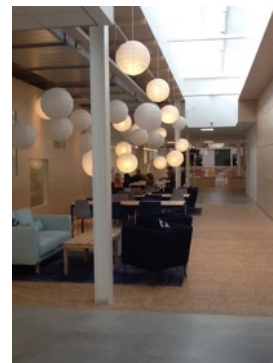
The small meeting rooms -cubes



Open plan office



Informal meeting areas



The library

People you know matters

Their 'neighbourhoods', the areas where the different departments reside are places of comfort, it gives a sense of safety and security to be with people you know according to the interviewees. One way of getting rid of frustration and stress is to talk to trusted colleagues.

"I feel safe and secure in my neighbourhood Part of it is knowing my colleagues are there, within arm's reach."

Moving around is not only mentioned to aid creativity it also seems to be a way to relieve stress, on your own or together with someone else.

"Sometimes just taking a walk with someone can be helpful."

"What I do now and then is go around the store to sort of like... ok let's get my mind off things."

"Sometimes we go for a walk in nature instead, it seems like you have a richness in meeting for two people, two humans out together... more relaxed for sure."

The interviewees also mention the new canteen as a great place to relax and enjoy the company of colleagues, have a chat and a break from work. It appears to be a place for both restoration and collaboration.

"It (the canteen) takes you away from work, feels like you are in an actual restaurant, gives you that sort of luxury feeling."

Outdoor activities – accidental elements of daily work

Just behind the big IKEA building the landscape opens up into a vast green space, as shown in figure 4. Despite having access to a nature area in direct association to their workplace few people use it. The interviewees go there sometimes during break or lunch, but not frequently.

"I forget about it, when I am signed in in the building I am working and when I sign out I go outside."



Figure 4. Aerial view of the IKEA building in Delft, Netherlands. Google Maps.

The interviewees express a desire to be outside more during the workday. When in temporary offices they had to walk to their lunch restaurant hence had to get outside but as it is no longer a natural part of the daily routine it rarely happens.

"But I don't know that we have created opportunities to go outside."

They experience a strong divide between working which is an inside activity and outdoors which is associated with leisure and time off. There is no time and no opportunities to go outside during the day. The planned outdoor terrace is something they all look forward to but it is still viewed as a place to visit for breaks and time off rather than a place that could be part of work activities.

“I think to be honest that it will make you more productive but the main reason why people are not doing it... that it takes to much of their day.”

Perceived Sensory Dimensions Analysis

Is it possible to apply the Perceived Sensory Dimension (PSD) framework (Grahn P. , 2005) to indoor workplace environment in terms of restoration, creativity and collaboration? As outlined in the theoretical framework chapter a multitude of studies have been carried out applying the PSDs not only to genuinely natural settings but also for parks, urban areas and even indoor office areas (Grahn, 2005; Grahn & Stigsdotter, 2010; Peschardt & Stigsdotter, 2013; Stjärne & Eriksson, 2015; Plambech & Konijnendijk van den Bosch, 2015; Skärbeck, 2015). In the following I am using the summary of these studies as seen in table 1 and applying it to the workplace study and the aspects described by the interviewees.

One could argue that there are elements of more or less all PSDs in the spaces and description of needs provided in the above results. Some specific elements transpire however when taking a closer look at collaborative, creative and restorative spaces. Figure 5 shows these findings and the interrelationships between the three areas.

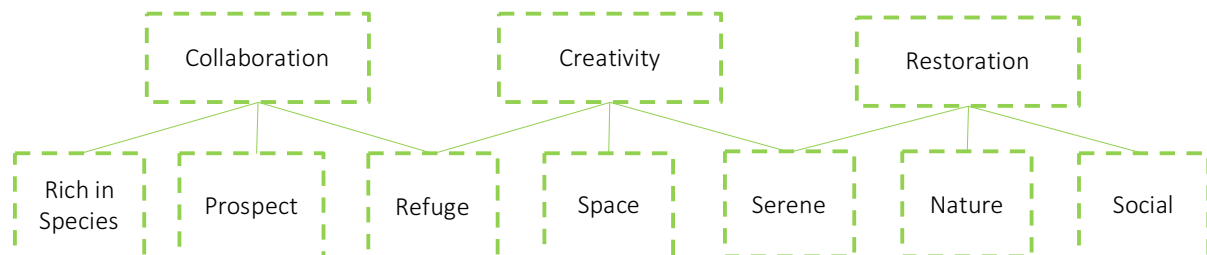


Figure 6. Author's interpretation of corresponding PSDs to collaboration, creativity and restoration and their interrelationships.

Collaboration

The two main Perceived Sensory Dimensions found to correspond with the work environments conducive to collaboration are 'rich in species' and 'prospect'.

The PSD 'rich in species' aims to help stimulate and discover without pressure, which translates well to brainstorming activities. The interviewees mention versatility and flexibility as key for collaborating and the space preferred – the studio – offers window views towards greenery, daylight and a variety of materials and dynamic spaces. The studio space is adjacent to the green wall which starts on the lower level in the library and goes all the way up to the mezzanine level where the collaborative area is located.

The aim of the PSD 'prospect' is to develop thinking rhyming with the collaborative aspects described in the interviews. Space in itself is important, a space that invites collaboration and

caters to different group sizes and purposes. It seems as if the combination of space and vistas is important, the studio area is welcoming and has views and daylight.

Collaboration and creativity are closely related especially when it comes to being creative in a group setting, the PSD 'refuge' connects the two and will be described more closely in the following.

Creativity

The interviewees describe two dimensions of creativity, individual and collective, and the corresponding PSDs reflect this. For the collective dimension to creativity the PSD 'space' implies being part of a bigger context which is often the case when a group is trying to solve a complex problem, it aims to facilitate reflection and meditation. Space in itself is also something the interviewees come back to as a prerequisite for effective creativity, tied in with air quality and light, something found in the studio area. Again window views seem to decide whether the space is attractive or not, the workshop area with wall dividers being rejected for that reason.

For the interviewees individual creativity requires an undisturbed space where it is possible to focus on the task at hand. The PSD 'refuge' aims to fuel imagination and empathy by providing a space which is calm and safe where you can gather thoughts and centre on complex assignments. In the office environment the interviewees resort to places away from disturbance such as the library area. But this PSD can also be viewed as collaborative as the spaces may very well be geared to smaller groups or one – on – one conversations.

Individual creativity and restoration both requires peace and calm according to the interviewees, the PSD 'Serene' connects the two. I will elaborate on this PSD in the following.

Restoration

Restoration can be many things in the eyes of the interviewees, the three PSDs that transpired reflect this; 'serene', 'social' and 'nature'. The PSD 'serene' equals the quiet spaces sought after by the interviewees when they are feeling overwhelmed as the aim for this dimension is to provide a calming sensation. Not being able to be seen and an ability to take a moment to reflect seem to be key for office restoration. The small cube rooms provided for this purpose are not ideal as they are not regarded as private enough. The planned outdoor terrace could potentially be designed with this in mind.

While 'nature' may possibly be the most challenging PSD to translate to an indoor office environment I believe it has its place here. The green wall by the library is mentioned many times, instilling a sense of calm, too calm for some. The interviewees' urge of seeking a natural green area, albeit outside also warrants a mention for this PSD which aims to provide fascination and undemanding attention.

'Social' is a dimension which is supposed to provide relaxation and enjoyment, in this case being able to take a break from work and have a chat with your colleagues. The neighbourhoods and the canteen area are such places for the interviewees. It does not need to be secluded or private for it to be restorative but with people you know and feel

comfortable with. The PSD 'social' connects restoration with collaboration as the interviewees for example view the canteen area as a collaborative zone as well.

Further analysis

Providing spaces for creativity and collaboration are important parts of the office design for both employers and employees. The companies have a clear intention with the open plan spaces and multiple opportunities for meetings and social interactions, it breaks down barriers between departments and avoids silo mind-sets within the organisation. This in turn helps fuel performance and productivity. Spaces for restoration seem to be less intentional, while recognized by most it appears there are few deliberate restorative places at the workplaces that are part of this study. Access to and usage of outdoor natural areas as part of a strategic performance enhancing measure seem to be non-existent. Spending time in outdoor greenery is something each individual will do as leisure time. It appears that culturally companies and their employees are not aware of any connections between restoration and potential increase in performance and productivity. Associating collaborative, creative and restorative zones to a structure such as the perceived sensory dimensions framework may provide guidance in terms of how natural elements could aid performance in these areas.

Discussion

In the following I have gathered my reflections about this study; how and why I chose the methods used and what the results gave in terms of thoughts and connections to existing research.

Discussion Method

The existing research on work environments in this area is limited, which means there is little guidance in what methods may be most suitable. What you know in hindsight is very often what you would have wanted as a foresight. I believe there are many good ways of conducting a study like this and do not claim to have made all the right decisions along the way.

Workplace examples

Part of the objectives for this study was to find out what restorative, creative and collaborative spaces may look like in a workplace. I wanted to give an insight to how attractive companies with a positive reputation for their workplace environment work in relation to this. I started this study hoping to go and see many more companies than I eventually did. I tried many times to get a face to face meeting with a representative at Google in Amsterdam, it is one of the companies I would have liked to study in person. But despite a contact and many e-mails this did not materialise, hence the relatively smaller amount of information about Google which made comparisons slightly difficult to carry out. The limited numbers of companies studied also limits the conclusions one can draw from the results.

When speaking to company representatives there is a risk of loyalty being more important than reality. I believe the people I spoke to were honest and trustworthy but also keen to give

a good impression of their respective company. The fact that these companies agreed to be part of the study could also indicate a bias towards the area studied which potentially further limits generalisations.

Since I spent more time at IKEA meeting several different people, my impressions may be biased as I compare the companies, I know IKEA better and perhaps understand their incentives better.

Workplace study

IKEA moved in to their new offices April 1st, 2016. I carried out the interviews during a 3-week period from mid-May to end of June the same year. The interviewees were still getting used to the new space and given more time in the offices the outcomes may very well have been different. A reorganisation with uncertainty and changes as a result was also underway at IKEA during the study and may have affected the responses in the interviews depending on where in the change process each employee was at the time.

The interviewees were chosen by a company representative in the Human resources department based on the criteria given with the provision that they had to have time and interest to take part. The interviewees may have been chosen for their positive attitude and for their interest in the topic which potentially could bias responses and make them less representative for the larger population of employees.

When I chose to work with semi structured interviews as outlined in Bryman (2001) and walk through evaluations (De Laval, 2004) I knew that the results would represent individual stories and perceptions. Ideally many more interviews should have been carried out to give a broader perspective. While a survey would have given more data it would have had limited value for the type of study I wanted to carry out as it is the broader description of the spaces that generates an understanding of the same. It could however have been used as a complement to the interviews and/or as input to the construction of the interview guide.

There is a risk of preconceptions once you have carried out several interviews at the same place, hearing what you expect to hear instead of what the interviewee is actually saying. Adhering to the interview guide becomes important while still being flexible in asking follow-up questions.

This study represents one company and a few of its employees and while there may be similarities in other workplaces it is important to note that the conclusions drawn here are valid for this particular place and point in time.

Application of the Perceived Sensory Dimensions (PSD) Framework

The PSD framework has its origin in natural outdoor settings (Grahn P. , 2005) and there are probably limitations in its use for an indoor environment.

The interpretation of the data must be seen in the light of this particular study, more interviews with a variety of employees would have added to the depth of the understanding of the spaces. The ensuing analysis is based on my perception of previous studies using perceived sensory dimensions. It may be important to note that there is only one previous

study, to my knowledge, that has applied the framework on an indoor environment (Stjärne & Eriksson, 2015) .

The application of the framework in this case, based on the summary of several different studies using the Perceived Sensory Dimensions, while subjective, is an attempt to create a starting point for how to potentially use PSDs in an indoor work environment.

Discussion Results

Different kinds of natural elements in the workplace and their benefits make up an area which I believe is not studied enough but has great potential for workplace development. Hence the research aim for this thesis. However, it was important to me to curb my enthusiasm when interviewing as I wanted to really understand what company representatives and employees viewed as restorative, creative and collaborative in their workplaces. The interview guides were constructed with this in mind to refrain from asking leading questions about greenery and I elaborated on the topic only towards the end of the interviews.

Workplace Examples

The visits and conversations I had with the three companies IKEA, Microsoft and Google were both inspiring and at times a reality check. There are many opportunities for workplace development and still a lot to do and discover but there are certainly companies out there aiming to create the best workplaces possible for their employees and for their own development and productivity, something that genuinely came across in the workplace examples in this study.

Increased nature contact, perhaps in various forms, may promote healthy workplaces (Largo-White, Chen, Dodd, & Weiler, 2011) and could be part of a strategic direction for these companies, along with the shift in ways of working. Attracting creative talent could also potentially be made easier by a versatile and more nature like workplace (Ling & Dale, 2011; Florida, 2003).

The overall impressions of Microsoft and IKEA are quite different. Microsoft has an obvious policy which they follow, no personal spaces, no personal desks and a multitude of meeting areas, not everyone feels comfortable with such 'strict flexibility' (Hua, 2007; Bryant, 2012). There are few places for solitude work and little or no access to greenery, indoors or outdoors. IKEA has another approach in their office environment, the departments have dedicated areas and therefore colleagues have a place to gather, albeit no personal desk space. There is access to greenery by means of windows and the nature park around the corner and in stressful situations this may be an advantage for the employees (Lottrup, Grahn, & Stigsdotter, 2013; van den Berg, Maas, Verheij, & Groenewegen, 2010). Although the main focus seems to be on providing areas for collaboration and cross communication while the more private areas where the individual employee can do undisturbed creative work and recover from stress are to a certain extent overlooked.

The corporate world in general is also experiencing new challenges when it comes to increasing stress related illnesses (European Agency for Safety and Health at Work, 2014) and companies are increasingly realising the need to act. Still there is a lack of awareness of how

access to outdoor greenery or views of greenery could decrease stress levels (Lottrup, Grahn, & Stigsdotter, 2013) which may result in missed opportunities when planning and renovating workplaces.

A suggested approach may be two-fold; a strategic and cultural shift (Lottrup, Stigsdotter, Mellby, & Sola Corazon, 2012) allowing and encouraging breaks and usage of greenery for work related activities as well as ensuring proximity to greenery as in natural surroundings, purpose built terraces or gardens or indoor equivalent spaces.

Workplace Study

Creativity and collaboration are important parts of the daily work for the interviewees in the workplace study and the overall open space in the new IKEA office environment seem to encourage this. The space has been created for a “free flow of relations” and “I want to be here; it’s inspiring” are some of the things expressed by the interviewees.

Access to flexible rooms and inviting open spaces came up repeatedly in the interviews, an appealing environment does indeed support well-functioning groups (Hoff, 2014). Job satisfaction, work ability and collaboration could potentially also be aided by natural settings (Lottrup, Stigsdotter, Mellby, & Sola Corazon, 2012; Mårtensson F. , 2012) communicated by the interviewees’ desire to be in spaces with daylight, window views and proximity to for example a green wall. The interviewees’ favoured collaborative space is the studio area which is located with views over greenery and in close proximity to a floor to ceiling green wall. However, every time I visited, the space was empty. Have the majority of employees not yet discovered the space? Are they so new in the environment that the habits have not yet formed or did I just visit at the rare random times when it wasn’t used?

Solving complex problems requires both physical and mental space according to the interviewees. The open plan offices at IKEA stimulate both team work and transparency but making sure the workplace offers both collaborative and quiet individual workspaces seem important and is echoed by previous studies (Heerwagen, Kampschroer, Powell, & Loftness, 2004; Hua, 2007; Bryant, 2012). Issues demanding individual attention call for undisturbed areas by the interviewees, where they are away from onlookers and can take a moment to reflect and really get into the matter. Several state the quietness and comfort of their own homes, when that is an option. Placing individual creative zones next to indoor greenery or window views of outdoor natural vistas could aid micro recovery from the directed attention needed to solve the complex problem (Loder, 2014; Öberg, 2015).

The interviewees point out the need to move around and shift the mood in order get new ideas and resolve an issue, there are several studies associated with a positive change in mood when walking in a natural setting as opposed to an urban setting (Roe & Aspinall, 2011; Bratman, Daily, Levy, & Gross, 2015; Berman & Kaplan, 2008). Encouraging a walk in nature may be the catalyser needed for creativity and new ideas (Plambech & Konijnendijk van den Bosch, 2015).

Spaces for restoration does not seem to carry the same weight for the interviewees as access to spaces for creativity and collaboration, they are too busy to take a break (Lottrup, Stigsdotter, Mellby, & Sola Corazon, 2012). IKEA has made a strategic decision to invest in an

non territorial environment encouraging new ways of working, eliminating departmental 'silos' and creating a workplace where transparency and interdependency are key words. At the same time, similar to individual creativity, restoration seem to demand opportunities to get away from the open space for the interviewees. While there are dedicated quiet areas and small rooms for private conversations they appear to be viewed as semi-public and does not seem to meet the needs of the interviewees.

The social dimension is important thus being surrounded by people you know, colleagues you can talk to when frustrated, instils a feeling of security and comfort by the interviewees and the 'neighbourhoods' provide sort of a safe haven in the open landscape. The current reorganisation may partly be responsible for the relative importance placed on this during the interviews, knowing where you belong becomes significant in times of change.

Seeking out greenery is another strategy the interviewees adapt to find peace and quiet. Real green places for recovery and restoration from mental fatigue as described by Kaplan (1995) may be difficult to obtain in an office environment but studies show virtual greenery could be an alternative (Annerstedt, et al., 2013). A quiet green area, such as the library space which is next to a green wall could act as the buffer needed to off-set stressful events. Another way of restoring depleted energy would be to make use of the vast green pastures just behind the IKEA offices, a place to experience soft fascination provided by the undemanding nature (Kaplan S. , 1995). All interviewees express a desire to get outside more. While renovation was on-going the IKEA employees had to walk between the temporary offices and the canteen area. Now the canteen is in the same building and the walk is no longer necessary which means they rarely go outside during the workday. This reluctance to go outdoors is also associated with a strong belief that spending time in greenery outside is for leisure time only. A physical and mental separation between work and leisure is expressed by the interviewees, something also shown in a study by Lottrup et al. (2012). The undeniable advantage for IKEA in Delft is that there is a natural green space right on the doorstep of the office, something few workplaces enjoy. This could act as a barrier to stressful events if used by the employees (van den Berg, Maas, Verheij, & Groenewegen, 2010). Proximity to green spaces (Grahn & Stigsdotter, 2003; Stigsdotter, et al., 2010) and encouragement (Lottrup, Stigsdotter, Mellby, & Sola Corazon, 2012) from managers and colleagues are important factors to consider when trying to establish new habits. The interviewees also see the need for a different approach to the outdoors, moving beyond it being a place to go only in breaks. Creating opportunities and possibly policies for outdoor activities such as one-on-one discussions may encourage using the existing nature area in the case of IKEA. The introduction of the much anticipated outside terrace presents an opportunity to form new habits, blurring the boundaries between indoors and outdoors and also raise awareness about the benefits – beyond leisure – of spending time outside.

Perceived Sensory Dimensions (PSD) Framework

Created for a natural outdoor environment the perceived sensory dimensions framework may have its limitations, as mentioned previously, when looking at an indoor office environment. Nevertheless, I found it surprisingly straightforward to apply the areas discussed with the interviewees regarding collaboration, creativity and restoration to the available PSD descriptions but at the same time a complex task as there are overlapping dimensions, parts that may be interpreted in different ways. Studies show that it depends on context and the

user's frame of mind as to which PSD is preferred (Grahm & Stigsdotter, 2010). The average office worker may not have a diagnosed stress syndrome but rather feelings of stress and pressure which may allow for a more liberal interpretation of the PSDs characteristics. Perhaps a smaller dose of nature or a nature like indoor environment does suffice to offset everyday stressful work events? In the 1980s Ulrich (1984) showed that a window view from a hospital bed could aid recovery, an indication that nature, even in small doses, can be beneficial. There is a risk of course that a less stringent interpretation of the PSD's may not have the desired results in terms of restoration.

As mentioned earlier I used the summary of different PSD studies, displayed in table 1, for the application of the different dimensions (Grahm, 2005; Grahm & Stigsdotter, 2010; Peschardt & Stigsdotter, 2013; Stjärne & Eriksson, 2015; Plambech & Konijnendijk van den Bosch, 2015; Skärbeck, 2015). There are elements of many PSDs in the three different areas studied. Perhaps this is an argument for the applicability of the framework even for an indoor environment. The dimensions corresponding to collaboration found in this study are 'rich in species' and 'prospect'. Aimed at things like discovery without pressure and developing thinking both individually and interactively, it seems compatible for teamwork and brainstorming. Collaboration which could be described as both highly cognitive and highly social has some connections to the PSD 'social' although this dimension is more aimed at relaxation and enjoyment and is therefore associated mainly with restoration in this study. 'Refuge' had connections with both collaboration and creativity as this PSD includes safe areas for interaction translated to smaller meetings and teamwork for indoor environments.

For creativity the selected PSDs after analysing the interviews were 'space' and 'refuge', contrasting in one way but so is creativity according to the interview responses depending on what type of creativity, individual or collective, discussed. Space is aimed at reflection and meditation representing the space needed for individual creativity but also the collective creativity in being part of something bigger. Refuge is aimed at fueling imagination and empathy working together in small focused teams. 'Serene' is the third dimension identified for creativity and connects with restoration. This PSD is characterized by silence and peace as well as private spaces something the interviewees single out for both creative and restorative spaces. Plambech & Konijnendijk van den Bosch (2015) had slightly different findings in their study which concluded 'serene', 'space' and 'nature' as the corresponding PSDs for creativity. This difference could potentially be explained by the fact that their study is based on experiences outdoors as opposed to the indoor focus of this study.

Restoration in the eyes of the interviewees needs to be calming and to a certain extent undemanding, which prompted the dimensions 'serene' and 'nature'. Admittedly 'nature' in this case can be a challenge to convert to the indoors but if the main feature here being the undemanding qualities of nature it could potentially be converted to an indoor context via lush green plants and even virtual greenery. 'Serene' represents the need for private and quiet places sought after for a moment of peace after a stressful event. The neighborhoods are perceived as a safe place where you are surrounded by people you know and like, it may be different should there be conflicts to deal with among the employees. The canteen could also be seen as a place for restoration, it is an important place for the interviewees, to hang out and relax with your colleagues over lunch. The PSD 'social' could in this light potentially be seen as remedy for what may be described as normal or everyday stress.

Conclusions and further studies

It is probably fair to say that collaboration and creativity are at the core of today's workplace development ranking relatively higher in importance to companies than restoration. With stress related illnesses on the rise I believe we will see an increased focus on the health aspect for employees. "An ounce of prevention is worth a pound of cure" to quote Benjamin Franklin.

In this study, as illustrated by the workplace examples, companies are interested in the cultural change and strategic advantages of a more collaborative work environment. For employees the corresponding sentiment seems to be the desire to perform on as high a level as possible leading to better results for both the company and the individual.

As presented in the theoretical framework chapter, there is an increasing body of evidence that job satisfaction, task performance and productivity may be enhanced by natural elements at work such as window views, green plants and access to outdoor greenery. The findings in this study seem to support the fact that creative, collaborative and restorative places are made attractive by access to greenery. Results also show that the desire to seek out greenery for different purposes are to some extent hindered by time, habits and company culture.

The strategic aim for the companies in the study is to increase collaboration and creativity by introducing new ways of working supported by a new office environment. The shortage of private spaces may become counterproductive with increasing time spent working from home thus not being present at work for collaboration and collective creativity.

While private spaces seem to be important for both Individual creativity and restoration, there is also the dimension of how being social at the workplace aids restoration for the employees in this study. It would be interesting to further investigate if the social aspect has a bigger restorative impact for 'normal' stress levels as opposed to diagnosed stress syndromes.

I believe many companies would benefit from a framework for workplace development and design pertaining to work environment. The application of the perceived sensory dimensions to the indoor work environment in this study is an attempt to identify elements of importance to collaboration, creativity and restoration. While standing on a very small sample it could be viewed as a humble beginning of such a framework aiming to create multiple indoor zones supporting restoration, creativity and collaboration.

The establishments of workplace zones and spaces for collaboration and collective creativity as well as individual creativity and restoration needs to be underpinned by a supportive company culture and the formation of new habits. Encouraging behaviours and habits including not only creativity and collaboration but also restoration and raising awareness of the benefits of the same.

I am hoping and expecting to see many more studies in this area moving forward.

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Appendix 1

Intro

Main question	Extension/Probe
What is your role in the organisation?	
How long have the company been in these offices?	
How many people work here?	

Physical Work Environment

Main question	Extension/Probe
What were the intentions for creating the work environment?	Was there anything in particular that prompted the creation of this work environment?
What was the process for developing the work environment?	What elements were taken in consideration?
Are there specific areas designated for different types of use?	What are they?
Is there anything in how the space is used that have surprised you or that was unintended?	

Attitudes to the work environment

Main question	Extension/Probe
What are the employees' reactions to the workplace?	Interest/Satisfaction/Complaints
What do you think the employees would describe as the main benefit of the workplace?	
Are there any places/spaces that are more popular than others?	Which and why?

Places/spaces in the work environment

Creativity & Collaboration

Main question	Extension/Probe
Are there specific places/spaces in the work environment designed to encourage creativity and collaboration?	What are those places if any?
In what way do they encourage creativity and collaboration?	What specific elements?
Where do employees tend to go to carry out creative tasks or collaborate with others?	Can those places be different from the places intended for the same?

Restoration

Main question	Extension/Probe
Are there specific places/spaces in the work environment that are designed to be restorative/stress reducing?	What are those places if any?
In what way are these places stress reducing?	
Where do people tend to go to recuperate from stressful situations?	Can those places be different from the places intended for the same?

Outdoor greenery

Main question	Extension/Probe
Do you have access to any outdoor greenery at the workplace?	If so, do people go there? Why?
Was access to outdoor spaces part of the brief for finding the workplace?	Why/why not?

Improvements/Changes

Main question	Extension/Probe
In hindsight, is there anything you would have wanted to do differently?	Improvements?
Are there any actual planned changes to the work environments?	What, if any?

Appendix 2

Introduction

I am doing a study to try to understand what role the physical environment has on creativity, collaboration and stress reduction. It is part of a master program in environmental psychology at the Swedish University of Agricultural Sciences.

Role & work situation

What is your role in the organisation?

How long have you worked for ikea?

Could you describe yourself – and say something about your life situation

What does a typical workday look like for you? – How do you get to work and what do you do during the day?

What is your work situation like? – how would you describe your workload and how often do you feel stressed at work?

Work environment

I will now focus on your work environment in relation to different needs and type of achievements; collaboration, creativity and recuperation.

Collaboration:

Is there a specific place where you prefer to have collaborative meetings? If so, where? Why?

Where do you work best in a group? Why?

Creativity:

Where do you choose to go to solve a complex problem? Why? Describe how this place helps you?

Would you say that there are spaces dedicated to creativity? Which ones? Do they work?

Recuperation: Where would you go to have a moment of peace? Why?

Where do you feel most comfortable and why?

Where would you recommend your colleagues to go or do when they feel stressed or overwhelmed at work?

What is good about that place?

Outdoor environment

At many workplaces one does not use the outdoor environment, what is it like here?

Are you ever outdoors during the workday?

If so where do you go? Why?

Do you have access to any outdoor greenery at the workplace? If so, do you use it?

Improvement & changesHow could the work environment be improved?

Do you miss something at your work place?

Is there anything you would have wanted to do differently?

Is there anything you want to change?

Your ideal work environment

Describe your ideal work environment

Favourites

What is your favourite place in the office? Why?

What is your favourite place outside the office, but in the immediate surroundings? Why?

Appendix 3

Introduction letter – Master thesis study

Dear X,

My name is Stina Hotine and I got your details from Robert Granat. I am currently doing a Master degree in Environmental Psychology at the Swedish University of Agricultural Sciences. The topic for my final thesis is restorative workplaces supporting stress reduction, creativity & collaboration.

My background is in Human Resources consulting with a focus on talent and performance management, I have lived and worked in Singapore and Holland for the past 15 years.

With your recent move to new offices at Inter IKEA systems, I am interested in understanding how you use the physical work environment. What places you frequent when at work both inside and outside, and how you perceive and experience these places. Therefore I am hoping we can schedule an interview which will take approximately one hour. I am hoping the results may bring more light to how a restorative office environment can help performance and productivity.

The data will be treated confidentially and your name will not appear in the report. I am planning to record and transcribe the interview, the recording will be destroyed after the study is completed.

If you have any questions please feel free to contact me, or my supervisor associate professor Fredrika Mårtensson. Contact details below.

I was hoping we could do the interview towards the second half of May, also to give you some time to get used to the new environment? Please let me know what your schedule is like and if this is possible.

Kind regards,
Stina Hotine

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