



Mondragon
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DOCTORAL THESIS

**A study on the physical working environment
and its effect on employee collaboration
through mediation of psychological well-being:
an analysis of Coworking spaces in the Basque
Country**

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Declaration of originality

I, Amaia Aranceta Zubeldia, declare that this thesis is the result of my personal work, and it has not been formerly intended for recognition nor the obtention of any professional qualification. A third person's ideas, images, and illustrations here submitted have been rigorously cited and referenced.

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Abstract

The aim of this study is to analyse the influence of the physical working environment on the employee collaboration with the mediating effect of the psychological well-being construct. The transition of current working habits into a more mobile and technology-centred production, has changed the understanding of workplace physical limits. The concept of work, as it is understood now, brings a whole new dimension with innovations like the introduction of open-offices or eco-design, that have changed employees' vision, understanding and psychology towards work.

The study covers a literary review on the topic of the physical working environment's influence on the psychological well-being and employee collaboration, and an empirical part on the statistical analysis of data based on quantitative methodology. For that, first scales have been adapted to obtain the best instrument for collecting data, and then, data has been collected according to a 7-point Likert scale from different Coworking sites in the Basque Country (Spain). After, data has been measured using the partial least squares-structural equation modelling or PLS-SEM that has drawn convincing conclusions about the relationship between the three main composites.

The statistical analysis has confirmed that the physical working environment has a positive relationship with employee collaboration, and it does also positively influence psychological well-being. However, the results show there is no mediating effect of the psychological well-being construct.

Resumen

El siguiente estudio trata de analizar el entorno físico del trabajo y la influencia que ejerce sobre la colaboración de los empleados a través de la variable mediadora del bienestar psicológico. Tras haber conocido de cerca la importancia del diseño y del espacio físico en las oficinas modernas, no solo en relación con la colaboración y el trabajo conjunto, sino también para el ámbito psicológico y del bienestar de los empleados, y al saber que hoy en día, el modo y la organización del trabajo han cambiado mucho, surge la necesidad de investigar el entorno físico del trabajo desde una perspectiva más global y holística.

Para ello, primero se ha realizado una extensa revisión de la literatura donde se han fijado las bases teóricas para el análisis posterior. La metodología para seguir el análisis estadístico ha sido la cuantitativa debido a la naturaleza de los datos que han sido recogidos mediante una escala Likert de 7 puntos en diferentes espacios Coworking del País Vasco. Tras haber obtenido los datos, éstos han sido analizados empíricamente a través del modelo de ecuaciones estructurales basado en el método de mínimos cuadrados parciales la cual ha obtenido resultados positivos acerca de la relación del entorno físico laboral con la colaboración de los empleados y el bienestar psicológico.

Los resultados demuestran que el espacio físico mantiene una relación positiva con la colaboración de los empleados y con el bienestar psicológico, aunque no exista mediación.

Laburpena

Ondorengo ikerketak espazio fisikoak langileen kolaborazioan duen eragina ikertzen du, ongizate psikologikoa aldagaiaren mediazioa tarte duela. Gaur egun, espazioak eta lanlekuaren diseinuak duten garrantziaz jabeturik, ez soilik kolaborazioa eta talde-lana sustatze aldera, baizik langileen ongizatea eta psikologia bermatzera ere, beharrezkoa zen aldagai hauek ikertzen zituen ikerketa-tesi bat burutzea. Espazio berriek eskaintzen dituzten onurak ikusirik, zinez garrantzitsua litzateken espazio hauek langileengan duten eragina ikertzea.

Horretarako, lehenik eta behin, literaturari dagokion errepasso sakona egin da eta ondoren, datuak aztertu dira metodologia kuantitatiboa erabiliz. Datuak 7 puntuko Likert eskalan oinarritutako galdetegi bidez jaso dira Euskal Autonomia Erkidegoko Coworking espazio ezberdinetan.

Datuen trataera enpirikorako ekuazio estrukturalak erabili dira minimo karratu partzialetan oinarrituta eta ondorioek adierazten dutenez, espazio fisikoak eragin positiboa du langileen kolaborazioan eta ongizate psikologikoan baina, mediaziorik gabe.

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A STUDY ON THE PHYSICAL WORKING ENVIRONMENT AND ITS EFFECT ON
EMPLOYEE COLLABORATION THROUGH THE MEDIATION OF PSYCHOLOGICAL WELL-
BEING: AN ANALYSIS OF COWORKING SPACES IN THE BASQUE COUNTRY

“The best way to predict the future is to create it”-Abraham Lincoln

CHAPTER 1

Introduction

1. INTRODUCTION

“The method of scientific investigation is nothing but the expression of the necessary mode of working of the human mind” -Thomas Henry Huxley

The aim of this study is to analyse the influence of the physical working environment on the employee collaboration with the mediating effect of the psychological well-being construct. For that, background information has been redacted first and data collected at several Coworking spaces in the Basque Country, a political-administrative region in north-eastern Spain bordering France. Afterwards, all this data has been statistically analysed to draw final conclusions.

1.1 Justification of the study

It has been previously analysed the influence of the working environment on psychological well-being and employee collaboration. Authors like Townsend, Demarie and Hendrickson (1998) have been years investigating the influence of the changing workplaces on employees. However, after considering the many factors that constitute the working environment, the workplace is one of the least analysed. But recently, many organisations have invested time and money in modifying their workplaces with the aim of improving competitiveness as the transformation and redesigning of the workplace can considerably improve collaboration (Heerwagen, Kampschroer, Powell and Loftness,2004; Sawyer,2010) and employees’ psychological well-being (Hartig, Marlins and Gery,1991).

Collaboration in the workplace is an essential part of the business praxis as an integral part of today’s working scheme, not only at organisations, but also in schools and in community life where people have always been dependable of collaboration. Collaboration has been the key for the survival of the species since ancient civilisations. Through collaboration and cooperation, animals and human beings have been able to develop into greater species. In the business field,

collaboration can help design new networks to broaden business goals and improvements for the future.

In addition to collaboration, psychological well-being is another factor that strongly influences employee's performance and further success of an organisation. As Danna and Griffin (1999:358) say, "an individual's experiences at work be the physical, emotional, mental, or social in nature, obviously affect the person while he or she is in the workplace" thus, considering well-being as an essential feature of daily working life. During the last years new tendencies have brought a whole new focus on the physical working environment and the workplace. Organisations have begun wondering about the suitability of their working areas and the influence these may have on employee's job performance (Janz, Colquitt and Raymond,1997). Workplace design has an important impact on the well-being of the employees, one reason being each employee's attitude towards the work environment (Carlopio,1996; Brennan,2002) and owing to the fact that employees spend much of their working time in that same environment. As it has been analysed throughout history, the transformation of the workplace from former cubicles to more modern, ergonomic, and sustainable offices transmit a sense of well-being to the employees. As several authors have already discussed and it is gathered in Brennan (2002:284) "perceptions of spatial characteristics, ambient conditions, and psychosocial characteristics of the office (i.e., lighting, temperature, environmental control, privacy) have been found to be related to environmental satisfaction" (Marans and Yan,1989; Spreckelmeyer,1993) and job satisfaction (Carlopio,1996; Sundstrom, Town, Rice, Osborn and Brill,1994) understanding satisfaction as the level of suitability and accordance employees feel towards the working environment in this case. Design generates different reactions on employees and people in general. The mixture of colours, light, furniture and the presence of art or plants, can be a positive stimulus for a better job performance and a state of mind. Knowing this, many companies have opted for transforming and actualizing their workplace with the aim of improving collaboration, well-being, and the overall performance.

The current trend of open offices that also include recreational areas at work are trying to mimic the best and most comfortable workplaces, where employees feel most closely at home. One of the most recent examples is found at Google Headquarters or Googleplex in Silicon Valley (California). This company has hugely invested in transforming its workplace and surroundings into a giant complex equipped with recreational areas, fitness centres, swimming pools or an organic garden, everything articulated by the latest technology. Google Headquarters in Palo Alto (see, image 1, on the next page) is characterised by its key features on design, office distribution and recreational areas:

**IMAGE 1**

Googleplex

Source: Retrieved on 23 February 2016 from Google photos.

This inclination towards keeping a balance between health, work and life is the main goal for many companies nowadays. As Greenhaus, Collins and Shaw (2003) explain, individuals should show positive commitments to different roles in life. As a result, workplace layout and the working space must contribute to the achievement of these life goals and become a model for different life roles including maternity and illness. Achieving psychological and physical well-being is essential for owning a balance in life. If there is any distress in our bodies or minds, we tend to be irritable, pessimistic and many times, we cannot make the right decisions. As a result, finding an equilibrium at work as well in life, is as important as improving other aspects like productivity and profits.

In relation to this, the concept of the workplace has changed considerably in the recent years. From standing prototyped offices with the same outline, structure, and design to nowadays' more creative interiors, new trends in workplace design have affected the place we work. Besides, employees are not now constantly stuck in a four-wall compound all day without any chance to move or access other areas as technology has enabled mobility and independence. Nowadays, employees from many different sectors can freely move from one place to another due to the use of technology and wireless devices. Wireless technology and internet connection have enabled us to work without having to stay attached to one place at a time. It is enough with having access to a wireless internet server or router to be ready to connect to the world and work from the office, home or abroad. We are now having the best of the examples due to the aggravated situation in

response of the Covid-19 virus spread, where many organisations and companies have had to establish virtual working networks for employees to continue working from their homes.

The advance of technology has reduced overworking inside the office, where employees and employers used to often stay until late in the evening. The Spanish tradition of working late has been enrooted for decades. However, as described by Duxbury, Towers, Higgings and Thomas (2007) and gathered in the book by Kaiser, Ringlstetter, Eikhof, and Pina (2010:269), “nowadays, the act of performing work is not limited to specific hours at a specific location. The latest incarnations of work-related technology for professional employees, such as laptops, cell phones and the Blackberry, support work outside the confines of the office, at almost any time of the day or night”. However, virtual working has also created overworking as it is very often difficult enough to completely disconnect from work and responsibilities.

Furthermore, mobile workplaces have become the image of a changing reality. Sending emails, sharing data, or giving presentations from outside the office has become a common practice. Workplaces have been rescheduled and reinvented to cover the needs of a changing reality technologically self-sufficient and independent, intended to satisfy the mobile nature of the current society. One of the examples of changing workplaces and the changing nature of work is found at Coworking spaces.

Coworking spaces as defined by Gandini (2015:194), are “shared workplaces utilised by different sorts of knowledge professionals, mostly freelancers (...) Practically conceived as office-renting facilities where workers hire a desk”. Regarding this, as part of the current evolving virtual work, Coworking spaces offer an alternative for many freelancers, start-ups, and small companies that otherwise, cannot pay a slightly overpriced office rental. Besides, Coworking spaces have been designed to promote collaboration and create synergies between members.

So, they are unique venues for freelancers, start-ups and small companies who can benefit from collaboration with others. But, apart from these new working environments that stimulate a new wave of virtual working and space-sharing, concepts such collaboration and employees’ psychological well-being are still in the verge of organisational management and health. In contrast, nowadays, where many goods and things are produced as a copied image of something else, having workplaces that are visually and noticeably different is an advantage.

However, do people who work from within these places day-to-day, feel and perceive their physical working environment as a positive outcome? How does the physical working environment affect

collaboration and psychological well-being? This ongoing study will present the hypotheses that will answer these questions and draw conclusions on them.

1.2 Rationale for the research

On this part, the different motivations for the election of the following study will be described. Beginning with the specification of the research context, the section will be followed by a brief explanation on the different motivational aspects for this doctoral thesis, scientific background, and practical reasons.

1.2.1 Research context

Geographically, the research context is set in the Basque Country, an autonomous community in the north-eastern part of Spain. The Basque Country has a population of around 2 million people and its administrative and institutional city is Vitoria-Gasteiz.

The standard of living compares to the most developed countries in the European Union as the region is in the top 32% in income comparing to the rest of the OECD regions according to the annual OECD regional well-being report. Health and safety standards range in the 10% top and the overall life-satisfaction reaches 6.7 points from 10, above the average.

Economically, the Basque Country has had a long tradition of industrial growth since the early coal and metal workers of the XVIII-XIX centuries. Already during the XX century, the industrialisation process spread to all the territory with the birth of different industrial sectors and new business models like the Mondragón Corporation, which centred around the valley of Arrasate-Mondragón. However, although manufacturing remains relatively strong these days, over the last 30-40 years the economy has become essentially service based as in other industrialised countries.

1.2.2 Personal motivation

The first idea for this project came to me from a different background; that is, education. As a teacher myself, I realised that educational institutions were ongoing a rapid change regarding their

physical space and teaching and learning methodologies. New trends like open classrooms, which are characterised by the lack of walls and similar architectonic limitations to space and based on the theories that focus on the early-stage stimulation of the child's autonomy and personal development were making a great impact on how schools are structured. With new teaching models, innovative spaces and concepts like cooperation and community I became myself interested in these new design trends and the possibility of adopting these ideas into business.

If collaborative spaces and open offices are becoming increasingly popular among teaching experts, sociologists, and psychologists, why will not organisations benefit from this? As a result, I began researching on what has lately been done regarding working spaces, workplaces, and innovation at different organisations worldwide when I found about Googleplex (the Google campus and headquarters at Silicon Valley, California). As one of the best workplaces to work for according to recent surveys like Fortune's¹, the first thing to notice is the unique distribution of its campus and all the different, eye-catching architecture and design that have been erected in the last years. Collaborative spaces, conference rooms, special rooms for teamwork, recreational areas, etc. the list is long enough to conclude that the success of Google mostly lies in the organisation of its space, working flexibility, and promoting employee's well-being as found on an article on *The Independent*². Consequently, I began to question myself on the advantages of innovation of workplaces and the promotion of employees' well-being can offer an organisation, and how they can affect employee collaboration.

Finally, I designed the research model that includes the following three main outcomes taken from an extensive literature review: 1. Physical working environment (Hua,2010) 2. Psychological well-being (Hartig,2004) 3. Employee collaboration (Mattessich and Monsey,2001; Sawyer,2017).

1.2.3 Scientific background

Although there are studies on workplace collaboration and psychological well-being, there is seldom any academic study on the impact of the physical working environment on collaboration and the psychological well-being jointly analysed. To promote collaboration, it is essential to first obtain the organisation's leaders' commitment towards its employees as a crucial part of their

¹ For more information, visit www.greatplacetowork.com/best-workplaces/100-best/2017

² See, the article on *The Independent* by Scheffield (2016).

business success. As Strauss, Griffin and Rafferty (2009:2) say, “transformational leadership-not hierarchical or traditional leadership models- at the team level enhances commitment to the team, which in turn enhances proactive behaviours”.

Drucker (1995) also suggests that success is based on growing relationships based on partnership (Inkpen,1996; Drucker,1995) by eliminating ownership roles that are considered hierarchical organisational models and enhancing practices like collaboration.

Psychological well-being is also an essential part of an organisation’s success according to Robertson and Cooper (2013:175-176) where they state that “the psychologically stable and motivated employee will perform better”. Grawitch, Munz and Gottschalk (2006) also say that there is a link between healthy workplace practices and organisational improvements like employee involvement, underlying those spaces where employees’ well-being is supported, stimulate employee involvement as well. So, despite the studies that justify the relationship between employee collaboration and psychological well-being, there is a literary gap on the study of collaboration and the physical working environment. As Heerwagen, Kampschroer, Powell and Loftness (2004:511) say, “collaborative work environments require spaces, furnishing and technologies that support both individual focus and group interaction”. These authors reviewed the links between the physical space and collaboration establishing the social dimensions of collaboration in knowledge settings while identifying outcomes. As they explain, the experiment intended to find out whether higher visibility and collaborative tools improve communication and reduce market time (Heerwagen et al.,2004). Therefore, there have been several variables and outcomes already defined that explain the dimensions of the physical working environment in relation to collaboration that will be used for collecting and measuring data.

In conclusion, the literature review and the constructs that will be next analysed, will also provide more information and knowledge on the relationship between the physical working environment, psychological well-being, and employee collaboration.

1.2.4 Practical reasons

Nowadays, one of the main points for improving an organisation’s performance and production is employee collaboration. Collaboration as described by Kraus (1980) and taken from Gordon and Edwards (1995:15) is, “a cooperative venture based on shared power and authority. It is non-hierarchical in nature, and it assumes power based on knowledge or expertise as opposed to

power based on role or function". However, there are different factors that have a direct influence on employees' collaboration levels. Regardless to say, space and design is one of the most challenging factors to be analysed as it includes many different features within. As gathered by Henneman, Lee and Cohen (1995), collaboration requires a team-orientated environment. As a result, spaces that are structured to promote team-based job performances are better stationed in promoting and increasing collaboration.

Open-spaces or open office designs better enable teamwork and collaboration as opposed to more individualistic approaches that entitle a more traditional view like closed offices or cubicles. Furthermore, Henneman et al. (1995) say that collaboration needs knowledge-based power and organisational values including leaders that commit to their job, their employees, and the organisation. As a result, collaboration is a broad concept that relates to many factors. However, the focus of this research study will be centred in response to the physical working environment and the psychological well-being of employees. Therefore, well-being and organisational health are also a major area for many organisations that try to include the psychological factor when enhancing collaboration. Many organisations have conducted different workplace transformations over the last years to modify the space and turn the organisation into a collaborative working environment that is also positively influenced by the psychological well-being of their employees. In the case of Cisco³ the human factor has been a central point in refurbishing their headquarters by changing the workplace into an open, collaborative space that also supports employee well-being.

These new tendencies of improving and changing the working space have bloomed from studies on well-being, collaboration, spaces of liberty⁴ (*espacios de libertad*), work psychology and ergonomics⁵. Some of the pioneers in this area have successfully concluded the impact space and design have on employees and the organisations. Studies like in Brennan, Chug and Kline (2002) or Oldham and Brass (1979) show better commitment of employees and employers, and a greater nurture of well-being as behaviour and perception change after a transition from an enclosed

³ A United States based informatics and technology company, at https://collaborate.cisco.com/workplace/_for_learning more about Cisco's workplace transformation.

⁴ Term associated with Koldo Saratzaga's investigations that have encouraged organisations to transform their workplace into a wider open space.

⁵ According to Humanscale^R ergonomics is "defined as the science of fitting a workplace to the user's needs" as it aims to increase efficiency and productivity and reduce discomfort.

space to an open-space office. Since the 1970s there has been a growing interest in the effects space and design have on employees' behaviour.

Regardless to say, this interest has hugely increased over the last years mainly as an ulterior consequence of the technological revolution and the founding of mobile offices and the change in psychology, understanding and indeed, behaviour that technology has brought. However, on an academic basis, there is still a lot to investigate on this field to support former and current hypotheses. Nevertheless, it is difficult to establish a direct relationship between the physical working environment and collaboration and the few studies that have been done only show the improvement on the psychology and the job performance of the employees like in the study conducted by Deloitte ⁶ (2017), the worldwide renown consulting agency. In reference to Coworking spaces, two of the largest spaces in The Netherlands, Wework⁷ and Tribes⁸, have recently opened new venues where design has been a central point for their final layout.

Geographically nearer, Orona Ideo⁹ in Hernani (Gipuzkoa, Basque Country) or the Think-Tank of Mondragon University's LEINN (Graduate studies in leadership and innovation) students' classroom that offer two of the most challenging examples of local entrepreneurship and office-design innovation. In all these cases space has been converted not only into a workplace, but a place for collaboration, creativity, and innovation.

Therefore, although literature on the topic of the physical working environment is not very extended yet, we can foreshadow there might be a positive relationship between space and collaboration. Consequently, the physical working environment and employee collaboration are two outcomes that need to be investigated further despite the difficulty of the research as it is often difficult to be conclusive on a field that is still at large on ongoing investigations. As a result, the psychological well-being outcome has been considered necessary to act as a mediating factor between the physical working environment and employee collaboration to facilitate the

⁶ Conducted by Deloitte UK consulting agency in 2017, as part of a study on workplace mental health and well-being.

⁷ WeWork Metropool recently opened in the year 2018 and it is in a four-storey building in Amsterdam that owns different areas for co-workers or temporary employees and more permanent, paying members.

Tribes one of the largest and widespread coworking spaces in The Netherlands that has greatly expanded over the last few years. Mostly centred on start-ups and innovation, Tribes offers "inspiring workplaces" that "enhance creativity" and "collaboration" according to their logo and manifest.

⁹ Orona Ideo: it is a Mondragon Corporation owned cooperative that is focused on supplying technology for the construction of escalators and similar machinery that due to its recent transformation of the space it is erected as one of the most innovative organisations in the Basque Country.

investigation and the empirical analysis. Besides, it is indispensable to analyse the psychological well-being of employees for being closely related to the individual's behaviour and perception of its surroundings that a workplace transformation can bring.

1.3 Objectives and main hypotheses

As it has been mentioned in the previous point, the main objective is to analyse the relationship between the physical working environment and employee collaboration. For that, first it will be analysed if there is a positive relationship between the physical working environment and employee collaboration, and if this relationship is directly given or through the mediating psychological well-being as an indirect relationship. The research model described in figure 1 (on the next page) shows the relationship between the three constructs that set the base for this investigation:

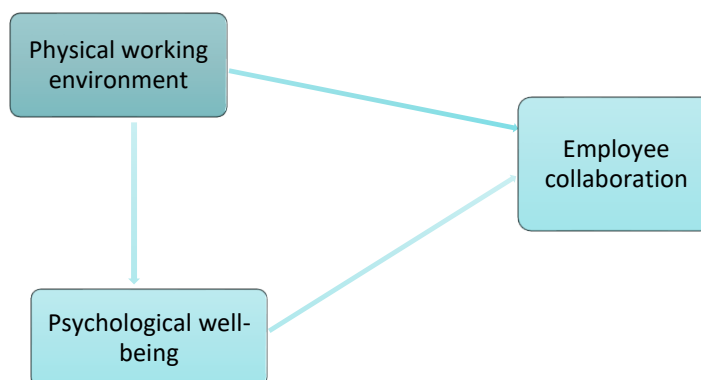


FIGURE 1

Research model

Source: self-elaborated.

For this, six specific objectives have been established:

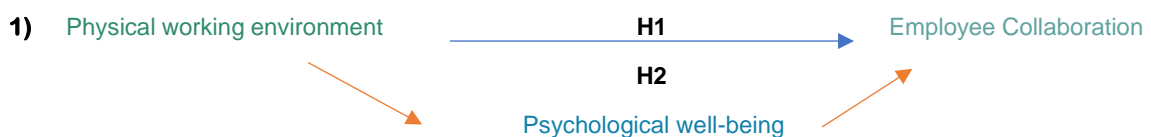
- **Objective 1.** The study of the Coworking network in the Basque Country.

- **Objective 2.** To complete an extensive literature review on the main premises for the study of the relationships between the main variables and previous investigations done on the topic.
- **Objective 3.** To create a validated scale for measuring collaborative work environments and the restorative effect on the psychological well-being.
- **Objective 4.** The analysis of the relationship between the physical working environment and employee collaboration with the mediating effect of the psychological well-being construct.
- **Objective 4.A.** The analysis of the relationship between the physical working environment and the psychological well-being through an indirect effect.
- **Objective 4.B** The analysis of the relationship between the psychological well-being construct and employee collaboration through an indirect effect.

After having established the objectives, the main hypotheses have been defined:

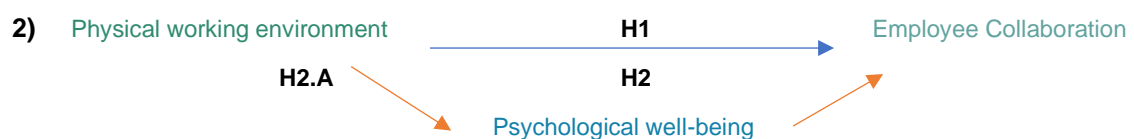
- **H1:** There is a positive relationship between the physical working environment and employee collaboration
- **H2:** Psychological well-being has a mediating effect between the physical working environment and employee collaboration
- **H2.A:** The physical working environment has a positive effect on psychological well-being
- **H2.B:** Psychological well-being has a positive effect on employee collaboration

The resulting summary shows the main hypotheses of the study regarding the theoretical model:

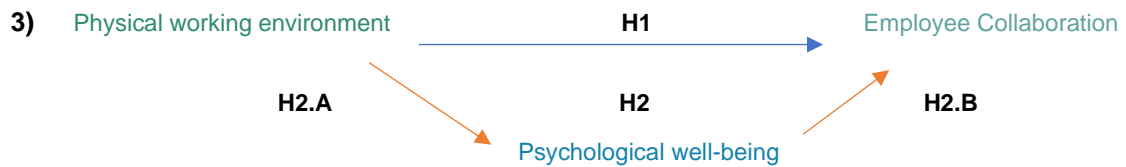


H1: There is a positive relationship between the physical working environment and employee collaboration

H2: Psychological well-being has a mediating effect between the physical working environment and employee collaboration



H2.A: The physical working environment has a positive effect on psychological well-being, the mediating construct



H2.B: Psychological well-being as the mediator has a positive effect on employee collaboration

1.4 Structure of the study

The structure of this study follows the research model proposed by Maxwell (2005). His proposal contemplates five main elements to be included in a research model: 1. Goals, 2. Conceptual framework, 3. Research questions, 4. Methods and 5. Validity (see, figure 2). It is an interactive model that enables the interaction of all five dependable elements that shift with the development of the research. For this research study it has been selected to adopt the research model by Maxwell (2005) as it is the most adequate for the empirical method integrating in this study, for the coherence in the objectives proposed, and the general structure of this doctoral thesis.

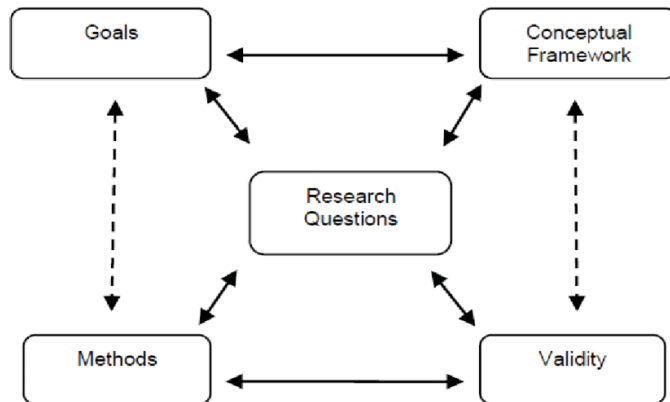


FIGURE 2

The design of the research model

Source: Maxwell (2005).

Therefore, this doctoral research-study is structured in five main areas:

1. **Goals:** scientific background, rationale for the research, and research objectives **Chapter 1**

2. **Research questions:** elaboration of the proposed hypotheses **Chapter 1**
3. **Conceptual framework:** theoretical framework and the research rational **Chapters 2, 3, 4 and 5**
4. **Research methods** and the empirical analysis **Chapters 6 and 7**
5. **Validity:** conclusions, results, and limitations **Chapter 8**

In addition, the timeline of the different phases of the study has been designed and divided into three major time-sets (see, figure 3):

1. Exploration
2. Design
3. Development and implementation

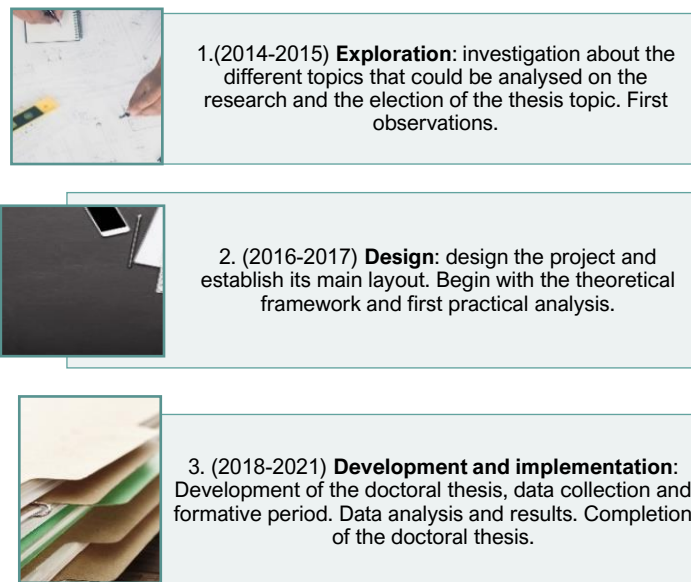


FIGURE 3

Chronology

Source: self-elaborated.

In summary, and after having designed and identified the research model, and having described the objectives or goals and the research questions, the following four chapters will centre in the literature review and the theoretical or conceptual framework that will provide the theory for the investigation and the empirical analysis.

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Theoretical framework

THEORETICAL FRAMEWORK

“Es gibt kein richtiges Leben im falschen“ - Theodor W. Adorno

Within the theoretical framework, the theoretical basis of this study will be set, and the research outcomes explained are based on theories written by authors from different disciplines. This section will focus on the three main topics of this research study: space (chapter 2), collaboration (chapter 3) and psychological well-being (chapter 4) and a further theoretical relationship between these three variables will be done in chapter 5.

This second chapter is based on the analysis of space. Within this chapter the conceptualization of space, space as a social product and the philosophical and social categorization of the production of space will be explained as the doctorate thinks it is essential for my study the analysis of space as a concept to clarify what does space mean socially. As the physical working environment variable mainly refers to the working space, it is indispensable to understand the conceptualization and the categorization of space as a social product before any kind of further analysis. For that, a review of the philosophical and social literature on the concept of space will be done with the aim of giving this concept a broader meaning and contextualisation.

CHAPTER 2

**Space and the physical
environment**

2. SPACE AND THE PHYSICAL ENVIRONMENT

“What desire can be contrary to nature since it was given to man by nature itself?”

-Michel Foucault.

2.1 Definition of space and the workplace as a heterotopia

As Foucault (1967:3) agrees with phenomenology in his *Of other spaces* essay, “we do not live in a homogeneous and empty space (...) we live inside a set of relations that delineates sites which are irreducible with one another”. Humans move between natural and artificial spaces in their everyday life; natural spaces, which are naturally placed within natural barriers, and artificial spaces, which are built from human physical strength and wisdom. An ordinary house is a primary example of an artificial space built for supplying shelter and protection against the wildest nature. All artificial spaces are built and designed for a purpose: schools for the education of children; hospitals for the healing of the sick; town-halls for the government of a town or a city and factories, for the placement of workers, the production of goods and the growth of the economy. As the French philosopher Lefebvre (1905) agrees, terms like “corner”, “place” or “home” of everyday discourse serve to distinguish spaces, and in general, to describe a social space as also found in Foucault and Miskowiec (1967:3) who says that words like “home” “correspond to a specific use of that space, and hence to a special practice that they express and constitute”.

Furthermore, there are only one kind of spaces that Foucault agrees do not exist within the real space of society. These are the utopias, sites with no real place. In contrast “there are also (...) places that do exist and that are formed in the very founding of the society (pp.3). These places, something like counter-sites, are called (in Foucault's terminology) Heterotopias. The workplace, for example, could be considered a heterotopia, as citing Foucault and Miskowiec (1967:4) it is “capable of juxtaposing in a single real place, several spaces, several sites that are themselves incompatible”. But when considering workplaces on the first hand, it is necessary to differ the production site from the other spaces within the workplace as it is the place where, considering

Lukacs'¹⁰ thoughts, the production and reproduction of men's life goes beyond their biological survival (Gianna,2014). This way, Lukacs tries to separate the category of production from the simple activity of life, recaching it like the global movement of man's sociability (Gianna,2014), in an attempt to *deategorize* the term "production" from former Marx's ontology and assigning a social sphere, where men develop their capacities. Lukacs confirmed that work is the base for the social praxis (Gianna,2014). However, these capacities which at the same time reflect in society, are a sub-product of the production process and the relations established at the production site; indeed, the ontological essence of the subject is conditioned to the production process. Despite having assigned a social category to the term "production", its ontological base endures within. And this ontological base drags the primary essence of the term "production", deleting any social categorization within. However, as controversial as it seems, it is in this controversy or in this dialectic that Heterotopia exists.

Workplaces nowadays are much more than the Marxist production sites. Sometimes, the workplace becomes the centre structure of a person's life. It could be like having a home outside the real home's boundaries. This displacement of the term "home" proves the relation between the workplace as a heterotopia. But apart from becoming *homes* sometimes, workplaces contribute to the socialization and the development of capacities of men and women. Despite Marx having said that the relations established within a factory, a production site, are just productive relations in the way that Gramsci introduced the concept of "hegemony" to describe such relations; as Lefebvre (1905:6) says "the concept is a statement of the cruder concept of "dictatorship" of the bourgeoisie", as shows the class struggle present between the bourgeoisie (owners of factories) and the proletariat (workers).

However, the new Marxist-ideology current of the Frankfurt School's theorists (second and third generation) have once again tried to socialize the sphere of the production process (look above for Lukacs's quote), stating that a factory is not only a production site (Adorno and Horkheimer, 2002). Other philosophical currents also underline the socialization process within the productive lines. Outside from the historical materialism or the most radical Marxism, currents like Humanism are much more centred in the social sphere of the term "work" and the persona, rather than the traditional class-struggle within the production process of factories. Maritain¹¹ (1939:1) defines

¹⁰ According to the Stanford Encyclopaedia of Philosophy, Georg Lukacs was a Hungarian-born philosopher, one of the founders of Western Marxism who formulated the Marxist theory as a self-conscious transformation of society.

¹¹ Maritain (Jacques): French catholic philosopher whose ideas developed later humanistic theories and who held an aesthetical vision of anthropoeia, where he considered man, as the direct reflection of God, the centre of social thinking

Humanism as a current that “tends essentially to make man more truly human, and to manifest his original grandeur by enabling him to participate in everything which can enrich him in nature and history”. Hence, Humanism does not consider workplaces as heterotopias because there is not a counterpart or any dialectics within its understanding of space. Space is where man interacts with others and executes his social life; and this non-limited understanding of space, can be assigned to any space available within man's social dimension.

However, it is nowadays visible that several goals meet within a factory or a business company. Without abiding by the production process, companies have developed themselves into a larger and functional environment. The cooperation between departments, different Coworking spaces amid many workers' profiles have enabled the growth of business and industrial companies to shape their cavities into not-only-for-one-purpose spaces prepared to adopt any kind of business activities. Far from the original purpose of factories built since the Industrial Revolution, the productive aspect has been replaced by more sophisticated concepts and activities like innovation, human resources, design or technology, reflection of the progress and the mechanization of the postmodern world.

Heterotopias, these *other* spaces so mythical and real, converge in workplaces the moment the former and original meaning of workplace (production process-productive relations) is replaced by the current business activities that take place within factories and companies. This does not mean that work has degraded into a mere social concept attached to the new socialization process of man inside his working environment. But as Foucault and Miskowiec (1967:2-3) did also say, “spaces are not empty containers (...) as we live in a space that has already been defined as a set of relations”. The first factories from the Industrial Revolution era, where spaces designed for production and profit and class struggle were visible. However, factories nowadays are spaces, where a continuous set of relations are given. Heterotopias as inversions of the other spaces they refer to, many workplaces today are also inverted spaces, as work itself has changed from dominating productive-relation- based site, to a socializing and Coworking¹² space. This inversion from the original definition of workplace creates an unnatural space inside factories, (unnatural comparing to the original treatment of the concept “work”), although the socialization of space is

and any philosophical theory.

¹² Co-working (Brad Neuberger): the coworking space, first launched by Brad Neuberger in 2005 in San Francisco, where independent workers share an office space by building a community of freelance workers and thinkers, adapted to the current needs of mobile and post-mobile society.

a process that aligns the relational and social aspect of modern society thus, it can be considered a natural aspect of the modern/postmodern times. According to Foucault and Miskowiec (1967:7-8) “relational spaces are promiscuous, giving birth to infinite diverse relations (...) being this, a powerful explanation of the anxiety of the modern world”. For this same reason, nowadays, a place is a sum of several juxtaposed spaces, hybrids of all these infinite relations that take place in the world.

2.1.1 Space as a social product

According to Lefebvre (1905:331), “social space is a product” and as we continue with the illusory demarcation of space in Foucault's Heterotopias, Lefebvre as well agrees that social space is a product “reinforced by double illusion (...) the illusion of transparency and the illusion of opacity”. The illusion of transparency as described by Lefebvre (1905) “becomes incarnate by means of a design”, and the illusion of opacity “appeals to substantiality” as “every society produces its space”, leading the space to an object that can be theoretically analysed. Therefore, space is an object placed in a specific time, committed to a historical process and within an unrealistic, illusory sphere that is mentally processed. Apart from this, space is also a social product derived from the productive relations that delimit society. If we consider a business company a social reality, where productive relations are intrinsic to the socialization of the production process, space becomes the reflection of these relations hence, a social product within itself because according to Lefebvre (1905), when space is considered in isolation with other objects, it is just an empty space. Space is directly connected to Energy and Time although is difficult to catalogue, where the limits of these three physical elements overlap.

Lefebvre (1905:332) says that “the distance that separates ideal space, which has to do with logico-mathematical categories (epistemological thought), from real space, which is the space of social practice (...) predisposes one another”. Nietzsche argued by saying that “where there is space, there is being” in relation to his continuum historicity (and the return of history to itself as a point for drama or tragedy) but differed from the Marxist view of space-time disglossis, where the production forces interact to produce space orientated by industrial and the state's rationality, and technological progress and knowledge. Furthermore, space embodies social relationships. According to Lefebvre (1905:332), “every society produces a space, its own space (...) social space contains and assigns appropriate places to the social relations of reproduction (biophysiological relations) and (...) the relations of production (division of labour and its organization

in the form of hierarchical social functions)". The workplace would be the axis for the combination of these two social-spaces. In the workplace both forces interact, the bio-physiological and the productive. There is a constant interaction between different sexes and ages, as well as ideologies, class, and the productive forces. It is the place where, the production of social space (according to the definition given by Lefebvre) is more visible than at any other place. On Lefebvre (1905:333) own words, "in reality, social space incorporates social actions, the actions of subjects both individual and collective, who are born and who die, who suffer and who act ... from the point of view of knowing, social space works as a tool for the analysis of society" as society generates appropriate social space through an amount of time, which can achieve a form by means of self-presentation and self-representation¹³ and this form can be studied to analyse society. Lefebvre (1905:333) also says that "all subjects are situated in a space in which they must recognise themselves" if not, they would simply get lost in the process.

The production of space is liable to a specific time in the present. The space assigned for work interacted with the leisure options (that were thoroughly banned for the proletariat) of urban reality. Nowadays, factories are also being built within the city boundaries or at industrial areas, specifically designed areas in the outskirts of the towns and cities that gather the main economic activity of the urban sphere. The representation of this space in the form of factories, business companies and multinationals cover "the dominant space in any society" on Lefebvre's account (1905) as it is in this representation of space, where space becomes physical, and men interact throughout a system of verbal codes or signs. The representational space (the third category of Lefebvre's theory on production of space) is a rationally committed understanding of that space by human knowledge and therefore, submitted to ideology. The understanding of space means that average people, citizens, rationally embrace the meant-to-be significance of space, which in this case, is thoroughly built for economic purpose.

¹³ Husserl (phenomenology-self-representation *dasein*): in Husserl's phenomenology (a philosophical trend) the word *dasein* means the representation of the self in the outside world that gives us the feedback of our existence.

2.1.2 Philosophical and social categorisation of the production of space

As Lefebvre (1905:334) suggests, “ecologists for example, would very likely take the natural ecosystem as a point of departure”, as their main field of interest would be the natural world. But whose concern are workplaces in the current times?

If we begin to analyse from the economic exchange between city and territory, state, and town, in neo-capitalism terms, we will notice that as Lefebvre (1905:334) suggests “spatial practice embodies a close association between the daily reality and urban reality (private life and leisure)”. Work has been fully integrated in the daily life of workers and employees as factories were being built within city boundaries and the daily reality. According to the Spanish author Pinillos (1977), the urban sphere of current cities, both private life and working life and commuting take place in a surrounding where the natural space has been replaced by geometrical constructions uncanny to the physical body and human spirit. This invasion of natural space by human forces and intelligence covers a great part of the urban anxiety we experience. These artificial spaces built for the economy and growth of the city, endangers the living space of citizens, as well as the generational continue. In the urban space, every citizen moves in the same direction, distracted by the thousands of sounds, signs, and eye-catching lights and colours that generates a despersonalisation of the human being by suppressing the natural human essence to a humanoid, entirely influenced by the technological dominance of its primary natural space.

As Pinillos (1977) says, technology oppresses the individual to an impersonal technological state where its own conditions are imposed. The constant anomie that the regular citizen suffers is the product of the advance in technology and the rapid change that society experiences within the urban sphere. The pre-established norms and structures, the constant moving, and the suppression of its natural human essence produces this anomie as a symbol of the modern-times anxiety and fear (what Nietzsche called, “*gefährlich zu leben*”¹⁴). The massification of cities subdues the individual thought to a unidirectional way of thinking (Marcuse)¹⁵ deleting all individuality and

¹⁴ *Gefährlich zu leben*: an expression attributed to the German philosopher Friedrich Nietzsche in relation to Husserl’s *dasein* concept.

¹⁵ Marcuse (1964) on his philosophical approach to understanding the horrors of Nazism, he set a concept of “El hombre unidirectional” to criticise the mass-thinking, mass propaganda and the deletion of any individual approach during the rise of the Nazis in Germany. As a result, he also became a symbol of resistance and alongside his Marxist approach, he also criticised the monodirectional thinking of modern society mostly influenced by progress, technology, and delirium.

increasing mass commitment. Marx also said that the current social system's exploitation makes humans alienated hence, becoming *slaves* of the undergoing system (thus, society) men alienate themselves to become part of that dominating system. Despite this contradictory sense, it is utterly understandable the need of the human being to become part of a greater system of elements. The individual alone is a weak characterization of the human species; it is always easier and more comfortable to join a group and adopt the group's main ideology and its way of actions.

Opposite to this Adorno¹⁶ (1981:117) argued that,

“The pressure exerted by the prevailing universal upon everything particular, upon the individual people and the individual institutions, has a tendency to destroy the particular and the individual together with their power of resistance. With the loss of their identity and power of resistance people also forfeit those qualities by virtue of which they are able to pit themselves against what at some moment might lure them to commit atrocity”.

In relation to this, Adorno also said that if the individual cooperates with the dominating state, there is no place for any autonomy, independence, or freedom. What did also Lefebvre suggest about social space being used to analyse society regarding a specific time and space in history, and because of his third principle (representational space) being submitted to ideology (sometimes), the dominance of a state-administered society and mass ideology could be more plausible to achieve. Gritzner (2015) says that Adorno considers the triumph of domination from the state, in the “cultural-industry”, which promotes “ideology of pseudo-individuality”, influenced by the Marxist critique of the production of commodities as a reflection of a capitalist society and class-struggle. Pinillos (1977) also argues in his book that the consumerist individual is not aware that by trying to fulfil the needs society has imposed on him, he becomes an instrument of that same economical machinery that works against him.

According to Marcuse (1964), the alienation imposed by the social system destroys the individual identity and robotizes him by reducing his praxis to a process thus, becoming a mere instrument of that society (no individual argument or thinking). In Adorno's (1981) terms too, instrumental

¹⁶ Theodor W. Adorno: one of the main theories from the circle of Frankfurt's school of social research, who heavily criticised Nazism and fascisms in Europe during the 40s and who tried to give an explanation to the Nazi holocaust during the Second World War by reasoning and justifying the immorality of Hitler and whole German Reich.

rationality aims to control and repress the non-identical as Adorno himself argues that such a repression of the non-identical manifests itself in the increasing reification of human relations in a context of life termed the “abstract society”¹⁷. This abstraction, product of the rationality installed in the modern theories about identity, and after losing the objective rationality of the Enlightenment, directs the human being into a non-expiring society, where each advance sets a default progress-scheme. Within these conditions, it is impossible for humans not to be repressed by that instrumental rationality and set-up on-progress, which does not leave a chance for any modification nor individual liberty.

Lefebvre (1905) also suggests that the producers of space act in relation to a representation and that the users of that space passively experience the imposed over them. If ideology is also reflected in the representational space, users would experience indeed, what has been imposed upon them. Social spaces in the XXI century, the products of a specific society, temporal and limited, do not favour new relational ties between individuals; and thinking still alienates to that of the Institutions and multinationals. We no longer live in a totally administered society nor a dictatorship, a bundle to strip the individual of every free-will, but the failure of late capitalism alongside the advance in technology and the redeeming mass culture, keeps exploiting the average human being inside an illusory oppression of the masses. There is no apparent political or military oppression but in other terms, mainly economic and social, oppression still exists within the current boundaries of society even at smaller communities. Postmodernism of the late XX and the turn of the century have brought new issues to the economy and society. New concepts like globalization, virtual space and nuclear war have arisen making the individual tremble inside the social anxiety that the modern world means. As Pinillos (1977) says, happiness is a prefabricated element in terms of the current economy thus, the individual is not able to feel the real happiness until today's economy becomes a new concept and changes into a new understanding, including all the different concepts arranged inside the concept of economy.

¹⁷ Original term by Hubert Zapf; analogue to Marcuse's monodirectional thinking (1964), Zapf's abstract society coins the term of the massification of every social aspect that was previously considered part of the individual thus, non-identical, which postmodernism has delectably suppressed its existence by the accelerated globalism and mass thinking (Grietzner,2015).

2.2 The XXI century, postmodernism, and new economic challenges

As the second point on this chapter, it is necessary to make an introduction to postmodernism as it brought many changes to society. Not only in the world economy but in many social and everyday aspects in life, postmodernism meant a radical change, breaking with former values and ideologies that were once settled. In relation to this, the XXI century also modified previous beliefs and brought new concepts and models, both economically and socially that virtuously have become the roots of this new century. As it is gathered on the preface of Lyotard's (1984:13-15) book, "postmodernism (...) involves a radical break, both with a dominant culture and aesthetics, and with a rather different moment of socioeconomic organization against which its structural novelties and innovations are changed". It has also been called the "media society" (Debord,1994) "consumer society" or "the bureaucratic society of controlled consumption (Lefebvre,1905) or "the post-industrial society" (Bell,1974). The hypothesis Lyotard (1984) underlines, the status of knowledge becomes altered when the society enters a post-industrial age and culture the postmodern era. It is a combination of both knowledge and culture that establish the argument around this period that refers to postmodernism. So, postmodernism primarily meant a crisis, a break in the former social, cultural, and scientific roots that were at large since the Enlightenment¹⁸ and the Industrial Revolution¹⁹. The capitalised world that had been shaping itself since the first factories during the XX century, found a barrier, a limitation that was exceeding its original capacities.

Industrial societies were on the verge of surpassing their limits of existence, their representation onto the world as knowledge became the principal force of production. Knowledge becomes a commodity within this industrial era, making it the most valuable force of production for the advanced and highly technological societies, and progress. According to Lyotard (1984:3), "the ideology of communicational transparency, which goes hand in hand with the commercialisation of knowledge, will begin to perceive the State as a factor of opacity and noise. It is from this point of view that the problem of relationship between economic and State powers threatens to arise with new urgency".

¹⁸ Enlightenment: an intellectual and artistic movement of the XVIII century

¹⁹ Industrial revolution according to Allen (2017) "refers to the far-reaching transformation of British society that occurred between the mid-18th and mid-19th centuries. On the plus side, manufacturing technology was revolutionized as factories replaced handcraft methods. Productivity leaped up through the invention of machines (...) the perfection of the steam engine (...) the replacement of charcoal by coal in the smelting and refining of iron; and the construction of the first railways" lead first the British society and then all of Europe to a revolution never happened before.

The State as a guiding institution is being replaced by the large corporations or multinationals that have arisen since the 1970-80s. The Nation, as a binding and the most powerful institution, is replaced by economic laws and financial operations, from the creation of the World Market or a Unified European Market within the European Union, to the opening of the Chinese market and the discard of a socialist alternative. Globalisation has made possible the exchange of information and knowledge around the globe, as countries become interconnected by networks of information and ruled by new economic laws. Lyotard (1984) accepts that knowledge is a question of government as governments manage knowledge for their own benefit. Knowledge and the advancement in science have enabled the computerization of societies. The current superstructure we live in, is a highly computerised system of global-operating relationships between each country's input and output. What Lyotard (1984:4) calls "performativity" the main characteristic of these societies and "the only alternative to this kind of performance improvement is decline". Lyotard (1984:10-12) defines knowledge as "a question of competence that goes beyond the simple determination and application of the criterion of truth (...) makes someone capable of forming *good* (...) it makes good performances in relation to a variety of objects of discourse" and it gets embodied in a subject constituted by these various competences.

So, the subject, constituted by knowledge can pass his learning onto another subject creating different social bonds. Knowledge determines how these social bonds will be formed thus, specifying how a society will perform. Lyotard also makes a distinction between what he calls narrative knowledge, linked with tradition and pragma, and scientific knowledge, the knowledge that prevails at advanced and computerised societies, an example of the current postmodern society. As Lyotard (1984:7-8) accounts:

"In contemporary society (...) the question of legitimation of knowledge is formulated in different terms. The grand narrative has lost its credibility (...) the decline of this narrative is an effect of the blossoming of techniques and technologies after the Second World War (...) and the redeployment of advanced liberal capitalism (...) Capitalism inherently possesses the power to de-realize familiar objects, social roles and institutions to such a degree that the so-called realistic representations can no longer evoke reality except as nostalgia".

There is only a place for experimentation, in accordance with the increase in computerised social discourse, jobs and lifestyle. Science and scientific knowledge have brought postmodernism another type of language: a metalanguage completely constituted by a technological and

computerised life, and a pragmatism and performativity only linked to this scientific and technological revolution of the late XX and the start of the XX's century.

In the same term, space has been reformulated from being a social product to a product of the postmodern society. Postmodernity has changed the vision individuals possess of society and surrounding. Although knowledge has tried to re-establish the fundamentals of clarity and return the subject to its inner-vision sphere, postmodernity's elimination of subjectivity has ended in spaces being disrupted and de-categorized. Instead of a social product linked to the sociability of the individual, space has become a tertiary part for the development of human's skills and sociability. The virtual world has partly enabled the transformation of space into a blurred notion where individuals spend time without a proper further or deeper meaning. It is visible the turn of the avant-garde to a post avant-garde, enriching a dialectic posed by the realms of industry and mass communication. What aesthetic judgment²⁰ states on Lyotard (1984:4) words is that "eclecticism is the degree zero of the contemporary general culture" and "by becoming kitsch, art panders to confusion", as art moves towards the realism of money, towards the profit it generates on the same way capitalism moves towards the accommodation of all needs including space and its concept. Space loses its concept under the capitalist pressure of the modern world. The reality of the aesthetic judgment is not completely true for modernity and the postmodern condition as art loses its original will-to-be or essence in the hands of capitalism.

In addition, postmodernity creates an anxiety that is new to the individual. It is not war or genocide that worries the individual now. Reality and its sphere have converged into other realities; not only the physical world, but an utterly unknown virtual one is arising new problems to the civilisation. Nowadays, it is not just in what we see, hear, or feel that erupts anxiety, but also in the unknown depths of the virtual world. The computerisation of society has brought new issues to society that even philosophy is not ready yet to give an answer to all these new concerns that stalk humanity. Stephen Hawking said that the next great extinction is probable to happen in this century and that artificial intelligence could develop a will of its own that conflicts with that of humanity.

This axioma is one of the biggest concerns of humanity nowadays: to have computers able to think by themselves which may overrule the actual biological thinking and the biological sphere of the

²⁰ Aesthetic judgment: According to Theodore W. Adorno (1981), "Art can free us from the anxiety of the world". Considering art an expression and a direct reflection of nature, anxiety the world suffers can be minimised or eliminated by art's self-expression of natural elements.

human being (biological-meaning cell/neurology/behavioural process). This argument can also be one of the reasons for the loss of identity experienced and feared with postmodernity and within the postmodern subject. When the individual loses the sense of reality, the sense of the physical world and enters another reality that has not any physical visible boundaries, he loses his own sense of existence as he cannot totally adapt himself to that new reality and therefore, he feels anxious and almost loses his mind. We live in such a hyperactive society that we constantly feel swamped by the amount of information that is shared and processed by our minds. According to Lyotard (1984:11), “modernity (...) cannot exist without a shattering of belief and without discovery of the “lack of reality” of reality, together with the invention of other realities”, affirmation that takes us back to Foucault’s concept of Heterotopia or to a reality within another reality. This is a sign of the fragmentation suffered with modernity, as Nietzsche called “nihilism”²¹ to this period, where the abandonment of the self and the reality, means that nothing else matters anymore as there is nothing else left outside to really matter.

Society is the cause of the neurosis the modern individual suffers because of the postmodern condition that as Lyotard (1984:10-13) defines, “puts forward the unrepresentable in presentation itself; that which denies itself” and taking us back to the previously exposed argumentative part of Adorno and his *Negative Dialectics*. According to Adorno (1981), illusion lies in the same false consciousness that is shared in ideology. As subjectivity redeems within the production series of commodities and fetichises that face our world today, neurosis are the pillars of society as they frustrate the better possibilities of the individual. As Freud and Breuer (2004) discussed the term “neurosis” in relation to a state of anxiety and frequently related to hysteria and phobias this can be coined to the neurological or neurotic state society and the individual suffers as a consequence of the intense pressure executed by postmodernism and the postmodern condition.

As a result, it can be concluded that all individuals are just economic concepts and competitiveness is the price the individual must pay for so many years of domination and total administration. The postmodern individual may have lost the ontological side of his original/human essence, but it is the individual, who in his freedom and subjectivity must fight the loss and the neurosis that humanity still suffers under this postmodern condition. The postmodern crisis attributed to the loss of moral values has fostered a worldwide movement of self-consciousness and self-emancipation from the

²¹ Nihilism: concept developed by the philosopher and theorist Friedrich Nietzsche. It summarises his idea on the belief in nothingness, meaning there is only destruction and death ahead and nothing else survives than the nothingness.

society that keeps us under its dominance. The representation of life and its denial is the inner fight that the individual suffers because of the loss of these moral values. Ethics have lost their battle against mundane and fetishist or commercial values; and the Heterotopias that Foucault describes are just the urge to represent those realities that have been lost or forgotten within the postmodern era.

2.2.1 The crisis of postmodernity

New issues regarding this XXI century mainly concerning the environment and the community's well-being arose anxiety on a great part of the world's population. It is not the economy or social values that are in crisis today, but environmental concerns have doubled since the turn of the century. As space is re-conceptualising as a green space, with the underlying effort of preserving nature and our planet, green and ecological tendencies have opened new paths for new beginnings even concerning workplaces and workspaces.

The economic and social inequality is easily visible in many parts of the world and this gap has become larger with the 2008 financial crisis. According to Hurst (2016) unemployment is lower than during the financial crisis of 2008; however, the number of people living in poverty is still high, increasing the gap between the poorest and the richest. Besides, society also suffers from a worrying environmental crisis as natural resources decrease, and the economic growth is environmentally speaking, unsustainable. The current social and economic reality is even more complex to understand with contradictions that are constantly arising in politics or education and the rapid changes in culture because of globalisation, mass consumption, and temporal concerns.

The greater individualisation of the self and the emerging of virtual space as a working space and for socialisation have brought a severe crisis in ethics and morality and a harsh discipline in terms of over-vigilance and control²². There is flexibility in the production process but an offshoring of companies as knowledge evolves into value-adding elements within a culture of innovation, and for innovation and progress. Current politics have opted for a constant privatisation of state organisations and companies plus adding the increasing number of problems related to working conditions, unemployment, and lack of resources, have worsened the situation.

²² Regarding Foucault's notion of over-vigilance of the state and control or punishments since the Middle Ages as gathered in his book *Vigilance and Punish* (1986).

Some of the challenges the society must face nowadays to reverse the social, political, and environmental crisis brought by postmodernism, are summarised here:

- **Globalisation and the un-rooting of the economy:** Robertson (2015) coined the term globalisation “to describe a process by which the world is being integrated” (pp.2). But not only does globalisation integrate or unified the world and world countries but it reduces to nothing but a flatline. In economic terms, the existence of big corporations and companies around the world and because of the impact of globalisation on global markets, this mesmerises the influence of less big companies worldwide and the stock market resulting in smaller resulting in the latter to have a limited geographical localisation abroad. These corporations lead the international business sector and their aim, apart from supporting privatisation, is to maximise their global earnings. In their attempt to also control global politics, they organise themselves into *lobbies* to better influence international organisations and country-based governments. These corporations and their business strategies propel the process of un-rooting of the economy and the offshoring of companies. According to Gereffi and Kaplinsky (2001:2) “the lead firms are predominantly located in developed countries (...) They play a significant role in specifying what is to be produced, how and by whom”. Considering globalisation also brings a disequilibrium in the localisation of these lead firms, it also has a negative impact over underdeveloped countries or over countries in the process of development.
- **The growing social inequalities:** social issues like poverty, undernourishment, hunger... are still on the growth according to recent data offered by international organisations like the UN. Social inequalities have increased all through the XX century and it is feared that they will still increase more throughout the XX’s century. The capitalist model of the economy enriches a few and impoverishes a greater number of the world’s citizens. According to Nobel Laureate Stiglitz (2016) the economic growth has only benefited those in the higher social and economic status²³.
- **The environmental unsustainability of the unlimited economic growth:** current economy is based on a model that is environmentally unsustainable. Nowadays the average citizen consumes more natural resources and emits more waste than the earth can largely

²³ In this quote Stiglitz (2016:1) refers to “the rising tide hypothesis” where “resources given to the rich will trickle down to the rest” so, we must give more money to those in the bottom to benefit not just the richest part of the population or “the ones above”.

regenerate and produce on an everyday basis. The initial idea of unlimited economic growth has turned into a model, environmentally unsustainable.

- **The running out of resources:** continuing with the previous point, we are foreboding an imminent crisis on the number of resources we consume that can evolve into more challenging social and economic changes. Petrol is the current main source of energy and power. Worldwide economy stands on the variability of petrol and its undergoing value in terms of money and the stock exchange. The decrease in the monetary value of petrol creates an urgent need for a change in economics and current company models and lifestyle. Thus, we must build social and economic models that are not so dependent on petrol and its variances, reduce the unlimited consumption of energy and bet for alternative power sources like wind or solar power, and work together to support the energetic efficiency of our companies and industry.
- **The increase of individualisation and consumerism:** as we live in a society that highlights the approach to the individual and the process of individualisation through concepts like self-realisation and the satisfaction of our own needs. Instead of considering the individual as part of a collective or a community, the present postmodern manifesto underlines the impact of the individual alone on the postmodern world and society. Individualism nurtures from a tendency that prides consumerism in current societies. This type of consumerism is rather more emotional than mechanical, and barely satisfies the desires within us. There is a good reflection and argumentation of this in Zygmunt Bauman's book *Consuming Life*, where the author explains that the consumer society associates happiness with a rising volume of desires, which imply in turn a speedy replacement of the objects intended to gratify them²⁴. There is a constant need for change and novelty, and when the individual cannot achieve this, frustration happens. There is a global need to install new lifestyles and guarantee well-being and survival and reinforce business ethics and alternative economies that can arrange life opposite to a consumerist approach.
- **The distribution of employment:** the ongoing financial crisis has worsened the situation of those seeking jobs, employment rates and working conditions in general. However, the

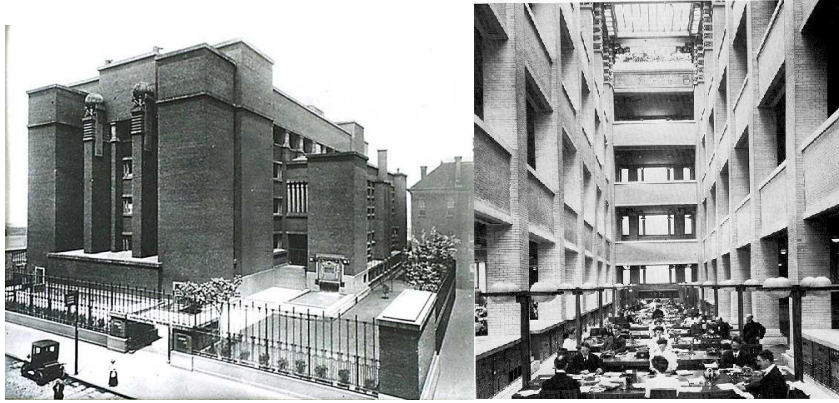
²⁴ According to the quote by Zygmunt Bauman, one of the greatest theorists and thinkers of the XX century, the consumer society's main source of gratification is the fulfilment of self's desires by a perpetual process of consumption of goods. He explains that the liquid society is nothing else than the actual reflection of oneself accomplishments regarding a cycle of constant consumption and self satisfaction based on prefabricated goods and instant commodities.

problem exposes far bigger issues than just the process of seeking a job or the lack of permanent job placements as this also becomes diluted in the greater social problem that all in all, hides the less important or less interesting problems. Therefore, discussion continues to exist as part of the global debate on the distribution of employment, the increase in the number of jobseekers, and finding better ways for managing people by granting access to remunerated jobs and finally, earning a decent life.

To summarise, some of the biggest issues postmodernism has brought are mainly condensed in the improvement of the distribution of wealth, social and economical growth, and sustainability. However, the postmodern crisis leads one step further as social breakdowns and the rapid consumption of the world's natural resources collide with an underlying problem of lack of individual thought and freedom, and the neutralisation or homogenisation of thought and subjectivity. Besides, without a founded belief in the future, the whole structure of the Western societies falls apart, as Nietzsche noted the role progress has played in the building of Western societies and in the decadence of these same societies into chaos (Gare,2006). Postmodernity is not only a term that refers to the current postmodern era, but a conceptual dilemma and an understanding of an ideology that has partly driven humanity to its features and camouflaged attractiveness.

2.3 The history of workplaces

There have been huge changes going on regarding workplaces during the last decades. A growing interest in the analysis of workplaces has turned workplaces from space designed exclusively for working to a multitasking, multicultural space. The changes in social beliefs, progress, and new ways of considering work have replaced old industrial areas and crowded closed offices with architectonic enriching spaces. As a result, and for this study, I have considered it essential to make a retrospective of the history of workplaces to see how offices have changed throughout the years and why do current offices and workplaces adopt tendencies and designs that relate to openness, greenery, ergonomic sceneries, and tasks driven by teamwork and collaboration. The first modern office was built by American architect Frank Lloyd Wright in 1903 at the Larkin Administration Building in New York. It was a translucent space that included teamwork, corporate identity to increase productivity, facilities for remodelling with centralised systems (see, image 2):

**IMAGE 2**

Larkin administration building

Source: Retrieved from google photos.

Early open plan offices followed the principles of Taylorism²⁵ that were rooted in the work of industrial engineers and efficiency experts like Frederick Taylor. With the invention of steel frame construction and lifts, buildings could scale more than 10 storeys for the first time. Skyscrapers would sweep the land allowing vast workforces to inhabit ever smaller square feet of increasingly expensive land. The office at that time was incredibly regimented, as workers sat at endless rows of desks with managers occupying the surrounding offices looking at them.

This approach was replaced in Europe in the 1960s by the development of “Bürolandschaft” or office landscaping. The *Bürolandschaft* originated by the Schnelle brothers (1958) of the *Quickborners*²⁶ consulting group, and according to Sundstrom and Graehl (1986), their main argument rejected the conventional arrangements of desks in parallel rows and claimed that open offices were more efficient. The German concept of the “Bürolandschaft” that in German means “landscape-office” used organic groupings of desks in patterns designed to encourage conversation and create a happier workforce. The traditional design used contemporary but conventional furniture with lateral file cabinets and large, potted plants that were used as partitions between desks. These were the first open plan offices in the history of workplaces. The “Bürolandschaft” according to Sundstrom and Graehl (1986:36) was “an entirely open office

²⁵ Taylorism: term originated from Taylor and Ford's first supply-chain factory that contributed to the origins of work-chain as the main workforce for industrial production and manufacturing (Encyclopaedia Britannica).

²⁶ The Quickborners: also referred to the *Quickborner team* in relation to a German consulting group “Quickborner”, where the Schnelle brothers, alongside the help of their team, invented the *Bürolandschaft* office.

arranged for efficient workflow, convenient communication and minimal indications of stuff". Besides, the "Bürolandschaft" tendency brought socialist values to business and office design, like the reduction in management and the distribution of the workplace and the people very attached to the ideological and political origins of the DDR²⁷ or West Germany. The German State Library was the first office designed according to *Bürolandschaft* patterns built by Hans Scharoun between 1964-1978 (see, image 3):



IMAGE 3

Bürolandschaft

Source: retrieved from Treutler (2017).

The *Bürolandschaft* first appeared in the United States in 1967 at the DuPont offices²⁸, and as Sundstrom and Graehl (1986) explain it allowed fast and cheap changes of layout but also saved space and it saved costs. However, the challenge was to eliminate hierarchy and turn management and power into a more socially democratic layout according to the German socialist values by encouraging interaction and positive human behaviour. This brought some employees, mainly mid-managers, to complain and claim the private office as a symbol of their status and oppose the "Bürolandschaft" design and ideology. This initial discontent increased due to problems with noise and lack of privacy.

²⁷ DDR: *Deutsche Demokratische Republik* or the German Democratic Republic was the Western part of Germany ruled by the URSS or the Soviet Union as a result of the re-organisation of the territory by the allied winning forces of the Second World War that lasted until 1989 or the end of the Cold War era.

²⁸ DuPont offices located in Delaware meant the first offices opened according to the *bürolandschaft* design values.

After the “Bürolandschaft” movement came what is known today as The Action Office, first introduced by Robert Propst²⁹. The first modular office furniture collections are still in use today. He introduced concepts like flexible and semi-enclosed workspaces, which allowed office spaces to be personalised and frequently modified to suit the needs of the company and its workers. In the 1980s, after the original idea of the action office, cheap and effective modular walls led to a sea of cubicles all over the globe. Cubicles arrived as economic growth created a swell in the number of mid-managers. Propst thought that the action office would bring flexibility and independence as it is reflected in the interiors of Herman Miller’s living office in New York (see, image 4):



IMAGE 4

Herman Miller interiors

Source: Retrieved from Wall Street Journal (2014).

With the beginning of the new millennium and within the advance in technology, workers became more mobile. Laptops, mobile phones, Wi-Fi, and new trends did not demand to be tied to a desk. This allowed workers to interact and collaborate more freely in the workplace. As the internet website specialised in office design and workplaces *Of Human Spaces* explains, the reaction inside the office was to make things more fun by appealing to the individual non-working self and transforming the environment to create work and leisure in one same space. Already in the XXI century, new features began to be considered within the design and the layout of the office and the workplace. The psychological aspect of employees and concepts like well-being began to claim attention from experts.

²⁹ Robert Propst: he designed the office after having done research on how office elements influence the office worker, and how these elements may be redesigned to improve health and productivity.

One such new trend, the biophilic design, was introduced around the 2010s and complemented design and layout with ideas mentioned above like, connecting nature and the workplace, and allowing to build an environment that connects the self with the other. As Kellert, Heerwagen and Mador (2008:3) state, “biophilic design is the deliberate attempt to translate an understanding of the inherent human affinity to affiliate with natural systems and processes into the design of the built environment”. Based on existing data about biophilic design, a growing number of experts like Kellert et al. (2008:5) admit that “office settings with natural lighting, natural ventilation and other environmental features result in improved worker performance, lower stress and greater motivation”. The biophilic design is characterised by the presence of plants, earth colours, natural lighting and ventilation and shapes imitating natural patterns (see, image 5):



IMAGE 5

Biophilic design

Source: Retrieved on May 25, 2017, from Google photos.

The biophilic design also cares for the environment and stimulates the concept of sustainability that has been increasingly gaining adepts in the last years. The desire for providing natural spaces in the office and planning a design that recreates Earth colours, natural lighting, and natural patterns, where the connection with nature predominates, also claims awareness for nature, the environment, and sustainability. Open luminous spaces and mobile furniture occupy now, the space where in contrast, enclosed cubicles stood in the previous century. The history of workplaces briefly shows how the office and the workplace have changed as the world and society evolved around and politics and ideologies changed. This did also enable to transform work and the subjects taking part and added different values to the concept of work and how work is understood by office managers changing working habits and traditional individualistic or bourgeois approach to work. Some of these current trends include Coworking and Hot Desking Tech, or the concept of *Worktivity*³⁰.

2.3.1 The technological revolution and workplaces

The same way technological revolution affected society and the world it also made a great impact on how work is understood today. At organisations and institutions people spend a great amount of time in front of an ecstatic screen, whether a laptop or a computer limiting their vision to a technological device. At the current work scheme, it is crucial for workers to know and learn IT skills to be able to promote and advance in life. Traditional modelled workers like craftsmen have declined in number in recent years partly due to the modernisation and technification of work, whereas positions which require basic skills at computation have potentially increased, as manual work is being transformed into an automatic or semi-automatic process.

According to Bender (2013) the technologically centred workspace has changed the understanding of space as technology somehow “erases” the surrounding human presence and dilutes the virtual world. Technology enables communication beyond the physical distance and this new freedom or autonomy technology has offered, constructs another dimension in our brains that demands new types of neuronal processes and understanding.

³⁰ *Worktivity*: like in *The Hubble* for London, the term is coined for offices that seek to create social, professional, and creative spaces for even more mobile and flexible staff like spaces for playing, creating, eating, and socialising.

As Rogers (1986:2) defines, “communication technology is the hardware equipment, organizational structures, and social values by which individuals collect, process and exchange information with other individuals (...) however, all communication technology extends the human senses of touching, smelling, tasting and hearing and seeing. Such extensions allow the individual to reach out in space and time”. As Prensky (2012) also describes, human brains change in response to the surrounding environment and nowadays it is in a new symbiosis with technology. Technology opens us a whole new world, as our mind does not stay static in one place or just one surrounding, but it expands to the external, to what technology brings from the outside world. The brain is not set to develop itself statically but dynamically to the extent that technology and new communication channels have revolutionised the way we learn and think. This massive transformation has also changed the way we work, and the way workplaces are now being designed. The “openness” that some workplaces offer, like Coworking spaces, share similarities to the idea of *externality of the mind* as seen in Husserl in or the sociability process described by Lefebvre. To be opened to a new world and to new possibilities are the main axis of the current technologically shaped lifestyle and somehow, technology has enabled both autonomy and openness. One of the greatest inventions of the last decades has undoubtedly been the Internet.

Nowadays, we are no longer bound to a physical space as we can be anywhere in the world and connect from all around the world at any moment. According to Anandarajan, Thompson and Simmers (2015:3-4) “the Internet is transforming our workplaces due to the enormous amount of information available, the disaggregation of work and location, and the rapid worldwide adoption of this technology (...) the Internet-enabled workplace also brings the advantages of flexibility to employees and to organizations when work is disconnected from place, time, and the information availability constraints”.

New internet-based applications like Skype allow instant communication with anyone from any part of the world. However, information becomes more segregated and there is the threat of appropriating foreign information or hacking data by illicit practice. However, the Internet has enabled a level of connection unimaginable ever before. Although the invention of the telephone, mass transport and television established new methods of communication, the Internet has revolutionised the whole concept of staying connected. Every mobile device used nowadays, (laptop, smartphones, TV) enables all kinds of instant connection despite being miles apart. Organisations have also taken advantage of this new wireless revolution, and many have restructured their working space into what are known as *High-Tech* offices as the High-Tech office,

specifically, the new Mac offices in Vienna designed by architects Najjar and Najjar (see, image 6):



IMAGE 6

High-tech office

Source: retrieved May 25, 2017, from Google photos.

However, workplace relationships have become more distant than before. Technology and the Internet have set a whole network of new, fast, and efficient communication channels but, employees do not communicate with each other nor engage in a work-based relationship as much as before. The lack of contact and the lack of sharing of experiences and emotions within these high-tech offices have led workplaces to become cold and distant spaces within a superefficient, high-speed design. Despite their architecture and ultra-modern layout, technology has partly distanced people from each other as it has assumingly reduced face-to-face contact and interaction. However, new workspaces like Coworking spaces, try to re-engage people and establish more human and less distant relationships by creating a sense of community inside the workplace.

2.3.2 The Coworking space

The concept of Coworking was first coined by DeKoven in 1999 and applied by Neuberg (2005) when he launched the Hat Factory, the first co-working environment in San Francisco. As Ramírez Leyva (2018) explains, it was basically an apartment where three information technology professionals would open their doors to freelancers who needed a place to work and wanted to share their experiences. Many autonomous workers found isolation one of the negative aspects of working alone. The Coworking space gave these professionals the opportunity to work together in the same space by sharing experiences and values, and by creating synergies.

The initial idea by DeKoven described a continuum ranging from competition to cooperation as gathered in Mills (1998). As DeKoven wrote on his blog “when I coined the term “Coworking” I was describing a phenomenon I called “working together as equals” (...) for the most part, people don’t work together as equals, especially not in the business world where they are graded and isolated, categorized and shuffled into hierarchy that separates them by rank and salary level”³¹. As stated before, the Coworking movement, although theoretically attributed to DeKoven, was first launched in San Francisco by Neuberg in 2005, when he began using the term “Co-Working” to describe a shared physical space while adding a new dimension to DeKoven’s original Coworking concept. The following statement describes what Neuberg (2005:9) said about Coworking:

“Traditionally, society forces us to choose between working at home for ourselves or working at an office for a company. If we work at a traditional 9 to 5 company job, we get community and structure, but lose freedom and the ability to control our own lives. If we work for ourselves at home, we gain independence but suffer loneliness and bad habits from not being surrounded by a work community. Coworking is a solution to this problem in which co-working, independent writers, programmers, and creators come together in community, a few days a week. Coworking provides the office of a traditional corporate job, but in a unique way”.

Mobile technology has allowed the mobility of workers from close, static workspaces to open and mobile offices.

³¹ *Deepfun* with Bernard DeKoven based on an interview, he explains the origins of the term *coworking* and the opening of the first Coworking offices in the San Francisco area.

Nowadays, it is common to work outside the office not only at home but in different spaces and environments. Major cities have beaten the challenge of the traditional office and have adapted their space to the demands of a changing market and lifestyle. There is no need for a static space to work from anymore. Mobile phones, laptops, tablets, and other technological devices have enabled the movement of workers around the city and the globe. According to authors Johns and Gratton (2013) today, there are more than 2000 Coworking spaces across the globe. A Coworking space is described by Willis and Aurigi (2018:1) as “community-based, low-cost, convenient, and eco-friendly solution” that has significantly changed the modern world’s vision of work and workplaces. Furthermore, for employers today, it is important to learn how to capitalise the virtualisation of work although there are initiatives organisations should consider adopting. In relation to this research study, the first of such two initiatives are the following:

- Focus on collaboration → as Willis and Aurigi (2018:1) say, “in the 21st century a new approach to work in a large organization must be aimed at supporting greater collaboration—the heart of an enterprise’s ability to innovate better and faster”.
- Reconceive physical workspaces → Willis and Aurigi (2018:1) explain, “private offices and cubicles are being replaced by more flexible, communal, and transparent workspaces”, trying to obtain a better culture, creativity, and support that “lead to greater trust, teamwork and quality”.

Other initiatives Willis and Aurigi (2018) describe include: the reconstruction of workflows to tap remote talent, to enable organisations to increase mobile platforms and collaborative technology; the investment in intuitive technology to increase the use of fast IT technology and tools; the recognition of idiosyncrasy to encourage employees to engage in different working personalities.

2.3.2.1 Harvard: third wave virtual work

In relation to the previous point, in the article published in the Harvard business review by Johns and Gratton (2013)³² analyse the changing nature of virtual work dependable on technology by dividing it into three different categories or waves. The first wave of virtual work is described as the period around the 1980s when a “freelance nation” of virtual workers emerged.

³² See, *Harvard Business Review* in <https://hbr.org/2013/05/the-third-wave-of-virtual-work.html>

As Johns and Gratton (2013) express this turn into virtual workers allowed -stay-at-home parents, caregivers, retirees, students-to enter the labour market. New jobs like writers or graphic designers began to emerge as freelancers were also hired by companies to do several inner tasks on a temporary level.

The second wave refers to the compromises attained between freelancers and company employers to benefit from the autonomy technology gives to continue working without having to stay physically in the office. Some XXI century events brought the idea of compromising organisations to virtual work giving the chance something like the SARS³³ pandemic-scare happens again and to be able to continue working despite having to stay confined at home. The current ongoing Covid-19 epidemic has also brought new ways of telematic, and virtual working even adapted for schools and Universities and young students. As explained by Johns and Gratton (2013) the option of working from home began to increase and soon organisations noticed that by joining in teamwork, people achieved significantly greater productivity and lower turnover than -inside the office.

The third wave meant virtual coworking, where after overcoming the first barriers organisations worked on enhancing teamwork, collaboration and coworking through the virtual world, driven by workers showing their concerns about their working lives which often lack a sense of community and limit collaboration. As a result, the third wave of virtual work tried to give a sense of a shared community to virtual workers. Nowadays, virtual work has advanced to new steps. What Johns and Gratton (2013) call *the Urban Hub*³⁴ or spaces used by mobile workers, are now varied and extensive.

As it was commented throughout the introduction, airports, hotels, or coffee-shops have become the new Hubs for mobile workers. This new urban environment has also transformed how work is understood and how the working space should be like with new tendencies rising and bringing innovative ideas everyday. As Johns and Gratton (2013) say, "Citizen Space in San Francisco, San Jose and Las Vegas, Somerset House in London, and the Hub, in Amsterdam and about 30 other cities worldwide, provide open workspaces, current technology, and creative environments (...)

³³ SARS pandemic: it refers to a 2003 outbreak of severe acute respiratory syndrome that spread from continent to continent with ease resulting in >8.000 infections, with approximately 10% mortality according to the National Institute of Health (USA).

³⁴ Urban Hub: a conglomeration of different hubs around the world that offered a space for mobile workers like *Citizen Space* in San Francisco or *The Hub* in Amsterdam.

they strike a balance between comfort and function” referring to the most prominent Coworking spaces and Hubs around the world.

These first Hubs were highly innovative and eye-catching in many ways: they occupied a strategic location in city centres reducing the long commuting hours, and the interior design was innovative with wide-open floor plans and high unfinished ceilings. The inside of these Hubs was new and attractive and far looking from the traditional office or former cubicles. These spaces have rapidly increased in number since the first Hubs in San Francisco. As Johns and Gratton (2013) continue to explain, these workspaces (or Hubs) have been strategically designed to connect people who generally work alone and have become the new trend for virtual and non-virtual workers.

2.4 The change of the urban space: the city, technology, and the changing nature of work

After the Second World War, cities and social issue changed dramatically. Both World Wars meant the loss of moral values and in general, a loss of all kinds of values. Besides, the revolution of technology and science brought the digitalization of culture, meaning that an objectivity order had replaced the subjectivity of the human being. As Husserl explained, consciousness must determine any kind of valid proximity to reality, thus always based on the subject as the personal I or the Ego, that captures the whole of this reality (Amigo,2003). The objective truth of things becomes personalized as the outside reality and the I-ego are not two opposed poles but two spotlights from the conscience. These premises were assumed by hermeneutics³⁵ like Jaspers, Gadamer and Ricoeur who opened the personal I-ego to the “other”, underlining the social responsibility (Amigo,2003).

Furthermore, we must resist globalisation and technocratic tendencies that do not assume the condition of human dignity. Workplaces, alongside other spaces in life are socially produced by re-citing Lefebvre (1905) as the “other” plays an important role in the human socialisation mechanism.

³⁵ As defined by Palmer (1969:3) “hermeneutics is the focal point of today’s theological issues” a term asserted to Martin Heidegger has a field in theology, philosophy, and literary interpretation that centres in the study of the methodological principles of interpretation and explanation.

Technology brings progress within and can hugely improve spaces where the socialisation process occurs. However, the reflection of the “other” inside us can also have a negative impact and result in not being totally able to erase this negative impact. Consequently, we ought to diminish the effects of this loss of identity that progress carries within if we desire to eliminate the negative impact the personification of the *otherness* brings.

Since the XIX century, society has assumed an ideology where normality or what is normal morally means the correct thing, so man gets homogenised inside this social mass seemingly underlying the loss of identity and dignity within as he offers himself to the normalisation and gentrification of the mass. Foucault said about the loss of identity that it is just the “awakening of the anthropological dream”³⁶ by following Habermas’s statement on Sense. During the XX century the inheritance of the former Industrial Revolution became more visible within the Darwinian character of developed societies, as competitiveness and market laws reign over every human sphere (Amigo,2003). The loss of humanity in the homogenised mass in favour of business and market-imposed laws, deletes the integrity of the human being by reducing it to a mere social role. This problem has severely increased with the radicalisation of the computerised or digitalised society and the feeling of attachment to that technological and virtual world. In addition, worldwide organisations suffer from the consequences the loss of the identity brought to their employees, in the same way it also affected the concept of the workplaces and even the concept of work.

Nowadays, there exists an opposition between the vital space (urban) and the virtual space that still needs to be again humanised by recovering the identity it lost to the technification of the world and the society. Scientific and technical progress have also brought a sense of misinterpreted utopia that is still nowadays, impossible to achieve as technology has been considered the means for obtaining an ideal state of life known as utopia. However, neither the improvement of technology nor science has brought any kind of ideal state. The historicity of the individual has been demolished inside the cyclic existence of progress.

³⁶ Foucault and the anthropological awakening: according to Cohen (2008:316) “with the anthropologization of modern thought, however, philosophy enters into what Foucault characterizes as a deep “slumber”, from which he insists it now ought to awaken (...) when the face of man will disappear like the fading contents of an unsettling dream”.

But when a rupture on this cycle appears and historicity becomes discontinued, man has not been able to convert this state and has become anxious about his own existence. To be permanently in this state of anxiety can affect the self-presence in certain spaces. Pinillos (1977) says that the economical and technical progress distance itself from what we understood as history becoming just a role of the historical order thus, socially categorised as the instrumentalization of progress. From this historical discontinuity have risen many problems affecting humans, the human condition, and the social sphere we dominate.

Furthermore, modern city structures do not help improve the situation ahead. The architecture of the urban space, like the case of cities, compels citizens to walk through the same streets, share the same corners and avenues all the time. The speed of life nowadays surrogate individuals into anxiety and domination, where technology installs its own living conditions. Although technology liberates the individual from effort and sacrifice, it somehow dominates the whole of the society due to the pressure that executes on the individual generating a state of constant anxiety. The same feeling is then transcended to the spaces we use for living and work. Traditional workplaces were exactly designed following old patterns of urban architecture that sometimes seemed chaotic and disorganised. Due to the anxiety these structures produced, it was a social and a moral necessity to reinvent the idea of workplaces and replace the old rectangular and enclosed offices with open-plan areas.

As described by Pinillos (1977) the reduction of the living space to inter-connected structures generated a state of anomia that as a result of the accelerated technological revolution and the historical discontinuity among generations have shown cases of social anxiety and ammonia among affected individuals. This as the result of emptiness, is many times the general feeling people experience at work and in their everyday life in the city, as most of the time of our daily existence transfers between architecturally pre-organised spaces that impose their own movements and force certain, pre-assumed psychological operations. As Pinillos (1977) continues to explain, either private life or work are executed in areas where the natural space has been replaced by geometric constructions that are visualised as outcasts of the physical body and the spiritual mind of the individual. The structure of the cities and many workplaces worldwide have also been architecturally designed to transmit the individual a sense of order and respect that society's current values stand for. The natural space has been drastically reduced and the loss of natural areas has generated further psychological problems. As Nietzsche explained and gathered by Pinillos (1977) due to the hyper-organization of the urban spaces there is an obsession that evolves into a social illness.

However, the modern individual lives better than before, as modernity and technology have brought commodities that facilitate life in all its aspects. However, as Marxist theory states, the abundance of industrially produced goods, generates a clumsiness of the critical conscience. Happiness is a prefabricated good, on average with the goodwill economy of the current societies.

The process of converting natural space into urban space rose with the XIX century's industrialisation process. Industrialisation attracted many peasants to the city to work at the factories there were being built to earn a better life. However, the city did not fulfil their expectations and these early workers fell into poverty, misery, and alienation from the surrounding society. Nevertheless, profit-makers invested money in the improvement of the industry and the city, mainly for the enjoyment of factory-owners, bourgeois, and wealthy families. These first executives transformed the city into a nourishing urban space by building shops, boutiques and elegant market areas separated from the suburbs where factory workers and their families lived, and the city began to redesign itself with elegant neighbourhoods, avenues, and areas for the entertainment of the rich (see, image 7):



IMAGE 7

Oxford street in XIX century

Source: Retrieved on 4 July 2017, from Google photos.

The increase in the population also forced city councils to build expansion districts around the city centre. These districts provided a place to live for the increasing middle-class of the XX century, those who made profit by working in factories and now owned a small amount of wealth for their living and recreation. Some of these expansion districts were considered separate neighbourhoods where their neighbours could sustain themselves without the need of the city's main structures. Furthermore, with the founding and settling of the middle-class other necessities also arose, such

as, leisure areas, educational institutions, recreational parks, hospitals, and all kinds of stores. In addition, work and workplaces also took another meaning.

2.4.1 Opening of new spaces to work

Since the early industrial era, new demands were met by the changing nature of work like specialised workforce and experts in communication, human resources, or job security that replaced the old manual and unskilled workforce. These new trends separated from the primary industry and early manufacturers and have replaced handwork with faster and more advanced tools and machinery because of the advance in technology and progress. It is not just the production of goods that society demands now, but other more sophisticated inquiries like consultants, analysts, or academics. Many of these new jobs could not be established inside an industrial seal or area but at extended neighbourhoods and districts or avenues and the centre of the city, where forthcoming clients and customers live. Jobs have become more selective and sophisticated and qualified people with higher studies are demanded to occupy these job placements.

Workplaces have suffered countless transformations too since the early XX century. The technological revolution has brought a brand-new concept of work with mobile workers and virtual and non-virtual communication rapidly becoming the pillar of these new working spaces. As a result, apart from the change in the demand on the type of job or service offered, the changing nature of work and technology have brought a whole new dimension of freelance or self-employed workers to the work scheme. As it is explained by McLoughlin, Preece and Dawson (2000:1749), “workers whose jobs have become more mobile through the re-engineering of organisations to become more customer-focused, coupled with the opportunities offered by technology”.

However, it is often difficult for self-employed workers to be able to rent a place, pay their annual taxes and progress on their businesses. In consequence, many of these workers have decided to join other freelancers or self-employed workers with the aim of sharing expenses and improving the progress of their businesses. Such has been the tendency lately that new concepts like coworking or Coworking spaces have rapidly gained popularity. As Andriessen (2003:3-5) explains, “the world of work is changing. The type of work itself, the workers and their tools are becoming radically different. Three primary drivers can be distinguished: technological changes, market changes and social changes (...) Most employees in western societies consist of information or knowledge workers who produce and process information in one way or another”.

As it has also been earlier explained, Coworking spaces have been created to facilitate freelance or self-employed jobs and promote collaboration. In exchange of an affordable monthly rate, these workers can join a communal space, where other freelancers or self-employed are working, facilitating employee collaboration, getting to know their businesses, and becoming part of a community.

To summarize, collaboration is one of the most important aspects of work today. But for freelance or self-employed workers, it is sometimes difficult to find partners who share the same goals and type of business. Different to jobs regarding services like beauticians, photographers or architects, many freelancers who opt to become entrepreneurs and set a business themselves must face many difficulties throughout their journey of becoming part of a small company, so it is always a good option to be able to collaborate and find joint partners to drive their business together. In this way, technology has largely helped to establish collaboration networks for any worker who wishes to co-operate with a business project. Andriessen (2006:4-10) also states that “technological developments are related to the trends towards more teamwork within and co-operation between organisations. Teamwork is essential to effective modern organisations (...) teamwork and co-operation requires communication and information exchange” and for that, technology becomes an essential tool.

Social networking platforms ultimately, have been the last invention for anyone willing to establish contacts or create professional networks virtually. Besides, nowadays, information is reached rapidly across any part of the world, and anyone can have access to it within seconds. All these new networks and the speed at which new information is generated and shared is crucial for any business and company not just for profit and benefits but also to gain recognition inside such a competitive worldwide market. Anyone can take advantage of these opportunities technology and virtual work offer as work becomes more mobile. As explained by Hislop (2008:28-29), “mobile workplaces are non-traditional work settings but cafés, parks, or airport lounges (...) in recent years such locations have important workplaces for mobile professionals among remote workers, telecommuters, self-employed, freelance workers, and entrepreneurs”.

Mobile work and mobile workplaces partly connect with the idea of heterotopia (Foucault and Miskowiec,1967) described in the first part of this chapter, as they are turned into workplaces that collide with the original concept of workplace (a primary construction designed to place office workers inside a larger company or at industrial era factories). Nowadays, some of these places where people work and are built for a working purpose, are not strictly or formerly considered workplaces but areas

built in cities to cover different needs and services for the average citizen, which could be coffee-shops, city Hubs or Coworking spaces.

Coworking spaces as interconnected networks for freelancers and self-employed workers, have been designed with the aim of offering a new service and to be able to respond to a change on the demand that has been transformed by technology and the high rents in the city. In addition, many of these spaces have been and are being designed according to open space-plans³⁷ with technology in the centre of all communication and information exchange. Technology as the most efficient tool that facilitates contact by email or social networking platforms, allows a constant interaction between workers that enhance teamwork and collaboration. However, although technology has enabled all this inter-connection and a rapid exchange of information and knowledge, Coworking spaces would be futile if they would not promote and engage collaboration between co-workers as their collaborative-community nature is not fulfilled.

³⁷ Open-space plan: concept developed by Brooks and Kaplan in 1972 alongside other experts on the matter of office design and partially as an aftermath of the *bürolandschaft* planning.

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CHAPTER 3

The benefits of working together

3. THE BENEFITS OF WORKING TOGETHER

“Collaboration drives creativity because innovation always emerges from a series of sparks-never a single flash of insight” -Keith Sawyer.

In the previous chapters, the concepts of space and postmodernism have been economically, historically, and socially contextualised and it has been briefly introduced the changing of workplaces through historical development that have resulted in an increase of mobile workers and new spaces to work like Coworking space. However, as one of the main points of study is the analysis of employee collaboration, it is essential to address what collaboration is and why it is important for the current workforce. Regardless to say, it is not only important to collaborate at work, but humans need interactions and social involvement to progress and survive. Collaboration, as the peak of human sociability and the socialisation process is a necessary skill all humans need to develop and to continue to exist as a society.

Collaboration is one of the most important features for success at organisational level. As it has been stated so far, it is important for organisations to collaborate and to foster collaboration among their employees. As Field (2003:7) states in the introduction to his book, “people connect through a series of networks, and they tend to share common values with other members of these networks; to the extent that these networks constitute a resource” similar to community-life. Collaboration has many different definitions. As gathered by Wood and Grey (1991:4), collaboration is “a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible”. In addition, according to the definition given by Logsdon (1991) and included in Hartono and Holsapple (2004:5), collaboration is “a process of joint decision making (...) of a problem domain about the future of that domain” where it is clearly identifying by some experts the necessity of defining the means and the objective of the collaboration process.

Both definitions highlight the main idea of collaboration as a process intended for problem-solving through decision making and exploration that guarantees a solution for the future. In addition, as

Wood and Grey (1991) define and considered by Burke and Demirag (2017:27) addressing collaboration as “solutions that go beyond their-employees, leaders-own limited vision”, implies that collaboration needs an openness of the mind and the ability to go beyond personal limitations by accepting the other’s point of view that may certainly differ from our own. By accepting this, we open to the other and the *otherness*, concepts explained by Lefebvre (1905) and Husserl’s phenomenology (Spielberger and Biemel,2017) already explained in chapter two.

Nowadays, with the changing nature of work, it is long forgotten the individualistic approach to work. Despite existing personal interactions related to the working environment and the workplace, these have lately been reduced to small talks. Nowadays, these relationships and interactions have extended from indoor spaces to outdoor areas outside the workplace boundaries, where anyone can be reached virtually or physically at any time of the day.

There is a current trend in the workplace and even a necessity to promote collaboration among employees from inside the company. It is crucial to learn skills on teamwork and collaboration not only for work related matters, but also to become efficient citizens for society.

The following chapter is organised into three different sections:

1. Conceptualisation of humans as social beings
2. The concept and contextualisation of collaboration
3. Measuring employee collaboration

3.1 Conceptualisation of humans as social being

Working groups function best when they have a shared identity and set common goals to succeed (Latham,2007). On a day-to-day basis collaboration marks the flow for setting common goals and working in partnership to achieve these. Schrage (1990) in his book *Shared Minds* underlines the importance of collaboration and collaborative teams by narrating the different boundaries affected by collaborative processes in life. Furthermore, Vera (2000:107) in his book *Creative Collaboration* highlights that “social, cultural, historical, and biological conditions together contribute to the realization of human possibility. Central to such an approach is the principle that humans come into being and mature in relation to others”, underlining the natural human-sociability skill for the collaborative process. So, can collaboration be an innate attribute to human sociability?

As explained by Lefebvre (1905) and as seen in the previous chapter, sociability of human nature is evoked by enhancing the social production of human space as the individual needs to live in

society. However, the concept that humans are sociable by nature is not a new affirmation. Since the early cavemen, humans tend to join in community-life not only for survival or for preserving the species, but for personal growth. The built-in society is the example of the ultimate human sociability process that after years of development and interactions has become a well-structured boundless construct. Vera (2000:37) includes a cite by Simone de Beauvoir that efficiently summarizes the innate nature of human sociability:

“We have a common store of memories, knowledge and images behind us; our attempts to grasp the world are undertaken with the same tools, set within the same framework, guided by the same touchstones. Very often one of us begins a sentence and the other finishes it; if someone asks us a question, we have been known to produce identical answers. The stimulus of a word, a sensation, a shadow, sends us traveling along the same inner path, and we arrive simultaneously at a conclusion, a memory, an association completely inexplicable to the third person”.

Consequently, being humans naturally sociable, it is thoroughly expected for the individual to enhance joint teamwork and build partnership and collaboration in favour of achieving common goals and to benefit the team and oneself.

3.2 The concept and contextualisation of collaboration

As Salas, Rico, and Passmore (2017:3) cite, “a team can be operationalized as a set of two or more individuals that adaptively and dynamically interact through specific roles as they work towards shared and valued goals”. It is necessary to highlight the words “shared and valued goals” as they make a reference to collaboration’s definition of constructively exploring their differences as cited in Wood and Grey (1991), as it is utterly important to establish common goals that can part from individual differences but drive employees to work and collaborate.

Salas et al. (2017) also state that since the late 20th century, the global economy has seen drastic changes strategically and technologically. In response, organisations have shifted from hierarchical structures to dividing collective efforts more efficiently, underlining the importance of the transformations work and global economy have suffered due to social changes and

The progress of technology. In consequence, collaboration now occupies a primary place in organisations and the world alone as society has learnt about the benefits of collaboration.

3.2.1 The power of teamwork

Teamwork is not a modern concept. People have been working together since the early civilizations. Romans for example, used to build teams to fight against the enemies. During Medieval times and following Durkheim³⁸ it existed as a “mechanical solidarity” in the feudal world based on the fixed structures and obligations between lord and peasant, cleric, and artisan. In contrast, in capitalistic, industrial societies, people live in a world where interpersonal relationships are mostly based on a variety of everyday interactions between neighbours, colleagues at work, family and friends or random people. However, current interactions are normally based on one’s self-interest and as a medium to reach an objective whatever the context and the setting.

A commonly shared “style of life” cited by Weber (1978), was a fundamental component of status-groups. Karl Marx’s theory was centred in social structures and the relationships attain to social classes and the problem of class struggle. However, Weber’s (1978) “style of life” can be related to Marx’s historical materialism in order that Marx discusses life of the proletariat and class-struggle that reflects life before the Revolution. Nevertheless, all these authors agree that cooperation, collaboration, and teamwork are the main factors that have sided people together.

Although historically teamwork has been used to compel something or fight in wars and with a survival rage, during the XX century a whole new extension became available, and teamwork began to be considered as an essential tool and skill not just socially, but also for work and education. Salas et al. (2017:15) state that “organizations are turning to team-based structures in order to contend with growing complexities of the environments in which their employees operate”. The complexity of nowadays environments requires more complex solutions to problems not only at organisations but also in society. Consequently, teamwork helps to handle issues better than individually. The alienated individual can come up with solutions to some of the aspects of life, but

³⁸ Durkheim (1858-1917): French social scientist and theorist who revolutionised the social research and methodology and who is considered the founder of the French school of sociology (Encyclopaedia Britannica).

it will be difficult to provide big solutions staying alienated from the rest. One of the aspects that organisations have decided to remodel is the working space, as it is considered a social product, where most of the day-to-day communication exchanges occur. Many organisations have redesigned their venues and revisited their internal plan only to strengthen teamwork and collaboration. The benefits of teamwork are many if conducted correctly, as teamwork and collaboration enhance the prospects of improvement and development in an organisation. According to Salas et al. (2017:5), teams have a special nature:

“Researchers have identified several other features that characterize the unique dynamics specific to teams, including existing to perform organizationally relevant tasks; exhibiting task interdependence; interacting socially; maintaining and managing boundaries; and being embedded within an organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity”.

There are several skills that co-exist together in a team. For example, according to Salas et al. (2017:16) “teamwork consists of three psychological facets: 1-attitudes, which denote those internal states that affect interactions; 2-behaviours that are all the processes necessary to engage in teamwork; 3- cognitions, as the structure and representation of knowledge among members”.

In addition, the authors say there exist what are known as core processes that as described by Salas et al. (2017:151) happen “as a result of the conversion of inputs to outcomes through effective, behavioural, and cognitive mechanisms, and emergent states, as the resultant properties of a team”. These core processes describe the influencing conditions for effective teamwork as summarised in table 1:

TABLE 1:

Core-processes in teamwork

Core processes	
1.Communication	4.Coordination
2.Conflict	5.Cognition
3.Coaching	6.Cooperation

Source: adapted from Salas et al., 2017.

Before having achieved collaboration, it is important for teams to work effectively. For that, there are internal or core processes that affect teamwork and its efficiency.

3.2.2 Collaboration core processes

As it has been introduced in the previous point, there are core processes that affect the process of collaboration. These core processes are divided into different sections that reflect the exponential growth in the dimension of the concept until the last and most meaningful stage of collaboration.

- ✓ First, there is **communication** that according to Salas et al. (2017:17) “it is a reciprocal process both for sending and receiving information” and an essential condition for sharing knowledge and for formal and informal interactions. These interactions establish the first steps for building different communication channels in the organisation. As Whittaker, Frohlich and Daly-Jones (1994) say, informal communication in the workplace has different social functions like team building. For that, physical proximity is necessary, although mobile working these days has geographically separated workers. However, interactions are given virtually or with the help of technological devices and teamwork is possible even being physically separated from each other.
- ✓ Then, as Salas et al. (2017) say, **conflicts** may arise if incompatibilities are given concerning beliefs or interests among team members. Conflicts can generate negative outcomes for an organisation and as a result, it is essential for all employees to learn how to cope with conflicts to obtain the best results. Related to teams, conflicts can delay the pace of work and even interrupt communication among members. These situations, apart from disrupting teamwork and the formal functioning of the organisation can also become an important source of stress at work.
- ✓ Regarding **coaching** and orientation, Salas et al. (2017:23) say that it is crucial for teamwork to “enact leadership behaviours and “lead directions to successfully accomplish goals” by building a self-orientated lead to achieve those goals. However, many times, it is not sufficient with self-orientation to obtain the desired results. Consequently, there are coaching and learning environments and procedures to help obtain the best results. It is important to lead different behaviours when meeting deadlines, setting goals and to reach those goals in partnership, and for that, coaching and orientation can help to deal with different situations more efficiently and empathetically. In addition, workplace coaching also refers to a learning process or interventions that uses collaborative, goal-focused relationships according to several authors (Smither,2011; Jonas, Woods and Guillome,2015; Salas, et al.,2017). According to these authors, coaching offers potential advantages and improvements on employees’ performance and behaviour. In addition,

coaching also positively benefits well-being (Grant, Curtayne, Burton,2009) and it is increasingly important for the development and performance of an organisation.

- ✓ **Coordination** is described by Salas et al. (2017:17) “as the enactment of behavioural and cognitive mechanisms necessary to perform a task” drawing the line team members must follow to plan and distribute work. Besides, as Barron (2000) explains, coordination is fundamental for mutual knowledge as it refers to a bond or a special relationship based on knowledge and communication. Consequently, for coordination it is important the team-based relationships at work and peer interactions.
- ✓ **Cognition** on Salas et al. (2017), is the “shared understanding” of “roles and responsibilities”. It also serves for a better understanding of teams and teamwork and the factors affecting team performance (Salas and Fiore,2004).
- ✓ **Cooperation** is described by Cutcher-Gershenfeld (1991) as the opportunity to generate joint benefits underlining the conceptual meaning of cooperation for conflict resolution and teamwork performance. In addition, Sanker (2012:8-9) explains that one of the main functions of cooperation is the “adaptation of activities to achieve common goals” by sharing business resources that coincide with the pursuit and guarantee of common interests and joint problem-solving explained by Cutcher-Gershenfeld (1991). Cooperation also influences the development of communication skills and interactions as for cooperation it is essential to establish solid relationships based on joint problems and conflict-solving and teamwork.

When all these core processes are fulfilled and when the initial teamwork effectiveness is achieved, it is time to advance to collaboration, which is a more complex concept. As Sanker (2012:15) defines, collaboration is the “synergetic relationship formed when two or more entities working together produce something much greater than the sum of their abilities and contributions” referring to Wood and Gray’s (1991) definition, who say that collaboration suppresses its own limited vision. Collaboration has been also described by Henneman, Lee and Cohen (1995:175) as a “cooperative venture based on shared power and authority. It is non-hierarchical in nature, and it assumes power based on knowledge or expertise”, referring to a bond or a relationship in terms of achieving common goals and commitments.

But collaboration is not just a process of further thinking, sharing goals or setting the same limits. As Sanker (2012:43) also states “effective collaboration can produce better-quality projects, make more efficient teams, create healthier environments, greatly increase productivity, and enable more growth in organizations” thus, highlighting the importance of collaboration in almost every

aspect concerning work and the workplace. According to authors like Henneman et al. (1995:44), “collaboration requires that individuals view themselves as members of a team” and “all participants offer their expertise, share in the responsibility for outcomes, and are acknowledged by other members of the group for their contribution to the process”. So, it is intrinsic in the term and nature of collaboration that employees in joint teamwork consider themselves as members of the team in a close feeling of membership and contribution including the factor of socialisation of the individual’s self.

3.3 Measuring employee collaboration

There is quite much research done on employee collaboration and there have been different measuring scales contrasted to measure it. Two of such studies are done by Schrage (1990), who did an analysis of shared spaces that foster collaboration in the office and Mattessich and Monsey (2001), who carried out literary research to analyse what factors influence collaboration. Schrage’s investigations included in his most prominent book *Shared Minds*, elaborated an analysis to better understand collaboration today within the presence of technology and tools that have brought to re-think the whole concept of collaboration and collaborative work.

Other more recent investigations like those carried by Bernstein and Turban (2018) also analysed the impact open workspaces have on collaboration. According to Bernstein and Turban (2018:2) the elimination of walls and spatial features is essential for collaboration and for the collective intelligence that it is described as “a form of distributed intelligence that arises from social interaction of individuals and predicts -a group’s general ability to perform a wide variety of tasks”. This collective intelligence also pursues collaboration as it activates channels of communication through employees and increases the number of interactions in each workplace. After the authors completed their investigation, it was concluded that current collaboration schemes are different from older forms of collaboration and interaction at work. Technology has allowed interactions to adopt new ways of communication where different fields of analysis (intellectual or social) participate. So, they say that human interactions that lead to collaboration have adopted a new complexity where different factors apply. Besides, their investigation also concluded that eliminating spatial boundaries does not specially increase collaboration as face-to-face interactions do not increase. However, employees opt for communicating via virtual channels of communication like emails and instant messages and isolate themselves from contact with others.

However, sociologically explaining and as the authors corroborate, removing spatial boundaries brings more people into contact although it is not only based on proximity or visibility issues. As humans have transitioned to the digital era, human interactions have been transformed from mainly face-to-face interactions to virtual interactions. Communication channels have also changed allowing the digitalisation of human communication and benefiting from the transparency technology offers. Different studies in recent years have focused on investigating new communication channels the digital era offers by analysing human and employee collaboration driven by digital and virtual devices like computers, laptops, and smartphones. Authors like Brown, Dennis and Venkatesh (2010:11) clearly state that “technology that facilitates collaboration via electronic means have become an important component of day-to-day life”. Besides, the authors also say that collaborative technology conveys a social environment for communication and interaction building collaborative networks where people transcend their sociability although they argue that greater social presence is brought by face-to-face communication, a statement found in Short, Williams and Christie (1976).

It is true that technology has allowed human interactions to change and even workplaces have adopted this new technology that permits virtual interactions and means for virtually or digitally communicating by emails, instant messaging, or social networks. One recent innovation in social interactions and collaboration in the virtual world has been the creation of Cloud platforms like (iCloud from Apple industries or Cloud from Google) that permit digital or virtual collaboration without having to interact. One investigation such as this done by Sun, Lambert, Uchida, and Remy (2014) about the usage of Google Docs to enhance collaboration, has demonstrated that employees began collaborating more quickly and with more people as the use of Google Docs increased. The authors did an investigation where Google Docs collaboration metrics, sharing and editing of documents was recorded. The results obtained showed that collaboration increased as the users of Google Docs platform increased. This evidence shows that current collaboration schemes have changed and that the dimension of employee collaboration goes beyond the physical boundaries of face-to-face interaction.

In other environments different to organisations and workplaces, the implementation and usage of digital or virtual instruments like Google Docs has also allowed an increase in collaboration like in the case of educational spaces that now virtually share documents and tasks and enhance virtual collaboration through platforms like Google Drive. These new advances in technology have permitted to reach levels of collaboration and commitment never experienced before, although it

is true that physical and more personal interactions and collaboration have decreased. However, workplaces have transformed their physical boundaries also to enhance physical or a more intimate collaboration and face-to-face interactions that are still valuable at work environments. Such is this the actual situation of Coworking spaces for example, where the openness of the working space and support for collaboration and collaboration projects has increased internal collaboration through virtual and non-virtual interactions. However, in this research study physical or face-to-face employee collaboration will be measured as the importance of the measuring variables rely on the number of interactions and the amount of collaboration given in the workplace. Other authors like Mattessich and Monsey (2001), analysed and identified different factors affecting collaboration and based on their investigations, they elaborated a list of 19 factors affecting collaboration in the workplace that will be used to measure employee collaboration. These factors are grouped into six main categories as described in table 2:

TABLE 2

Factors affecting collaboration

CATEGORIES	FACTORS
1.Environment	a. History of collaboration or cooperation in the community. b. Collaboration group seen as a leader in the community. c. Political/social climate favourable.
2.Membership characteristics	a. Mutual respect, understanding, and trust b. Appropriate cross-section of members. c. Members see collaboration as in their self-interest. d. Ability to compromise.
3.Process and Structure	a. Members share a stake in both process and outcome. b. Multiple layers of decision-making. c. Flexibility. d. Development of clear roles and policy guidelines. e. Adaptability.
4.Communication	a. Open and frequent communication. b. Established informal and formal communication links
5.Purpose	a. Concrete, attainable goals, and objectives. b. Shared vision. c. Unique purpose
6.Resources	a. Sufficient funds. b. Skilled convener.

Source: Adapted from Mattessich and Monsey (2001).

There are six categories that classify the different factors in relation to their nature. The following categories (environment, membership, process and structure, communication, purpose, and resources) describe the collaborative process and the dimensions that best influence employee

collaboration. Each of the dimensions covers different factors which make a total of 19, including factors related to trust and understanding, decision-making, open communication or shared vision that resemble the investigations previously done by Mattessich himself. Mattessich and Monsey's (2001) investigations were carried through an intense review of 133 prior studies that concluded in the selection of 19 most prominent factors for measuring collaboration. Then, a questionnaire was handed in to several organisations to measure the scoring for each of the categories and analyse those low-graded parameters to be considered to improve collaboration. Furthermore, Sawyer (2017) in his book called *Group Genius*, established a list of 12 characteristics organisational based collaboration must have for achieving group-flow and building collaborative webs (networks) as part of a situational research and analysis of different scenarios where collaboration is nurtured (see, table 3).

TABLE 3

Characteristics of collaboration

CHARACTERISTICS	DESCRIPTION
1. Group's goal	a. To be able to solve specific problems b. Problem-finding creativity
2. Close listening	a. Mutual respect, understanding, and trust b. Unplanned statements and improvisation
3. Complete concentration	a. Let the natural progress of work b. Demarcate the shift to performance
4. Being in control	a. To be granted personal and team autonomy
5. Blending egos	a. Contribute on building ideas b. Listening and reacting to what it is said
6. Equal participation	a. Managers and team members participate in the same way
7. Familiarity	a. Shared common goals, knowledge and understanding b. Agreement on the conventions
8. Communication	a. Constant communication required
9. Synergy	a. Combination of small ideas that emerge from collaborative teams
10. The potential for failure	a. There is not creativity without failure, so groups must accept failure is an opportunity for success b. Accepting risk and tensions
11. Frequent interactions with teams	a. Take expertise from one another
12. Multiple discovery	a. Emerging critical ideas and new knowledge

Source: Adapted from Sawyer (2017).

These 12 dimensions include different aspects regarding organisational based collaboration. Each of these characteristics describes a different dimension that globalises the concept and practice of collaboration on an organisational level. There are dimensions that refer to trust and respect, sharing goals and knowledge, contribution in the collaboration process, building of ideas or contributing expertise in parallel to those described by Mattessich and Monsey (2001) (see, table 2) and investigations involving the concept and the process of collaboration as found in authors like Salas et al. (2017), Sanker (2007) or Schrage (1990).

After having analysed factors that describe collaboration both by Mattessich and Monsey (2001) and Sawyer (2017), a list has been made that covers the main outcomes for measuring employee collaboration in a combination of both authors. The selection of these outcomes has been made in relation to the proposed model. The most suitable outcomes have been selected and the list has been adapted (see, table 4) to meet the objectives of the study that will be used to measure collaboration based on the outcomes described by Mattessich and Monsey (2001)-dimensions of employee collaboration 1- and Sawyer (2017)-dimensions of employee collaboration 2-.

TABLE 4

Employee collaboration outcomes

CONCEPT	Dimensions of Employee collaboration 1	Dimensions of Employee collaboration 2
Context	Environment	
Individuals	Membership characteristics	Being in control/Blending egos
Interaction processes	Communication	Communication
Structure	Process and structure	Equal participation
Support	Resources	
Tasks		Complete concentration/Synergy
Teams		Frequent interactions

Source: adapted from Mattessich and Monsey (2001) and Sawyer (2017).

Context as described by Mattessich and Monsey (2001) refers to an environmental category in relation to the context or the environment where collaboration physically takes place. On the other hand, Sawyer explains the importance of **individuals** to promote creativity and thinking through brainstorming and learning. Sawyer explains, companies that have adopted a collaborative culture where brainstorming, group-thinking and creativity are enhanced collaborate more than those without fully developed collaborative organisations (2017). Besides, as Sawyer continues to explain (2017:117), “collaboration also makes the mind more creative because working with others exposes you to new and unexpected concepts” highlighting the tight

connection between creativity and collaboration. One analogy Sawyer uses in his book is “thinking outside the box” that clearly manifests the idea of opening to others and the openness of the mind. Mattessich and Monsey (2001) analyse individuals based on membership characteristics that underline the importance of mutual respect, compromise, and the representativeness of the different segments of the community. Regarding **interaction processes** like deep listening, communication, and decision-making Sawyer (blending-egos and synergy) says they are key factors for achieving collaboration. Sawyer (2017:48) states that “most people spend too much time planning their own actions and not enough time listening and observing others (...) while people who listen closely are energizing” as they keep the group flow that influences collaboration. According to Sawyer (2017) through close listening and granting autonomy and authority to the group’s emergent decision processes managers and teams can work together and equally participate on the road to successful collaboration. Furthermore, when information is shared through collaboration, and decision making is decentralized, there is no need for a hierarchy to gather and channel information to a single decision maker, thus enhancing collaboration through optimised teams and teamwork and equal participation of managers and teams. Besides, Sawyer (2017:158) also describes the term *Holocracy* as “the anti-hierarchical organizational philosophy”³⁹ to explain that it is important to take managers’ power and distribute it or share it with teams and single individuals to decentralise decision-making and reducing one-way authority. On the other hand, both Mattessich and Monsey (2001) also rectify what Sawyer says, as they explain that collaboration cannot function without open and constant communication among its members. According to both authors (2001:18), communication also serves for establishing personal connections and “producing better, more informed, and cohesive group working on a common project”.

Structure refers to the development of clear roles where each member exactly knows is or her own role inside a team and the concept of adaptability, to accept all the changes and variability that takes place inside a team in the process of merging collaboration according to Sawyer (2017) who underlines the importance of equal participation and implication in the collaborative project. In

³⁹ Holacracy: referring to business and organisation, it empowers people to make meaningful decisions in pursuit of an organization’s purpose. In addition, it can be defined as a system of non-hierarchical structure and willingness to achieve the organisation’s goals and commitments in joint decision-making and partnership.

addition, Mattessich and Monsey (2001) identify structure with the organisation of the collaborative group that according to the authors, it needs to be flexible to adopt variations in the project and in the nature of the collaborative group members. In addition, the authors say it is important for the group and for all its members to have clear roles and equal interests and strengths, and own adaptability for major changes that may occur during the collaborative process. Additionally, for efficient sharing of information and to facilitate communication, it is essential for organisations to have a solid **support** of all necessary technological tools and well-established networks. Mattessich and Monsey (2001) consider support as resources that may indicate either having sufficient funding or any tools or necessary material to fulfil the collaborative project. Likewise, and according to Sawyer (2017:190) “two technological developments will continue the trend: social media and the Internet that support the dense networks of communication that allow for the frequent sharing of small sparks, and new software tools that support design”. This new technology will allow collaborative webs to extend beyond an organisations’ boundaries. Besides, the influence technology has on collaboration through data-sharing software, email, social media, and the Internet is high. Besides, all this new technology helps collaboration between clients and customers to improve.

Tasks according to Sawyer (2017) should be pre-selected and categorised for building synergy and elaborating new ideas that will in the end lead to collaboration. The selection of tasks is also important not to exceed in multi-tasking and to meet deadlines and have time for random improvisations in the team and finally, and as previously stated, there is the power of **teams** and engaging in teamwork. As explained by Sawyer (2017), it is essential for organisations to succeed in adopting collaboration as central to their culture not as a norm or imposed, but as a necessity that serves both innovation and performance and benefits the whole of the organisation.

To summarise, collaboration is an essential tool not only at organisational level but also for communities and everyday life. In the business field, organisations must engage in collaboration with their employees and with other organisations, even within an international scale to obtain more rewards and compensations and better results. Without collaboration, organisations cannot succeed and prosper although they must also consider different aspects that set collaboration and a collaborative environment. As not an isolated tool, collaboration also requires the participation of all members apart from other requisites, partnership, companions and ethical or moral values that must also be studied, improved, and exploited for the benefit of the organisation and all members that consolidate.

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CHAPTER 4

**Psychological well-being in the
workplace**

4. PSYCHOLOGICAL WELL-BEING IN THE WORKPLACE

“More compassionate mind, more sense of concern for other’s well-being, is source of happiness” -Dalai Lama

The following chapter intends to provide a literary analysis and a deeper understanding of the psychological well-being concept. For that, characteristics associated with psychological well-being have been considered like organisational health and organisational climate. Although this study does not centre in the topics of health or climate strictly, as an intrinsic part of it, it has been decided to conceptualise and contextualise well-being beginning from broader concepts like organisational health. Consequently, the chapter offers a description and contrast between the concepts of organisational health and organisational climate. After having done this, the concept of well-being will be explained and lastly, how to measure psychological well-being.

Psychological well-being is an organisational feature as important as collaboration for its well functioning. Well-being in general will mark the attitudes employees have towards their jobs and the organisation even in their behavioural aspect, as when employees’ well-being is promoted, the overall performance level also increases. Literature indicates that workplace health promotion aims to improve lifestyle, work ability and productivity (Rongen, Robroek, Van Lenthe and Burdorf, 2013). With programmes encouraging both employers and employees to submit a healthy lifestyle, the organisation ensures its workers to be healthy and to also enjoy a healthy psychological state.

According to different authors, a healthy workplace maximises the integration of shared goals for well-being and the company objectives for profitability and productivity (Sauter and Murphy, 1996; Burke and Richardsen, 2019). So, it is not only important to integrate health and well-being in the workplace as health and well-being transcend to a larger dimension concerning performance, production, profits, and rewards that affect the whole organisation. However, to better understand psychological well-being in the workplace, it is first necessary to discuss a broader spectre, that is, organisational health.

4.1 Organisational health, climate, and culture

Organisational health is a concept that integrates different elements from fields like the physical climate. A healthy organisation was first defined by Miles (1969:378) as “an organization that not only survives in its environment, but continues to cope adequately over the long haul, and continuously develops and extends its surviving and coping abilities”. More recent definitions like Jaffe (1995:15) state that “organizational health implies an expanded notion of organizational effectiveness” as an organisation can be healthy by growing and being efficient to employees and by offering a healthy environment as well as quality products and services (Shoaf, Genaidy, Karwowski and Huang,2004). Besides, as found in Shoaf et al. (2004:83) and as Rosen (1991) describes, a healthy organisation is “one that holds a core set of humanistic values like the commitment to self-knowledge and development, firm belief in decency, respect for individual differences, spirit of partnership, high priority for health and well-being, appreciation for flexibility and resilience, and passion for products and process”. These authors like Rosen (1991) include organisational health at the focus of different organisational outcomes reflecting the diversity of the concept and that organisational health does not only attain to an only field and definition.

4.1.1 Organisational climate

It is not specified whether organisational climate is a sub-group of organisational health per se, but surely, they share some characteristics regarding behaviour and psychology. As Schneider, Ehrhart and Macey (2012:362) gather in their article “organizational climate may be defined as the shared perceptions of and the meaning attached to the policies, practices, and procedures employees experience and the behaviours they observe getting rewarded”. Other experts like Neal, Griffin and Hart (2000:100) say that “organizational climate is a multidimensional construct that encompasses a wide range of individual evaluations of the work environment (...) perceptions of the general organizational climate develop as individuals attribute meaning to their organisational context based on the significance of the environment for individual values”. Organisational climate, therefore, is thought to exert a strong impact on individual motivation to achieve work outcomes (Brown and Leigh,1996; Neal et al.,2000). So, in the sense that perceptions, behaviours, and environmental aspects are considered, organisational climate is a key factor for defining and improving more complex concepts like organisational health. What is more, by considering Miles (1969) first definition of organisational health, to be able to cope with a

constantly changing environment, it is crucial to build healthy organisations and to reconsider organisational climate too.

4.1.2 A culture of health

Health is also an extensive concept that has been attributed to different definitions and conceptualisations. Concerning health there are different approaches even in the scientific or academic sphere. As Danna and Griffin (1999:363) state,

“Researchers are also inconsistent with the terms they use to refer to psychological and/or physical concerns. For example, some of the more frequently used terms researchers use to describe what they are measuring are “psychological well-being,” “physical well-being,” “mental health,” “physical health,” or “subjective well-being.” Some researchers, however, discuss “health” or “well-being” in a broader sense, sometimes referring to both mental and physical attributes as a single entity, while others explicitly see them as separate constructs”.

The complexity of the notion of health is attributed to the difficulty at defining health and transcending into concepts like well-being. Danna and Griffin (1999:364) last conceptualisation of health and the one connected to organisational, or job experiences comprises “both physiological and psychological symptomatology within a more medical context (...) the term health as applied to organisational settings be used when specific physiological or psychological indicators or indexes are of interest and concern”. So, according to these authors, the measuring possibility of the term health when referring to the organisational sphere is mainly measurable as indicators. However, a culture of health is understood as a dominant feature of healthy organisations. Organisational culture and organisational climate’s concern should indistinctly be to promote health inside the organisation. Even though the ambiguity of the definition of health, there are elements identified by different authors to better understand the concept of health at work environments (see, table 5). Flynn, Gascon, Doyle, Koffman, Saringer, Grossmeier, Tivnan and Terry (2018) for example, identified four main culture elements part of a healthy organisation and their direct implication for employees, management, and the organisations.

TABLE 5

Culture elements for a healthy organisation

Culture elements	Employees	Management	Organisation
Norms	Shared values	Executive leadership	Organizational leadership
Supportive built physical environment	Recruitment and selection	Employee involvement and empowerment	Training and learning
Peer support	Organizational resources	Sense of community	Rewards and recognition
Relationship development	Traditions and symbols	Orientation	Shared vision and mission

Source: adapted from Flynn et al. (2018).

Norms refer to the shared values of all members of an organisation that must have to support a culture of health at work. Also, there must be leadership both in management and in the organisation that directs values to all employees.

The **supportive built environment** as Flynn et al. (2018:6) say “supports activities aligned with organisational values. In a healthy culture, the built environment supports well-being” meaning that the physical environment also supports the concept of well-being, and therefore, it is especially identifiable with the psychological well-being concept that will be later analysed in this chapter. From one side, there is the process of recruitment on employee level as the built environment will also provide a suitable space for selection of new employees.

Besides, as Flynn et al. (2018) say, management and the organisation must provide a suitable environment for employee involvement and offer training and learning to employees in response to the needs the working environment demands.

In addition, the element of **peer support** as according to Flynn et al. (2018:6) “provides knowledge, experience, and emotional, social, or practical help to each other” essential resources for all employees and for building a sense of community inside the workplace that will lead to self-recognition sustained from peers and colleagues and influencing the positiveness of the mind.

Relationship development, otherwise, is based on everyday interactions between individuals which foster further emotional tie like friendship, support for teams and collaboration (Flynn et al.,2018), as well as the perseverance of traditions, management-based orientation for a better and more friendly atmosphere at work, and for building a mission at organisation level that will be supported by every member of the established relationships.

All these elements characterise the broader dimension of the concept of health and of culture that as far from being a single concept, health is connected to different areas or dimensions even at work settings that build a culture of health inside the organisation. Therefore, and as previously stated, it is important for organisations to adopt a strong healthy culture to support not only all employees' health but also the diverse dimensions of work settings.

4.1.3 Steps for a healthy organisation

As it has been stated in the previous points, it is important for organisations to promote health and establish work practices to improve both employee's physical and psychological health. According to Grawitch, Gottschalk and Munz (2006:129) "now, employees in companies are inundated with a multitude of organizational programs designed to maximise employee health and the health of the organization" as concerns about health have increased in the past years and specifically this year as a direct consequence of world pandemic. Nowadays, at many organisations worldwide a schedule of healthy practices has been promoted, like healthy menus in the cafeteria or yoga sessions at work, even fitness centres built inside the organisation's premises as health is something worth achieving for everyone and members of that organisation.

On the contrary, unhealthy organisations spend an incredible amount of money in covering all financial and human costs associated with health problems as is explained by several authors like Cooper, Sparks and Faragher (2001) or Grawitch et al. (2006). Healthy work environments at work are crucial in the path for both physical and psychological well-being. As Danna and Griffin (1999:365) express, "health hazards, safety hazards and other hazards and perils, can obviously create dangerous work settings, which, in turn, negatively impact health and well-being among workers" when referring to work settings and work environments that can damage the standards of health and well-being in the organisation. As authors like Smith, Kaminstein and Makadok (1995:368) also explain, "certain types of work environments have been found to be related to certain health risks" as the exposure to hazardous and dangerous elements at work severely affects individual health.

Some precarious job settings undoubtedly affect employees' health, for the importance of having well-established health and safety protocols and encouraging programs to promote health and safety in the workplace. As Danna and Griffin (1999:368) say, "the safety culture of an organization has also been recognized as being an important determinant of the safety and health of

employees", underlining the importance of owning a strong safety culture and the commitment to improve health at work environments. In addition, there are factors that have been identified attributed to the improvement of health as described by Grawitch et al. (2006) according to their PATH model for achieving health at organisation. The PATH model for practices on how to achieve both physical and mental health and is a model that includes three interconnected sections which include the elements for employee well-being and healthy work practices to achieve maximal health standards in the workplace (see, figure 4):

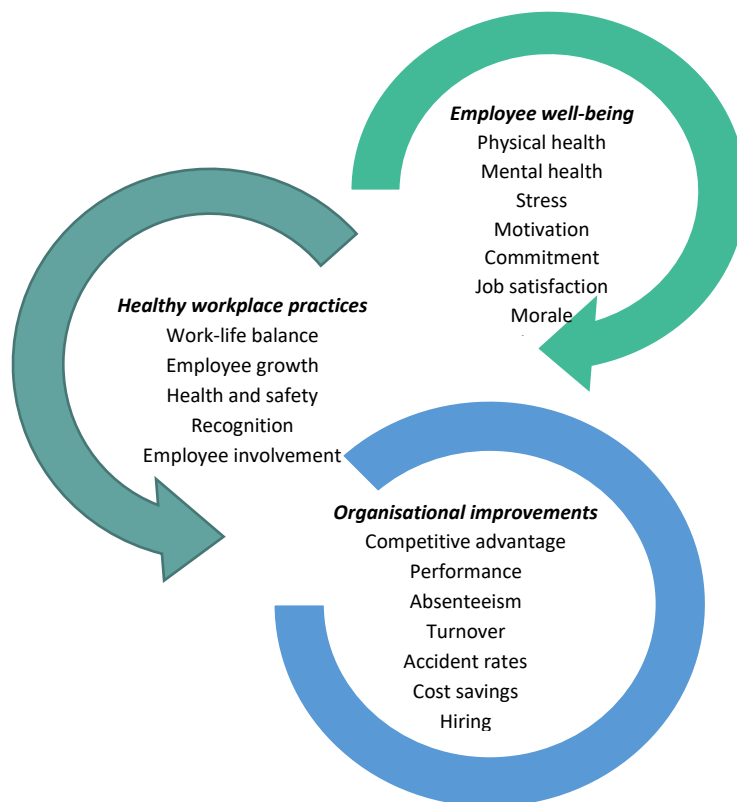


FIGURE 4

The Path model

Source: adapted from Munz et al. (2006).

In the PATH model, employee **well-being** is not just an isolated feature as different aspects regarding work and the workplace are considered. Nowadays, not only physical health but mental health has gained concern among managers and high-ranking executives. Increasing problems like stress diminish work performance and the overall psychological state of the individual and group psychology. In regard, healthy practices at work that will also sustain employee well-being should be adopted by all organisations. Besides, it is also important for both employers and employees to be motivated towards their jobs and occupations because without motivation, it is

very difficult to achieve well-being at work as the sense of downfall in employees' morale is very present. Also, each employee's commitment to their job should be highlighted as an individual without commitment cannot obtain rewards or satisfaction from the job and this has a direct impact on the job satisfaction levels that indeed affect individual psychological spheres and well-being.

Referring to the five elements of **healthy workplace practices** described in the model, it is important to consider the organisation as a solid system. In relation to this, the first element of healthy practices to adopt is work-life balance. As it was mentioned in chapter one, although employees must deal with different levels of responsibility outside work, there should be certain flexibility for employees to find the balance they need between work and family and social life. Childcare or any other responsibilities that may affect employees' life outside working hours, can sometimes have a negative impact on the employee's working life. As a result, there are cases where parents must deal with childcare at home while completing strict working hours at their workplaces. When there is flexibility for dealing with responsibilities outside the workplace, employees can better organise their working life and life outside the workplace. For that, finding the optimum balance is essential for psychological well-being and overall health. It is important for organisations to also promote adaptive mechanisms for the changing life-situations of its employees. Life's unpredictability is something organisations must consider for supporting employees' health, as there are times that things occur without any prior announcement. Flexible organisations have a better chance to adapt to these life-changing situations and, as a result, it is always better for an organisation to be able to find flexibility for its employees.

The second element is employees' growth and development as an individual. For that, it is plausible to see that professional growth influences personal growth in life. Developing knowledge and new skills that contribute to a better job performance demands a guarantee of health. According to Grawitch et al. (2006:137) "employee growth and development programs allow an organization to capitalize on the potential of all employees by helping to develop leadership, problem-solving, and other skills that may make them more committed to the organization". A constant professional development by offering on-the-job training is crucial for the growth and the development of employees. By recycling knowledge and learning to adapt to constant changes of modern life, employees are also able to grow professionally and have the chance to learn new skills to perform better at their jobs.

As the third element, health and safety are basic needs that employers and organisations should guarantee as it has already been stated prior in this chapter. When there are health or safety issues

in an organisation, employees feel insecure towards their workplace and their jobs, and this insecurity can be reflected in the attitude and performance. As Grawitch et al. (2006:138) describe, “employee assistance programs for alcohol and drug addiction, wellness screenings, stress management training, counselling, and safety training are examples of potential programs that organisations may implement to increase health and safety of their employees”. Instead of adaptability to issues concerning employees’ health and safety, an organisation must work to improve aspects regarding health and safety and offer guidance and counselling to those in need. Health should not be only promoted in accordance to enhancing positive outcomes but also by trying to improve the psychological and physical state of each of the employees even if the problem is not directly connected to their jobs. The sense of being understood and estimated by the organisation in similar terms with recognition, contribute to the health and safety of employees as positive mood elevates, there is a chemical reaction in the body like endorphin⁴⁰ segregation that increases pleasure and positive feelings in the mind.

According to the fourth element recognition, it is an essential value for any employee, although not just work-based but also recognition for things achieved in life. When an organisation recognizes each employee’s contributions to their jobs and the organisation, the employee’s satisfaction levels, and mood improve. In the current society, it is important as social beings to be able to recognise individual work and life accomplishments. Not only in work settings but recognition outside working life should also be valued. Recognition is a booster for positive attitudes which are reflected on economical rewards and bonuses.

As for the last element, employee involvement, it is crucial for employees to get involved in different aspects of decision-making and be instruments in the participative process of the organisation as they can lead to a better health and safety culture by encouraging employee involvement in decision-making. When employees are free to share their ideas, give their opinion and participate in decision-making, their sense of contribution to the organisation increases and consequently, so does their health.

⁴⁰ Endorphin: a neuropeptide that functions as blocking pain perception and a neurotransmitter of the nervous system. It delivers a feeling of pleasure because of its opioid effects (2020).

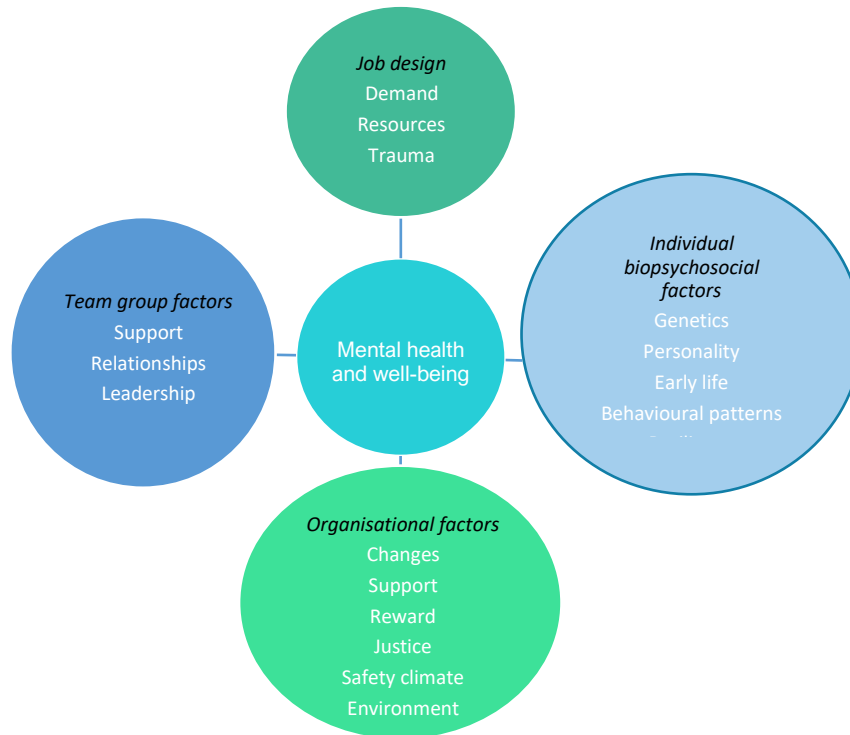
Regarding **organisational improvements**, it is true that by improving health and well-being, problems like absenteeism decrease. When employees feel well with themselves and towards the organisation and therefore, health standards improve, their work performance also increases. Besides, promoting and caring for everyone's health leads to better communication, higher levels of collaboration and a more satisfying overall atmosphere at work. A competitive advantage is essential for organisations to acquire health and safety standards through organisational improvements and positive initiatives like saving costs and funding programs can be used to hire the required elements for supporting health and safety. Eliminating all negative outcomes including turnovers and decreasing accident rates also highly contributes to the health and safety of an organisation.

In summary, there are many programs and practices organisations should include in their everyday working life to guarantee health and safety. If all these dimensions and elements affect health and as described by Grawitch et al. (2006) are guaranteed, organisations will be recognised for exploiting a healthy culture that will foster and care for all employees' health.

4.2 Workplace psychology and well-being

Workplace psychology and well-being are two concepts that bear similarities with the individual's mental estate, although well-being is a more extensive concept than psychology (as defined as the science of the psyche by Jung, 1954). Although frequently related to health and the medical field, both concepts show to be more extensive than their lexical definitions. In terms of work settings, psychology and well-being concerns have greatly increased during the last decades. As it has been described throughout this chapter, nowadays, organisations have adopted several healthy culture elements that do serve to regulate and implement healthy practices that also support employee psychology and well-being. Authors like Harvey, Joyce, and Growth (2014) for example, suggest different elements affecting mental health and well-being in work settings (see, figure 5) that describe the psychosocial safety climate⁴¹ and the physical environment factors contributing to mental health and well-being in the workplace.

⁴¹ Psychosocial safety climate: according to the US National Institute of Health, psychosocial safety climate (PSC) refers to the climate for psychological health and safety that also reflects the concerns by management towards psychological health of the employees.

**FIGURE 5**

Factors affecting mental health and well-being in the workplace

Source: adapted from Harvey et al. (2014).

The four dimensions affecting mental health and well-being in the workplace (job design, team group factors, organisational factors, and individual biopsychosocial factors) mark the leading elements for achieving and improving mental health and well-being divided into four categories. Not only individual biopsychosocial factors (genetics, personality, early life, behavioural patterns, and resilience) but work-related factors such as, job design (connected with trauma experienced at the job placement or outside the organisational boundaries and the availability of resources on demand), team group (the importance of the relationships established inside the work environment and support from the inside of the organisation also involving leadership) and organisational factors (providing changes and improvement, support, rewards, justice and legal coverage, the organisational safety climate and the work environment) directly affect mental health and well-being.

In conclusion, workplace psychology and well-being are two main elements that are interconnected with different job and organisational aspects. In the end, as such broad multidimensional concepts like workplace psychology and well-being, affect the whole of the

organisation and all its employees and as a result, it should be considered by all participating members.

4.2.1 Workplace psychology

Workplace psychology has gained adeptness in terms of well-being and health. According to Arnold, Silvester, Patterson, Robertson, Cooper and Burnes (2015) work psychology does affect the individual and has direct consequences at organisational level. Although the term work psychology has different variations like occupational psychology, its study points are the different human behaviours observed and developed inside an organisation.

There are several areas where work psychologists proceed, such as ergonomics, occupational health, well-being, or work design as described by authors like Arnold et al. (2015) or The British Society of Psychologists. Despite psychology being related to different areas, it is interesting to underline the importance of work psychology on employee well-being as it was stated by the British Society of Psychologists, as psychological well-being is one of the three main variables in this doctoral thesis. Positive emotions broaden the limits of our brain and perception whereas, adverse conditions can severely affect one's psychological state. The segregation to the bloodstream of certain neurotransmitters like dopamine⁴², follows the excitement that accompanies positive emotions as explained by Frederickson, Tugade, Waugh and Larkin (2013). Dopamine labels environmental stimuli with appetitive value, predict, and detect rewards and signal alerting and motivating events as described by Schultz and Wolfram (1998). Dopamine is a chemical responsible for memory, motivation and emotional response, reward and desire, addiction, and sensory processes. Alongside serotonin⁴³, it regulates mood and pleasure. When dopamine and serotonin levels are adequate, and external stimuli contribute to the increase of these hormones, the individual psychological state improves. Due to the importance of these two chemicals on

⁴² Dopamine: the US National Institute of Health describes dopamine as an endogenous catecholamine that exerts widespread effects both in neuronal and non-neuronal tissues. It plays a key role in the control of locomotion, learning, working memory, cognition, and emotion (2005).

⁴³ Serotonin: a neurotransmitter that is synthesized by neuronal cells from tryptophan. It has a direct effect on the neuronal tissue, and it is also a hormone responsible for the regulation of body temperature, sleep, and locomotor and emotional response (Pfreundschuh and Schölmerich, 2002).

human psychology, it becomes essential for organisations too, to work on improving employee's mental health through positive stimuli. To meet basic needs like materials and equipment is the first step towards achieving those positive emotions that lead to an optimum mental state and consequently, psychological well-being. It is important for the individual to feel they are part of the organisation by sharing organisational values and by standing in accordance with the person-environment fit described by Harter, Schmidt, and Keyes (2002). Additionally, as Harter et al. (2002) say, the feeling of being positively and actively contributing to the organisation is influenced by relationships and random opportunities at work. When employees can develop themselves both professionally and personally, the chances for employees to feel better towards their own persona and the organisation will also increase.

Human relationships and the way individuals relate to others are essential for the human psyche. When humans help each other to progress and achieve attainable goals, the feeling of this contribution positively affects the individual's own psychological state. Resilience as a manifest of the individual's empathy, is also an essential part in the developing process of psychological well-being.

4.2.2 The concept of well-being

As it has been previously described, well-being covers a broad concept apart from its lexical approximation to a built definition. Different authors have contributed to provide a more specific definition, like Warr (2018), who described different approximations to well-being in the workplace: job specific and context-free well-being. According to Warr (2018), job-specific well-being refers to people's feelings in relation to their jobs and context-free well-being covers feelings in any setting. As found in Warr (2018), well-being is not just the perception of happiness by taking an optimistic focus in life, or a hedonist tendency. Well-being covers a much bigger sphere of behaviours and attitudes regarding workplace, job, and the organisation. As Cotton and Hart (2003) say, well-being includes not only emotional but also cognitive components in the same way as Warr describes the context-free well-being to cover feelings that affect employees' every life setting.

Furthermore, and according to the conceptualisation of well-being included throughout this chapter, well-being covers a much more extensive field rather than just the mental, psychological, and physical sphere. The definition for well-being provided by Grawitch et al. (2006) and found in

Bieda, Hirschfeld, Schönfeld, Bravloskaia, Zhang and Margraf (2017:299) addresses “the representation of the physical, mental and emotional facets of employee health, synergistically acting to affect individuals in a complex manner” contributing to the complexity of the word well-being, as a concept that affects all mental, psychological, and physical state. Danna and Griffin (1999:359) also state that “well-being is viewed as comprising the various life/non-work satisfactions enjoyed by individuals (i.e., satisfaction and/or dissatisfaction with social life, family life, recreation, spirituality, and so forth), work/job-related satisfactions (i.e., satisfaction and/or dissatisfaction with pay, promotion opportunities, the job itself, co-workers, and so forth), and general health”. In a broader sense than Grawitch et. al (2006), Danna and Griffin’s (1999) definition of well-being relates well-being standards with the levels of satisfaction in life, work, and health thus, comprising the main three dimensions affecting individual well-being. In addition, Diener, Wirtz, Toy, Kim-Prieto, Choi, Oishi and Biswass (2010) use the term “subjective well-being” to describe a person’s overall experience in life essentially reflecting a person’s self-described happiness. What is clear in fact is that there is not one way of defining well-being and each different definition found adds a larger dimension to its basic notion or lexical definition.

Having a closer look at Danna and Griffin’s (1999) conceptualisation, it becomes clear the connection between Grawitch et al. (2006), Waar (2018) and Cotton and Hart’s (2003) definitions on well-being as all three authors agree that as same as health, well-being is also part of a bigger and a more complex dimension, and not only referring to psychology but also in its physical manifestations. As Bieda et al. (2017:305) say, “theory and research have focused on constructs such as the general physical health, job satisfaction, employee morale, stress, motivation, organizational commitment, and climate” as well-being indicators. Well-being, as well as health, partly shapes organisational productivity and performance. Problems associated with poor health and well-being can result in problems derived to the organisation like absenteeism and an increase in health-care expenditure. In a literary review of health and safety programs done by Aldana (2001), the author states that health promotion programs have been related to lower absenteeism and a reduction in costs as much of the money owned by organisations was used to cover absenteeism and costs on health. Grawitch et al. (2006:131) also explain “implementation of healthy workplace initiatives (...) are a form of organisational support” addressing the benefits brought by health implementation programs to the organisation.

According to Boyd (1997) and Danna and Griffin (1999:358) “workers experiencing poor health and well-being in the workplace may be less productive, make lower quality decisions, be more prone to be absent from work” and as found in Price and Hooijberg (1992), health and well-being issues

consistently diminish the overall contributions to the organisation by decreasing rewards or lowering incomes. As a result, it is necessary to underline the importance of promoting not only health but both physical and psychological well-being at work and work settings.

4.2.2.1 Physical well-being

The standards of health and well-being in the workplace have changed in the last decades. The modernisation of workplaces and progress have brought health and well-being conditions that highly differ from former factory workers and more primitive office settings. Diseases related to chemicals, toxic fumes and malnutrition are not a major concern anymore, but other affections related to stress, cardiac disease, or bad posture, have severely increased due to the modernisation of workplaces and the society.

As Danna and Griffin (1999:366-367) explain, “in the last few years, more attention has also been paid to other workplace perils (...) ergonomic hazards related to musculoskeletal problems (Bruening,1997; Finnegan,1997; Skov, Borg, and Orhede,1996); respiratory diseases such as tuberculosis (Hooten,1997); and increasing rates of fatal pneumoconiosis⁴⁴”. What Danna and Griffin (1999) project are the main hazards suffered in the past century that nowadays have already become more obsolete as a result of the modernisation of workplaces, a better investment in occupational health and safety, and a more extensive understanding of well-being. A study carried by Smith et al. (1995) identified three main areas of research regarding health and well-being of employees at different work settings: 1. The relationship of hazardous work settings with illnesses and diseases; 2. The relationship of stress to work conditions; and 3. The relationship of specific illnesses with personality characteristics or types of work environments. Health and well-being issues described by Smith et al. (1995) such as those associated with negative affectivity at work concluded that being unrelated to cardiac disease, there can be a correlation between the perception of negative affectivity and a higher symptomatology of immune deficiency and neurological disorders. Nowadays too, there are workplace perils that seem to have increased in

⁴⁴ Pneumoconiosis: according to RSNA publications on Radiology, pneumoconiosis is a lung disease due to inhalation of particles and characterized pathologically by fibroid induration and pigmentation. It is related to certain occupations and trades accompanied by various pulmonary fibrosis. It assumed importance as a disabling disease during industrial development (Dubrow,1934).

the last few years in connection to updates in the office's mobile furniture and an increase in technological and wireless tools, like: ergonomic related hazards, headaches and irritability, lung and infectious diseases or eye fatigue. According to Danna and Griffin (1999:367), these include affections like the sick building syndrome⁴⁵ that "is characterized as the excessive prevalence of irritative symptoms of the skin and mucous membranes, and a host of other symptoms including fatigue, headache, and difficulty concentrating among the people occupying a building". This is partly the effect of the increased presence of technological devices in the workplace and an increased electromagnetism in buildings that are not internally prepared to sustain such radial emissions. Furthermore, apart from studies that relate health and well-being issues to specific work environments, another increasing phenomenon relates the frequency and severity of a variety of non-specific symptoms associated to work, like: headache, backache, eye irritation, nasal congestion, tiredness, memory problems, and poor concentration that according to Spurgeon, Gompertz and Harrington (1996) relate to the complexity of describing all the health and physical well-being issues regarding work environments, and the lack of a definition of a specific pattern concerning these symptoms. Nowadays, although physical health and physical well-being problems related to toxic fumes and chemicals have relatively decreased there are other hazards and threats to solve.

On balance, it is important to focus attention on physical well-being as well as other factors affecting employees, workplaces, and organisations such as, health and safety. Although current research theories and literature focus on analysing stress related health and well-being issues and work conditions, also concerns regarding the advance on technology and the technification of buildings have partly worsened the physical well-being of employees. Many researchers have associated the sick-building syndrome (see, note 42) with indoor air quality in the workplace. As Wargocki, Wyon, Yong, Glausen and Fanger (1999:1-2) say, "increased pollution load on indoor air due to pollutants emitted by building materials and furnishing (...) can negatively affect the health of building occupants by increasing the prevalence of mucous membrane, cutaneous or general symptoms". There is also sickness that manifests with abstract symptoms related to the electro-

⁴⁵ Sick-building syndrome: according to the National Institute of Health, the sick-building syndrome is an emergent disease that includes various nonspecific symptoms like headaches, dizziness, sore throat etc. that occur in the occupants of a building. These experiences are "acute-health or comfort-related effects" and are linked to the time spent inside the building. The sources of the syndrome vary from chemical contaminants to inadequate ventilation or electromagnetic radiation (Sumehda,2008).

magnetic fields and wireless appliances because of a prolonged use of computers, laptops, and other electronic devices in the workplace. Although current physical well-being concerns are more abstract and cover a diverse symptomatology, they are physically less damaging than conditions attributed to toxic exposure and other hazards of the past years. However, this does not imply less important concern about current health problems regarding physical well-being in the workplace.

In conclusion, physical well-being contributes to the organisations' success and increased performance as it directly affects personal job and progress in his day-to-day activity. Therefore, the physical aspect is an essential part of organisational outcomes to be considered alongside health and safety, and the psychological well-being of employees that will be discussed in the following point.

4.2.2.2 Psychological well-being

When health and physical well-being are promoted and psychology is also reinforced, employees have a stronger belief and commitment in health and safety issues and know better how to work to decrease work related health problems that affect the overall well-being of employees and the organisation's performance. Psychological well-being according to Ryff and Keyes (1995) connects to the positiveness of the mind. However, they also explain that there is a lack of a joint definition of the concept of well-being that should be tested first nationwide. The positive perception of the environment and oneself are basic notions for defining well-being according to Ryff and Keyes (1995). Positive emotions that bloom in oneself are a real reflection of the inner psychological well-being sphere. These authors described six factors that genuinely affect psychological well-being as part of its own dimension that they use to scale and to better conceptualise the dimension of well-being: 1. Self-acceptance 2. Positive relation 3. Environmental mastery 4. Personal growth 5. Autonomy and 6. Purpose in life. However, Ryff and Keyes (1995) mainly refer to psychological well-being as an emotionally emulating positive state, achievable under different circumstances and contexts.

In addition, this positive state manifests itself clinically and physically but not in the form of disease, but in physical manifestations and behaviours derived from a positive psychological well-being concept. In contrast, negative emotions have highly more visible physical manifestations according to Ryff and Keyes (1995) that contradict the concept and context of well-being. In consequence, negative emotions have more severe effects in terms of physical distress and health

related outcomes apart from having a negative psychological impact on the individual's mental health that derives in physical and clinical manifestations. This affirmation also relates to the initial distinction of negative and positive effect made by Bradburn (1986) to define the categorisation of psychological well-being into two dimensions. Well-being is described here as a multi-scale concept that is understood as the absence of illness (Jahoda, 1958). Since Aristotle and his definition of *eudemonia*, psychological well-being has been defined as necessary for obtaining the most important good achievable, that is, happiness. Therefore, if the object of well-being is the personal growth and development that will lead to this ultimate good, all aspects of life should be conditioned to facilitate the achievement of that good. Referring to Ryff and Keyes (1995), Bradburn (1986) and Jahoda's (1958) categorisation, it is also concluded that a positive dimension is required for psychological well-being, either the manifestation of positive emotions, positive affect, or the lack of illness. It is true there are factors affecting psychological well-being that will consolidate the obtention of the achievable good of happiness. Behaviours, emotions, and life experiences will mark easiness or the difficulty in shaping psychological well-being that becomes sometimes aggravated by external circumstances that also affect physical integrity and health. Nowadays, several adverse situations can result in the prevailing of negative affections and the negative side in the dichotomy of psychological well-being. In relation to work environments and workplaces, one of the most important current affections is stress and stress related affections that have become one of the most extended health and psychological problems worldwide.

4.2.2.2.1 Modern pandemics: stress

Stress is one of the biggest health problems related to certain work environments and modern lifestyles. As King, Dunseth and Beehr (1995) as well as Danna and Griffin (1999:369) state, "stress-related disability claims, for example, are now the most rapidly growing form of occupational illness within the workers' compensation system". Stress is found to be strictly related to severe health problems. Jenkins, Rose and Hurst (1976) as Beehr and Newman (1978:667) say that "in addition to considering the interaction of psychological (mind) factors and physical (body) factors, there is increasing interest in the social environment as a very important determinant of health/illness" regarding the multidimensional effect of stress.

In relation to job-related stress, Margolis, Kroes and Quinn (1974:668) define "as a condition at work interacting with worker characteristics to disrupt psychological or physiological

homeostasis. The causal, situational conditions are job stressors, and the disrupted homeostasis is job-related strain". Margolis et al. (1974:669) also suggest that there are "at least five dimensions of job-related strain: short-term subjective states (e.g., anxiety, tension, and anger), long-term and more chronic psychological responses (e.g., depression, general malaise, and alienation), transient physiological changes (e.g., levels of catecholamine⁴⁶, blood pressure, etc.), physical health (e.g., gastro-intestinal disorders, coronary heart disease, and asthmatic attacks), and work performance decrement".

Progress in science and technology has also been closely related to stress as an increase in that constant necessity of being connected and its repercussions for mental health. A new word, "technostress" coined by Brod (1984) has been used to define stress produced by technology. As Brod (1984) states, the problem with technology is the lack of adaptability produced by the inability to cope with these new computer technologies that has resulted in an overstressed society. This technology-centred life-utopia has increased the number of people who have become addicted to technology although the current society is intrinsically attached to technology, and life without it could be now unimaginable. High levels of stress produce different changes in the body, health, and consequently, also in work performance producing excessive strain and fatigue.

Work-related stress is a risk for an employee's health. It increments the probability of emotional distress, psychological and physical health problems like cardiovascular disease by physiological changes found in the organism. As a result, it is essential to take measures to reduce stressors in the workplace and promote healthy practices that will improve the psychological response on the individual and the psychological well-being. As Sarafino and Smith (2017) explain, stress changes people's behaviours because when stress and stress-induced psychological responses like anger or hysteria collide, negative social behaviours increase and social interactions and communication between individuals can be also impaired. According to Cartwright and Cooper (1997:87) "eliminating or reducing stressors that are intrinsic to the job may involve (...) ergonomic solutions, task/workplace redesign, and alleviation of work overload/underload by recruitment, skills training, appropriate selection decisions, and more delegation". In the end, as Larsen, Adams,

⁴⁶ Catecholamine response to stress: catecholamines function as hormones and neurotransmitters in the body and are produced by the adrenal glands. Large amounts of catecholamines in blood are an indication of physical and mental stress. Catecholamines are released into the bloodstream when adrenocorticotrophic and cortisol levels are elevated, both hormones playing key roles in bodily response to stress (Epidemic Answers, 2013).

Deal, Kwoen and Tyler (1998) say, even some minor adjustments can make workers more efficient and increase their productivity by improving health, psychology, and well-being standards.

4.3 Measuring psychological well-being

In the scientific literature, there can be found different scales for measuring psychological well-being according to the conceptual domain or the definition given to well-being. Ryff and Keyes (1995) for example, and as previously explained (see, 4.2.2.2), created a six-factor scale to measure psychological well-being in relation to positive psychological functioning: 1. Self-acceptance (a positive evaluation of oneself) 2. Personal growth (a continuous development as a person) 3. Purpose in life (considering one's purpose in life as meaningful) 4. Positive relations with others (to own quality relations with others) 5. Environmental mastery (to be able to manage one's life and the surrounding world), and 6. Autonomy (a sense of self-determination). Within this investigation the authors proved the multidimensionality of the psychological well-being construct as the theoretical explanation of well-being is also a multifaceted dimension.

Other scales like the Psychological General Well-being Schedule (Dupuy, 1984) have been used to measure general well-being without the categorisation of the well-being concept; and the Medical Outcome Studies Short-Form 36 Health Survey questionnaire found in several authors like Ware and Sherbourne (1992), measures the general functioning of the body and mind and consequently, gets insights for measuring and assessing physical well-being as well as psychological well-being.

Additionally, in an article written by Hartig, Mang and Evans (1991) the restorative effect of natural environments was described. Although previously stated by Kaplan (1983) the influence natural environments have on human psychology this influence was found to be positive and beneficial on Kaplan's investigations. Known as Kaplan's Attention Restoration Theory (1995), the theory is built on assumptions made about cognitive capabilities and their development in natural environments. Kaplan (1983) discusses the idea that contemporary busy environments demand to stay focused and direct attention continuously mainly due to the excess of information we receive as constant stimuli.

As Ewen, Mitten and Overholt (2014:74) explain, "directed attention fatigue may be reflected in negative emotions, irritability, decreased sensibility to interpersonal cues, decreased helping behaviour, performance decrements on tasks requiring directed attention, and in accidents". The

world where we live is an over-stimulated environment where information is shared constantly. This attention-seeking environment forces us to stay alert and focused, and to direct our attention to the many stimuli that drown us to a hyper sensibility state. The anxiety suffered as a product of this constant stimulation can turn individuals irritable and solitary as a mirror to the manifestation of humanity's sole existence. As a result, many organisations discovered the necessity to guarantee psychological well-being that has a direct effect on the organisation's overall performance as analysed in 4.2.2.1. As Hartig, Korpela, Evans and Gärling (1997) explain, certain environments have a restorative effect on the humans' psyche as they help to soothe problems associated with stress and fatigue. Hartig et al. (1997) identified four dimensions that affect the restorative experience environments bring and can also be used to identify the restorative property of different environments. These factors provide a full restorative experience for human psychology and psychological well-being, and they will be separately explained in the following points.

4.3.1 Being away

Being away is described by Hartig et al. (1997:176) as "a necessary condition for restoration involves getting distance from some ordinarily present or routine aspects of one's life". As the authors state, it is important to get away from distractions that surround our everyday lives as the instant from everyday distractions is important for the individual in order to achieve inner calm and improve one's own psychological well-being. As Hartig et al. (1997) continue to say, distance is only psychological when we distance our minds from surrounding distractions to try to ease the mind. The psychological awareness of distracting environments and the feedback of this awareness onto oneself, is a way the human psyche can help achieve well-being. The sense of being away, of being able to distant us from distracting and confusing environments is crucial for achieving the ideal state of psychological well-being. Not only for our everyday lives, but in the workplace, at school or even at home, we sometimes need to push ourselves further and distant our minds from constrictive environments. Some meditation activities like mindfulness⁴⁷, help

⁴⁷ Mindfulness: according to Headspace, mindfulness is the quality of being present and fully engaged now. As a result, it increases attention-focus and helps to sooth the body and mind by its meditational effect.

direct our attention to the present moment and focus on the moment's pleasures, sensations, and calm. These new trends to boost our psychology are becoming popular among school practices and even at work settings.

4.3.2 Compatibility

In the definition given by Hartig et al. (1997:178) "compatibility refers to the match between the person's goals and inclinations, the demands made on the person by environmental conditions, and the patterns of information available in the environment for support of purposive and required activities". Regarding this definition, a person's activity in a specific environment will be crafted by the conditions that environment sets for him/her and the expected personal goals or objectives. Therefore, compatibility occurs when an environment demands something that meets personal goals or objectives. However, as Hartig et al. (1997) continue to explain, these objectives and the activity set at that environment can also be influenced by the information available at that precise moment. This information can generate different responses depending on the individual, who can adapt the preceding activity, goals and objectives depending on the information received from the environment. Being able to fit in a highly demanding environment is incredibly positive but this can also become a stressful experience sometimes. According to Evans and Cohen (1987) and found in Hartig et al. (1997:178) "stress as the result of a mismatch between needs or goals and the environmental supports for meeting those needs or goals", is the primary reaction of the mind towards environments that do not fit in the individual's present goals or aims. This produces stress that will negatively affect the individual's psychology. Regarding workplace environments the performance can be badly influenced for incompatibility of the environmental fit and the posterior adverse physical and psychological response to that experience. On the contrary, when compatibility is too high or too perfect, the individual can get immersed into the construct and even lose the sense of being in a physical environment at all. This other experience can generate a sense of depersonalization and adverse mental health problems. As a result, it is important to feel in accordance with the environmental demands and personal needs that will fit to serve us to achieve goals and objectives. For this, it is essential to know how to focus our attention only on important things and not become too affected by the over-excess of information and stimuli found in the surrounding environments.

4.3.3 Extent

Hartig et al. (1997:177) define extent as, “the relatedness of immediately perceived elements or features of the environment, as a coherent whole, to some larger organisational structure, such as a mental representation of the area (...) the immediate surroundings and areas that are out of sight but imagined (...) the relevant frame of reference may exist in a wholly conceptual or imaginary domain, extent can be experienced through immersion in intellectual activities as well as in physical environments”. It is important to know and connect with the environment beyond the visual array. Some mathematical and psychological processes like mapping make use of neuronal networks to establish connections far beyond the immediate surrounding. This process on a higher level may identify scopes where minds can be attained on a perceptual and conceptual basis, real or not. It is not just imagining worlds, as extent is achieved through a deeper stimulation of the brain, but the capacity of returning to these conceptual domains when the surrounding environment feels chaotic or stressful and experiencing the restorative impact on the psychological well-being brought by those extended surreal experiences.

Hartig et al. (1997) divide the concept of extent into two elements: coherence- and scope-. Hartig et al. (1997:177) explain that coherence is the “relatedness of immediately perceived elements or features of the environment” and scope refers to “the scale of the domain in which the perceptual and organisational activity is situated”. Other authors like Berman and Hayes (2015) say that coherence means to be in accordance with the place or the environment as a necessary part of that “outer world” that the space offers, while scope refers to the length of the space that should be sufficiently large to be analysed. However, both authors agree that the domain of extent is more subjective than direct as it measures both conceptual and perceptual elements.

4.3.4 Fascination

Fascination can be found in many different situations, and even in things that are conceptually negative like violence. Kaplan (1995) introduced the term *soft fascination* to represent an experience of moderate fascination with aesthetically pleasing stimuli also found in Hartig et al. (1997). Soft fascination can be found in everyday environments that provide a pleasant and a soothing effect of the mind as a response to aesthetically and visually appealing environments.

This can also be achieved in built environments when design provides the fascination produced by natural environments. The pleasing effect some environments have for the mind can be achieved by artificially and architecturally designed elements that attain that pleasing effect; or found in strategically built otherwise stressful environments where trauma is experienced like hospitals or medical centres. At workplaces it is becoming a common practice nowadays to enlighten this soft fascination among employees by creating and designing visually pleasant or soothing environments inside the built environment. Because of the pleasing effect and the positive emotional response, the individual feels towards the object that visually, sensorially and aesthetically is considered pleasant, fascination has a restorative effect for the mind. However, according to Hartig et al. (1997:178) “the value of fascination in recovery of capacity is suggested by (...) studies that have employed behavioural measures of attention to document recovery of directed attention capacity following depletion” thus, recommending the use of behavioural techniques alongside contents and processes that generate pleasure or soothing is important to educate the mind in seeking positiveness even in adverse environments. In this sense, fascination helps to identify features in the surrounding environment that play a practical aesthetical part in reducing stress and psychological fatigue.

4.3.5 The biophilic design to enhance psychological well-being in the workplace

Apart from these four outcomes described by Hartig et al. (1997) and found in the investigations by Hartig (2004), restoration and psychological well-being can be obtained from attributes from different natural settings that people find appealing and aesthetically pleasing when reproduced in built environments (Caperna and Tracada,2013). Consequently, any human-built environment that is designed following natural elements or environments can have the same pleasing effect as nature. Nowadays, many workplaces and offices have been built following natural patterns and including natural elements on their designs. The attention restoration capacity of these built environments has become utterly important for the health and the overall psychological well-being of the individual abiding workplace environments and the employees.

One such trend is the biophilic design that provides natural soothing and increases psychological well-being by including natural elements at different settings and environments. Wilson (1993) coined the term biophilia for the first time in his book *Biophilia*. He defined it as “the innate urge of

humans to affiliate with nature and other forms of life and life-processes” (1993:1). Historically, there has been a tendency to integrate buildings into nature or the natural landscape. Cities have been designed according to natural elements of their surrounding landscapes. Although in current construction schemes there is a tendency to reduce the natural landscape for artificially built environments due to factors like the expansion of cities or tourism, nature is still a fundamental part of modern architecture.

Concepts like sustainability, biophilia and the *eco* movement have become trendy these last years as they try to restore the innate bond humans have with nature by finding beauty and pleasure in the most simple and purest things on Earth. Furthermore, the aesthetic criteria of natural symbols and the natural landscape has a cognitive response in the human brain altering its mind and behaviour. There is evidence in Kellert, Heerwagen and Mador (2008) that indicates the biophilic design brings benefits to human health. The built environment has a restorative effect by promoting well-being when adopting natural elements in the design. There are three main approaches that explain how to bring nature to the built environment: 1. Ecological cities⁴⁸ (Register,2006), 2. Biomimicry ⁴⁹ (Benyus,2009), and 3. Biophilic design (Wilson,1993; Kellert et al.,2008). Environments have a restorative effect on the human mind. There are studies for example, that analyse the positive effect the presence of plants and natural light have in the recovery process of patients as Beukeboom, Tanya-Dijkastra and Langeveld (2008), who found that by showing photos of plants to patients in hospital rooms self-reported stress decreased. Literature and several studies done on this field support the impact of certain design elements in the human psychology and mental estate and consequently, in the impact of the physical working environment on the psychological well-being of employees. According to Kellert et al. (2008:4), “office settings with natural lighting, natural ventilation, and other environmental features result in improved worker performance, lower stress, and greater motivation”. Besides, the authors explained that biophilic design fosters contact between people and supports collaboration. Gillis and Gatersleben (2015) did an analysis on the benefits of biophilic design, and they identified certain direct and indirect attributes that characterise a biophilia. The direct experience with nature includes elements like

⁴⁸ Ecological cities: also known as eco-cities, they are modern cities designed based on natural shapes and patterns and with integrated waterways, plenty of vegetation, land for farming and bike-friendly paths that constitute one of the biggest challenges and innovations of the last century (Register,2006).

⁴⁹ Biomimicry: a practice that mimics the patterns and strategies found in nature for the design of human built environments and buildings (Benyus, 2009).

light, air, water, plants, animals, weather, natural landscapes and ecosystems, and fire. The indirect experience, otherwise, includes images of nature, natural materials, natural colours, the simulation of natural light and air, naturalistic shapes and forms, the evoking of nature, information richness, age, change and the patina of time, natural geometrics, and biomimicry (see, table 6):

TABLE 6

Biophilia outcomes

Biophilia outcomes
Direct experience with nature
Indirect experience with nature

Source: adapted from Kellert et al., (2008) and Gillis and Gatersleben (2015).

To summarise, the above-mentioned outcomes (being away, compatibility, extent, fascination and biophilia) will be used to measure the psychological well-being dimension in relation to the working environment (and its effect on psychological well-being) and employee collaboration. However, it has been the decision of the researcher to adopt the indicators described by Hartig et al. (1997) and Hartig (2004), and Kellert et al. (2008) for psychological well-being, as they better relate the physical working environment construct to psychological well-being. Therefore, and to conclude this chapter, the outcomes (see, table 7) selected to measure the psychological well-being construct are, being away, compatibility, extent, fascination (Hartig et al., 1997; Hartig, 2004) and biophilia (Kellert et al., 2008):

TABLE 7

Psychological well-being dimensions

Psychological well-being dimensions
1. Being Away
2. Compatibility
3. Extent
4. Fascination
5. Biophilia

Source: self-elaborated, adapted from Hartig (2004) and Kellert et al. (2008).

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CHAPTER 5

The physical working environment

5. THE PHYSICAL WORKING ENVIRONMENT

“Pleasure in the job puts perfection in the work” -Aristotle

Although the exact concept of the physical environment is not yet well defined, workplace design is fundamental to the experience of the personal space. Factors affecting design like territoriality, crowding or light have a direct effect on several aspects like mental health or well-being and as a result, also on aspects related to job characteristics and job performance (Veitch and Navai,2003). Architecture and design contribute to the development of social cohesion and this proximity facilitates social interaction (Fleming, Baum, and Singer,1984). Therefore, work environments that are socially supportive of each other are also perceived as healthier places to work (Lowe,2003). Besides, according to Wilson and Wagner (1997), the physical element of the organization’s climate -in relation to the environment and the environmental settings- includes factors in the work environment affecting health, which also benefit the whole organisation in reverse. Besides, authors like Hua (2010) have demonstrated the positive influence the physical working environment has with collaboration by analysing and measuring collaborative work environments.

The special features these workplaces show, like access to service areas or presence of technology and tools, facilitate formal and informal interactions and communication that, consequently, enhance collaboration. Work settings, which are built and designed to favour communication and collaboration, are characteristically prominent in the use of mobile furniture, open spaces for free circulation and mobility, and proximity to service, amenity, and meeting areas.

So, the physical working environment is related to different aspects of work settings. From design to its influence on the individual, the physical working environment is a broad concept that includes dimensions from a wide range of characteristics. As a result, it is one idea of choice to jointly consider the physical working environment and the different outcomes like employee collaboration or psychological well-being, to analyse some of the dimensions the physical working environment relates to, and as the focus point of this study.

5.1 Defining the physical working environment

As mentioned in the previous point, there is not a unified conceptualisation and contextualisation of the physical working environment as it is a concept that nurtures from different dimensions and lexical influence. Some authors consider the physical working environment as an inner part of the organisational climate (see, point 4.1.2). However, there are different connotations regarding the conceptualisation of work environments. The concept of the physical working environment can be analysed from different perspectives although this study will mainly centre on workplace design and its influence on employee collaboration and the psychological well-being.

As it has been reported in the second chapter, workplaces have been changing since the early XX century. From cellular offices and cubicles to open-space plans and “non-territorial” offices (Vos and Van der Voordt,2002), workplaces have experienced a critical change, where the concept of the workplace itself has been re-introduced and re-defined. As Vos and Van der Voordt (2002:49) say, “the efficient handling of space and facilities requires the sharing of workplaces. The central office is increasingly assuming the character of a meeting place, and this demands a great degree of open space, and cosy corners” in relation to this new conceptualisation of the workplace. As these authors continue to say (2001:49), “these factors (meeting place, open space, cosy corners) act as a stimulant to interaction, consultation, and creative group process” by stimulating and enhancing communication. Environmental design must nowadays include societal, economical, and technological developments that reflect the changing nature of work. Workplaces change as well as their surrounding world, and the development in technology and other job outcomes like group processes, communication, and well-being have gained adepts in the last years.

The design of the interiors is more openly revisited, with designs favouring earthy colours or minimalistic, Scandinavian styles; areas intendedly designed for chill out and socialisation or, large open areas with sufficient natural lighting like found in Spring House, an Amsterdam based coworking space (see, image 8):

**IMAGE 8**

Spring House interiors

Source: Self-taken in August 2018.

New working venues immensely differ from older, traditional designs. Technologically centred workplaces are a good example that reflect the current needs of today's organisations and job profiles. Innovation can help in the redistribution and reconsideration of the physical environment in the workplace as according to Vos and Van der Voordt (2002), workplace innovation can hugely improve the notion and perceptions of the physical working environment through different ways as described in table 8:

TABLE 8

Workplace innovation

	Examples
Rebuilding an open-plan office as a combi	For individual work, group work and meetings
Flexi-working with shared workplaces	Activity related workplaces
Furniture	Ergonomic and attractive
Advanced information and communication technology	Computers, mobile phones, intranet and the Internet
Distance working	Home, commute, abroad digitally connected

Source: adapted from Vos and Van der Vrodt (2001).

The different workplace innovation ideas or challenges that face workplaces and organisations today, like the rebuilding of the space as an open-plan office or activity specific workplace characteristics like available spaces for individual and group work or flexible working with workplace sharing intended for workplaces that centre in different activity set a serial of

innovations that can greatly improve work settings. Other workplace innovation ideas like the selection of adequate furniture (ergonomic and attractive), the presence of information and communication technology, or distance working, also reflect the modernisation and changing tendencies in the interior and workplace design. The adoption of new work schedules like homeworking, the use of mobile technology devices like computers and mobile phones, or furniture that fits commodity and health, have mostly been possible due to the technological progress and advancement in idealisation of work and work settings. Many organisations worldwide have built new strategies to renew and rethink the concept of workplace and its influence on employees and their jobs. However, the working space is not categorically limited to economical processes, but space is also the physical expression of the socialization of space as explained by Lefebvre (1905). Current office workers interact, communicate, and collaborate in groups, and share information and knowledge actively in their workplaces that have turned from static passers-by spaces to active emulators.

Workplaces continue to innovate and improve to be able to cover the current demands on work and work settings. Despite the XXI century bringing many new variations to work environments and design, the upcoming years will also forecast new tendencies that organisations should adopt in order to grow and proliferate.

5.2 The challenge of workplace design

As it has been already mentioned, the physical work environment has a huge impact on all employees. Whether psychologically or physically, the workplace occupies a central point in the individual's everyday life. As mentioned in chapter two, the history of workplaces is the perfect reflection of the many different trends regarding design through the passing of the years and decades.

As the average employee spends eight hours daily in the office, it is incredibly important to analyse the working space as an essential attribute to the business praxis. The organisation of space, although many times architecturally limited, has extended its way onto more sophisticated and trendy plans greatly influenced by Silicon Valley's high-tech offices and shared working spaces. The popularity of these workplaces is the result of many different factors. However, one of the main attractiveness of Silicon Valley's organisations and business companies has been their investment in design and spatial organisation. Except some areas in cities like London, Amsterdam, or Berlin

most of the rest of the countries have quite a low index of popularity for the attractiveness of their workplaces in terms of design. According to a study done by WMAE also known as the WMAE index, in the last 10 years there has been a 6% increase of U.S companies to occupy the top of the list among the WMAE index of most attractive employers, and a decrease of 10% in European companies⁵⁰. According to Vos and Van der Voordt (2002:54), “through workplace innovation, organisations hope to be better turned to changing work processes, to achieve a higher degree of employee’s job satisfaction, and to achieve higher work productivity and considerably saving costs” thus, the importance of innovation also for workplaces. Consequently, innovation in the workplace is not only limited to design or the physical indoor environment but also to the adaptability each organisation has towards a constantly changing society. Wilkinson, the architect who designed the interiors of Google headquarters in Silicon Valley, said that they (American companies) know about the impact that an environment has on productivity and effectiveness (2014, online interview) highlighting the importance of working together to enhance changes from the inside and be open and ready to accept new challenges regarding work environments and work settings.

Architecture has been a domineering science in workplace design and like the Bauhaus⁵¹ school’s influence in architecture of the early XX century, the new perspectives on office-design can also broaden an organisation’s capacity for adaptation. As society is continuously changing, it is mandatory for organisations to adopt innovation as the leading path for evolving within a volatile environment and be prepared to face future challenges.

According to Brennan, Chugh and Kline (2002:280), “there are many different types of office design ranging from traditional, private offices to open offices (...) In open offices, people who work together are physically located together with the geometry of the layout reflecting the pattern of the work groups (...) the various areas can be separated by plants, low movable screens, cabinets, shelving, or other furniture”. Although the tendency of open offices has mainly increased over the last few years, open offices were primarily designed in the 1950s despite not reaching popularity

⁵⁰ For more information see, <https://universumglobal.com/blog/worlds-most-attractive-employers-2019/>

⁵¹ Bauhaus school: founded by architect Walter Gropius in Germany, it was one of the most important symbols of Weimer’s architecture and a worldwide reference (Encyclopaedia Britannica).

until the 1970s. As Brennan et al. (2002) say, designers have tried to build flexible space, allowing layout to be more sensitive to changes in size and structure as it is believed that the absence of physical barriers facilitate communication.

However, some negative aspects about open office plans concerning employees' perceptions can debilitate the open office design if not considered in advance. Zalesny and Farace (1987) for example, found that the new work area referring to the open office, was less adequate than before as employees had less privacy. Besides, negative factors like noise disturbance (Brennan et al., 2002) are thought to have reached epidemic proportions as sites report they are bothered often by different sources of noise. Yet studies on this topic have drawn mixed conclusions like Sundstrom, Town, Rice, Osborne, and Brill (1994) who did not find a relationship between disturbances and performance, but only in common areas and related to meetings being held. However, most studies found that whatever the increase in communication levels in open space offices, employees still demand certain privacy and private areas for tasks demanding more concentration like meetings or telephone calls. Nevertheless, it is undeniable the success of open-office designs nowadays. Although their popularity may be the reason for different cumulative factors, according to various authors also the belief that they facilitate greater communication while increasing productivity has been one central reason for many organisations to have recently adopted open-office designs (Boje,1971; Pile,1978; Brennan et al.,2002).

In addition, open offices can play a stimulating role for decreasing boredom or inactivity in the workplace as they alone are a source of stimulation and encouragement. Furthermore, the real challenges of workplaces nowadays mostly lay in the level of adaptability or survival of organisations to such volatile environments, but also in the characteristics of the design and the comfortability or pleasantness it offers that affects the levels of satisfaction of employees towards their job, their organisation, and their workplace. As several authors explain (Marans and Yan,1989; Spreckelmeyer,1993) and found in Brennan et al. (2002:282), "perceptions of spatial characteristics, ambient conditions, and psychosocial characteristics of the office (i.e lighting, temperature, environmental control, privacy) have been found to be related to environmental satisfaction" considering the different dimensions of space, like its sociability and its effect on human psychology. On the contrary, when the working environment or its design do not fulfil employees' needs, employees' satisfaction levels towards their workplace and even their jobs and the organisation changes and this closely affects job performance and production on a greater scale. So, it is significantly important to think of short and long-term consequences of a change in workplace design and the space that require a previous well-studied plan and attitude. In

conclusion, different spatial and psychosocial characteristics of space lay within the perception of the individual who enjoys the free movement those spaces offer. Design, as one of the most important components of the physical working environment does not only affect the physical dimension of an individual, but the psychological and the social too as they are very attached to the concept of well-being and collaboration, two of the three variables going to be analysed in this study. Therefore, the physical working environment being a multidimensional concept, covers a larger area than just the physical aspect of the workplace, as the physical environment overall, affects both employees and the different areas inside an organisation.

5.3 Measuring the collaborative working environment

There are several outcomes to consider when measuring collaborative working environments. As Hua, Kraut, Loftness, and Powell (2010) say, spatial features like size, location, formal and informal collaborative spaces, service, and amenity related areas are some of the characteristics to consider when analysing the collaborative working environment. For measuring the physical working environment in relation to employee collaboration and psychological well-being, it is interesting for this study to analyse collaborative spaces on the one hand, and well-being factors on the other. Both specific features will centre the study in the analyses of the physical working environment and how it affects employee collaboration through the mediating effect of the psychological well-being construct as proposed on the research model. As Hua et al. (2010:429) explain in relation to collaborative spaces, “we mean not just spaces explicitly identified or designed for collaborative work, such as team rooms or conference spaces, but also spaces that may potentially be used for collaborative work and casual interactions” as the concept of collaboration integrates different dimensions. According to Hua et al. (2010) there are four main spatial characteristics to measure collaborative working environments. These are: 1. Teamwork related features (conference rooms, open-plan design, meeting areas), 2. Service-related features (copiers, printers, shared kitchen, coffee areas); 3. Amenity related (coffee and lunch areas, chill out areas); 4. Technology and tools as a supportive outcome and an important factor of nowadays’ working reality. Therefore, regarding the similarities with the conceptual domain in Hua’s investigations, the measuring scale for the physical working environment construct has been taken from Hua (2010) based on the workplace elements identified by Hua (2010) and Hua et al. (2010) to

measure the different typology of work settings in relation to collaborative elements in the workplace (see, table 9):

TABLE 9

Collaborative environment satisfaction items

CONCEPT	Collaborative environment satisfaction items
Teamwork	Teamwork related:
	1. Adequate types of collaborative places
	2. Available of places for collaboration needs
	3. Availability of meeting spaces
	4. Good variety of collaborative places
Spatial layout	5. Collaborative environment in general
	Service related:
	6. Distance workstation- copier/printer areas
Technology and tools	Amenity related:
	7. Distance workstation- kitchen/coffee areas
	Technology and tools related:
	8. Support of tools and technology

Source: Adapted from Hua (2010) and Hua et al. (2010).

5.4 The relation of the physical working environment with employee collaboration

On the following point, it will be described the relation of the physical working environment with employee collaboration and psychological well-being according to the research model designed for this study. It is then essential to establish the theoretical relationship between these two constructs and the physical working environment as the main point of this study, and a literary based explanation about the established relationships between the three constructs.

5.4.1 The relation between the physical working environment and employee collaboration

Collaborative spaces as mentioned in 5.3, can be formal or informal although this study will mainly cover informal spaces as they are part of a more natural environment for the sociability of employees and not for intentionally planned encounters. Collaborative spaces as Becker and Sims (2001) explain and as described in Nag (2019:14) are “highly diverse places that recognized and

accommodated, even celebrated, the value of giving people lots of choice in where and when and how they worked” that also implies the personal choice and flexibility to organise work. The open-office design enables collaboration as it increases the possibility for casual interactions owing to the visibility of the space. Coworking spaces for example, which are mostly designed following an open-plan office design, are more likely to enhance interaction due to the openness of the space. Open-space plans may satisfy collaborative workplaces and facilitate free-movement by an increase of casual interactions between employees and workers of different sections or departments. As several authors say, the situation awareness open offices bring, state that the visibility of others and their behaviours simplify interactions and enable a better understanding of the context (Gutwin and Greenberg,2002; Hua et al.,2010). However, studies are not yet fully conclusive when considering whether open offices facilitate employee collaboration by enabling better chances for formal and informal interactions. Nevertheless, and according to Hua et al. (2010), as space layout and typology are analysed the relationship between visual openness and workplace interaction is not consistent. In addition, in a study done by Gutwin and Greenberg (2002) who focus on situation awareness, state that the visibility open office plans offer allow for easier interactions and shared understanding in the workplace thus, supporting the idea that openness does indeed positively influence collaboration. So, investigations on open office design have drawn mixed conclusions over the openness and the chances for interaction.

In addition, several authors have also studied open office plans and employee collaboration in relation to the concept of accessibility to the space that can highly influence external intrusions given in the workplace as openness delivers a sense of externality that welcomes random interactions (Oldham and Rotchford,1983; Hua et al.,2010). As a result, and according to the results from investigations done, it is easier to get involved in different levels of interaction in an open-plan office rather than in a traditional or enclosed office design, interactions that can later lead to collaboration or collaborative projects. Therefore, although some investigations have obtained positive conclusions on the physical working environment in relation to employee collaboration, conclusions are not yet conclusive.

One reason for this ambiguity is found in Heerwagen, Kampshroer, Powell and Loftness (2004) as they explain that the central conflict about employee collaboration is not having a unified definition or conceptualisation that provides a balance between the need to interact and collaborate, and the need to work effectively for oneself in private. Depending on the type of job, the individual will need more space for work alone or for meetings rather than the amount of open space available. Additionally, a constant manipulation of space can have a negative impact on individual work as it

can result in an increase in noise, distractions, and interruptions (Heerwagen, et al.,2004). For that, space should be effectively planned when designing or re-thinking the workplace. Due to the importance of the design of the space for employee collaboration but also for allowing individual work or jobs which require more privacy, it is important to find an adequate balance regarding the different profiles and types of jobs. As Hua et al. (2010:371) say, “the current workforce is specialized in terms of knowledge and skill sets, and multidisciplinary and cross-functional⁵² collaboration is becoming an important element” although certain spatial settings may inhibit desired behaviours if there is a negative response to the achieved setting. As Heerwagen et al. (2004) explain, there are occasional brief interactions in the workplace like, passing on information or asking questions that normally last less than 1 minute and they are the consequence of occasional or accidental interactions that are formed on an every day working basis.

Furthermore, regarding the definition of collaboration given by Kraut (1990) and Heerwagen et al. (2004), the authors describe these interactions over time, as they specify that collaboration normally lasts longer than formal or informal interactions, although shorter collaborations are possible when less relevant matters are concerned. As several authors also corroborate, workers spend between 20% and 35% of their time in interactions with colleagues (Reder and Schwab,1990; Perlow,1999; Brill and Wiedemann, 2001; Heerwagen et al.,2004) noting the importance of these brief and casual interactions in the workplace. Informal interactions are normally unplanned, and they occur because of daily socialisation processes. As Heerwagen et al. (2004:513) continue, “informal group spaces are a common workplace solution to enhance collaboration is the provision of informal group spaces adjacent to or interspersed among personal workstations” with mobile furniture available in the open and often shared by different work groups. The intent of the space is to support spontaneous meetings and informal work (Heerwagen et al., 2004), when describing the space for interactions regarding the sharing of information. As Heerwagen et al. (2004:521) say,

“Non-territorial, high-mobility offices eliminate assigned workstations, providing in their place a variety of spaces that can be used by individuals or groups. Many such

⁵² Cross-functional collaboration: according to Ellinger (2000), cross-functional collaboration refers to the collaboration scheme based on the alliance of two or more different fields in the process of achieving the same goals. A cross-functional example of collaboration would be the collaboration between logistics and marketing to achieve a shared goal and enhance collaboration and teamwork.

spaces also eliminate walls and barriers to encourage visual and aural access among workers (...) Although the spaces designed for collaboration vary, they share several key features: aural and visual openness, shared information displays, mobility within the space, and easy movement between the individual and group work”.

The openness and free mobility that collaborative spaces usually have as a common feature determines the number of interactions that will take place in the office. As a result, it is exponentially better for offices to be arranged openly, with mobile furniture and available technological tools. Progress in technology has allowed workplaces to become mobile places where employees do not have to compulsory stay in one same office to conduct their jobs. This has also allowed mobility inside the workplace and among different workplaces territorially or internationally. Worldwide interactions have increased due to technological tools and devices that have enabled an extensive worldwide communication net where an employee from the USA for example, can straight forward connect and interact with another employee in any part of the world. In addition, collaboration only happens when there is the participation of more than one person.

As a result, collaboration is part of the social dimension and the sociable nature of the individual. As gathered in Cole, Shaninger and Harris (2002) social exchanges are based on self-interest and characterised by a kind of interdependency. This remarks that there is always an implicit self-interest within every interaction that can partly help us achieve a certain goal. At least two actors need to participate in interdependent interactions regardless of each actor's interest in the proceeding interaction and achievable further goals. Cole et al. (2002) suggest that when an individual is attracted to another, this attraction is normally intended to obtain rewards and consequently, it proceeds directed by a previously established goal or objective underlining the implicitness of self-interest in the scheme of human interaction.

Therefore, any formal or informal interaction inside a social dimension where the interaction takes place, implies a personal interest, and rarely occurs without an initial goal or a further aim. However, these interactions get fully accepted and interiorised because in a familiar environment like at home, at school, or in the workplace, these interactions are generally based on trust. As Cole et al. (2002) say, individual trust must be earned, meaning there is a response to previous experiences where trust has been earned by both participating parties in advance and the workplace environment is a clear example of a trustworthy space where employees must trust on each other to achieve common goals set by the organisation.

To summarise, there are several factors that directly affect the physical working environment and its relation to employee collaboration. Depending on the means the environment has been designed for, the expected results or outcomes will be different. Owing to this, to measure how the physical working environment affects employee collaboration, the collaborative group measuring items (see, table 10) have been taken from the investigations done by Mattessich and Monsey (2001)-employee collaboration items 1- and Sawyer (2017)-employee collaboration items 2- as explained in chapter three:

TABLE 10

Collaborative group measuring items

Employee collaboration items 1	Employee collaboration items 2
1. People in this collaborative group have a clear sense of their roles	1. Collaboration is granted personal and team autonomy for major decision making
2. People in the collaborative group know and understand shared goals	2. The team builds dense networks for collaboration
3. The level of commitment of members with the collaboration is high	3. My collaborative team practices deep listening
4. This climate is the adequate for starting the collaboration	4. When the collaborative group makes major decisions, members show support from the organisation and colleagues
5. I am informed as often as I should about what is going on in the collaboration	5. There is a positive relationship and backup from colleagues
6. People involved in collaboration trust each other	6. There is constant in person communication
7. People involved in this collaboration are willing to compromise	
8. Communication happens both in formal and informal ways	
9. Spatial characteristics for collaboration are optimate	

Source: adapted from Mattessich and Monsey (2001) and Sawyer (2017).

5.4.2 The relation between the physical working environment and psychological well-being

According to Warr (1999), a person's psychological well-being has a strong impact on his or her job-specific well-being as this may affect general feelings. Although well-being is a broader concept (see, chapter four) rather than just speculating about organisational or workplace well-being, job related well-being is essential for the correct functioning of the whole organisation. Workplace environment or the physical working environment has become a needed structure for

the analysis and study of well-being in the workplace. Current trends in office design have opened new possibilities of research and categorisation of job-related well-being. However, there are not yet many studies that cover the relationship between the physical working environment and employee's well-being. As Heerwagen, Heubach, Montgomery and Weimer (1995) say, there are not many attempts on developing a conceptual framework between the environment and human outcomes although the interest and the importance of the influence the environment may have on the individual, is now increasing. As Heerwagen et al. (1995:459) explain, "people prefer to be in environments that are compatible with their needs and preferences (...) instead, people are likely to experience negative outcomes, including stress responses and discontent" resulting in the importance design and the working environment have on individual psychological well-being. For an organisation, it is important to consider the changing employees' needs at all moments and regulate any kind of adverse outcomes or results that may affect the relationship between the environment and the individual.

As Spivak (1969) says, there are archetypal places according to their special characteristics and the relationship with the individual. Spivak (1969) made a classification of three types of archetypal places called "territory", "meeting" and "shelter". For him, meeting places are not only for communication but also for dominance, governing, and socialization, and when the space does not provide the archetypal type for each specific situation, the individual functioning and quality of life are impaired. It is important then, for the space to fulfil the specific characteristic it has been designed for, elementary speaking and considering the workplace, as it should cover the spatial needs of every individual working there.

In addition, it is true that humans have the ability for adaptation as naturally adjacent to its sociability or the social attribute to human nature. However, not all adaptations show positive results, specially, if the adaptation process has not been adequate or, if the adapted environment is not the correct for the fulfilment of goals or, the psychological outcomes of self-incapacity that make it difficult to adapt to new environments. As Heerwagen et al. (1995) establish, there is a close connection between Maslow's pyramid⁵³ and the physical environment. According to this,

⁵³ Maslow's pyramid: it refers to the hierarchy of needs described by psychologist Abraham Maslow in a pyramidal shaped hierarchy of human basic needs within an outline of 5 different levels beginning with psychological needs in the lowest level and ending with self-actualization (Baumeister and Leary,1995).

and as explained by Heerwagen et al. (1995:460), “spiritual and cultural values must be integrated into the designed environments to give a sense of meaning to places” as each space contributes to the local identity or the self-awareness of the individual. The term “workplace” then, can deliver a feeling of an enclosed space that is only used for work, but each exact workplace owns a specific meaning that is related to colleagues, timely events, celebrations, daily life and in the end, a range of random memories. These recollections of a place can disrupt the original meaning or understanding of such places mainly based on previous life experiences. Consequently, if time at work brings positive memories, the concept attached to that place will also be positive. In such a way, the place specific concept, the emotional attachment, and the eagerness to remember it as a positive experience, will also depend on the created environment, designed, or built for its purpose. There are five levels that correspond to the hierarchy of human needs as described by Maslow: 1-Psychological, 2-Safety, 3-Social, 4-Esteem and 5-Self-actualisation and in relation to the needs found in the workplace (see, table 11):

TABLE 11

Maslow’s hierarchy of needs related to the workplace

NEED	Achieved by
Psychological	Good working conditions, attractive salary, subsidies, free catering
Safety	Private health care, pension, safe working conditions, job security
Social	Group relationship, team spirit, informal activities, open communication
Esteem	Positive feedback, job titles, promotion, and reward
Self-actualisation	Challenging job, promotion opportunities, encouraging creativity, autonomy, and responsibility

Source: adapted from Huczynski and Buchanan, 1991.

According to Maslow, there are five basic needs (see, table 5.4) that simulate the original hierarchy of the needs’ theory. Each need is linked to different requirements individually and collectively in the workplace. In addition, Maslow’s needs in the workplace relate to the well-being outcome as it represents the different features related to the basic needs of well-being. These basic needs are divided into 1. collective well-being and 2. individual well-being. Besides, there are several features that increase the chances of achieving collective and individual well-being in the workplace. Workplace features based on investigations by Boyden (1971) also integrated biological and behavioural aspects in Maslow’s original hierarchy of needs and Stokols (1992) added religious and cultural to the original hierarchy of needs described by Maslow (table 12):

TABLE 12

Maslow's needs adapted to the workplace

Collective well-being	Resulting features
Social cohesion	Informal and formal meeting places
Cultural and collective meaning	Integration of symbols of cultural and group identity
Individual well-being	
Control of physical and social environments	Enclosure to privacy, individual space for ability to adjust to ambient conditions
Expression of species typical behaviours	Indoor and outdoor exercise areas, opportunities to personalise space, visually interesting environments, space that provides a sense of discovery
Interesting visual and sensory environment	Access to daylight, incorporation of variability through textures, colours and shapes, access to indoor and outdoor natural stimuli
Self-expression, accomplishment, and learning	Freedom from distractions, visual and auditory privacy, spatial design that promotes movement, sharing of resources, opportunities for spontaneous interactions, group meeting rooms with necessary equipment
Restoration and tranquillity	Quiet spaces with interesting visual décor, soft lighting, access to nature, low sensory stimulation, distant views
Making sense of the environment	Landmarks, pathways, variability of space

Source: adapted from Heerwagen et al. (1995).

According to Heerwagen et al. (1995:465) “in work settings an environment must not only make it possible to carry out important tasks in an efficient way, it also must provide a sense of pleasure, promote feelings of rootedness and belonging, provide sensory variability and change, allow for self expression and personalization, and allow persons to regulate their behaviours” very attached to the well-being concept. Consequently, space does not only provide an archetypal type for social interactions, group activities and collaboration, but it must also provide a personal meaning to the self.

Considering space as a social and psychological product it enables a better conceptualisation as a multi-functional equity. Heerwagen et al. (1995) investigations on the physical working environment relating space to different variables including the psychological sphere and well-being. This is also strongly related to Hartig et al. (1997) psychological well-being outcomes described in chapter four. In addition, and according to the investigations done by Loftness and Snyder (2002), it is important for buildings to enhance features like sustainable workplaces and offices that contribute to well-being. Buildings accommodate a unique climate by creating spaces where human needs are covered, and individual's needs are guaranteed. A building is more than just an architectural structure. Inside a building, life goes on at a different pace, and in the end, life encompasses everything that shapes humans from the emotional side to the social (Clements-Croome, 2006). So, it is essential for a building to cover all these basic needs that will ubiquitously

help achieve well-being and fulfil the natural human attribute of continuing life. As it was stated in the first chapter, people spend most of their daily hours in the workplace that normally means staying indoors. As Clements-Croome (2006:27) says, “people spend about 90 per cent of their time inside a building. Employed people spend anything from 20 to 60 hours per week in offices or factories”. According to this, it is important to highlight that most of our lives is spent inside a built structure whether it is at home or in the workplace. Clements-Croome (2006:28) enlists two types of environments that can be found in a building: 1. social environment, provided by people and 2. physical environment, “provided by the things we see, hear, touch, feel and smell”. As a result, the interior design of a building is extremely important for enhancing a sense of well-being and for the individual’s psychological state as the sensory stimuli we receive from the interior of buildings makes an impact on mental health. Several positive mood-inducing factors like colours, airing, aesthetics, or nature should be thoughtfully designed to build an optimal indoors atmosphere and promote well-being.

Regarding organisations and management, an organisation that does not have a well-established design that would subtle these positive mood-inducing factors, will ultimately enhance psychological well-being, will probably expect negative outcomes such as higher levels of stress, absenteeism, or health conditions. As it has been described throughout this point, Maslow’s needs regarding workplaces and well-being should be covered by organisations if they expect their employees also to be psychologically fit to perform their jobs and challenge everyday.

For measuring psychological well-being and as described in chapter four, Hartig’s restorativeness scale has been selected because of its relation to the restorativeness effect of certain environments and as it is easier to connect it with the other two constructs and indicators that complete the research model, the physical working environment and employee collaboration. The scale has been derived from the initial attention restoration theory by Kaplan (1995). Hartig et al. (1997) established four outcomes that influence the achievement of well-being in the workplace: 1. being away, 2. compatibility, 3. extent, and 4. fascination. These four factors play a significant role in the attention restoration theory proposed by Kaplan (1995) later analysed and re-conceptualised by Hartig et al. (1997) in regards of the environmental restorative process as an essential factor for the renewal of the senses and the re-establishment of the attention-focus, and the resources necessary to achieve psychological well-being. The measuring scale for the psychological well-being construct has been adapted from Hartig (2004) and the variable biophilia has been added from Kellert et al. (2008) as summarised in table 13.

TABLE 13

Restorative quality of environments and its influence on the psychological well-being

CONCEPT	Restorative quality of environments items
Being Away	1. To get away from things that usually require my attention
	2. It is an escape experience for me
	3. I like to go to places like this
Fascination	4. The setting has fascinating qualities
	5. I would like to spend more time in this place
	6. There is much to explore and discover here
	7. I would like to get to know this place better
Compatibility	8. It is a confusing place
	9. There is a great deal of distraction
	10. Being here suits my personality
Biophilia	11. I have a sense that I belong here
	12. The environment provides direct experiences with nature
	13. The environment provides indirect experiences with nature

Source: adapted from Hartig (2004) and Kellert et al. (2008).

However, in a research study done by Pasini, Berto, Brondino, Hall and Ortner (2014) the dimensions of the perceived restorativeness scale have been revisited and adapted from the original by Hartig et al. (1997). According to the investigation done by the authors, a four-factor model fits better than the original five-factor model. As Pasini et al. (2014) argue, the psychometrics of the original scale have not been established in a definite way yet, the scale gives the researcher the opportunity to adapt to the best fit for the proposed model.

Kaplan's attention restoration theory included five factors assumed to be present in the given environment "extent" being formed by coherence and scope. As Pasini et al. (2014) explain, since Hartig's first investigations on the adaptation of Kaplan's attention restoration theory intended for the study of environments, there have been only two published studies that have assessed the psychometrics of the scale so far. In consequence, the results over the effectiveness of the scale and the value of Hartig's scale are not conclusive. Pasini et al. (2014) opted for trying different adaptations of the scale to see which fits their model best. As Pasini et al. (2014) say, "even the authors-Hartig et al. (1997)-struggled to settle on the number of items making up the scale" regarding the original version that underlines the ambiguity of the scale or the conceptual domain or the conceptualisation of "context". Contrary to this, two items have been constantly identified as most effective when measuring the restorativeness scale: 1. Being away and 2. Fascination (Hartig, 2004; Pasini, Berto, Scopelliti and Carrus, 2009; Purcell, 2011). As a result, considering

Pasini et al. (2014) study and the results obtained by Hartig (2004) the indicator “extent” has been eliminated from the measuring scale in order to obtain better results in the empirical analysis.

5.4.3 The relation between the psychological well-being and employee collaboration

Psychological and physical well-being may influence collaboration, as psychology also supports collaboration needs. The individual’s mental state will limit the way and frequency of interactions with others. According to Bedwell, Wildman, Diaz-Granados, Salazar, Kramer and Salas (2012), collaboration is a process that requires at least two social entities. Within this definition, it is understood that collaboration is entirely a social process. Referring to the concept of socialisation that it has been discussed throughout the second chapter and the importance of this social sphere also for psychological well-being, it can be stated that a previous relationship exists between psychological well-being and the social dimension of collaboration.

However, the relationship does not only refer to the social sphere as not all the psychological aspects or dimensions have been yet studied in relation to collaboration and more specifically, in relation to employee collaboration at work settings. As Bedwell et al. (2012:130) explain, “collaboration is the process that people engage in to achieve some desired outcomes”, despite the fact the authors fail to give a more explicit explanation on the factors affecting the collaboration process. As said by Storbacka, Strandvik and Grönroos (1994) and found in Blomqvist and Levy (2006:33), collaboration “owns a relationship quality consisting of commitment, communication, bonds, and satisfaction” elements that relate to the social side of the collaboration process. Factors affecting socialisation, like the individual’s mental state, levels of stress or preconceived opinions about the interacting individual such as behavioural patterns, as well as biological factors, can positively or negatively affect interaction, and consequently, the collaboration process.

However, according to the scale for measuring employee collaboration adapted from Mattesisch and Monsey (2001) and Sawyer (2017), communication is also a decisive factor affecting collaboration that closely relates to human psychology, as communication basically is a mental process. However, although psychological well-being factors considered in this study (away, biophilia, compatibility and fascination) do not strictly relate to employee collaboration, the inner processes of achieving well-being based on the restorativeness scale by Hartig (2004) and the mental processes influencing this relationship, may influence the outcome of collaboration. Certain

environments may have a restorative effect on human psychology and psychological well-being, indirectly affecting employee collaboration. Two main theories extensively cover the literature on restoration and the restorative effect of certain environments. The first theory was narrated by Kaplan (1995), commonly known as the Attention Restoration Theory (ART) also found in Hartig (2004). As Hartig (2004:187) argues “a person’s ability to direct attention depends on a central inhibitory capacity” and when this inhibitory capacity becomes weakened, it can have negative consequences such as, irritability, failure to recognize own self-awareness, a reduction on self-control, and an increased rate of committing errors (Hartig, 2004).

For defining restoration, Hartig (2004) says, the term denotes a set of processes through which individuals re-establish adaptive resource ties that have become diminished with time. Therefore, the restorative effect certain environments produce on human psychology helps to re-establish certain capacities on the individual’s psyche. This way, a person can restore the ability to inhibit the excessive amount of information and overloading stimuli by voluntarily directing attention to something interesting and by renewing attention-focus. In addition, the theory proposed by Ulrich (1983), focuses on affective and aesthetic response to visual stimuli mainly elaborated as a response to stress and environmental stressors that conditionate an individual’s psychological estate and well-being. What Ulrich (1983) proposes to overcome stress and stressors is the restoration occurring when a scene or an environment transmits feelings of interest, pleasure, and calm. This way, attention is primarily focused on that visual stimulus that declines the psychological negative arousal by perpetuating an affective physical and psychological response of calm or serenity, and well-being.

Many health and psychological conditions related to work and working environments, manifest symptoms that are physical manifestations of stress and fatigue as seen in chapter four. When sensory information is over-stimulated, we are continuously exposed to this overload of stimuli. Working overtime to meet deadlines, attending meetings that extend the limit of scheduled hours or technology, are some of the main causes for work related stress, fatigue, irritability, headaches and other non-defined symptoms or conditions as seen in chapter four. The restorative effect of environments on human psychology helps to overcome stress, fatigue and other psychological conditions that are followed by physical manifestations. As Kellert, Heerwagen and Mador (2008) say, contact with nature for example, has healing properties and helps in the patient recovery process. Additionally, Clements-Croome, Turner and Palaris (2019:5) state that “natural elements are associated with perceived well-being: light, natural materials, views of nature and sound of water all create a sense of calm helping to increase attention (...) integrated into buildings

contribute to improving the health, well-being, and productivity of employees” or, as Caperna and Tracada (2012) say that natural scenery does not overload the attentional system and undermine cognitive performance unlike urban areas. Besides, people experiencing open spaces normally report fewer health problems owing to the sense of liberty open office designs offer. Other environmental features have also proved to improve performance, lower stress, and increase motivation and in the workplace, the physical working environment and its features can also influence psychological well-being of employees and consequently, also have a direct impact on employee collaboration. The restoration of certain attributes that help in the process of adaptation and re-establishment of resources and capacities, can also open a new path to psychological well-being and employee collaboration.

Collaboration, referring to the psychosocial factors affecting human interactions, are essential to build trustworthy environments that enhance communication and consequently, collaboration among its members. If there is not trust, communication and collaboration become impaired, and the mutual interests and shared goals and values also become diminished. In consequence, it is important for workplaces to incorporate spatial characteristics that enhance employee collaboration by facilitating interaction processes. To model the working environment to include features that contribute to employee collaboration is as essential as nurturing employees’ psychological well-being in order to prevent negative behaviours and attitudes that negatively affect collaboration. In addition, factors causally related to the psychological profile, or the personality of employees can also influence the individual behavioural response thus, affecting interaction and communication with others and consequently, negatively inhibit collaboration. As a result, the psychological aspect of interaction and communication is a main component for enhancing collaboration in work environments. However, there is still research to do to identify the main elements affecting psychological well-being in relation to employee collaboration.

On balance, and after having established the relationship between the three constructs proposed in this research study (1. Physical working environment, 2. Psychological well-being, 3. Employee collaboration), items have been selected and modelled according to literature and the adequacy of the measuring instrument. To conclude, a final list has been designed that establishes the relationships between the authors, constructs, and the selected items (see, table 14).

TABLE 14

Relation between authors, constructs, and items

Hua (2010) and Hua et al. (2010)	PHYSICAL WORKING ENVIRONMENT
Teamwork related	Teamwork
<ol style="list-style-type: none"> 1. Adequate types of collaborative places 2. Available of places for collaboration needs 3. Availability of meeting spaces 4. Good variety of collaborative places 5. Collaborative environment in general 	<ol style="list-style-type: none"> 1. I feel there are suitable places to fulfil my collaborative needs available 2. I feel my workplace has an open space plan 3. I consider my workplace to provide enough meeting spaces 4. I feel there are adequate types of collaborative spaces in my workplace 5. I feel my workplace design affects the relationship I have with my co-workers
Hartig (2004), Kellert et al. (2008), and Pasini et al. (2014)	PSYCHOLOGICAL WELL-BEING
Being away	Away
<ol style="list-style-type: none"> 1. To get away from things that usually require my attention 2. It is an escape experience for me 3. I like to go to places like this 	<ol style="list-style-type: none"> 1. Away: I sometimes don't have self-awareness when I'm at work while I concentrate on what I'm doing 2. Away1: It is easy for me to adapt to my workplace and its environment 3. Away2: I feel relaxed, happy, and positive when I enter my workplace
Compatibility	Compatibility
<ol style="list-style-type: none"> 1. Being here suits my personality 2. I have a sense that I belong here 	<ol style="list-style-type: none"> 1. Compatibility: I feel being here in my workplace suits my personality 2. Compatibility1: I have a sense I belong here
Fascination	Fascination
<ol style="list-style-type: none"> 1. The setting has fascinating qualities 2. I would like to spend more time in this place 	<ol style="list-style-type: none"> 1. Fascination: I think my workplace has many interesting things to draw my attention to 2. Fascination1: I like being in this working environment 3. Fascination2: There is much to explore and discover in my workplace 4. Fascination: I find components of my workplace to be beautiful and pleasant
Biophilia	Biophilia
<ol style="list-style-type: none"> 1. The space provides direct contact with nature 2. The space provides indirect contact with nature 	<ol style="list-style-type: none"> 1. The workplace provides direct contact with nature 2. The workplace provides indirect contact with nature 3. I feel happy and positive at this moment
Mattessich and Monsey (2002), Sawyer (2017)	EMPLOYEE COLLABORATION
1. People in this collaborative group have a clear sense of their roles	Teams: My team-mates and I have clearly defined roles
2. People in the collaborative group know and understand shared goals	Teams1: My team-mates and I have well-established goals
3. No other organization is trying to do what we are exactly doing	Teams2: My team, my organization and I own a shared identity
4. The level of commitment of members with the collaboration is high	Structure: I feel collaboration is valued in my department
5. Collaboration is granted for personal and team autonomy for major decision making	Context: I feel my team and I have control of actions and environments
6. This climate is the adequate for starting the collaboration	Context1: I feel collaborative environment is adequate for me and my type of job
7. I am informed as often as I should about what is going on in the collaboration	Support: I have all the information I need to fulfil my work
8. The team builds dense networks for collaboration	Support1: I feel my organisation helps to build working networks
9. My collaborative team practices deep listening	Support2: I feel my organisation enables deep listening
10. When the collaborative group makes major decisions, members show support from the organisation and colleagues	Tasks: My co-workers, team members and I help each other to complete tasks
11. People involved in collaboration trust each other	Individuals: I trust my co-workers and project members
12. People involved in this collaboration are willing to compromise	Individuals1: I feel positive and happy around my co-workers
13. There is a positive relationship and backup from colleagues	Individuals2: I have a positive working relationship with my co-workers
14. There is constant in-person communication	Processes: It is easy for me to communicate face-to-face with my co-workers
15. Communication happens both in formal and informal ways	Processes1: In my organisation there are established informal and formal communication links
16. Spatial characteristics for collaboration are optimate	Processes2: I feel there is enough space in circulation areas for conversations with my co-workers

Source: self-elaborated from Mattessich and Monsey (2001), Hartig (2004), Kellert et al. (2008), Hua (2010), Hua et al. (2010), Pasini et al. (2014) and Sawyer (2017).

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CHAPTER 6

Method and methodology

6. METHOD AND METHODOLOGY

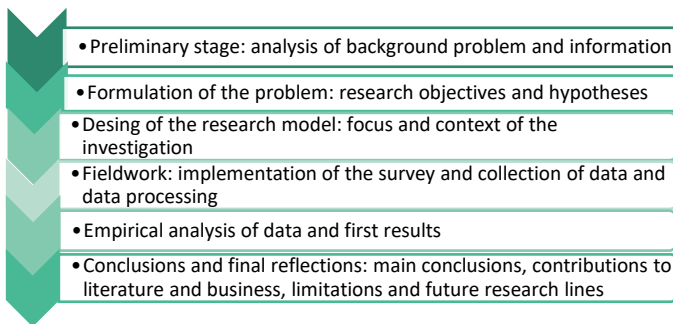
“We are what we repeatedly do. Excellence then, is not an act, but a habit”-Aristotle

Once it has been established the rationale for the research, the objectives, and the hypotheses, it is the continuation to develop the methodology that will enable to contrast the hypotheses previously stated and verify the proposed research model. This chapter will explain the theory on the methodology used for the empirical analysis of data.

6.1 The process of the investigation

This research project intends to measure variables in their natural state and as a result, the methodology used for the observation of the variables has been done through fieldwork. Consequently, it is preferable to use quantitative methodology on this research study, as the use of this method to contrast hypotheses enables the researcher to have a global vision of the data collected and the results obtained. Besides, the quantitative method as aids to analyse the causal relationships between variables, is better justified for this study case due to the nature of data, which is numerical, and the hypotheses proposed.

The study has been divided into six stages: (i) the preliminary stage that includes a background analysis of the problem; (ii) the formulation of the problem that includes the main research objectives and hypotheses; (iii) the design of the research model including the focus and context of the investigation; (iv) fieldwork, regarding the implementation of the survey, data collection and data process; (v) the empirical analysis of data and the first results; (vi) main conclusions of the research that are obtained accompanied by an input to general knowledge, limitations, future research lines and additional information. Figure 6 summarises the different stages of the investigation process:

**FIGURE 6**

The investigation process

Source: self-elaborated.

6.2 Characteristics of the population and the sample

The first thing to do before starting with the empirical analysis is to decide and analyse the population from which the sample has been taken. In this case, it has been determined to delimitate the population and the sample to Coworking spaces in the Basque Country because of the proximity for the focus of the study and the possibility of repeatedly visiting the different organisations that contribute to the sample.

Regarding the Coworking space as the research unit of this study, the number of Coworking spaces in the Basque Country is 28 and the obtained sample of 10 makes around 35% of Coworking spaces (see, table 15). For conducting the empirical analysis, a survey has been shared between the workers of these spaces and 50 responses have been collected with more than one respondent for each of the analysed spaces. However, it has not been possible to know the exact percentage of Coworking users that exist in total as the number of co-workers from each space changes constantly. The survey assembles participants' conformity towards each of the items regarding the three main constructs of the research model: 1. the physical working environment, 2. employee collaboration and 3. psychological well-being. For that, a 7-points Likert scale has been used ranging from 1-totally disagree- to 7- totally agree- (see, annex 2). Table 15 explains the number of respondents for each of the Coworking spaces and characteristics:

TABLE 15

Relation between Coworking space, its characteristics, and the number of respondents

Number of Respondents	Coworking spaces	Characteristics
2	Alzola Coworking	It is a middle size coworking site located in the centre of Bilbo that has recently increased in population due to its strategic location.
15	BBF (Bilbao Berrikuntza Faktoria)	Located at the premises of the University of Mondragon in Bilbo and mainly functions as a coworking/think tank/idea sharing space for start-ups and new graduates.
5	Icaza Colaborando	It was first founded as a company specialized in the design of workplaces that it later turned its premises into a Coworking space.
2	WeLink	It was built parting from a consulting company.
6	CoSpaceSS	Initially an architecture studio, now apart from architectural counselling they also offer a coworking site for space sharing and collaboration.
8	Impact Hub	It is part of an international networking of Coworking spaces worldwide specialised in social and community-based projects.
4	Hub Gasteiz	It is the result of combining the Hub concept with coworking that apart from a coworking space works as a <i>think tank</i> for upcoming projects.
5	Senda15	It is located inside the venues of a city-theatre in Gasteiz. It was designed for coworking and for sharing workspaces and to better establish communication and collaboration between start-ups.
1	Eibar Coworking	Strategically and geographically well-connected to the capital cities of Donostia and Bilbo and to provide available workspaces for renting and sharing that have recently become a social demand for students, start-ups, and entrepreneurs.
2	Oñati Co-work	It is the most recently opened space for coworking in the town-village of Oñati that serves as a space for sharing and coworking mainly used by young entrepreneurs

Source: self-elaborated.

The Coworking spaces included in this study are diverse as they all differ in size, number of co-workers, workplace environment and design, and ongoing projects. The sampling has been obtained through the non-probabilistic approach of snowball sampling. As a result, the obtained sample is diverse regarding the precedence of each of the Coworking spaces and the participants on the investigation. Besides, Coworking spaces form alternative workplaces based on the idea of sharing and working together. Far from traditional office designs, Coworking spaces offer venues purposefully built for coworking or working together.

As explained in chapter three, Coworking spaces have considerably grown in number in the last ten or twenty years, due to factors such as, the high rental fares at city centres, overpopulation of the cities, and the changing nature of work. Mobile and wireless technology has enabled the access to new work settings that provide a more autonomous way of working. In addition, new studies and

tendencies in office design try to stimulate elements that were before omitted or less considered. These new trends have arisen the attractiveness and popularity of Coworking spaces as venues built for information and knowledge-sharing based on collaboration and teamwork. The high renting fares and the overpopulation of the urban space, however, have brought the opening of new spaces to work. Besides, as Beck (2000) and Lyons (2000:198) say, “the extent to which work is part of the modern European’s moral being and self-image is evident from the fact that, in Western culture, it has long been the only relevant source and the only valid measure for the evolution of human beings and their activities”. Therefore, work is enrooted into the Western civilisation as a means for evolution and survival although these new spaces provide an alternative to traditional industries that were mostly manual, mechanical, and intended for mass production. Nowadays, bigger industries are built in large industrial units in separated neighbourhoods. Coworking spaces in contrast, are smaller venues in size mainly due to the exceeding rental fares as space in the city centre is an overvalued and overpriced resource. As Beck (2000) and Lyons (2000:62) say, “in the countries of the West (...) a historical bond is broken between capitalism, welfare state and democracy” meaning work and social values have been reconsidered and re-contextualized for the needs of the current society. Neoliberal utopias, based on the idea that humans should achieve freedom by working, have been reinvented with the idea that work, as well as different work settings, should serve people and not in reverse.

Hence, Coworking spaces and coworking itself propose a new way of thinking and understanding work that is symmetrical to new ideologies that are settled not according to old capitalist theories but the modernisation and liberalisation of culture and thought. In this way, even in smaller regions or parts of the world, successful practices, and new tendencies like Coworking spaces are being built and extended in number to serve all the transforming ideas and concepts of the current world. The idea of social incubators and the socialisation of space as seen in chapter two, have generated new work settings where, instead of the traditional office and values, social aspects of work and community life are joined to form a brand-new working dimension. As Nicolopoulous, Özkan and Cristopher (2015) say, Hubs as social incubators are idealised with the determination of an entrepreneur but also employing ethical values with the intent of creating a positive impact for the society and the environment.

In the Silicon Valley area in San Francisco, California, where the world’s most important tech-companies are located, the initiative of founding Hubs was based on the idea of coworking and knowledge-sharing. These spaces had been long opened to provide a space for collaborative projects for university students, who still had not clear what careers to follow, so they could

interact with each other to share knowledge and experience. These became essential venues for future Silicon Valley employees as they provided a space for personal and professional development and by helping others to develop themselves. As Oksanen and Ståhle (2013:815) say, “innovative spaces may enable interaction, nurture social capital, accelerate start-ups, generate artistic activities, and support the flow of ideas” to underline the importance of these spaces and coworking as essential elements for adapting to new business models and practices and the changing nature of work. The project for shared spaces, coworking and Hubs, was brought from the Silicon Valley area to other major cities across the US and Europe. Cities like Amsterdam, Berlin or London have already a decade-long experience on the development and opening of Coworking spaces and social incubators being the first European cities to see the growth of these spaces in their urban area. Although the worldwide coworking movement is still quite recent, the idea behind the opening and the development of Coworking spaces in Europe was greatly influenced by the idealisation and founding of the HUB London around 2005-2006. These first Hubs or social incubators helped start-ups on their ranking spree towards social and urban innovation (Nicolopoulous et.al,2015).

Furthermore, during the last years, there has been an increase of Coworking spaces in smaller areas like the Basque Country. The first Coworking spaces in the Basque Country were opened around the year 2010-2011 mainly located in larger cities like Bilbo, and as for today, there are 28 registered Coworking spaces in the whole of the territory: 6 in Araba, 12 in Bizkaia and 10 in Gipuzkoa.

6.2.1 General aspects of the Coworking spaces in the Basque country

Coworking spaces in the Basque Country are relatively small compared to larger venues with a more international perspective found in major cities like Barcelona or Madrid. These spaces were mainly founded by personal initiatives and motivations with the aim of facilitating spaces to collaborate and work together in different projects. Regarding the Basque Country, the largest number of Coworking spaces are in the three major cities: Gasteiz (see, image 9), Bilbo and Donostia (see, images 10 and 11).

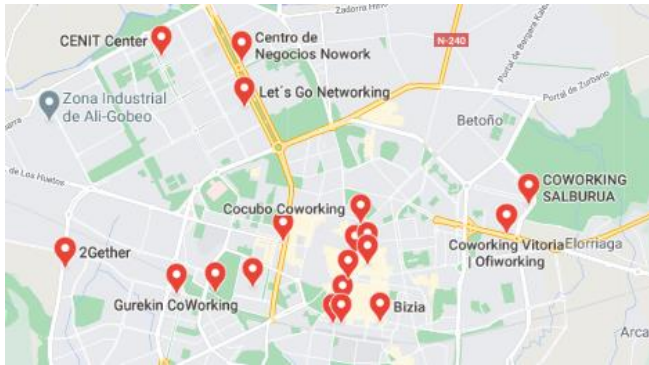


IMAGE 9

Coworking spaces in Araba

Notes: The images also show the localisation of other venues similar to Coworking spaces, as the mapping locates all premises that match the search criteria for coworking.

Source: Retrieved from Google Maps on 02/05/2019.

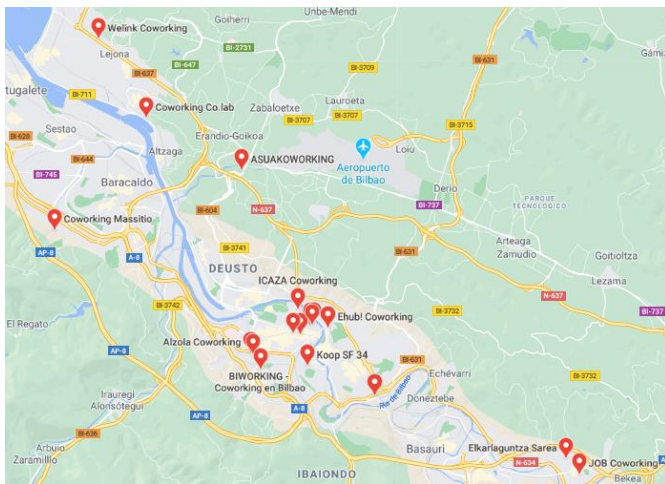


IMAGE 10

Coworking spaces in Bizkaia

Source: Retrieved from Google Maps on 02/05/2019.

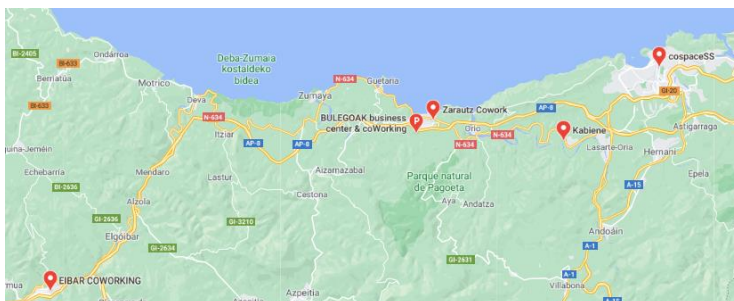


IMAGE 11

Coworking spaces in Gipuzkoa

Source: Retrieved from Google Maps on 02/05/2019.

One of the main reasons for the gentrification of these spaces in the three major cities is because their original founding was intricately linked to the growth of the urban space and the centralisation of the city, where population is larger and there are more options for finding co-workers and partners for collaborating and founding projects. As a result, being Coworking still quite a new alternative to traditional work settings, the choice for finding a Coworking space that suits personal and interpersonal requirements is larger in urban areas than in the country.

For example, Impact Hub in Donostia (Gipuzkoa) is located inside the building of Tabakalera, a cultural space centred in the development and support of sustainable, social, and community-based projects (see, image 12):



IMAGE 12

The interiors of Tabakalera

Notes: The building of Tabakalera, a former tobacco unit was re-designed as a cultural-urban venue for entrepreneurs, small businesses, culture activists and social innovators.

Source: Retrieved from Google photos on 17/06/2020.

Impact Hub (see, image 13) is a social cooperative founded in 2005 as a global networking company and as it is described on its official website, it is “one of the world’s largest networks” focused on building “entrepreneurial communities” based on the work of entrepreneurs, who create tangible solutions to different issues:



IMAGE 13

Impact Hub

Source: Self-taken on 20/02/2019.

As a short description, the interior design of Impact Hub and the space is divided into desks distributed in an open space area that form a star-shape layout which enables individual work based on a central collaboration mapping. There are three main separate meeting rooms that also function as working spaces for small companies of around 10-12 members, a small area for events and a coffee area with a kitchenette. Although the Hub is relatively small with a central open area there is a *chill out* space and a private backside for meetings.

There is a fixed membership and a non-member fare and co-workers. Permanent members work alongside different companies and organisations in joint social and community projects. The aim is not just to give or provide but also to receive. As for this reason, they work together for the building of a community apart from the social activities they organise on their free time such as, *hubdates* or connecting dates that are an important part of the Hub’s collaborative objectives.

The idea of Impact Hub is similar to other spaces like Hub-Gasteiz (see, image 14), which is a space designed for collaboration and coworking. Hub Gasteiz was founded by an entrepreneur whose

original idea was to *create* knowledge and share it to use for specific projects and enhance think-tank like initiatives.



IMAGE 14

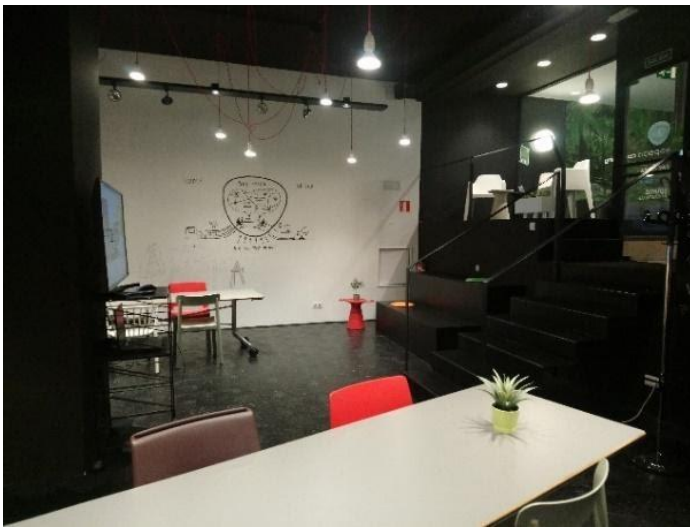
Hub Gasteiz

Source: Self-taken on 12/04/2019.

In Hub-Gasteiz, there is a main entrance glass door that provides natural light, but the interior is not as bright as the reception area. The enclosed meeting room at the backside is dark, too small, and messy. The couch and the coffee area at the entrance of the space are well distributed creating a welcoming atmosphere, nice and relaxed. However, the Hub lacks a suitable design to fulfil its main purpose of collaboration and coworking on a larger scale.

Apart from Impact Hub and Hub-Gasteiz, there is Icaza Colaborando (see, image 15) in Bilbao, a Coworking space of around 700 m² and relatively large, located in the centre of the city. It was founded five years ago by the three founders who had been previously working in the field of office-design. Consequently, due to their expertise on the field, they decided to open a Coworking space that would facilitate a specialised area specialised for collaboration and coworking, while taking advantage of an unused space at one of the most centric venues in Bilbo.

On the ground floor, there is one large open space specially designed for coworking and on the upper floor, there are meeting rooms and private rooms for paying members to be used when they require. The space is bright with the presence of plenty of natural elements and shiny colours within a minimalistic-urban indoor design. There is a large venue for events they organise all the year around and a coffee or a lunch area.

**IMAGE 15**

Icaza Colaborando

Source: Self-taken on 05/04/2019.

Furthermore, it is important to highlight that knowledge and resource sharing is not exclusively linked to Coworking spaces as some of these spaces were founded alongside the idea behind the original HUB movement in San Francisco, initially conceived as knowledge-sharing venues inside top-ranking technological campuses across the United States. However, both Coworking spaces and HUBs share a common idea and values, that are: collaboration, coworking, and sharing thus, enhancing an ideal place for both economic and social innovation.

6.2.1.1 Future tendencies of Coworking spaces in the Basque country

The coworking movement in the Basque Country began to expand around the year 2010 although in the last 2-3 years there has been an increase in the number of Coworking spaces that have been opened in all the Basque territory. As it is a relatively new trend, there are only a few spaces yet as the average citizen does not fully understand the idea behind the concept of Coworking turning it quite difficult to engage people in the projects these spaces provide and coworking, opposite to the traditional office and larger organisations that still dominate the Basque industrial network. However, newly graduates and younger generations have a larger tradition of learning by working in projects and teamwork that are naturally and intrinsically more engaging than the traditional idea of work. These new graduates and postgraduates will be short-term job-seekers whose curriculum and experience will determine future economic tendencies of the Basque Country.

The predominating ideas of collaboration, working and sharing together, inclusion and projects-based work these spaces offer, will build future work settings that will typify the economic and social layout of the Basque industry. As a result, Coworking spaces and Hubs are an essential part for the future all along, by challenging the needs of current graduates and innovation.

6.3 Scaling of variables

Measuring scales are instruments for establishing and studying relationships between concepts explained in the theoretical framework. In this chapter, the scales that have been used for measuring variables will be explained to obtain the most suitable scales for the empirical analysis. For that, an extensive literature review has been done and the scales have been thoroughly selected to design the survey and a measuring instrument that will best fit data and the nature of the observed variables.

6.3.1 Physical working environment indicators and measuring scale

Physical working environment indicators have been selected in relation to collaborative spaces taken from Hua, Kraut, Loftness and Powell (2010) and Hua's (2010) own investigations as described in chapter five. These indicators relate the work environment and spaces for

interaction. Hua's (2010) study exclusively describes a workplace typology in which its main functionality is to promote interpersonal contact and experience and enhance collaborative opportunities. According to Hua (2010) there are several factors that influence work environments in relation to collaboration that have been identified to measure their statistical relevance. Her investigation includes characteristics to measure the workplace for collaboration indicators (see, table 16) such as: individual workstation proximity to corridors and service areas, openness of the floor plan, visibility, and the presence of technology.

TABLE 16

Collaborative environmental indicators

Collaborative environment satisfaction indicators
Teamwork related
Space layout related
Technology related

Source: Adapted from Hua (2010).

From the spatial characteristics described by Hua (2010), items related to collaborative environments have been selected for the design of the measuring scale.

- 1. Teamwork related
- 2. Space related: service-related and amenity-related
- 3. Presence of technology and tools

Therefore, and after having analysed the different spatial characteristics of collaborative work environments, the outcomes for the design of the scale have been selected and furtherly adapted. For this, the spatial outcomes that best influence collaboration have been selected. The three most significant features of the analysed work environments (teamwork, space, and technology) have been identified for the analysis of collaborative environments. The selected items (see, table 17) have been adapted from Hua (2010) and a new scale has been created.

TABLE 17

Physical working environment indicators and associated items

CONCEPT	INDICATORS	ITEMS
Teamwork	Teamwork	I feel my workplace has an open space plan
	Teamwork1	I consider my workplace to provide enough meeting spaces
	Teamwork2	I feel there are suitable places to fulfil my collaborative needs available
	Teamwork3	I feel there are adequate types of collaborative spaces at my workplace
	Teamwork4	I feel my workplace design affects the connection I have with my co-workers
Space	Teamwork5	I feel this connection to be positive and welcoming
	Service	My workplace is in proximity to copiers and printers
Technology	Amenity	My workplace is in proximity to kitchen and coffee areas
	Technology	I think there are enough technology and tools available in my office

Source: self-elaborated from Hua (2010).

6.3.2 Employee collaboration indicators and measuring scale

For measuring employee collaboration, Mattessich and Monsey's (2001) 19-factors scale on employee collaboration that was divided into 6 categories, and Sawyer's (2017) 12 indicators of collaboration have been selected. The selection of the scales from these authors has been made based on the nature of the indicators to analyse and their suitability for measuring collaboration according to the model. The categories described by Mattessich and Monsey (2001) are summarised in table 18 while the categories for measuring collaboration according to Sawyer (2017) are summarised in table 19:

TABLE 18

Mattessich and Monsey's categories for measuring employee collaboration

Dimensions of employee collaboration
Environment
Membership characteristics
Process and structure
Communication
Resources

Source: adapted from Mattessich and Monsey (2001).

TABLE 19

Sawyer's categories for measuring employee collaboration

Dimensions of employee collaboration
Group's goals
Close listening
Complete concentration
Being in control
Blending egos
Equal participation
Familiarity
Communication
Synergy
The potential for failure
Frequent interactions with teams
Multiple discovery

Source: adapted from Sawyer (2017).

After having the original dimensions selected according to Mattessich and Monsey (2001) and Sawyer (2017), the dimensions have been re-grouped in seven conceptual domains according to their suitability. Then, indicators have been named after the concept and finally, items have been selected from the original list by Mattessich and Monsey (2001) and Sawyer (2017). The final measuring scale is, therefore, an adapted version but including the original items by the authors (see, table 20).

TABLE 20

Employee collaboration measuring scale

CONCEPT	INDICATORS	ITEMS
Teams	Teams	My team-mates and I have clearly defined roles
	Teams1	My team-mates and I have well-established goals
	Teams2	My team, my organization and I own a shared identity
Structure	Structure	I feel collaboration is valued in my department
Context	Context	I feel my team and I have control of actions and environments
	Context1	I feel collaborative environment is adequate for me and my type of job
Support	Support1	I feel my organisation helps to build working networks
	Support2	I feel my organisation enables deep listening
Tasks	Tasks	My co-workers, team members and I help each other to complete tasks
Individuals	Individuals	I trust my co-workers and project members
	Individuals1	I feel positive and happy around my co-workers
	Individuals2	I have a positive working relationship with my co-workers
Processes	Processes	It is easy for me to communicate face-to-face with my co-workers
	Processes1	In my organisation there are established informal and formal communication links
	Processes2	I feel there is enough space in circulation areas for conversations with my co-workers

Source: self-elaborated from Mattessich and Monsey (2001) and Sawyer (2017).

6.3.3 Psychological well-being indicators

In the case of the psychological well-being construct, the measuring scale has been taken from the Perceived Restorativeness Scale designed by Hartig (2004) and originated from Kaplan's (1995) Attention Restoration Theory. The main reason for this selection has been its relationship with the physical environment outcome, as restorativeness has an impact on well-being. The scale is formed by four indicators as described by Hartig (2004): being away, fascination, extent, and compatibility. In addition, there is another variable, biophilia (Kellert, Heerwagen and Mador, 2008), which has been selected for the scale as it closely relates to the restorativeness theory (Kaplan, 1995; Hartig, 2004) as analyses the influence certain environments have on well-being. For measuring this part of well-being, biophilia has also been added to the psychological well-being measuring scale. The scale containing all indicators for the psychological well-being construct can be found in table 21.

TABLE 21

Psychological well-being measuring scale

CONCEPT	INDICATORS	ITEMS
Being Away	Away	I sometimes do not have self-awareness when I am at work while I concentrate on what I am doing
	Away1	It is easy for me to adapt to my workplace and its environment
	Away2	I feel relaxed, happy, and positive when I enter my workplace
Fascination	Fascination	I feel my workplace has many interesting things that draw my attention to
	Fascination1	I like being in this working environment
	Fascination2	There is much to explore and discover in my workplace
	Fascination3	I find components of my workplace to be beautiful and pleasant
Extent	Coherence	I feel my workplace is a confusing place
	Coherence1	I feel there is a great deal of distraction in my workplace
Compatibility	Compatibility	I feel being here in my workplace suits my personality
	Compatibility1	I have a sense I belong here
Biophilia	Biophilia	My organisation provides direct experiences with nature (presence of plants, animals, water, natural light, natural landscapes, weather, fire)
	Biophilia1	My organisation provides indirect experiences with nature (images of nature, natural materials, natural colours, simulation of natural light and air, naturalistic shapes and forms, evoking nature, information richness, the patina of time, natural geometries, biomimicry)
	Biophilia2	I feel my overall emotional state is happy and positive in this moment

Source: self-elaborated from Hartig (2004) and Kellert et al. (2008),

6.4 Theoretical model

After having selected the target population and having described the measuring scales, it will be next explained the statistical methods that will be used for empirically contrasting the hypothesis. For that, first the theoretical model will be explained and characterised.

The model specification describes the model (see, figure 7) that has been designed after the revision of the literature. It describes the theoretical model containing all variables and indicators. In addition, this model will determine the empirical model that will be used to analyse the relationships between the variables (Henseler, Reinartz, Haenlin,2009).

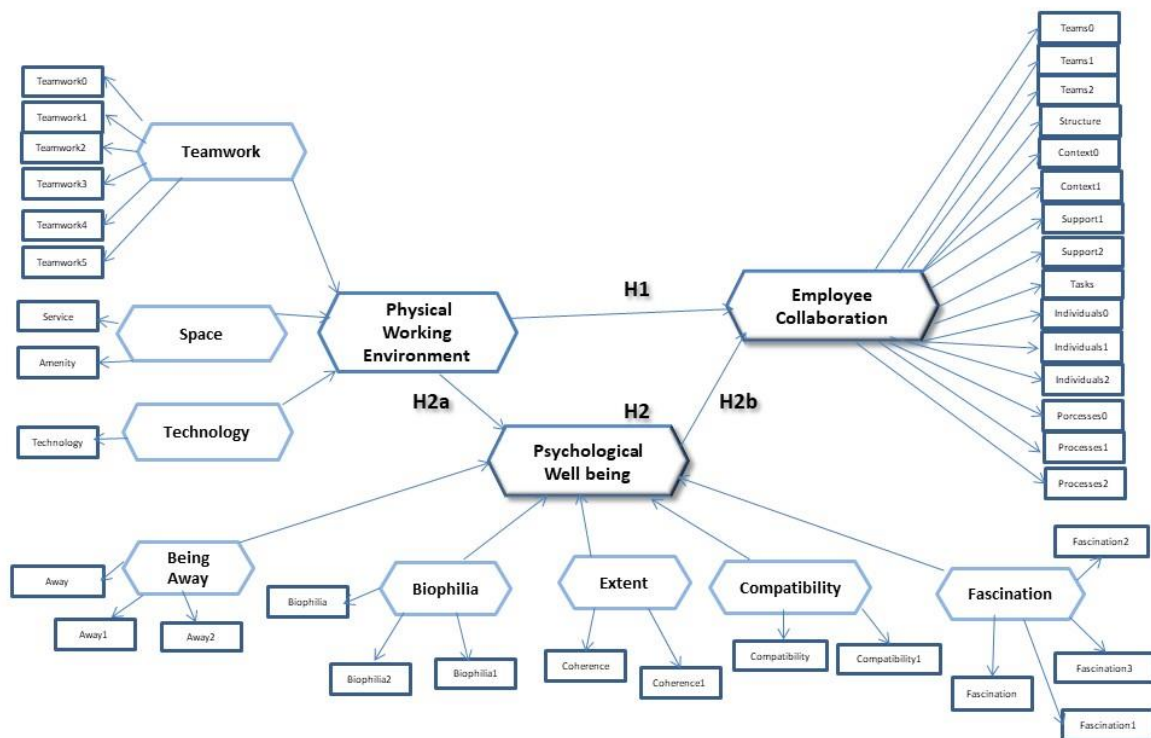


FIGURE 7

Theoretical model

Source: self-elaborated.

In the field of social sciences researchers deal with complex models that can operate within different levels of abstraction establishing high-order constructs or hierarchical component models (HCM). Most common constructs are second-order constructs which refer to a construct

composed by different dimensions of first-order components which are otherwise used to identify the construct correctly (Hair, Hult, Ringle and Sarstedt,2017). In this analysis, they are modelled as composites as the theoretical model indicates (see, figure 7).

6.5 General aspects of the methodology: structural equation modelling

Due to the complexity of the proposed model and the presence of unobservable variables, it is highly suggestable to use Structural Equation Modelling (SEM) to analyse the relationship between different types of variables. A multilevel model examines and analyses processes at different levels. As it often happens in nature and in the social sciences field, there are processes like behaviours that interact at different levels of measurement. When this happens, processes occurring at a higher level can influence those at a lower level and the researcher cannot control or restrict all the phenomena that directly or indirectly affect the model. As life is not fully controllable, the researcher must also assume there are outside influences that will most probably affect the model. As Douglas (2004:2) says, “it becomes important to measure and analyse those effects” as the results obtained can be conclusive if these unobservable effects are not considered. For that, it is necessary to provide with the adequate statistical techniques that enable the analysis of the influence both observable and unobservable variables have. Such techniques like structural equation modelling or SEM, have been developed to solve first-generation methods’ limitations, like the measuring of unobservable variables that it was not possible with primary techniques. In contrast, structural equation modelling is a multilevel model that can measure relationships between dimensions and variables at different levels. There are two categories for multilevel models: 1. Multiple Regression and 2. Structural Equation Modelling.

Structural Equation Modelling or SEM was introduced when the LISREL⁵⁴ program was first developed by Jöreskog in 1975 (Jöreskog and Sörbom,1989). As Haenlin and Kaplan (2004:285)

⁵⁴ LISREL: an acronym for Linear Structural Relations, it is a widely used statistical programming package for structural equation models. It can also be used for other statistical analysis like exploratory data analysis and regression (Salkind, 2010).

say, “SEM allows the simultaneous modelling of relationships among multiple independent and dependent constructs (...) additionally, it enables the researcher to construct unobservable variables measured by indicators and to model the measurement errors”. In the field of social science research, it is common to have unobservable variables that influence the model.

As Jacoby (1978) states, humans live in a complex, multivariate world and consequently, variables cannot be studied in isolation from the real world. Variables like age or gender are observed directly from nature, but other variables like creativity, job satisfaction or well-being, are only observable indirectly. Partial Least Squares based Structural Equation Modelling is the statistical method that will be used for the empirical analysis. However, the use of structural equation modelling is sometimes limited due to the model design or the sample size.

According to Ringle, Wenden and Will (2010), the non-parametric procedure of SEM or the partial least square approach with the bootstrap method, can execute the analysis using small sample sizes and does not require normal distribution.

PLS-SEM or Partial Least Squares-Structural Equation Modelling was first introduced by Wold in 1975 and it is a nonparametric approach that focuses on maximising the variance of the dependant variables explained by the independent ones as described by Hair, Ringle and Sarsteadt (2011). Barclay, Higgins, and Thompson (1995) suggest the model is a combination of the analysis of principal components approach that connects measurements and constructs while other variables and constructs are guided by theory. The path analysis enables the design of a structural model (Barclay et al.,1995; Tsoukas and Mylonopoulos,2004) in the two-step method approach (measurement and structural).

Besides, PLS-SEM is preferable for prediction and theory development as statistical power is larger (Henseler, Hubona and Ray,2016). PLS-SEM is an iterative process, where the explained variance of the endogenous latent variables is maximised by estimating partial model relationships in an iterative sequence of ordinary least square regressions (Monecke and Leisch,2012). The latent variable punctuations are obtained in two ways:

- ✓ An outer approximation that represents a pondered aggregation of its own indicators.
- ✓ An internal approximation that represents the aggregated construct scores.

A component in the analysis by PLS-SEM is known as weights for mode B composites. As in PLS-SEM unobservable variables are estimated as linear combinations of their indicators and substituted by latent variables (Monecke and Leisch,2012), weights are used to determine if the resulting case-value captures most of the variance of the independent variables that predict the dependent. By calculating a weighted average value for each indicator, it is possible to determine a value for each unobservable variable too. In the PLS-SEM method, latent constructs are commonly linked to their measures and each construct includes an underlying associated loading. There are guidelines for correctly using and assessing the measurement model in PLS-SEM (see, table 22), which help follow the right steps for completing a PLS-SEM analysis.

TABLE 22

PLS-SEM guidelines

DATA CHARACTERISTICS	GUIDELINE
Measurement scales	Do not use categorical variables in endogenous constructs
PLS algorithm setting	
Starting values for weights	Use a value of 1 as initial value for each of the outer weights (Löhmler scheme)
Weighting scheme	Use path weighting scheme
Maximum number of iterations	Iterations should be less than 300
Parameter setting	
Number of bootstrap samples	5,000 (recommended: 10,000)
Number of bootstrap cases	Equal to number of valid observations
Outer model evaluation	
1. Indicator reliability Mode A composites	Standardized indicator loadings >70% and significant; in exploratory studies significant loadings of 0.40 are acceptable
2. Internal consistency and validity (convergent and discriminant) Mode A composites	Composite reliability should be >70% or in exploratory cases 0.60 is also acceptable
	AVE for convergent validity > 0.5
	Fornell and Larcker and HTMT criterion (Henseler et al.,2016) for discriminant validity should be smaller than 0.85
Mode B composites	Significant weights and VIF index < 3.3

Source: Hair, Hult, Ringle and Sarstedt, (2019).

The main reason for having chosen PLS-SEM is that the variables have been defined as composites. Besides, the model contains both reflective simulating and formative simulating composite constructs.

Secondly, PLS-SEM is a technique valid for complex models containing high-order composites. Regarding the type of composites, this study covers high-order composites because the constructs that will be used in the theoretical model are the result of a linear combination of each sub-dimension. According to literature, there are two main ways for estimating a model that contains high-order constructs to obtain a more plausible model: 1- Repeating indicators (Wold, 1982; Lohmöller, 2013) and 2- Two stages method (Chin, 1998a). It has been decided to use the two-stage method described by Chin (1998a), because as Becker, Klein and Wetzels (2012:365) state, “the two-stage approach has the advantage that latent variable scores are determined in PLS-SEM, and thus, latent variables for lower-order latent variables can be obtained” and due to the complexity of the model, this method allows to make it more plausible for its analysis. Therefore, in this case, it is a better option than the repeating indicators method. For that, first the original model must be reduced to obtain a more plausible model. On the first step, scores are estimated by the aggregated punctuations of first-order dimensions without including second-order constructs. Then, on the second step, the aggregated punctuations are used as indicators to model second-order constructs although ultimately, this will enable locating in the first stage, second-order constructs as endogenous variables (Ringle, Sarstedt and Straub, 2012). Then, the model assessment fit is conducted for assessing nomological validity, and the measurement model’s reliability and validity will be evaluated. After, the structural model will be assessed.

As a third point, PLS-SEM as the composite-based approach to SEM, permits considerably larger options for normal distributed data, and even for distributions that do not assume normality as it is a non-parametric test (Vinzi, Trinchera and Amato, 2010). PLS-SEM handles small sample sizes better than other techniques as it follows a complex models segmentation order.

6.5.1 Modelling latent variables

Regarding the variables to analyse, there are different ways to operationalise the theoretical concepts. Referring to second-order constructs that the model contains and according to Schubert, Rademaker and Henseler (2020), there are four types of second-order constructs: 1- common factor of common factors, 2- common factors of composites, 3- composites of common

factors and 4- composites of composites. The common factor of common factors is also called reflective-reflective second-order construct that as Schubert et al. (2020:2) explain, “it is used to operationalize a multidimensional concept that is assumed to cause several concepts, each itself measured by a set of observable variables”.

The second type, or the common factors of composites, is used for unidimensional concepts that in regards, cause other concepts that form a composite that are composed by their observable variables. The third, or the composites of common factors type have been recently investigated (Schubert et al., 2020) and therefore, it is quite a recent concept.

Lastly, the fourth, or the composites of composites type and as Schubert et al. (2020:3) say, are supposedly “composed of its first-order constructs which are in turn built by a weighted linear combination of observable indicators”. This approach is used to operationalise concepts that are likewise formed by other concepts that are assumed to be composed. Therefore, and as described in the theoretical model, the physical working environment and the psychological well-being constructs have been defined as high-order composites. Besides, PLS is a composite based method that represents the conceptual variables in the model (Hair et al., 2017). In addition, to estimate the model parameters and according to Hair et al. (2017), PLS uses mode A and mode B weighting schemes. Mode A shows bivariate correlations between indicators in the construct, whereas mode B corresponds to regression weights and considers no correlations between the indicators (Hair et al., 2017). As default, PLS uses mode A simulating reflective constructs and mode B for simulating formative constructs. In this research study, the researcher has opted to define the physical working environment and psychological well-being as composites estimated in mode A at indicator level and in mode B at dimension level as it is understood the indicators combine to compose the construct (Benítez, Henseler, Castillo and Schuberth,2020). Employee collaboration, otherwise, is a composite measured in mode A as according to Nunnally and Bernstein (1994), it is understood that the construct is a representation of all the items available within its conceptual domain.

6.6 Evaluation of a variance-based partial least squares structural equation model

In PLS-SEM the model is analysed through the two stages method (Wetzels, Odekerken-Schröder and Van Copen,2009; Ringle, Sarstead and Straub,2012). First, the measurement model is assessed and then the structural model (Barclay and Thompson,1995).

6.6.1 Measurement model assessment

As Henseler, Hubona and Ray (2016) say, the model assessment fit is the starting point for the measurement model assessment. The model assessment fit is calculated for the saturated model and rely on bootstrapping. Bootstrapping is a resampling procedure that determines the significance of certain parameters. The model assessment fit is given by the standardised root mean square or SRMR with values under 0.08 considering an acceptable fit (Byrne, 2008; Henseler et al.,2016). However, although the 0.08 limit is not met, and as Henseler et al. (2016) say, the SRMR value should be lower than established limit value of 95% interval level or at 99% to proceed with the analysis, meaning the value should be at least equal or smaller than P95 or P99. According to Henseler et al. (2016) this means that the discrepancy values are below the ones from the actual model.

Already having done this, the next step is to assess reliability and validity of the measurement model.

6.6.1.1 Reliability and validity

Scale reliability is defined as the ability for consistently measuring data and the characteristics which it pretends to measure. Consequently, scale reliability cares for the precision of the measuring scale or the random errors associated with the measuring process. This way, if the scale is reliable, it will draw consistent conclusions independently of the population or the sample used. For evaluating the measurement model, the model's reliability and validity are checked (Law, Wong, and Mobley,1998). The criteria for checking reliability and validity will depend on the nature and the characterisation of the composites in mode-A or mode-B. Table 23 summarises the steps for checking reliability and validity for **mode A** composites.

TABLE 23

Steps for checking reliability and validity in PLS-SEM

RELIABILITY AND VALIDITY IN PLS-SEM		
Indicator reliability	Outer loadings	0.7 or higher (significant)
Internal consistency	Composite reliability	0.7 or higher
Convergent validity	AVE or average variance extracted	0.5 or higher
Discriminant validity	Latent variable correlation	Correlation square root of each latent variable should be greater than the correlations among the latent variables by Fornell and Lacker criterion and Henseler's criterion or HTMT < 0.85

Source: Adapted from Hair et al. (2017).

Indicator reliability means that an observable variable should explain at least the 50% of the variance of its indicators. In PLS-SEM this is measured by simple correlations or outer loadings (Barclay, Higgins, and Thompson, 1995). These authors established a minimum value of 0.707 for outer loadings whereas Carmines and Zeller (1979) set a limit of 0.7. Therefore, a value larger than 0.7 means that more than the 50% of the variance is shared with the indicator, so it is the indicator indeed, which explains the construct (Barclay and Thompson, 1995). Items with lower loadings than the established limit of 0,7 should be checked considering the other indicators for reliability and validity. However, at the first stages of the empirical analysis, measurements can be more flexible.

Internal consistency is given by the indicators that form a construct. Internal consistency measures that all variables explain the right latent variable consistently enough. To assess this, Cronbach's alpha and composite reliability are most frequently used. Cronbach's alpha serves for evaluating the internal consistency for the different latent variables. It is the most common parameter in the academic field. Composite reliability, otherwise, and according to Geldhof, Preacher and Zyphur (2014), "estimates true score variance as a function of item factor loading (...) it represents the relation between a scale's underlying latent factor and its unit-weighted composite" (pp.73). Although it approximates to Cronbach's alpha, the alpha pre-assumes that all indicators of a construct share the same amount of variance with the construct itself, and composite reliability uses each item's loadings as in the causal model. As a result, and according to authors like Fornell and Larcker (1981), composite reliability is a more consistent measure than Cronbach's alpha. However, the values for each of the measures can be equally considered following the established acceptance limit of 0.7 as proposed by Nunnally (1978). As the author says, 0.7 represents a medium reliability proportional to the early stages of the investigation, while strict reliability values should be around 0.8.

In addition, and just to highlight, both Cronbach's alpha and composite reliability are only applicable to latent variables with reflective indicators as expressed by Chin (1998b) of composite mode A. Besides, scale validity represents the accuracy of the scale to the extent to which results really measure what they are supposed to. There are three different ways to contrast validity:

1. Content validity
2. Construct validity
3. Nomological validity

Content validity is used to evaluate the representativeness of the scale in relation to the concept it measures. As this is of qualitative nature, there is not a statistical coefficient that will give us an exact number for content validity to the extent to which the measurement covers all aspects of the concept that is being measured. Following Hambrick's (1981) ideas about how to measure content validity, this can be established by expert panels set by professionals or academics.

The study relies on literature review and scientific support of the empirical evidence to validate the different measuring scales. For this purpose, the initial scales have been taken from scales suggested by literature and theory, like the measuring scale for physical working environment, the scale for employee collaboration and the scale for psychological well-being, although they have been self-adapted afterwards. Besides, as Grapentine (1995) says, the more items a scale has, the more probability there is of having content validity, although it is not just the number of items disposed but also the sample size that can interfere in content validity. For composite mode-B constructs, content validity is addressed by the content specification (Hair et al., 2017) in which is clearly specified the domain of content the indicators are intended to measure. Besides, as explained by Hair et al. (2017:139) "in creating formative constructs, content validity issues are addressed by the content specification in which the researcher clearly specifies the domain of content the indicators are intended to measure".

Construct validity and according to Messick (1980), it integrates content evidence and criteria for testing the hypotheses regarding the most relevant theoretical relationships. This investigation covers two high-order composites, one for physical working environment and another for psychological well-being. The employee collaboration construct is a first-order composite that only contains one dimension. In addition, Campbell, and Fiske (1959) propose to assess convergent validity and discriminant validity that will be calculated in this study:

- **Convergent validity** as Carlson and Herdman (2010) say, reflects the extent to which two or more indicators measure a construct. This is given by the Average Variance Extracted

- **(AVE) index and factor weights for reflective indicators (Chin,1998b).** When all indicators measure an equal patron, they will be correlated, and it will be significant. Besides, according to Fornell and Larcker (1981), the average variance extracted should have a value higher than 0.5, so the %50 of the variance is explained by the construct's indicators.
- **Discriminant validity** is a complementary characteristic of convergent validity and indicates the difference between the constructs. The discriminant validity specifies that the amount of variance shared by a latent variable and its indicators should be higher than the variance shared with other latent variables and indicators (Barclay and Thompson,1995; Hulland,1999). Although discriminant validity can be measured by using the AVE or the Average Variance Extracted approach, a better parameter is given by the Heterotrait-Monotrait Ratio (Henseler et al., 2016) or the HTMT Criterion index. The authors suggest a minimum value of 0.85 or 0.9.

Finally, **nomological validity** refers to a form of construct validity that according to Cronbach and Meehl (1955) signals if a construct behaves as expected with its related constructs or within its nomological set. External validity can be assessed in terms of nomological validity by linking the composite with any other relevant outcomes. Nomological validity expresses the relationship between the physical working environment construct, employee collaboration, and psychological well-being and the significance level for each of these relationships is calculated based on the hypothesis questions and the literature review. In addition, nomological validity is also demonstrated with the adjusted Bootstrap fit in the saturated model.

For composites modelled as **mode-B** collinearity is assessed to check multicollinearity problems by calculating the Variance Inflation Factor (VIF) and the significance of indicator weights:

- **VIF** calculates the degree to which the standard error has increased due to presence of collinearity. VIF values must be lower than the established limit of 3.3 to be acceptable. In PLS-SEM a VIF value of 5 and higher indicates a potential collinearity problem (Hair, Ringle and Sarstedt,2011).
- The **outer weight** is the result of a multiple regression (Hair et al.,2011) and express each indicator's relative contribution to forming the construct. These values are normally smaller than the outer loadings of reflective indicators (Hair et al.,2017). Non-significance weights should be considered by the researcher for their absolute contribution to its construct. This is given by the formative indicator's outer loadings. When an indicator weight is non-significant, but the outer loading is high or above 0.5, the indicator should be interpreted as important and should be retained (Hair et al.,2017). Weight significance

- is calculated through the Bootstrap method that checks the significance of each indicator's weight and it is given by the t-statistic and its associated p-value.

6.6.2 Structural model evaluation and assessment

After having assessed the measurement model, the next step will be to evaluate the structural model. As mentioned before, in PLS-SEM the structural model is analysed by evaluating the significance of the path coefficients. As it is gathered by Hox and Roberts (2010), path analysis was invented by Wright (1921) and according to Streiner (2005) it is an extension of the multiple regression approach. Path analysis examines situations where there are chains of influence, normally stated as causal modelling. The PLS method uses the R^2 coefficient, path coefficients and the effect size for testing:

- ✓ The **coefficient of determination or the R^2** evaluates the structural model and as explained by Hair et al. (2017), it represents the amount of variance in the endogenous construct explained by all exogenous constructs connected to it. Its values range from -1 to +1 where higher values indicate a better predictability, 0.7 or higher. As authors like Falk and Miller (1992) say, lower values would provide very little information and their predictive ability would also be low. It is also recommended to ensure that the most complex regression owns a power of 80%. This is given by the G test by the software G*power (Faul, Erdfelder, Lang and Buchner, 2007).
- ✓ **Path coefficients (β coefficients)** represent the standardized regression weights that are obtained through simple regressions. The β coefficients should get a value of 0.3 or higher (Chin, 1998a).
- ✓ **The effect size or f^2** measures R^2 values of the endogenous latent variables when a selected exogenous latent variable is both included or excluded from the model. The effect size ranges from small (0.02) to medium (0.15) and large (0.35) according to Cohen (1988).

Furthermore, in PLS-SEM, non-parametric tests are used to evaluate the structural model's significance. The two most common techniques are Jackknife and Bootstrap. The Bootstrap method is a better choice and requires less computing time (Efron and Gong, 1983), so it has been opted to use the Bootstrap method to assess the model's quality.

6.6.2.1 The bootstrap method

Bootstrap is a technique first applied by US researcher Efron in 1977 (Efron and Tibshirani, 1993). According to the author, the bootstrap procedure estimates from a single sample. The idea is to run the process of selecting many samples to find the probability that the values of their correlation coefficients will fall within the established intervals. Bootstrapping can be used when the size of the sample is small, as Bootstrap method uses a surrogate population for the purpose of approximating the sampling distribution of a statistic; this is, to resample by replacement from the data at hand and create several bootstrap samples (copies of a sample statistic). As the mean of the sampling distribution often differs from the original by an amount of $\approx c/n$, it is referred to as bootstrap bias. This bias is corrected by the equation $\text{Bias}(\theta) = E(\theta^*) - \theta$, where θ^* is the bootstrap estimate. The corrected estimator is θ_c . The number of bootstrap samples that depend on the desired level of accuracy are based on the confidence interval. For bias-corrected percentile bootstrap confidence intervals are considered the best choice. It is advisable though, to use at least 10,000 bootstrap samples to predict the estimator. According to Wong (2013), Bootstrapping is also used for significance testing in path analysis. If the obtained p-values are higher than the established significance level of 0.05, the structural path will be significant (confidence interval and significance).

Finally, for evaluating the predictive ability of the proposed model, a cross-validation technique will be used, the **blindfolding** method. Blindfolding is used to assess the predictive relevance of the path model (Hair et al., 2017) that is given by the Q^2 statistic. Its values should be above or different to 0 to ensure the model owns predictive ability (Chin, 1998a). Additionally, the mediating effect or the indirect effect will be analysed after having assessed and evaluated the measurement and the structural models.

After having assessed the measurement and the structural models, the mediating effect will be next calculated, as described by Cepeda-Carrion (2006).

6.7 The mediating effect

The mediating effect refers to the effect an independent variable has over the dependent variable (Hair et al., 2014). This means there is a third variable that has a partial role between the independent and the dependent variables. The amount of mediation is called indirect effect. When

tested simultaneously the entire model can be estimated by SEM, as it combines multiple outcomes into one or more latent variables. Figure 8 gives a description of the mediating effect:

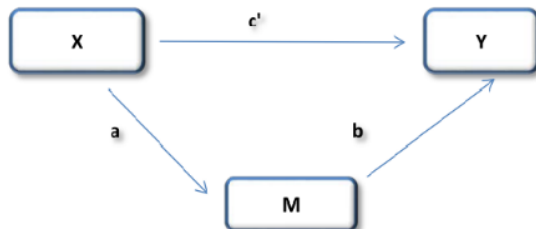


FIGURE 8

The mediating effect

Source: self elaborated.

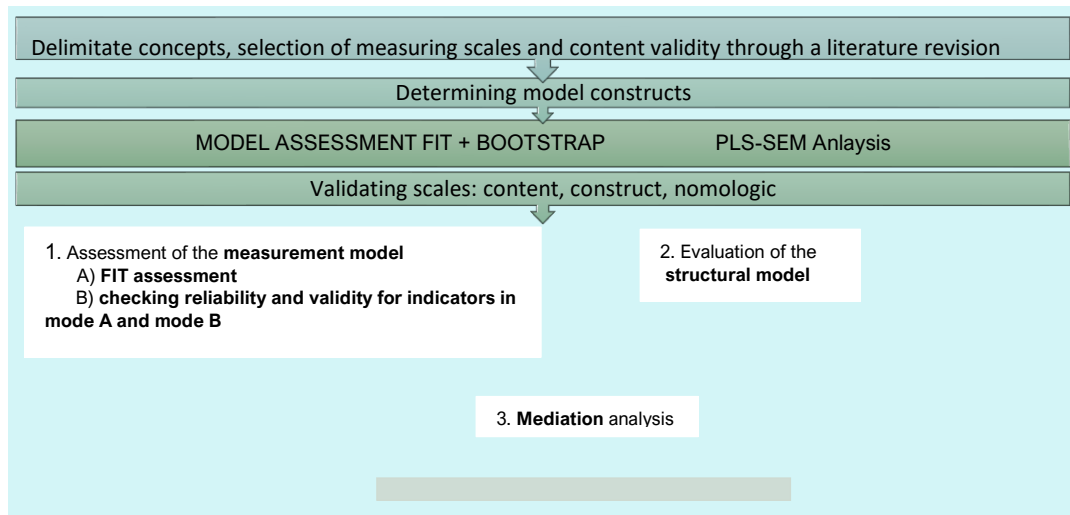
According to Nitzl, Roldán and Cepeda-Carrión (2016) the process for evaluating mediation is done in two steps:

- ✓ Evaluation of the **significance of the indirect effect** → To obtain precise information on the selected population and its distributional pattern, it is recommended to run the Bootstrap method to assess the significance. In addition, to evaluate the mediating effect the Variance Accounted For (VAF) index and significance of the path coefficients will be used. If both the direct and the indirect effect are significant, this will mean there is partial mediation.
- ✓ Evaluation of the **type of the mediating effect** → According to literature, there are two types of mediating effect: total or partial. A total mediating effect indicates that the effect of variable X on Y is totally given by the mediating variable M. Otherwise, partial mediation indicates that a certain amount of the effect on Y is explained by the direct relationship between X and Y.

There are two types of partial mediation:

- ✓ Complementary → It happens when both the direct and the indirect effect point to the same direction (Baron and Kenny, 1986).
- ✓ Competitive → It happens when the direct and the indirect effect point into opposite directions (Baron and Kenny, 1986).

To conclude with this chapter, figure 9 includes a summary of all the steps described for the empirical analysis:

**FIGURE 9**

Summary of the steps for the empirical analysis

Source: self-elaborated.

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CHAPTER 7

**Analysis and results of the
empirical data**

7. ANALYSIS AND RESULTS OF THE EMPIRICAL DATA

“All the analysis of infinite reality which the finite human mind can conduct rests on the tacit assumption that only a finite portion of this reality constitutes the object of scientific investigation”

-Max Weber

In this chapter, data will be statistically analysed to draw conclusions for the main hypothesis questions of the study. For that, the sample will be characterised first and secondly, the empirical analysis will be done. For the analysis, the measurement and the structural model will be evaluated. The assessment of the measurement model will be done through the exact test of goodness-of-fit based on bootstrap and the model's reliability and validity. Then, the structural model will be evaluated. Finally, mediation will be assessed to test the research hypothesis as proposed by Cepeda-Carrion (2006).

7.1 Sample characteristics

Regarding the sample and as Barclay, Higgins, and Thompson (1995) say, the optimal sample for the proposed analysis will be the sample that makes the base of the most complex regression possible. In this case:

- ✓ The most complex formative construct indicators, that is, the latent variable with the highest number of indicators.
- ✓ The greatest number of background constructs that lead to an endogenous construct as a predictor of an Ordinary Least Squares (OLS) regression, or what is the same as the endogenous construct with most structural directions pointing at it.

However, for a more specific calculation, the effect size of the regression analysis will be calculated according to Green (1991). A high effect size will only draw results of the most observable effects and the power of the predicted model would not be enough to draw more general or universal conclusions. Nonetheless, this is an exploratory analysis based on observable relationships or facts, as it is presupposed that the physical environment positively influences

employee collaboration. Consequently, for this analysis and with a pre-assumed power of 80% and an alpha of 0.05, the minimum sample size for high effect should be 48 as summarised in table 24.

TABLE 24

Sample size

NUMBER OF PREDICTORS	SMALL	MEDIUM	HIGH
1	390	53	24
2	481	66	30
3	547	76	35
4	599	84	39
5	645	91	42
6	686	97	46
7	726	102	48

Source: taken from Green (1991).

7.2 Analysis of the research model

The statistical analysis will be done based on PLS-SEM (SmartPLS) a variance-based structural equation modelling approach is the main technique used to test the hypotheses. The main reason for using PLS-SEM is due to the characteristics of the composite construct included in the model. Both theoretical (Sarstedt, Ringle and Hair, 2017) and empirical evidence (Sarstedt et al.,2017) support the use of PLS-SEM for models based on composites. Besides, the research model is complex, given the types of the relationships hypothesised (direct and mediated) and they also are multidimensional. For the operationalisation of the constructs and between the most used two techniques (indicator repetition or hierarchical method, and the two-stage method), it has been decided to use the two-stage method (Wetzels, Odekerken-Schröder and Van Oppen,2009; Ringle, Sarstedt and Straub,2012) as the model contains composites of composites (Schubert, Rademaker and Henseler,2020).

Therefore, and following the two-stage method approach, first the model assessment will be evaluated through the exact test of goodness of fit and reliability and validity of the measuring instrument will be checked (see, figure 10) and after, the structural model will be assessed. To test the hypotheses a mediation procedure will be done using PLS in combination with bootstrapping (Nitzl,2016). Figure 10 shows the steps that will be followed to complete the empirical analysis:

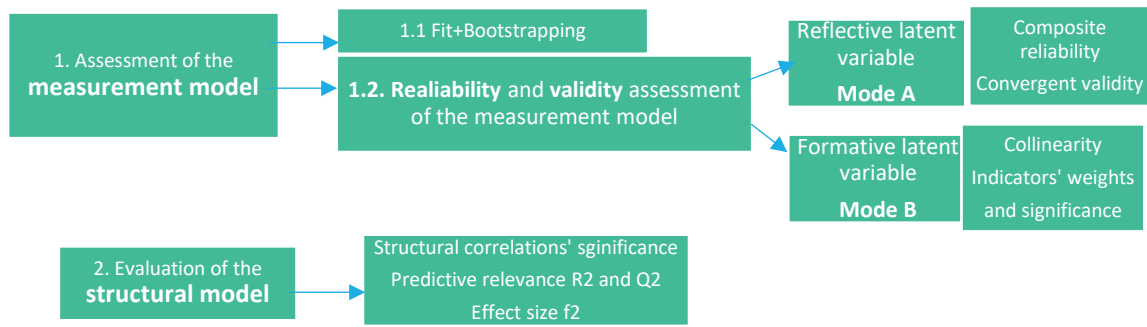


FIGURE 10

Steps for the assessment of the measurement and structural models

Source: self-elaborated adapted from Hair et al. (2014).

Referring to the model, the physical working environment and the psychological well-being have been defined as high-order composites, estimated in mode A at indicator level and mode B dimension level. According to Podsakoff, Shen and Podsakoff (2006), high-order models are present when the constructs being analysed are complex and each dimension becomes an important self-component for the construct. In addition, and according to McKenzie, Podsakoff and Jarvis (2005), these models improve the construct's representativeness and provide the best models for evaluation.

7.2.1 Measurement model

For evaluating the measuring instrument's psychometrics, the original model must be reduced to obtain a more plausible model due to its complexity. As a result, the model assessment fit is conducted to assess the model following Schubert et al. (2020).

7.2.1.1 Measurement model assessment

The measurement model (see, figure 11) will be first evaluated through the model assessment fit in PLS that reveals if the generated composites act in their own nomological set rather than at indicator level thus, proving nomological validity (Henseler, Hubona and Ray,2016). Additionally,

according to Schubert et al. (2020:8), “the model fit investigates whether the specified model is consistent with the collected data” and consequently, with the reality. As Schubert et al. (2020:21) continue to explain, for calculating the fit the bootstrapping test will be used “based on a discrepancy measure such as the SRMR value” with P95 and P99 quantiles as critical values.

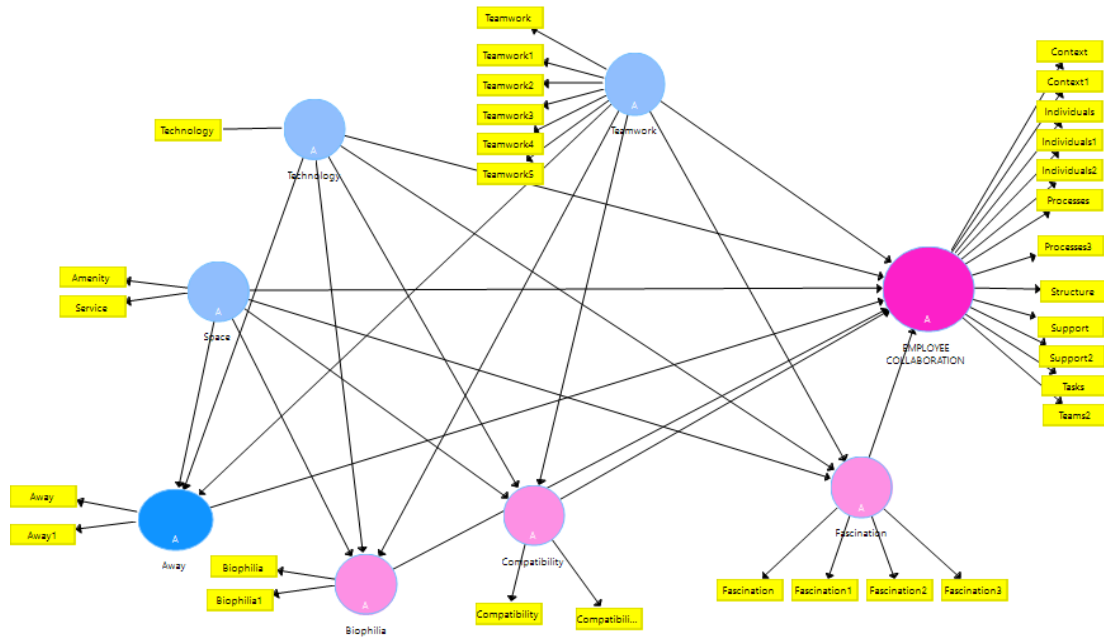


FIGURE 11
Measurement model -model1-

Source: self-elaborated.

The results for the saturated model in Bootstrap (see, table 25) indicate the model fits the collected data and composites are acting in the nomological network.

TABLE 25
Saturated model -model1-

Saturated model			
	Value	HI95	HI99
SRMR	0.142	0.145	0.155
d _{ULS}	9.994	10.376	11.840
d _G	60.041	na	na

Notes: SRMR: standardized root mean square residual; d_{ULS}: the unweighted least squares discrepancy; d_G: the geodesic discrepancy; HI95: bootstrap-based 95th percentile; HI99: bootstrap-based 99th percentile.

Source: self-elaborated.

The SRMR value for the sample is 0.142 that as stated by Henseler et al. (2016) and taking the criteria established by Hu and Bentler (1999) lies a little above the maximal of 0.08. However, the value is smaller than the 95th quantile (0.145). The value for d_{uls} (9.994) also lays below the HI95 quantile (Schubert et al., 2020). Then, the model will be tested for reliability and validity. The criteria for assessing reliability and validity will be different for composites estimated in mode A and mode B. The assessment criteria for the model's reliability and validity for mode A composites, will be found summarised next:

Indicator reliability covers the loadings for each factor, so it is a better indicator of the internal consistency (Fornell and Larcker,1981). Some authors say values of the loadings should be higher than 0.7 (Carmines and Zeller,1979; Fornell and Larcker,1981) although others argue that these norms should be more flexible like Chin (1998) who discusses the initial states of scale development to establish the minimum limit for indicator reliability (see, table 26).

Internal consistency is assessed by Cronbach's alpha (Cronbach,1951) and composite reliability (Fornell and Larcker,1981). Cronbach's alpha considers each indicator's average correlation compared to the other items. The standard criterion for each construct's individual reliability according to experts is from 0.7 to 0.9. (Tavakol and Dennick,2011).

Convergent validity is given by the Average Variance Extracted (AVE) index. For this model, the criteria suggested by Hair, Sarstedt and Kuppelwieser (2014) will be followed with an extracted variance score of 0.5 or higher. In this case and as it will be demonstrated in the results obtained, all latent variables show an average variance extracted score higher than 0.5 (see, table 26).

Discriminant validity is used to measure if the variables share a higher amount of variance with their own indicators rather than with the rest of the constructs. To assume discriminant validity, the element on the diagonal must be higher than the elements in its row and column as described by Fornell and Larcker (1981). The Heterotrait-Monotrait Ratio index otherwise, is used for calculating discriminant validity and as suggested by Henseler et al. (2016), the limit value is <0.9 . The results for the assessment of reliability and validity of the first model are summarised in table 26.

TABLE 26

Assessment of reliability and validity -model1-

Physical working environment (Multidimensional construct mode A)	Loading	P-value	Weight	P-value	CR	AVE
Teamwork					.894	.584
Teamwork	.755***	.000	.181***	.000		
Teamwork1		.000	.205***	.000		
Teamwork2	.772***	.000	.236***	.000		
Teamwork3	.777***	.000	.220***	.000		
Teamwork4	.726***	.000	.222***	.000		
Teamwork5	.781***	.000	.245***	.000		
Space					.855	.747
Amenity	.902***	.000	.652***	.000		
Service	.825***	.000	.499***	.000		
Technology					n/a	n/a
Technology	1.000	n/a	1.000	n/a	n/a	n/a
Psychological well-being (Multidimensional construct mode A)						
Being Away					.785	.653
Away	.666***	.000	.396**	.002		
Away1	.928***	.000	.793***	.000		
Away2	Eliminated					
Biophilia					.906	.828
Biophilia	.745***	.000	.500***	.000		
Biophilia1	.811***	.000	.597***	.000		
Biophilia2	Eliminated					
Compatibility					.840	.725
Compatibility	.802***	.000	.469**	.001		
Compability1	.908***	.000	.692***	.000		
Fascination					.857	.601
Fascination	.697**	.001	.221**	.030		
Fascination1	.761***	.000	.319***	.000		
Fascination2	.831***	.000	.383***	.000		
Fascination3	.829***	.000	.353***	.000		
Extent	Eliminated					
Coherence	Eliminated					
Coherence1	Eliminated					
Employee collaboration (Composite mode A)					.928	.520
Context	.672***	.000	.101***	.000		
Context1	.776***	.000	.129***	.000		
Individuals	.704***	.000	.082***	.000		
Individuals1	.821***	.000	.136***	.000		
Individuals2	.792***	.000	.133***	.000		
Processes	.741***	.000	.115***	.000		
Processes1	Eliminated					
Processes2	Eliminated					
Processes3	.600***	.000	.131***	.000		
Structure	.773***	.000	.132***	.000		
Support	.747***	.000	.113***	.000		
Support1	Eliminated					
Support2	.679***	.000	.102***	.000		
Tasks	.744***	.000	.129***	.000		
Teams	Eliminated					
Teams1	Eliminated					
Teams2	.558***	.000	.073***	.000		

Notes: CR: Composite Reliability, AVE: Average variance extracted n/a= not applicable, ** significance at $p < .05$ *** significance at $p < .001$ (2-tailed).

Source: self-elaborated.

According to the results obtained for assessing reliability, the results in table 27 show that most of the indicators meet the established values or the criteria for reliability (Carmines and Zeller, 1979) although some indicators like Processes1 ($\lambda=.424$, $p=.002$), Teams ($\lambda=.586$, $p=.000$) and Teams1 ($\lambda=.433$, $p=.005$) suggest values far lower than the established limit of 0.7 for outer loadings (Hair et al., 2014) and have been eliminated from the model. In the case of Support1 ($\lambda=.717$, $p=.000$) and Processes2 ($\lambda=.737$, $p=.000$), although they have values higher than 0.7, they have been eliminated with the aim of improving employee collaboration's discriminant validity issues. The rest of the missing indicators (Away2 and Biophilia2) have been eliminated to obtain reliability and ensure the validity of the model. However, as the psychological well-being is measured in mode A at indicator level, the indicators are supposed to be correlated, so the conceptual frame of the composite is not altered. In addition, and due to correlation problems shown with the indicator "extent" in further empirical analysis, the researcher has opted to eliminate the indicator from the model (see, figure 11). This problem was also experienced by Hartig (2004) as the "extent" subscale showed insufficient reliability being the subscale coherence more representative than the scope subscale, although items from the extent scale were at first retained from the main investigation process. It was found that the coherence subscale also correlated negatively with other scales. However, the restorative effect produced by the PRS scale by Hartig, Korpela, Evans and Gärling (1997) and Hartig (2004) was proved throughout his investigations.

Once these items have been eliminated, the results obtained for convergent validity show an AVE higher than the minimum of 0.5 (Hair et al., 2014). Therefore, the results show that convergent validity is met. Regarding discriminant validity, which has been measured by the HTMT criterion (Henseler et al., 2016), all indicators have values lower than the maximum of 0.85 (Hair et al., 2014) although Teamwork has a borderline value of 0.850 (see, table 27). This also corroborates the Fornell-Larcker criterion. Therefore, the overall results support the model's validity.

TABLE 27

The HTMT criterion and Fornell-Larcker discriminant validity

Indicator	HTMT								
	Away	Biophilia	Compatibility	Employee collaboration	Fascination	Space	Teamwork	Technology	
Away									
Biophilia	0.549								
Compatibility	0.313	0.156							
Employee collaboration	0.681	0.283	0.678						
Fascination	0.789	0.360	0.624	0.571					
Space	0.816	0.495	0.221	0.415	0.602				
Teamwork	0.792	0.431	0.633	0.850	0.850	0.642			
Technology	0.316	0.250	0.215	0.281	0.553	0.771	0.536		
Indicator	Fornell-Larcker criterion								
		Biophilia	Compatibility	Employee collaboration	Fascination	Space	Teamwork	Technology	
Away	0.808								
Biophilia	0.399	0.915							
Compatibility	0.174	0.003	0.855						
Employee collaboration	0.515	0.245	0.552	0.730					
Fascination	0.514	0.299	0.481	0.514	0.779				
Space	0.520	0.372	0.128	0.323	0.450	0.864			
Teamwork	0.539	0.364	0.503	0.786	0.723	0.505	0.771		
Technology	0.246	0.226	0.195	0.274	0.495	0.642	0.499	1.000	

Source: self-elaborated.

After having obtained the results, the punctuations of the latent variables have been saved, so the model is again estimated but instead of including second order dimensions as latent variables, they are set as manifest variables (see, figure 12):

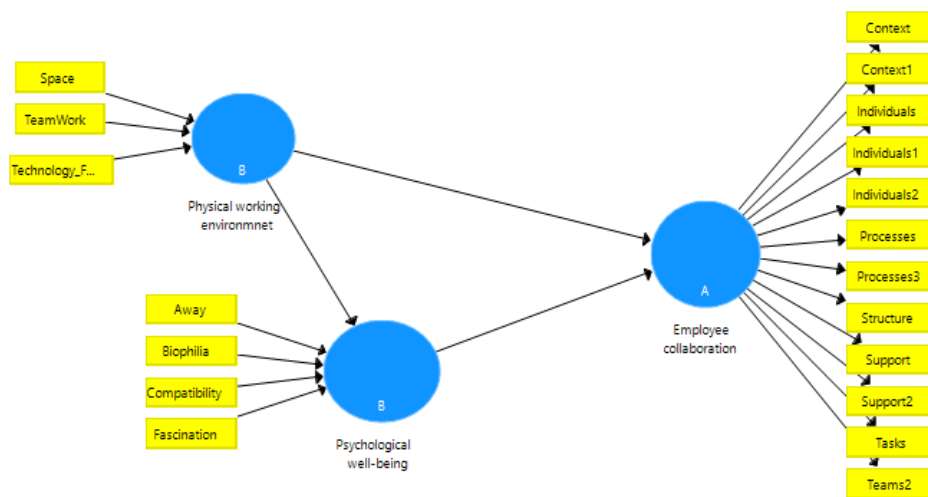


FIGURE 12

Measurement model assessment -model2-

Source: self-elaborated.

The saturated model is estimated again to see if this more plausible model is valid (see, table 28).

TABLE 28

Saturated model -model2-

	Saturated model		
	Value	HI95	HI99
SRMR	0.086	0.079	0.088
d _{ULS}	1.417	1.171	1.456
d _G	0.880	1.420	1.880

Notes: SRMR: standardized root mean square residual; d_{ULS}: the unweighted least squares discrepancy; d_G: the geodesic discrepancy; HI95: bootstrap-based 95th percentile; HI99: bootstrap-based 99th percentile.

Source: self-elaborated.

The SRMR value (0.086) although it is a bit higher than the established value of 0.08 by Henseler et al. (2016) it is lower than the 99th percentile. Likewise, the indicator for d_{ULS} also has a value lower than HI99 and d_G lies below the 95th percentile. So, the model supports nomological validity. The results indicate that the composite constructs are mostly acting in their embedded nomological set rather than their indicators. As a result, the model also meets nomological validity. Next, the model will be assessed for reliability and validity issues (see, table 29).

TABLE 29

Reliability and validity assessment -model2-

Physical working environment (Mode B)	VIF	Loadings	P-value	Weight	P-value	CR
						n/a
Teamwork	1.424	.996***	.000	.999***	.000	
Space	1.831	.530***	.000	.120	.196	
Technology	1.833	.446**	.005	-.129	.175	
Psychological well-being (Mode B)						n/a
Away	1.490	.741***	.000	.407**	.013	
Biophilia	1.220	.435**	.003	.157	.146	
Compatibility	1.317	.697***	.000	.446**	.000	
Fascination	1.755	.844***	.000	.379**	.024	
Employee collaboration (Composite Mode A)						.935
Context	2.390	.677***	.000	.107***	.000	
Context1	3.280	.770***	.000	.120***	.000	
Individuals	2.216	.698***	.000	.078***	.000	
Individuals1	3.076	.816***	.000	.129***	.000	
Individuals2	3.109	.784***	.000	.128***	.000	
Processes	2.433	.730***	.000	.106***	.000	
Processes3	1.831	.614***	.000	.148***	.000	
Structure	2.579	.777***	.000	.142***	.000	
Support	2.923	.748***	.000	.115***	.000	
Support2	2.570	.681***	.000	.104***	.000	
Tasks	2.453	.739***	.000	.122***	.000	
Teams2	1.811	.573***	.000	.087***	.000	

Notes: CR: Composite Reliability, VIF: Variance inflation factor ns: nonsignificant n/a: not applicable ** significance at $p < .05$ *** significance at $p < .001$ (2-tailed) with bootstrapping (sub-samples=10.000).

Source: self-elaborated.

According to Hair et al. (2014), the assessment criteria for constructs measured in mode B is given by collinearity or the VIF index that should be around 3 or lower, and weights and their significance level. Besides, content validity is given through the revision of the literature. Bootstrap method is used to test for significance of each indicator's weight (Hair et al.,2014). When a value of an indicator's weight is non-significant at 95% level, and according to Hair, Rischer, Sarstedt and Ringle (2019:10) "the indicator's absolute contribution to the construct is considered, as defined by its outer loading". According to Hair et al. (2019) indicators with a nonsignificant weight should be eliminated if the loading is also nonsignificant and lower than 0.5. With a significant loading below 0.5, it is the researcher's decision to eliminate the indicator depending on the indicator's relevance for the measurement theory.

The results (see, table 30) conclude that the model supports reliability and validity, although Space ($\lambda=.120$, $p=.196$) and Technology ($\lambda=.129$, $p=.175$) in the physical working environment construct have nonsignificant weights. However, their loadings suggest values larger than 0.5 for Space ($\lambda=.530$, $p=.000$) although lower than 0.5 for Technology ($\lambda=.446$, $p=.003$), thus significant. Nevertheless, despite having obtained not significant weights with $p<.05$, following Hair et al. (2019) recommendations, it has been decided to maintain both indicators for further structural model analysis.

Biophilia ($\lambda=.157$, $p=.146$) in the psychological well-being construct has nonsignificant weight. Besides, its loading is also smaller than 0.5 with a value of ($\lambda=.435$, $p=.003$) but significant. Following Hair et al. (2019) it has also been decided to maintain the indicator for further structural model analysis. In addition, all VIF scores are around 3 or a lower value according to Hair et al. (2019), so it is also concluded that the model does not show collinearity issues.

Regarding mode A composite employee collaboration, most of the values for outer loadings are close to 0.7 (Carmines and Zeller,1979; Fornell and Larcker,1981) except Teams2 ($\lambda=.573$, $p=.000$) that has been decided to maintain as the results for the rest of the indicators for reliability and validity do not show further problems. Composite reliability is also accepted for employee collaboration ($\lambda =.931$, $p=.000$) as it indicates a higher value than 0.7 (Nunnally,1978).

Finally, discriminant validity is also met as the values for the HTMT criterion are lower than the critical value of 0.85 (Henseler et al., 2016). Regarding convergent validity, all values for AVE are higher than 0.5 (Hair et al., 2014) thus, indicating that the indicators share at least the 50% of the variance with the construct. In conclusion, the results suggest the model meets validity and reliability and consequently, it is now possible to continue with the evaluation of the structural model.

7.3 Evaluation of the structural model

Once the measuring model has been evaluated, the structural model will be next analysed. The structural model tests for significance of the relationships between variables or the built hypotheses. For this, non-parametric tests are done, as PLS does not assume any criteria for the distribution of data (Chin and Newsted,1999). For evaluating the structural model two steps will be followed:

- First, the strength of the direct effects will be measured through the analysis of the path coefficients and bootstrapping.
- Second, the model's predictive ability will be analysed.

Figure 13 describes the visual representation of the structural model with the R^2 coefficients and path coefficients:

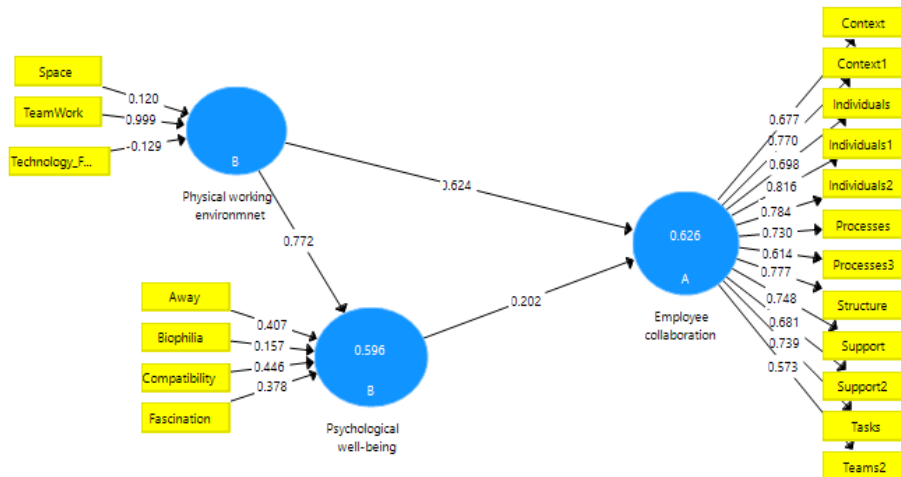


FIGURE 13

Structural model

Notes: significance level $p < .001$ (1-tailed).

Source: self-elaborated.

For the analysis of the structural model the **coefficient of determination R^2** and **path coefficients** are tested. Regarding the explained variance (R^2) of the endogenous variables and following Falk and Miller's (1992) criteria, the R^2 must be higher than 0.1. The model presents R^2 values of 0.626 for employee collaboration and 0.596 for psychological well-being.

In the same way, the **effect size (f^2)** has been calculated that measures the strength of the relationship between two variables. In other words, the f^2 indicates the change in R^2 when a variable has been eliminated allowing the researcher to see if the eliminated variable has a significant effect over the factors associated with. The f^2 can be measured as small ($f^2 = .02$), medium ($f^2 = .15$) or large ($f^2 = .35$) effect-size. The model presents a f^2 value of 0.421 for the relationship between the physical working environment and employee collaboration, and a value of $f^2 = 1.474$ for the physical working environment and psychological well-being (see, table 31). The

effect size or f^2 is 0.044 for the relationship between psychological well-being and employee collaboration.

In addition, a power test has been conducted to ensure the model owns a minimum of sample size for conducting the regression model with a power of 80%. Considering Cohen's (1991) categorisation of **G power test** results to obtain a sufficient sample size the effect size should be high. For this study case, and according to the results from figure 14, to obtain a power of 85% an effect size of 0.3 is required.

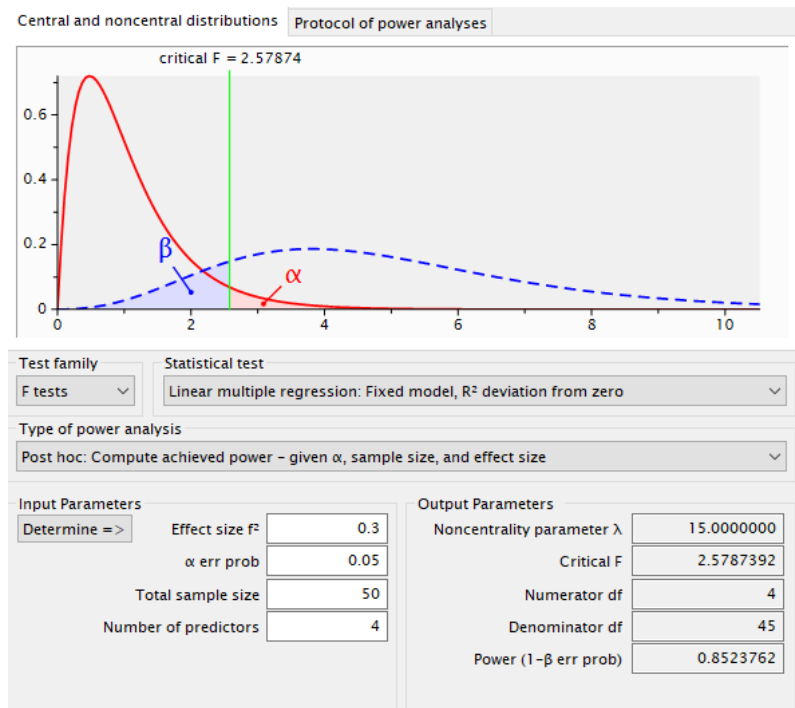


FIGURE 14

G-power test

Source: self-elaborated on G power test (Cohen, 1991).

In addition, the **Bootstrap** method is used to assess the precision and the stability of the obtained estimators (Chin, 1998) by analysing the significance of the direct effects. The bootstrapping sample has been set at a 0.05 significance level, 1-tailed, over 10000 samples as the hypotheses are formulated with signs. After running the bootstrap analysis, the results show that T-student values for the bootstrap coefficient are significant under the 5% of significance level except for psychological well-being → employee collaboration according to table 30.

TABLE 30

Bootstrap results for significance testing

Hypotheses	Path	T statistic	P-value	F ²
	coefficients			
Physical working environment → psychological well-being	.772	16.096***	.000	1.474
Physical working environment → employee collaboration	.624	3.847***	.000	.421
Psychological well-being → employee collaboration	.202	1.058	.142	.044

Notes: ns: nonsignificant ***p-value < .05 (1-tailed) Bootstrap with 10000 samples
 $R^2 = 0.626$ for Employee collaboration and $R^2 = 0.596$ for Psychological well-being
 $Q^2 = 0.295$ for Employee collaboration and $Q^2 = 0.270$ for Psychological well-being

Source: self-elaborated.

The direct relationship between the physical working environment and employee collaboration ($\beta = .624$, $p = .000$) is significant whereas, the relationship between the psychological well-being and employee collaboration ($\beta = .202$, $p = .142$) is not significant. The relationship between the physical working environment and psychological well-being ($\beta = .772$, $p = .000$) is also significant. Finally, the **blindfolding** technique or Stone Geisser's test is done to assess the predictive relevance of the path model (Hair et al., 2017). The Stone Geisser test calculates the coefficient Q^2 for each dependent construct. If the results of the obtained Q^2 are higher than 0, it is assumed the model owns predictive value. In this case, the results for the blindfolding coefficient are 0.295 for employee collaboration and 0.270 for the psychological well-being construct, both higher than 0. Therefore, the results demonstrate the model owns predictive value.

7.4 The mediating effect

The results from the structural model analysis conclude that the physical working environment does positively influence employee collaboration as supported by theory. However, the relationship between the psychological well-being and employee collaboration ($\beta = .202$, $p = .142$) is nonsignificant. Therefore, there is no mediation. In addition, the direct effect, the indirect effect, and the total effect are calculated (see, table 31):

TABLE 31

Total, direct, and indirect effects

Total effect of physical working environment on employee collaboration		Direct Effect of physical working environment on employee collaboration		Indirect Effect of psychological well-being on employee collaboration		
Coefficient	t-value	Coefficient	t-value	Specific	Coefficient	Bootstrap CI
						Percentile BC
						5% 95% 5% 95%
.780***	16.616	H1 .624***	3.816			(.336 ; .886) (.324 ; .858)
					H2 .156 ^{n/s}	(-.437 ; .075) (-.416 ; .104)
				H2.A	.772***	(.713 ; .870) (.834 ; .823)
				H2.B	.202 ^{n/s}	(-.526 ; .096) (-.514 ; .125)

Notes: n/s= not significant, BC= bias corrected, ***p< .05 (1-tailed).

Source: self-elaborated.

According to the results, the total effect, as the summary of the direct and indirect effect, gives a value of 0.780 ($p=.000$), so it is significant. However, when analysing the direct and indirect effects separately, there is a significant value of 0.634 for the direct effect between physical working environment and employee collaboration with ($p=.000$) and, hypothesis H1 is accepted, although the results for the indirect effect are nonsignificant with a value of 0.156 ($p=.157$). As a result, H2 is rejected, and it confirms there is no mediation of the psychological well-being construct for the relationship between the physical working environment and employee collaboration.

Nevertheless, when analysing the specific indirect effects, there is a path-coefficient value of 0.772 ($p=.000$) for the physical working environment and psychological well-being and therefore, H2.A is accepted. The relationship between the psychological well-being and employee collaboration has a nonsignificant value of 0.202, so hypothesis H2.B is rejected (see, table 32).

TABLE 32

Hypotheses testing

Hypothesis	Contrasting hypothesis
H1: Physical working environment → Employee collaboration	ACCEPTED
H2: Mediation between the physical working environment → Employee collaboration	REJECTED
H2.A: Physical working environment → Psychological well-being	ACCEPTED
H2.B: Psychological well-being → Employee collaboration	REJECTED

Source: self-elaborated.

In addition, the results obtained conclude that the physical working environment is basically defined by the indicator “Teamwork” whereas, psychological well-being is specially defined by “Away”, “Fascination”, and “Compatibility”.

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CHAPTER 8

Final results and conclusions

8. FINAL RESULTS AND CONCLUSIONS

“Success is a science; if you have the conditions, you get the results” -

Oscar Wilde

Although the exact concept of the physical environment is not yet well defined, workplace design is fundamental to the experience of the personal space. Factors affecting design like territoriality, crowding or light have a direct effect on several aspects like mental health or well-being and as a result, also on aspects related to job characteristics and job performance (Navai and Veitch, 2003). Architecture and design contribute to the development of social cohesion and this proximity facilitates social interaction (Fleming, Baum, and Singer, 1984). Therefore, work environments that are socially supportive of each other are also perceived as healthier places to work (Lowe, 2003). Besides, according to Wilson and Wagner (1997), the physical element of the organisation's climate-in relation to the environment and environmental settings- includes factors affecting health, which also benefit the whole organisation in reverse.

So, the physical working environment can refer to different aspects of work settings. From design to the influence the environment applies on the individual, the physical working environment is also a broad concept that includes dimensions from a wide range of characteristics. As a result, it is one idea of choice to jointly consider the physical environment and different outcomes like employee collaboration or psychological well-being to analyse some of the dimensions the physical working environment attains to and merely, as the focus point of interest of this study.

This last chapter includes the general conclusions derived from theory after having done the empirical analysis and the main implications for organisations and Coworking sites in the Basque Country. Furthermore, limitations that have been found while completing the study will be appointed, which can contribute to a better understanding of this research and the results obtained. In addition, further investigation lines will be appointed if continuing with the study here presented.

8.1 General conclusions

To draw the main conclusions, the results obtained from the empirical analysis will be contrasted with literature to support the results with theory.

First, the main objective of this study has been to analyse the physical working environment in relation to employee collaboration and psychological well-being. Therefore, the hypotheses here formulated have contrasted the relationship between physical working environment and employee collaboration and the effect of psychological well-being when included as a mediating construct. Considering these main two hypotheses, conclusions withdrawn from the empirical analysis show that there is a positive relationship between the physical working environment and employee collaboration whereas, there is no effect of the mediating construct, the psychological well-being.

Additionally, the results from the empirical analysis have concluded that the dimension that most explains the physical working environment is “Teamwork” and in the case of the psychological well-being, “Away”, “Compatibility”, and “Fascination”.

8.1.1 In relation to the physical working environment and employee collaboration

Regarding the direct relationship between the physical working environment and employee collaboration, literature in Hua (2010) states that the importance of the distribution and the design of the workplace is one aspect that it really needs to be considered when measuring employee collaboration. As it has been previously found in both of Hua’s (2010) investigations about collaborative space layout and its features, and in Mattessisch and Monsey’s (2001) and Sawyer’s (2017) analysis of collaboration, the design of the space at work settings directly influences employee collaboration. Although there are different indicators of employee collaboration on an organisational level, the most important aspect for this study has been the measuring of the relationship between the physical working environment and employee collaboration, and as a result, characteristics of other types have been excluded from this context.

In addition, collaborative spaces suggest the distribution and the refurbishment of the workplace is dedicated to enhancing collaboration as it was found in Hua, Loftness, Kraut and Powell (2010) and Hua’s (2010) own investigations about work settings and space typology. According to both

studies, during the last decades there has been an approximation or a simulation to transform the space to promote and enhance collaboration in work settings. As an essential part of business and organisational praxis, collaboration needs to be supported and enhanced, and spatial layouts like open-office plans have become immensely popular. As it has been already tested, openness contributes to increasing collaboration among employees. As seen in authors like Brennan, Chugh and Klein (2002), who found a correlation between the degree of environmental change and the positive feelings associated when discussing the transition to the open office, or as found in Brookes and Kaplan (1972), open offices facilitate interactions due to an improvement in communication and group cohesion. However, the authors state that noise and distractions derived from open-office plans can negatively affect individual job performance. Therefore, there are mixed opinions regarding the effectiveness of open offices, as despite openness being potentially exploited in current offices and following Heerwagen, Kampschroer, Powell and Loftness (2004), a constant manipulation of the space can have negative effects on individual work.

Nevertheless, and apart from some negative outcomes found in several of the investigations here considered, experience suggests that open offices which promote teamwork are effective enough for enhancing employee collaboration. The results obtained in the empirical analysis also support this argument.

Furthermore, considering the dimensions and indicators used for the measurement of the physical working environment, the analysis of the structural model suggests that Teamwork has the highest ratio of influence in the measurement of collaborative work environments. This study has revealed interesting results, as Teamwork is the most notable dimension when collaborative spaces are evaluated according to the scale used in this study and not space typology. According to Hua (2010), the presence of conference and meeting rooms, open areas, and work groups intended for teamwork are the most important features in terms of enhancing positive relationships to increase employee collaboration. However, other characteristics that support good communication, positive relationships and enhance teamwork are also necessary. Likewise, communication and factors like face-to-face interactions enhance collaboration as Sawyer (2017) certifies. As Sawyer (2017) also states, collaboration needs open and frequent communication to succeed, being communication one of the dimensions that best define employee collaboration, and teamwork is an important mechanism for increasing the chances of interaction. Consequently, the results of the study reflect what reality marks when considering teamwork, the most important feature in relation to employee collaboration.

In conclusion, the overall results from the empirical analysis and the literary review suggest that there is a positive relationship between the physical working environment and employee collaboration although Teamwork is the most influencing dimension. In consequence, Coworking spaces should promote spatial features to improve collaboration through teamwork. In addition, in the recent years there has been an increase of modification of the space in several Coworking sites and organisations aiming to increase teamwork and collaboration. As stated by Merkel (2015) and gathered in Orel and Alonso-Almeida (2019:4), “Coworking spaces focus on independent individuals who seek optimized work environments which will allow them to establish relationships with like-minded individuals, form collaborations, and enter various networks” highlighting the importance of teamworking and collaboration for the design of new spaces. Nevertheless, the space prototype is still merging and there is not a conclusive characterisation of the space for increasing teamwork and collaboration when space layout is also considered as the second most affecting factor. Besides, teamwork and collaboration now also seek a virtualisation of the space as it is being experienced in Covid-19 generated situations. Virtual teamworking and collaboration are already a reality nowadays, merging to search for new designs of the space that is no more just a physical domain. In addition, the current pandemic has forced organisations to limit the capacity of employees physically available at a certain time. Therefore, teamwork and the chances for collaboration have been diminished by the lack of presence of employees in the workplace, and organisations have had to rely their efforts on adapting teamwork to function virtually by changing the environment where teamwork and collaboration are held. This opens a new bridge for organisations to decide about the future of teamwork and collaboration that may return to a pre-pandemic scenario or re-adapt to post-pandemic times.

8.1.2 Mediation of psychological well-being

Although results have concluded there is a positive relationship between the physical working environment and psychological well-being, there is not a positive relationship between the psychological well-being and employee collaboration and therefore, there is no mediation of the psychological well-being construct in the link between the physical working environment and employee collaboration.

The lack of previous empirical evidence adds to the problem that has neither been possible in this study to empirically corroborate that the psychological well-being explains the relationship and the

positive influence of the physical working environment on employee collaboration. Academic researchers have mostly investigated mental health in the workplace in relation to reducing problems like absenteeism or turnover as seen in Wright and Bonett (2007). These authors included psychological well-being of employees as a mediator for investigating the relationship between job satisfaction and employee turnover, or in relation to the worksite, as also found in Panaccio and Vandenberghe (2009). These scholars did a longitudinal study about the effects of organisational commitment and support on well-being. However, the only evidence regarding mental health, as a holistic concept affecting collaboration, is found on research done at large organisations such as Engage for Success or Unilever⁵⁵ that mainly measure data on mental health illness such as anxiety or stress.

Nevertheless, there might be other mechanisms that could explain psychological well-being's features that may affect the relationship between the physical working environment and employee collaboration depending on the conceptualisation of the construct. Certain behavioural aspects for example, may have a direct influence on collaboration when considering it explicitly a mental process. Nonetheless, the specifications of psychological features influencing collaboration should be closely identified, which requires further research. Parr, Cook and Wall (1979) for example, investigated several work attitudes of psychological well-being by relating concepts like job satisfaction to happiness and perceived anxiety. Osland, Devine and Turner (2015) investigated the field of organisational behaviour debating also concepts like job satisfaction, happiness and psychological well-being, but both research lack an approximation to well-being dimensions considered in this study by Hartig (2004) and their relation to employee collaboration.

Furthermore, regarding the positive relationship between the physical working environment and psychological well-being, theory supports that as Kaplan (1995) already suggested, certain environmental features influence individual psychological well-being based on his attention restoration theory. In addition, Hartig's (2004) investigations adopted Kaplan's initial theory to include environmental needs in his restorativeness scale to support the restorative capacity of certain environments. However, as Hua (2010) and Hua et al. (2010) say, space does not entirely create actions or behaviours as it is mainly a physical structure. Besides, there is not enough literary evidence of a solid relationship between the physical environment and human psychology

⁵⁵ An American based worldwide organisation that throughout the years has elaborated many reports on how to improve different aspects of employees' life like mental health, well-being, physical health, or Covid-19 related issues now, with emphasis on successful work practices like collaboration and team building.

and specially, on psychological well-being according to the scales used in this study. Likewise, according to Hartig (2004), although certain environmental features influence psychological well-being, it is more difficult and more abstract to measure this in the built environment.

However, and as it has been demonstrated in this study, it is implied that teamwork can implicitly affect individual and psychological well-being. As Mierlo, Rutte, Kompier and Doorewaard (2005) say, positive perceptions of employees towards teamwork also improves general well-being as teamworking offers support and a scope for accomplishing tasks individually not possible which in return, positively affect well-being. In addition, this study has concluded that the physical working environment and specially teamwork, affect well-being features associated with the most representatives of the psychological well-being construct: away (with the highest value), compatibility and fascination that are translated into self-presence or self-awareness, personality, and personal interests as stated by Heerwagen et al. (1995). Related to this, the physical working environment will generate a higher effect on the capacity of self-presence or awareness that is brought by surroundings that are pleasant and welcoming. As a result, by improving the physical working environment, the chances for finding ourselves inside a specific environment because of the pleasantness it provides will be also higher thus, positively affecting well-being.

Additionally, as described by Hartig (2004), environments have a direct impact on human psychology and well-being, as certain spatial features like meeting areas, open spaces, or cosy corners act as stimulants to interaction, consultation, and creative group processes while boosting a positive feeling and an improved mental state. In regards, Kaplan and Kaplan (1983), Heerwagen et al. (1995) and Loftness (1997) say that different work settings produce different behavioural and psychological responses on the individual. Moreover, according to Heerwagen et al. (1995), work settings must provide a sense of pleasure and promote positive feelings by allowing the individual to regulate behaviours compatible with the surrounding environment and increased fascination. In addition, Hartig's (2004) investigations on the environmental restoration theory and the influence of natural elements found the importance of centering attention to features that are pleasant and interesting as essential for improving psychological well-being.

In contrast, and according to Hartig (2004), certain environments generate negative reactions and the possibility of developing health conditions like attention-induced fatigue or stress, which have a severe negative impact on the individual. Built environments, for example, have a direct negative impact on well-being because they are not natural habitats (Herwaagen et al.,1995). Additionally, work settings negatively affecting the scopes of compatibility with the surrounding and fascination

towards the workplace and a sense of being away, conclusively impair individual psychological well-being. In addition, research has also proved the positive influence that nature, and particularly, natural environments have on individuals, as seen on patients' recovery process or those hospitalised. For example, in a study conducted by Ulrich (1983), he analysed the impact of window views to outdoor landscapes on hospital patients. Ulrich (1983) concluded the outdoor landscape views reduced the patients' pain experience after a surgery. Kellert and Calabrese (2015) also say that the many benefits associated with nature and natural environments are conclusive in terms of physical and psychological improvement and they proved that natural environments improve attention and concentration and increase social interactions. Therefore, it is consequently justified the correct management of each organisation's own space to enhance well-being, a practise that has largely increased in the recent years as a result of the importance of promoting well-being that may also benefit organisational results. Nevertheless, although supported by this study, there is not much literary evidence on the relation between physical working environment and specially teamwork, with psychological well-being studied features (away, compatibility and fascination) and consequently, it is important to continue with research to generate more conclusive results and a standing viewpoint on the undergoing relationship.

In addition, research should be extended in the field of psychological well-being through expanding investigation and study features like Hartig's (2004) restorativeness scale or Kaplan's (1995) attention restoration theory in relation to collaboration and alike.

8.2 Final reflections and main implications for organisations and coworking spaces in the Basque country

The following point describes the final personal reflections on the completion and the instalment of the research, and implications for organisations and Coworking spaces in the geographical territory of the Basque Country.

8.2.1 Personal reflections

Despite the initial difficulties on how to design the research model and how to make a logical relationship between the constructs, a review of the available literature helped me design the final

model that has led to the completion of this research study. As it has been stated at the introduction, the path to complete this doctoral thesis has not been easy, as it has meant constant dedication that sometimes was not easy to accomplish due to my outside job's schedule. However, the journey of personal and professional development and growth since the ink-pointed first idea to its fulfilment, has also undoubtedly been a journey of acquisition and knowledge.

Since the starting point of this roller-coaster of academic and personal adventure, I have felt and experienced different emotions and feelings regarding the accomplishment of the goals and objectives set at the beginning of this doctoral thesis. I have felt joy, anger, and frustration; I have felt myself tired, overloaded with work, anxious; hopeful and hopeless at the same time. I have felt myself excited, tense, distressed, and elated, but I am sure, the steps walked, and the lessons learnt have apprehended myself in a powerful way for the future and the days to come, which have in turn made myself stronger and more knowledgeable, and in the end, a better self.

For each spoonful of new theories built, the amount of research done, and the progress accomplished, bigger initiatives have arisen to help transform the world and the society we live into a better place. With the opportunity provided here to contribute with this thesis to improve and embellish the world and the society, I hope that by helping future academics to construct new theories, I will be contributing to humanity with the ink and effort of my soul.

8.2.2 Implications for coworking spaces and rest of the organisations in the Basque country

After the conclusions obtained from both the literary review and the empirical analysis, the main implications for Coworking spaces and organisations in the Basque Country will be described regarding the improvement of the current situation. In addition, the implications of this study for the available literature will be summarised.

In relation to this, the main contributions of this study have been to provide new evidence on the relationship between the physical working environment, psychological well-being, and employee collaboration. Besides, and supported on evidence, it is highlighted how to enhance collaboration at Coworking sites and organisational level by transforming the physical environment into a collaborative space, and its impact on psychological well-being. As there is not still much evidence in literature and previous studies concerning the above-mentioned constructs (the physical

working environment, psychological well-being, and employee collaboration), this study also provides updated information on the relevance of the relationship between the dimensions studied and it opens new research opportunities while contributing to theory and knowledge.

As the results of the empirical analysis and the theoretical background propose, the physical working environment plays an important role in the promotion and increase of employee collaboration at different work settings. Knowing this, it is essential for Coworking spaces and for organisations in general to plan the design of their workplace in detail to enhance collaboration through teamwork. Besides, it is strongly recommended to laboriously plan the design of work settings by strategically setting specific areas to enhance teamwork, and to include elements that have a positive impact on the psychological well-being of employees. On this aspect, factors affecting the physical working environment and employee collaboration according to the results obtained and the conclusions drawn are the following:

- the disposition of the space to generate teamwork and facilitate formal and informal interactions.
- openness of the working space to facilitate communication and interactions among employees that will also improve teamwork opportunities and collaboration.
- the presence of different tools that may facilitate teamwork through physical and virtual interaction.

Furthermore, as many Coworking spaces already promote collaborative work it should be an essential feature to transform the work settings to increase better opportunities for collaboration and implement or adequate the workplace by centering its activity around teamwork and collaboration. Besides, Covid-19 pandemic has generated new situations that both Coworking and organisations must have had to adapt to, like home-working or online meetings and teamworking through virtual sharing platforms that have yet emphasized the need for new spaces to work. The importance of teamwork and collaboration has been aggravated by the world pandemic that has opened a new era for living, socialising, and working. Human interactions that are so essential for generating collaborative work models have become highly virtual, by exposing us virtually and not physically, with the consequences this virtualisation of the workplace brings. If organisations and workers need to rethink the concept of interaction, teamwork and collaboration, the outcomes here exposed need also to be evaluated again and studies like Hua's (2010) regarding collaborative work environments, need to be reconsidered by also integrating the virtual space. So, Coworking sites and organisations have nowadays a double task: to reconvert their physical space to promote

teamwork and increase collaborative opportunities and design the virtual space that on many occasions has created adverse situations or slowed down daily progress because it was not properly organised, or employees did not know how to function in the virtual world.

Regarding factors affecting the physical environment and psychological well-being otherwise, results suggest that the workplace design should also enhance psychological well-being of employees by supporting environmental features that are pleasant, compatible with the employees' job and personal sphere, and fascinating. Space and the surrounding environment greatly influence well-being standards as found in Hartig (2004) or as stated by Heerwagen et al. (1995). For this, it is highly recommended for Coworking spaces and organisations to adopt an adequate design that will promote well-being, mainly self-awareness standards related to the indicator "away", through teamwork. Likewise, apart from the restorative quality of certain environments, a well-established health and safety program has a direct impact on the reduction of costs associated with problems like absenteeism, stress, and mental health as found in Goetzl, Ozminkowski, Sederer and Mark (2002) that contribute to the achievement of psychological well-being.

In addition, the promotion of physical and psychological health should be an integral part of an organisation's culture as described by Munz, Grawitch and Gottschalk (2006). Healthy practices like finding life-work balance, health and safety training, employees' growth and development, or self-involvement in the organisation's goals positively influence the overall psychological well-being of employees. As Sarafino and Smith (2017) explain, several health conditions like stress negatively affect the human mental state which can have an implication on certain behavioural responses. As a result, it is also important for Coworking spaces and organisations to promote physical and psychological well-being by reducing dangerous practices that can severely affect personal and general well-being (Danna and Griffin, 1999; Munz et al., 2006).

8.3 Limitations

Every research study predicts a set of limitations on its development that affect the results and the final conclusions. In this point, the most important limitations regarding the completion of this study and the choice of the variables will be noted.

The first and the most important limitation has been the small number of literary reviews and scientific articles available for the justification of the research model and for the choice of the variables that has delayed the initiation of this doctoral thesis. Although there are many interesting authors and publications that support the scales used and the relationships established, finding enough evidence that would justify the specific relation between the three constructs here analysed, has been a difficult task as there are not many authors or published material about previous research covering the scales and the dimensions adopted for this study.

Therefore, the theoretical framework and the justification for the study have been limited to a few main authors and theories that have finally enabled the doctorate to design a valid model. Establishing the relationships between the physical working environment, psychological well-being and employee collaboration supported by theory or, including mediation have been complicated at first, although when supporting evidence has been found, it has been yet easier to establish a connection between the constructs.

However, the lack of literary evidence and previous studies on the topic, has also diffculted the design of the scale that would fit the data for its posterior empirical analysis. There are scales that have been previously used by different authors and researchers that measure one construct independently like the physical environment as found in Hua (2010) and Hua et al. (2010). The study connects collaboration with collaborative space layout, although it mainly refers to the levels of perceived satisfaction or distraction towards the given environment by centralising the study on spatial typology and spatial characteristics.

Regarding Hartig (2004) and his restorative scale for measuring psychological well-being was also previously used by other researchers to measure the restorative quality of environments and their influence on psychological well-being like in Pasini, Berto, Brondino, Hall and Ortner (2014), although the authors had had to adapt the original scale to obtain a better model and generalisable results. The adapted scale for measuring the restorative quality of environments included four different subscales and analysed which of the scales obtained the most accurate results. Having observed this and not being a unified scale for measuring the psychological well-being construct, the scale used in this study was also adapted from the original by Hartig (2004) to better adapt to the outcomes of the research and the items of the questionnaire. Another limitation regarding the scales has been found in the data collection technique as any study based on a questionnaire contains attributed errors that may have influenced the results obtained.

In addition, another limitation has been found in the availability of the target population due to the small number of Coworking spaces in the Basque Country. As a result, it has been difficult to reach a minimum number of participants for the survey and data collection that would bring consistent and valid results in the empirical analysis. In addition, the eagerness of employees at Coworking sites to participate in the research has also been a disadvantage although depending on the location and the nature of a particular Coworking space, their internal policies, and the number of active workers at the time of completing the questionnaire, the level of responses has varied in large, and also contact with the participating spaces. Additionally, it is always preferable to obtain large sample sizes to ensure more generalising results and heterogeneous data.

Finally, as for the statistical method chosen for the analysis of data, the PLS-SEM approach supposes a linearity in the causal relationships that may have simplified in excess the pre-existing problems of the relationships proposed in the research model. As a result, the quantitative approach alone does not fully enable the observation and explanation of the causes for the established relationships in detail. The incorporation of qualitative methodology to complement the empirical analysis should have also been a possibility that would have facilitated the incorporation of variables for a more extended study and explanation of results.

8.4 Further research lines and additional information

In this point, further research lines will be described that in the end, will serve as a starting point for future investigations and for providing a deeper insight of the topic here analysed. It will also contain additional information that can be used for a better understanding of certain concepts from the research.

8.4.1 Further research lines and opportunities for future investigations

The three main research lines established are related to the three constructs here analysed which have in combination, set the direction of this research study: 1. The physical working environment 2. Employee collaboration 3. Psychological well-being. As the basis for this study and the proposed

model, it will be interesting for future investigations to continue with research on the dimensions and the relationships established in this study.

Having contrasted the positive implications of the relationships set in hypothesis H1 and H2.A, the results can be extended not only to Coworking spaces but to larger organisations worldwide and even to the educational community. Due to the possibility of extending to other major areas, there is a wide opportunity for continuing with different investigation lines in the future regarding the scales, the constructs here analysed, or the relationships established.

1. Research lines related to the **Physical Working Environment**:

- A future investigation line exclusively directed to the improvement of work settings and office design for enhancing both employee collaboration and psychological well-being. There are features that have been identified, although they need an adequacy of the scale, that can be considered for the design and improvement of the physical environment such as, ergonomic furniture, in order to improve individual well-being by providing physical well-being through ergonomic office utensils. In addition, open-office plans, and a refurbishment of the office furniture to adapt the environment to the openness of the space or mobile office equipment may enhance collaboration by increasing interactions with other employees apart from delivering pleasantness which open spaces provide and improving perceived well-being.
- Another research line covering collaborative work environments and their spatial characteristics and an updated virtual space typology, in order to obtain a suitable scale for measuring different types of collaborative work settings, even those required for virtual teamwork and collaboration.
- A third line based on the analysis of the physical working environment specially at Coworking spaces intended for workplace innovation, while introducing new or different spatial characteristics that have also proved successful for increasing teamwork and collaboration. This way, the study would also provide more knowledge on the physical working environment that still lacks a sufficient presence in the current literature.
- A fourth line regarding space as a continuously changing physical and social factor that should be more often considered as an integral indicator of different outcomes that range from the understanding and the study of urban space to interior design, workplaces, and virtual work settings. Likewise, awareness on the study of space should be increased by promoting space as an important indicator of different research outcomes. Besides, the

- philosophical and lexical definition of space needs to be adapted and renewed to the current times, including Covid-19 generated situations, and the concept of space reformulated further than the approximation done by Foucault about space as heterotopia.
- Finally, one last research line integrating a comparative study of the physical working environment before and after having it modified to closely measure and analyse the improvements brought by a thorough modification of the space.

2. Research lines related to **Employee Collaboration**:

- Any research line directed to the analysis, measurement, and the study of collaboration like the comparison of different types of employee collaboration in a specific sector, or the establishment of a new measuring scale for all types of employee collaboration in specific work settings. In addition, employee collaboration can also be studied from the different participating agents like co-workers, managers, and employees with a different ranking and in different settings such as, academic and health institutions.
- To broaden the analysis and the understanding of Coworking spaces, Hubs, and social incubators both nationally and internationally as important parts of the current professional network which direct their work to the accomplishment of collaborative and community projects and cooperation between different organisations.
- Another research line centred in the conceptual analysis and study of collaboration as a term that refers to many different dimensions. It is important then, to re-conceptualise collaboration and to find a unified definition equally usable for academics and researchers and to rectify the ambiguity towards the conceptualisation and definition of collaboration that currently exists.

3. Research lines related to **Psychological Well-Being**:

- Applicable to different business sectors according to the needs, the promotion of physical and mental health and specifically, psychological well-being as an essential factor for the psychological state of an individual. For measuring health and well-being affecting factors like stress, and its related clinical manifestations like insomnia and anxiety, or the consequences of suffering from stress at different work settings, psychological well-being becomes a significant indicator of the psychological health sphere. Besides, the individual responds to psychological factors in different ways, and a joint analysis should be done on

- the several physical manifestations and mental state outcomes concerning psychological well-being at different work settings.
- In addition, concepts like biophilia can play an important role in restoring the psychological well-being of the individual because of the restorative effect of certain environments. Nowadays, urban architecture and the built environment are often designed following biophilic theory, by increasing the presence of natural elements in their design. It can be an important feature then, for restoring psychological well-being through the restorative effect of these environments. Biophilic research lines can be implemented in different settings like organisations or health institutions, and the study of biophilia extended to the restoration ability of certain environments in human psychology. Furthermore, the design of a valuable scale to measure the impact of biophilia on well-being and a new adaptation of Hartig's (2004) scale should be considered to measure the effects of biophilia and a complementary scale for measuring the psychological and physical responses and reactions to specific environmental features.
- Another research line can encourage the study of psychological well-being from a social and political perspective, as well-being directly influences people's perceptions about life. An investigation line based on the social-economic factors affecting psychological well-being would present conclusions on the relationship between economic growth and perceived well-being that might help to identify subscale problems or provide an important insight of the overall well-being index. Major urban areas, where most of the Coworking sites are located, can also be analysed to measure indoor well-being levels in employees, in contrast to those found in the surrounding community and outdoors.
- Another investigation line can cover a longitudinal study on technostress and psychological well-being at Coworking spaces and organisations, abide by including a philosophical analysis on the implications of progress and technology on personal and professional life.

At last, it is also necessary up to this moment, to elaborate a valid measuring scale that will jointly measure the three dimensions here analysed with the potential to measure collaborative workplace environments regarding observable environmental features for the promotion of employee collaboration, and the influence of the spatial design on employee's psychological well-being and hitherto, obtain more general and conclusive results.

Moreover, a further mediation analysis can be re-designed to include the effect of geographical location through a comparative study of Coworking spaces in different countries and overseas.

8.4.2 Additional information

Philosophically, the concept of Heterotopia was brought to this research as a first approximation to the understanding of the working space that it is understood as a multitasking environment that does not only hold work-related activities but also a place where humans interact, feel and live. However, Foucault's heterotopia does not relate to any sensorial or emotional aspect of space, and it is a dimension worth studying for an actualisation of the original concept. The opening of this doctoral thesis citing Foucault also brings a non-familiar introduction to the study of the physical work environment and the perception of that close relationship between philosophy and design. It is often important to bring these authors forward and be included in new research studies as they are frequently outcast from the scientific research spectrum. Therefore, it is essential to be able to provide a humanistic approach to research and investigation and include philosophical and humanistic values in science and progress.

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ANNEX

ANNEX 1: Letter of presentation for formally requesting the elaboration of the survey

Introductory letter

Dear all,

My name is Amaia Aranzeta and I am a PhD candidate and researcher at the University of Mondragon in Spain.

With this study, I would like to analyse how does the physical working environment influence employee collaboration. As you may know, current workplace design tendencies such as open-space plans, are becoming popular among many top companies worldwide. There are previous studies that highlight the impact these spaces have on collaboration levels, creativity and even psychology of the employees. As a result, I became interested in analysing this topic more in depth; and Co-working spaces offer me a unique environment concerning design and collaboration or teamwork.

There is a questionnaire I have designed using existing theory that I would like you to complete whenever possible. The questionnaire is composed of 40 items, but the questions are easy to answer. It won't take you more than 10 minutes to complete. Besides, I also have the online version for those of you who prefer to complete it online. Of course, the questionnaire and everything related to this research is anonymous and data won't be shared with thirds.

This part of the research is very important for me, as with the number of responses I get I will be able to analyse data and draw conclusions or not. So, I formally request, with the aim of completing this doctoral study, to take your 10 minutes and answer the questions you will find on the survey.

If anyone would like more information, I will be glad to answer all your concerns.

Many thanks in advance,

Amaia

ANNEX 2: Questionnaire



The following questionnaire likes to analyse the physical working environment and the employee collaboration in your organisation.

Please indicate on the 7-point scale the extent to which the given statement describes your experience in the setting

(1 = Strongly disagree 7 = Strongly agree).

1. My team-mates and I have clearly defined roles:

1.	2.	3.	4.	5.	6.	7.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. My team-mates and I have well-established goals:

1.	2.	3.	4.	5.	6.	7.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. My team, my organization, and I own a shared identity:

1.	2.	3.	4.	5.	6.	7.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. I feel collaboration is valued in my department:

1.	2.	3.	4.	5.	6.	7.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. I feel my team and I have control of actions and environments:

1.	2.	3.	4.	5.	6.	7.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. I feel the collaborative environment is adequate for me and my type of job

1.	2.	3.	4.	5.	6.	7.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. I have all the information I need to fulfil my work:

1.	2.	3.	4.	5.	6.	7.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. I feel my organisation helps to build internal working networks:

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1. 2. 3. 4. 5. 6. 7.

9. I feel my organisation enables deep listening:

1. 2. 3. 4. 5. 6. 7.

10. My co-workers, team members, and I help each other to complete tasks:

1. 2. 3. 4. 5. 6. 7.

11. I trust my co-workers and project members:

1. 2. 3. 4. 5. 6. 7.

12. I feel positive around my co-workers:

1. 2. 3. 4. 5. 6. 7.

13. I have a positive working relationship with my co-workers:

1. 2. 3. 4. 5. 6. 7.

14. It is easy for me to communicate face-to-face with my co-workers:

1. 2. 3. 4. 5. 6. 7.

15. In my organisation there are well-established informal communication links:

1. 2. 3. 4. 5. 6. 7.

16. I feel there is enough space in circulation areas for conversations with my co-workers:

1. 2. 3. 4. 5. 6. 7.

17. I feel my workplace has the best open-space plan:

1. 2. 3. 4. 5. 6. 7.

18. I consider my workplace to provide enough meeting spaces:

1. 2. 3. 4. 5. 6. 7.

19. I feel there are suitable places to fulfil my collaborative needs available:

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1. 2. 3. 4. 5. 6. 7.

20. I feel there are adequate types of collaborative spaces at my workplace:

1. 2. 3. 4. 5. 6. 7.

21. I feel my workplace design affects the connection I have with my co-workers:

1. 2. 3. 4. 5. 6. 7.

22. I feel this connection to be positive:

1. 2. 3. 4. 5. 6. 7.

23. My workplace is in proximity to copiers and printers:

1. 2. 3. 4. 5. 6. 7.

24. My workplace is in proximity to kitchen and coffee areas:

1. 2. 3. 4. 5. 6. 7.

25. I feel there are enough technology and tools available in my office:

1. 2. 3. 4. 5. 6. 7.

26. I sometimes don't have self-awareness when I am at work while I concentrate on what I am doing:

1. 2. 3. 4. 5. 6. 7.

27. It is easy for me to adapt to my workplace and its environment:

1. 2. 3. 4. 5. 6. 7.

28. I feel relaxed and positive when I enter my workplace:

1. 2. 3. 4. 5. 6. 7.

29. I feel my workplace has many interesting things that draw my attention to:

1. 2. 3. 4. 5. 6. 7.

30. I like being in this working environment:

Annex

1. 2. 3. 4. 5. 6. 7.

31. There is much to explore and discover in my workplace:

1. 2. 3. 4. 5. 6. 7.

32. I find components of my workplace to be beautiful and pleasant:

1. 2. 3. 4. 5. 6. 7.

33. I feel my workplace is a confusing place:

1. 2. 3. 4. 5. 6. 7.

34. I feel there is a great deal of distraction in my workplace:

1. 2. 3. 4. 5. 6. 7.

35. I feel being here in my workplace suits my personality:

1. 2. 3. 4. 5. 6. 7.

36. I have a sense I belong here:

1. 2. 3. 4. 5. 6. 7.

37. My organisation provides direct experiences with nature (presence of plants, animals, water, natural light, natural landscapes, weather, fire):

1. 2. 3. 4. 5. 6. 7.

38. My organisation provides indirect experiences with nature (images of nature, natural materials, natural colours, simulation of natural light and air, naturalistic shapes and forms, evoking nature, information richness, the patina of time, natural geometries, biomimicry):

1. 2. 3. 4. 5. 6. 7.

39. I feel my overall emotional state is positive at the moment:

1. 2. 3. 4. 5. 6. 7.

ANNEX 3: Short interviews to several Coworking spaces' managers

1. Leon, StartUP Port-Amsterdam-

- 1. How long have you been working at StartUP Port?**
- 2. Do you think open-space plans in the office encourage teamwork and communication, increasing collaboration among co-workers?**
- 3. How important do you think is collaboration for the current work scheme?**
- 4. Do you consider workplace design to be a condition to enhance collaboration among employees?**
- 5. Do you think there is a connection between workplace and design, and psychological well-being?**
- 6. In what amount do you think that these open-space plans and workplace design affect employees' psychological state?**
- 7. Do you or your organisation plan more informal activities like a lunch with co-workers, a picnic, a day out... with the aim of socializing, making contacts and get to know each other?**

2. Marlene, Spring House-Amsterdam-

- 1. How long have you been working at Spring House? And how many members are at Spring House at the moment?**
- 2. Do you think open-space plans in the office encourage teamwork and communication, increasing collaboration among co-workers?**
- 3. How important do you think is collaboration for the current work scheme?**
- 4. Do you consider workplace design to be a condition to enhance collaboration among employees?**
- 5. Do you think there is a connection between workplace and design, and psychological well-being?**
- 6. In what amount do you think that these open-space plans and workplace design affect employees' psychological state?**
- 7. Do you or your organisation plan more informal activities like a lunch with co-workers, a picnic, a day out... with the aim of socializing, making contacts and get to know each other?**

3. Ana, Makerversity-Amsterdam-

- 1. How long have you been working at the Thinking Hut?**
- 2. Do you think open-space plans in the office encourage teamwork and communication, increasing collaboration among co-workers?**
- 3. How important do you think is collaboration for the current work scheme?**
- 4. Do you consider workplace design to be a condition to enhance collaboration among employees?**
- 5. Do you think there is a connection between workplace and design, and psychological well-being?**
- 6. Do you or your organisation plan more informal activities like a lunch with co-workers, a picnic, a day out... with the aim of socializing, making contacts and get to know each other?**

4. Iñigo, Hub Gasteiz-Gasteiz-

- 1. ¿Dónde comenzó el proyecto de Hub Gasteiz?**
- 2. ¿En estos momentos a qué proyectos enfocáis el Hub Gasteiz?**
- 3. ¿Qué tipo de trabajadores, co-workers, socios hay en Hub Gasteiz?**
- 4. ¿Cuáles son los proyectos con los que estáis trabajando en estos momentos?**
- 5. ¿Qué me puedes decir acerca de la organización del Hub?**

5. Daniel, Icaza Colaborando-Bilbo-

- 1. ¿Cómo está organizado el coworking?**
- 2. ¿De dónde surgió la idea de crear un espacio coworking?**
- 3. ¿Cómo entienden la idea o el concepto de coworking?**
- 4. ¿Creen que el diseño influye en la colaboración?**
- 5. ¿Y, ¿cuál es el caso de Icaza Colaborando?**
- 6. ¿Cuál es el perfil del cliente que apuesta por un servicio coworking?**
- 7. ¿Qué tipo de eventos son los que organizan en Icaza?**

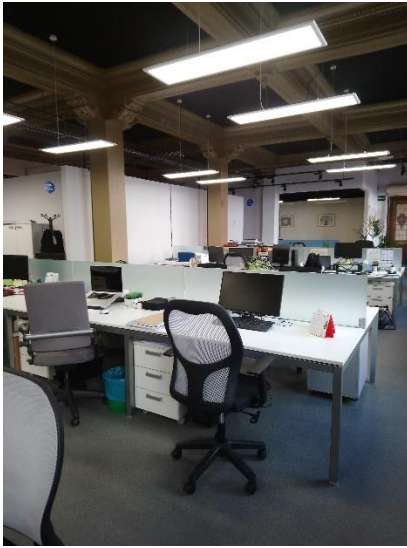
6. Vanesa, Eibar Coworking-Eibar-

- 1. ¿Cómo surge la idea o el proyecto del Coworking?**
- 2. ¿Cómo es la organización del Coworking?**
- 3. ¿Cuál es el perfil de los coworkers?**
- 4. ¿Cómo crees que es el trabajo o el coworking en Euskadi?**

ANNEX 4: Measuring scales, indicators, and items

AUTHORS/MEASURING SCALE	CONSTRUCTS/INDICATORS
<p>Hua (2010) Teamwork related 1. Adequate types of collaborative places 2. Available of places for collaboration needs 3. Availability of meeting spaces 4. Good variety of collaborative places 5. Collaborative environment in general</p> <p>Service related 1. Distance workstation-copier/printer areas</p> <p>Amenity related 1. Distance workstation-kitchen/coffee areas</p> <p>Technology and tools related 1. Support of tools and technology</p>	<p>PHYSICAL WORKING ENVIRONMENT Teamwork Teamwork: I feel there are suitable places to fulfil my collaborative needs available Teamwork1: I feel my workplace has an open space plan Teamwork2: I consider my workplace to provide enough meeting spaces Teamwork3: I feel there are adequate types of collaborative spaces in my workplace Teamwork4: I feel my workplace design affects the relationship I have with my co-workers</p> <p>Space Service: My workplace is in proximity to copiers and printers</p> <p>Amenity: My workplace is in proximity to kitchen and coffee areas</p> <p>Technology Technology: I feel there are enough technology and tools available in my office</p>
<p>Hartig (2004), Kellert et al. (2008), Pasini et al. (2014) Being away 1. To get away from things that usually require my attention 2. It is an escape experience for me 3. I like to go to places like this</p> <p>Compatibility 1. Being here suits my personality 2. I have a sense that I belong here</p> <p>Fascination 1. The setting has fascinating qualities 2. I would like to spend more time in this place 3. The place is interesting</p> <p>Biophilia 1. Direct contact with nature</p> <p>2. Indirect contact with nature</p>	<p>PSYCHOLOGICAL WELL-BEING Being away Away: I sometimes do not have self-awareness when I'm at work while I concentrate on what I'm doing Away1: It is easy for me to adapt to my workplace and its environment Away2: I feel relaxed, happy, and positive when I enter my workplace</p> <p>Compatibility Compatibility: I feel being here in my workplace suits my personality Compatibility1: I have a sense I belong here</p> <p>Fascination Fascination: I think my workplace has many interesting things to draw my attention to Fascination1: I like being in this working environment Fascination2: There is much to explore and discover in my workplace Fascination3: I find components of my workplace to be beautiful and pleasant</p> <p>Biophilia Biophilia: My organisation provides direct experiences with nature (presence of plants, animals, water, natural light, natural landscapes, weather, fire) Biophilia1: My organisation provides indirect experiences with nature (images of nature, natural materials, natural colours, simulation of natural light and air, naturalistic shapes and forms, evoking nature, information richness, the patina of time, natural geometries, biomimicry)</p>
<p>Mattessich and Monsey (2001), Sawyer (2017) 1. People in this collaborative group have a clear sense of their roles 2. People in the collaborative group know and understand shared goals 3. No other organization is trying to do what we are exactly doing 4. The level of commitment of members with the collaboration is high 5. Collaboration is granted personal and team autonomy for major decision making 6. This climate is the adequate for starting the collaboration 7. I am informed as often as I should about what is going on in the collaboration 8. The team builds dense networks for collaboration 9. My collaborative team practices deep listening 10. When the collaborative group makes major decisions, members show support from the organisation and colleagues 11. People involved in collaboration trust each other 12. People involved in this collaboration are willing to compromise 13. There is a positive relationship and backup from colleagues 14. There is constant in person communication 15. Communication happens both in formal and informal ways 16. Spatial characteristics for collaboration are optimate</p>	<p>EMPLOYEE COLLABORATION Teams: My team-mates and I have clearly defined roles</p> <p>Teams1: My team-mates and I have well-established goals</p> <p>Teams2: My team, my organization and I own a shared identity</p> <p>Structure: I feel collaboration is valued in my department</p> <p>Context: I feel my team and I have control of actions and environments</p> <p>Context1: I feel collaborative environment is adequate for me and my type of job</p> <p>Support: I have all the information I need to fulfil my work</p> <p>Support1: I feel my organisation helps to build working networks Support2: I feel my organisation enables deep listening</p> <p>Tasks: My co-workers, team members and I help each other to complete tasks</p> <p>Individuals: I trust my co-workers and project members Individuals1: I feel positive and happy around my co-workers</p> <p>Individuals2: I have a positive working relationship with my co-workers</p> <p>Processes: It is easy for me to communicate face-to-face with my co-workers Processes1: In my organisation there are established informal and formal communication links</p> <p>Processes2: I feel there is enough space in circulation areas for conversations with my co-workers</p>

ANNEX 5: Gallery. Coworking spaces.



Name: Senda15

Location: Calle San Prudencio 6., Gasteiz.

Visiting date: 12/04/2019



Name: Hub Gasteiz.

Location: Calle Pintor, 13., Gasteiz

Visiting date: 12/04/2019

Annex



Name: WeLink.

Location: Paseo Landabbarri 1., Leioa.

Visiting date: 05/04/2019



Name: Strijp-CS Coworking.

Location: Torenalle 62., Eindhoven.

Visiting date: 11/07/2018



Name: Startdock.

Annex

Location: Herengracht 420, Amsterdam

Visiting date: 06/08/2018



Name: Charley's.

Location: Kerkstraat, 26, Amsterdam.

Visiting date: 06/08/2018



Name: Coworking Espiritu23

Location: Calle del Espiritu Santo, 23., Madrid.

Visiting date: 20/04/2017

Annex



Name: UtopicUS

Location: Calle de la colegiata 9., Madrid.

Visiting date: 19/04/2017



Name: CoCoworking Pamplona.

Location: San Pedro 43., Iruña

Visiting date: 23/03/2017

ANNEX 6: Planning and timeline

		2015	2016	2017	2018	2019	2020-2021
Initial framework	First revision of literature						
	Elaboration of the research project						
	1. Outside evidence-Coworking spaces						
	<i>-Fieldwork</i>						
	2. Inside evidence-first Coworking visits						
	<i>-First practical approach</i>						
Data collection and analysis	3. Design of the survey						
	4. Inside evidence <i>in situ</i>- second Coworking visits						
	<i>-Data collection</i>						
	5. Election of data measuring technique						
	6. Empirical analysis of data						
	Contrast of results from the empirical analysis with theory and literature						
	<i>-Second literature revision</i>						
Results	Final joint analysis of the data, results, and theory						
	Final redaction						

Design and elaboration of the research project

Fieldwork I: field analysis

Fieldwork II: data collection and analysis

Joint analysis of results and literature, final redaction

