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Citation for published version (APA):
Tuzcuoglu, D., Yang, D., de Vries, B., Sungur, A., & Appel-Meulenbroek, H. A. J. A. (2021). The phases of user experience during relocation to a smart office building: A qualitative case study. Journal of Environmental Psychology, 74, [101578]. https://doi.org/10.1016/j.jenvp.2021.101578

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DOI:
10.1016/j.jenvp.2021.101578

Document status and date:
Published: 01/04/2021

Document Version:
Publisher’s PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:
• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher’s website.
• The final author version and the galley proof are versions of the publication after peer review.
• The final published version features the final layout of the paper including the volume, issue and page numbers.

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The phases of user experience during relocation to a smart office building: A qualitative case study

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ARTICLE INFO

Keywords: Smart office User behaviour Satisfaction Expectation Relocation

ABSTRACT

Smart office concepts became popular in recent decades, and organisations adopt this concept with expected benefits on users. Yet, it is unclear how users experience the relocation process to a smart office environment. This study examines user experiences during such relocation by focusing on their behaviour and satisfaction. Eleven semi-structured interviews were conducted with users after relocation to a smart office building of a Dutch Municipality. The data were analysed based on grounded theory and thematic analysis. The results reveal that the process of experiencing a smart office environment consisted of four phases: pre-relocation phase, confrontational phase, progressive phase, and stabilised phase. Each participant experienced the process differently as four different trend lines related to interpreted emotional responses throughout this process. This study concludes by advocating that the understanding of user behaviour in each phase is crucial to enhance user satisfaction when moving into a smart office. The phases further highlight the importance of understanding user expectations, and the relationships between users and workplaces before and after the relocation.

1. Introduction

1.1. General

Smart (intelligent) office buildings became popular in recent decades. They are commonly defined as workplaces equipped with new technology, where interactive systems are supported by the internet, sensors and mobile devices (e.g., Brugmans, Appel-Meulenbroek, Kempterman, & Dinnissen, 2017; Buckman, Mayfield, & B.M. Beck, 2014; Niezabitowska & Winnicka-Jaslowska, 2011; Sinopoli, 2010). Smart office concepts are expected to work together with new workplace practices and characteristics, such as sharing workstations, activity-based workplaces, clean desk policy, and user applications (e.g., Appel-Meulenbroek, Janssen, & Groenen, 2011; Bodker, 2016; Brugmans et al., 2017). The main purposes of smart office design are to provide effective and efficient workplaces which respond better to work dynamics and user needs (Bodker, 2016; Mikulecky, 2012).

Numerous studies have investigated user behaviour and satisfaction in various office types, such as open-plan offices and activity-based offices (e.g., Appel-Meulenbroek, Groenen, & Janssen, 2011; Babapour, Karlsson, & Osvalder, 2018; Blok, Groenesteijn, Schelvis, & Vink, 2012; Haapakangas, Hallman, Mathiassen, & Jahnecke, 2019; Hongisto, Haapakangas, Varjo, Helenius, & Koskela, 2016; Mahes & von Hippel, 2005). However, the literature on smart offices mostly focuses on the development of technology, and yet, very little focus is given to user experiences. Particularly, the relocation to a smart office has not yet been studied in-depth from a user perspective. Therefore, this study aims to understand user experiences when relocating to a smart office building by focusing on user behaviour and satisfaction. Thus, qualitative research is conducted with the office users after relocation to Stadhuistoren, a smart office building of the Municipality of Eindhoven in the Netherlands.

1.2. Literature review

Office design is developed by various factors such as changes in user needs, the emergence of new technologies and work conceptions, and business needs (e.g., Danielsson, 2005; Niezabitowska &
The revolution of information and communication technologies (ICT) further supported the developments of workplaces in the last decades. Smart office design became popular, mostly referring to workplaces equipped with sensors, connected to the internet, and mobile devices (Brugmans et al., 2017; Ghaffarianhoseini et al., 2016; Mikulecky, 2012). From a user’s perspective, the integration of technologies in office environments is to improve work efficiency as well as user satisfaction (Clements-Croome, 2011; Ghaffarianhoseini et al., 2016). In other words, these technologies and interconnected devices are to enhance interaction between the user and certain supportive building facilities. The key idea in smart office concepts is not only to provide workplaces responsive to user needs and environment but also being effective in minimising the environmental impacts and natural resource wastes (Ghaffarianhoseini et al., 2016; Kua & Lee, 2002). Hence, the smart office building concept refers to workplaces that provide flexible, efficient, effective, and attractive use in means of the combination of spatial, organisational, and ICT based solutions.

The literature on smart offices has investigated workplaces mostly from the technological aspect, and a few studies have included user behaviour in relation to technology. For instance, Belaf, Hong, and Reith (2017) compared smart building management with intuitive human control, and claim that sensor data collecting user behaviour and presence can minimise energy use. Janeva et al. (2015) developed a method gathering occupancy data to provide effective use of shared workplaces in smart offices. They highlighted that a better understanding of user behaviour could facilitate design and facility solutions. Alberdi, Aztiria, Basarab, and Cook (2018) showed that user behavioural data in smart offices can also be used to enhance user well-being as well as supporting office management. They developed a method to predict occupational stress in early phases based on the data gathered from user behaviours in smart offices. However, the existing studies on smart offices still have little focus on user behaviour and satisfaction; in particular, it is still unclear how users experience, perceive and adopt the concept and the new environments of a smart office building. Especially, the literature is almost lacking when relocating to a smart office building.

In general, previous relocation studies have examined user experiences from different angles. Most of them have investigated user satisfaction before and after the relocation to different office types (Danielsson & Bodin, 2009; Danielsson, Bodin, Wulf, & Theorell, 2015; Hongisto et al., 2016; Kim & de Dear, 2013). For instance, studies show that user dissatisfaction appeared to be higher in open-plan offices than private offices (e.g., De Croon, Sluiter, Kuijer, & Frings-Dresen, 2005). The reasons mostly are the lack of privacy, distraction by noise (Danielsson & Bodin, 2009; Frontczak et al., 2012; Haapakangas, Hongisto, Varjo, & Lahtinen, 2018), poor air quality, inadequate thermal conditions (C. B. Danielsson & Bodin, 2009), and the amount of workspace (Charles & Veitch, 2002; Hongisto et al., 2016; Kim & de Dear, 2013). On the other hand, user satisfaction with social interaction in open offices is found higher than in private offices (Danielsson & Bodin, 2008). Studies claim that easy access to meeting places can enhance communication among users (Lee & Brand, 2005) and control over the physical workspace can improve productivity and satisfaction (e.g., Lee & Brand, 2005; McCunn, Kim, & Feraroc, 2018). Importantly, studies draw the positive causal link between satisfaction with the office environment and job performance (Oswald, Proto, & Sgori, 2015; Veitch, 2018; Veitch, Charles, Farley, & Newsham, 2007; Vischer, 2007). Therefore, the impact on user satisfaction when moving into a new office environment is important for organisations.

In order to understand the determinants of user satisfaction, numerous relocation studies have explored user behaviour in means of habituating to new office characteristics (e.g., Babapour et al., 2018; Haapakangas et al., 2018). Habituating to a new environment and adopting new behaviour can be difficult (Van Koetsveld & Kamperman, 2011), and can differ between individuals and teams (Appel-Meulenbroek et al., 2011; Babapour et al., 2018; Dinç, 2009; Scannell & Gifford, 2017a). For instance, Babapour et al. (2018) observed how users developed different behaviours (adopting, experimenting with, or rejecting) and appropriation levels for adopting a desk-sharing policy. Thus, identifying user differences can provide a better understanding of user needs for office spaces (Hoendervanger, Ernst, Albers, Mobach, & Van Yperen, 2018) and lead changes when adopting a new behaviour (Tagliaro & Carramella, 2016). A recent relocation study by Haapakangas et al. (2019) shows that the previous office type appears to influence an individual’s adoption of a new one. They observed adverse effects on social support, quantitative and emotional demands only among office users who moved from private offices to open offices. Hence, it would be significant to identify what factors can affect user experiences when moving into a smart office environment.

Finally, place attachment theory can contribute to understanding user experiences through behavioural and emotional responses when moving into a new environment (e.g., Inalhan, 2009; Inalhan & Finch, 2004; Scannell & Gifford, 2013; Scrima, Rioux, & Lorito, 2014). In general, place attachment refers to an individual’s interaction and emotional bond with a place (Low & Altman, 1992) which has implications for well-being and psychological benefits (e.g., Scannell & Gifford, 2017b). It can create resistance, emotional volatility, and stress on users when it is disrupted (de-attachment) (e.g., Inalhan & Finch, 2004; Milligan, 1998; Scannell, Cox, Fletcher, & Heykoop, 2016). Still, users are expected to adapt to new environments by developing new place attachments. Since all individuals engage in territorial behaviour (Brown, 2009), a better understanding of users’ (work)place attachment is recommended for successful relocation management (Inalhan, 2009; Inalhan & Finch, 2004). Thus, supporting users to build new connections throughout the relocation is significant (e.g., Inalhan, 2009), considering the complexity of the relocation process and expected benefits to the organisation (Donald, 1994; Rothe, Heywood, Christersson, & Sarason, 2015).

Altogether, numerous studies investigated user behaviour and satisfaction when relocating to a new office; however, there are limited studies on smart office environments. Thus, it would be important to understand how users experience a smart office environment, considering that relocation to a smart office environment can have extrinsic and intrinsic factors affecting user satisfaction and behaviour. The smart office concept, in particular, may evoke different expectations or preferences among users than those office types studied before.

2. Method
2.1. Research design and context
A qualitative study was designed to understand user experiences in detail when moving into a smart office building. It consisted of semi-structured interviews, which were conducted approximately 6–12 months after relocation to Stadhuistoren. The building was renovated as a smart office building for the Municipality of Eindhoven in 2018. The motivations for the renovation were to enhance the quality of the workplaces equipped with advanced technology and to improve user satisfaction and productivity, as well as to achieve sustainable building goals (i.e., recycled material use, energy-efficient). Thus, the new office concept was considered as ‘smart’ by the real estate management of the municipality; however, users were not informed about the meaning of the concept of ‘smart office’ and which advanced technologies were applied.

General information was available to all employees via the intranet system, and more details (e.g., exact relocation date) were given three months before the relocation. A project leader managed the relocation and communicated closely with one employee from each department. Additionally, two visiting tours to Stadhuistoren (before and after the renovation) were optionally available. The relocation from Stadskantoor (previous building) to Stadhuistoren started in August 2018 with moving 355 out of 590 employees. The rest was planned to move into two
other municipal buildings in the centre of Eindhoven. The previous building had six floors (of which four were in use for the municipality) with an overall 11,000 m². Each floor had a 2000 m² open plan and was used by several departments. Floors had a variety of adjoining rooms for single, closed and silent offices, meeting rooms in different sizes, and a pantry which was located separately from workplaces. The new office building is located in the same area as the previous one and has nine floors with an overall 5500 m². Unlike the previous building, each floor with a 450 m² open plan is dedicated to only one department, with flexible desk use, single offices, and meeting rooms in different sizes. However, employees are given the flexibility to use workspaces on other floors or in other municipal buildings based on their preferences and daily tasks. Different from the previous building, each floor has a shared area with a table and kitchen adjacent to workplaces in the new office building.

2.2. Interview design and procedure

Semi-structured interviews were designed based on the study aims, and consisted of open-ended questions with a particular focus on user experiences on two main parts:

(i) Participants’ general attitude towards the relocation idea (e.g., initial emotional response, expectations),

(ii) Participants’ experiences and appraisal of the new working environments of the smart office building (e.g., comparison with expectations; previous working patterns; development of new attachment).

Sample questions were developed based on the existing literature and the objectives of the research (Table 1). The first group of questions was formed based on the issues that may influence user satisfaction during relocation, such as place attachment theory and user expectations (e.g., Fleming, 2005; Göksennin; Inalhan & Finch, 2004; Maher & von Hippel, 2005; Scannell & Gifford, 2017a). The second group was developed based on users’ experiences in means of physical, functional, psychological needs in relation to productivity, satisfaction, or stress (e.g., Budie, Appel-Meulenbroek, Kemperman, & Wejs-Perree, 2019; Oseland, 2009; Preiser & Vischer, 2005). All sample questions were summarised with keywords and clustered based on their contents to support the interview trajectory. As recommended by Camargo-Borges (2019), the aim was to pay attention to the rhythm of the conversation to allow new topics to emerge during the interview. During the interview, participants knew the research was about the smart office; however, no description of smart concepts was given to the participants to avoid influencing their opinions and perceptions.

The first author conducted interviews with eleven participants within the decision of the saturation point of the data gathered, between April 02, 2019 and May 28, 2019. Participants were invited through prospective participants list provided by building management and through other participant’s referrals during the study. All interviews were carried out face to face and lasted on average, 45 min.

After the interview, participants were asked to fill out a short questionnaire, consisting of socio-demographic information including gender, age, job, department, time spent in the current and previous office, and work type (Table 2). All participants moved into the new office building and had been experiencing the new office ranging from three months to a year. At the time of the study, four floors were occupied, and at least one participant represented each floor. Different age groups were represented; the median age was 45 years old (youngest = 28, oldest = 61; SD = 10.4 years).

2.3. Coding procedure and analysis

Interviews were anonymised and transcribed verbatim by using the transcription software Amberscript, and manually edited by going through all transcriptions to correct necessary parts (i.e., special names). The analytical software ATLAS. ti® (Scientific Software Development GmbH, version 8) was used to code, sort, and categorise the key themes. The data were analysed based on combining approaches from the grounded theory method (Glaser & Strauss, 1967) and thematic analysis (Bryman, 2012; Howitt, 2010; Ryan & Bernard, 2003). The analysis was used to make an overview of the variety of behaviour and attitudes that may link to user satisfaction based upon the participants’ experiences in the smart office building. The first author examined the data individually considering the intra-coder reliability, as Bryman (2012) recommended. Initially, the first readings of all transcriptions were undertaken to identify obvious themes and highlight the text sequences relevant to the objectives of this study. Then, all transcripts were re-read in detail multiple times for familiarisation and identification of the main themes. Multiple coding cycles were then completed, as suggested by Creswell (2014), Hennink, Hutter, & Bailey, 2011, and Saldana (2010). It involved progressively categorising codes into concepts and emergent themes, which led to generating the results of this research.

Table 1

| Sample questions | Relevant group |
|------------------|----------------|
| 1. How was your first week/day at the office? | ii |
| 2. What are the things you like most/least in the new office? | ii |
| 3. How is your social interaction with your colleagues in the new office? | ii |
| 4. How did you feel when you were informed that you were moving to a new office? | i |
| 5. What kind of expectations/opinions you had before you moved to the new office? | i |
| 6. Do you miss any specific things from the previous office? | i, ii |
| 7. How do you find your working efficiency/motivation/concentration in the new office? | ii |
| 8. What do you think about the physical arrangements in the new office? | ii |
| 9. Have you made any changes to the new office environment? | ii |
| 10. How is your experience with temperature/noise/lights in the new office? | ii |
| 11. What would you like to change in this office? | i, ii |
| 12. Would you describe how you choose your workstation? | ii |
| 13. How you describe your lunchtime/coffee breaks? | ii |
| 14. How do you find this office considering a smart office concept? | ii |

Table 2

| The socio-demographic profile of participants (N = 11). |
|-----------------------------------------------|
| Demographics | Frequency | % |
| Sex | | |
| Female | 4 | 36.4 |
| Male | 7 | 63.6 |
| Location & Department | | |
| 3rd floor (Communication) | 3 | 27.3 |
| 6th floor (Call Center) | 2 | 18.2 |
| 7th floor (Control) | 5 | 45.5 |
| 9th floor (Security) | 1 | 9.1 |
| Age | | |
| 25–34 | 2 | 18.2 |
| 35–44 | 3 | 27.3 |
| 45–54 | 4 | 36.4 |
| 55–64 | 2 | 18.2 |
| Education | | |
| Bachelor | 9 | 81.8 |
| Master | 1 | 9.1 |
| PhD | 1 | 9.1 |
| Time Experience in the new office | | |
| 3 months | 1 | 9.1 |
| 3-6 months | 2 | 18.2 |
| 6-12 months | 8 | 72.7 |
2.4. Ethics procedure

Significant considerations were made for confidentiality and privacy of the collected data. Participants received a participant information sheet and consent form and were given the opportunity to withdraw at any point of the study without giving a reason, assuring that their data will be retained in such a case. All interviews were conducted and recorded after receiving a signed informed consent form. Interview data were anonymised during the transcription, and the anonymity of the participants was ensured using randomly generated identification numbers.

3. Results

The interview data analysis revealed that there is a process of experiencing a smart office environment that contributes to the understanding of user behaviour and satisfaction (Fig. 1). The process consisted of four phases, which emerged during the coding procedure:

- **The pre-relocation phase** lasted from the relocation announcement until the first day in the new office. Participants developed expectations for their future office environment during this phase.
- **The confrontational phase** lasted from the first days in the new office until a participant took any interventional action or behaviour (e.g., make a complaint about an issue, changing something in the office). It consisted of preliminary user experiences with an initial appraisal of the new workplace.
- **The progressive phase** lasted from the time of user interventions until they had a stabilised (ultimate) workplace appraisal.
- **The stabilised phase** refers to the time when a participant had less or no interests to make interventions in the new office and a stabilised workplace appraisal.

Each participant experienced the process differently based on various extrinsic and intrinsic components throughout the process (e.g., the day of the relocation announcement). Their emotional responses within each phase were interpreted by going through the interview data several times. Emotional responses were identified as positive, neutral, and negative. Throughout the process, four different emotional trends were recognised among participants (Fig. 1, below). Trend 1 represents the group of participants who appeared to have higher excitement and motivation for the relocation; however, they seemed to have negative experiences in the new office. Trend 2 represents the group who seemed to have negative emotional responses (e.g., confusion, anxiety) when they were first informed about the relocation. However, their emotional response altered positively with the additional information they received before the relocation, and they seemed to be content with the new office environment. Trend 3 and 4 represents the groups who seemed to have neutral emotional and behavioural responses to their office environment in general. The group of Trend 3 had relatively more positive opinions in the pre-relocation phase compared to Trend 4. The interrelation between the phases and relevant codes from the interview analysis are discussed in the following sections.

3.1. Pre-relocation phase

The pre-relocation phase lasted from the time of the relocation announcement until the relocation to the new office. During this phase, participants seemed to develop expectations for their future office environment. The components of their attitude are identified and categorised as ‘reflective indicators’ and ‘motivational factors’ (Table 3).

Participants were specifically asked to outline their initial impressions when they were first told about the relocation. The responses to this part revealed ‘reflective indicators’ as their general attitude towards the relocation idea, including their initial feelings and thoughts. The majority of the participants were positive, while some expressed neutral opinions by noting relocation or alteration in their workplace was not an important issue for them. Some stated that they were not happy when they learned about the relocation, because it was not clear to them what their future office would look like. However, these participants seemed to positively alter their emotional responses towards relocation idea as they received additional information (e.g., the floor they will move). These positive alterations during the pre-relocation phase are also discussed in the previous section, as shown in Trend 2, Fig. 1.

![Fig. 1. The process of experiencing a smart office environment (above), and the trends of interpreted emotional responses (below).](image-url)
Table 3
Components of the attitude towards the relocation and the development of the expectations during Pre-location process.

| Main Categories       | Subcategories     | Codes (components) | Amount |
|-----------------------|-------------------|--------------------|--------|
| Reflective indicators | Emotional responses| Positive (e.g., excitement, curiosity) | 6      |
|                       |                   | Neutral            | 3      |
|                       |                   | Negative (e.g., confusion, anxiety) | 2      |
| Motivational factors  | Individual-level  | Positive alterations | 2      |
|                       |                   | Satisfaction level with the previous office (and place attachment) | 2      |
|                       |                   | Past work-type, office experiences | 4      |
|                       |                   | Acquaintance with various (smart) office types | 2      |
|                       |                   | Personality        | 4      |
|                       |                   | Clarity of the announcement/information about future office | 3      |
|                       |                   | Building location  | 2      |
|                       |                   | Participation of users in decision-making | 2      |

Amount = number of participants that mentioned the relevant code at least once.

‘Motivational factors’ represent the factors contributing to the participants’ attitude and their expectations for their future smart office environment. For instance, on an individual level, the satisfaction level with the previous office (and place attachment) seemed to create an expectation that the new office could provide at least the similar comfort level they had in the previous one. Meanwhile, the participants who were dissatisfied with their previous office environment appeared to be more excited when they learnt about the relocation. For them, this announcement may have promised a positive change and improvement. Some participants who had regular meetings in different buildings appeared to have neutral opinions towards the relocation announcement. In addition, being acquainted with the various office types and smart office examples seemed to shape expectations for the future office environment distinctively. This part is discussed further in Section 3.2.

On an organisational level, the activities and decisions by building management were identified as they contributed to participants’ experiences. For instance, the participants who had unclear information about their future office seemed to be stressed and confused during that period. The need for precise and detailed information about the future office seemed to influence their emotional responses and expectations and enable them to be prepared for future office use. The location of the new office building seemed to be significant for participants since some noted their contentment when they learnt the new office was also located in the same area, as they were already happy with the location. Being involved in the decision-making process seemed to have positive impacts on participants. For instance, one participant noted that he was happy because they worked closely with the responsible person and discussed their needs in detail, and he and his team were eventually happy since their requests and opinions were taken into account. On the contrary, another participant noted dissatisfaction because she felt she was not involved in the decision process and was not asked what her ideal workspace would look like.

3.2. Confrontational phase

The confrontational phase represents the time just after the relocation, where participants had preliminary experiences from the first day in the smart office. Participants were asked to recall their experiences on the first day or week in the new office environment. Almost all of them described these experiences with salient words such as chaotic, difficult, confusing, complicated, and crowded. These emotional responses were likely to be related to their explorational behaviours, which can also be an indication of developing new place attachments in the new office environment. Their responses also consisted of comparisons with the expectations they developed before the relocation. The codes related to this phase were grouped as ‘exploring workplace’ and ‘initial appraisal’ (Table 4).

Participants seemed to have exploratory behaviours when they first moved into the new office. Such behaviours were about seeking a convenient workstation, basic facilities (e.g., coffee machine, printer), spaces for phone calls or one-to-one meetings, available meeting rooms as well as exploring the functions of facilities. Besides, participants sought specific building facilities. For instance, one participant noted her disappointment when she could not find the expected office features that she was informed about before the relocation. Participants noted not only their own experiences but also remarks from their colleagues. In particular, participants sought an indication of the smart features of the office environment. They seemed confused when they could not associate the meaning of smart office with an office feature. Their confusion even appeared to create negative emotions, such as anger or anxiety. One was confused about the meaning of smart office, whether the concept was only related to the technical level but not to users. This confusion most probably indicates a need for a more precise explanation of the meaning of smart office concept.

As a result of preliminary experiences, participants appeared to have an initial workplace appraisal. These appraisals were based on comparisons, distinctive characteristics of the new workplace and the problems they faced. The comparisons were related to participants’ past experiences and acquaintance with different (and smart) office examples. For instance, one participant expressed his excitement in the first week and emphasised that he found the new office modern, nicer with the improved quality, which was different from the previous office. The

Table 4
Components of attitude and behaviour (and preliminary appraisal of the new workplace) during Confrontational phase.

| Main Categories       | Subcategories     | Codes (components) | Amount |
|-----------------------|-------------------|--------------------|--------|
| Exploring workplace   | Facility-based    | Convenient workstation | 6      |
|                       |                   | Basic facilities (e.g., coffee machine, printer) | 4      |
|                       |                   | Space for phone calls/private talks (one-to-one meetings) | 1      |
|                       |                   | Available meeting rooms | 1      |
|                       |                   | Functions of facilities (e.g., if windows operable) | 1      |
| Information-based     | Expected building facilities | 1     |
|                       | Remarks from colleagues | 2      |
|                       | Indications and definitions of smartness | 3      |
| Initial appraisal     | Comparisons       | Previous office environment/previous condition of current building | 3      |
|                       |                   | Previous working habits | 2      |
|                       |                   | Acquaintance with various (and smart) office types | 2      |
|                       |                   | Spaciousness | 2      |
| Distinctive characteristics | New, modern appearance | 1      |
|                       |                   | Scenery | 2      |
|                       |                   | Plants | 1      |
| Problem-based         | Climate (e.g., chilly temperature, draught) | 3      |
|                       | Noise | 3      |
|                       | Concentration | 2      |
|                       | Personal Space (proximity to colleagues) | 3      |
|                       | Elevators | 5      |

Amount = number of participants that mentioned the relevant code at least once. * = if the participant had experienced the building before the renovation.
participants who seemed to have more acquaintances with various (and smart) office examples evaluated their new workplace compared to those experiences. The participants, who had experienced the office building before the renovation, compared the new workplaces with those experiences and had positive remarks about the improved quality of the office building.

The distinctive characteristics of the new working environment noted by the participants seemed to create positive workplace appraisals. Such characteristics were noted as spaciousness, freshness and modern appearance, impressive scenery, and plants. On the contrary, confronting problems appeared to create negative appraisals. Several participants noted their discomfort with chilly indoor temperatures during the summer. Besides, some noted they felt their personal space and privacy significantly decreased in the new office. Some had concentration problems caused by the noise around them. A few participants had concerns about the future use of the elevators (i.e., long waiting time), whether the use could worsen when all the floors are occupied.

### 3.3. Progressive phase

The progressive phase refers to the time when participants either took actions or adopted a behaviour (named as interventions) after having significant experience concerning repeated events or problems in the new office. During this phase, they further experienced the office environment and had expectations for the problems to be solved. The components of participants’ attitude and behaviour were identified and grouped as: ‘impulsive factors’, ‘interventions’, and ‘further appraisal’ (Table 5).

The impulsive factors contributed to participants’ further experiences were consisted of individual and cultural characteristics, environmental comfort and social interaction. The individual and cultural characteristics (and preferences) seemed to influence participants’ experiences differently. For instance, one participant noted that he was content with the temperature level while the others were not. Similarly, personality and past-working patterns appeared to affect their experiences distinctively. Team motivation and support seemed significant when an interventional action needed to be taken in the workplace. Participants noted negative experiences with environmental comfort, including noise, temperature (chilly during summer), lights, draught (from ventilators), acoustical and air quality problem in small meeting rooms and closed offices. Most of the participants had noted the noise as being distracting. Several causes for the noise noted were colleagues, ventilation, jacket holder (when it was in use) or the construction works outside (a temporary situation).

Most participants noticed a decrease in their social interaction in the new office. Some experienced less spontaneity of seeing colleagues, and some had difficulty knowing whether their colleagues were in the office. The layout plan of the new office seemed to decrease the visual and physical interaction as the elevators located in the middle of the floor-plan created two separate workplaces. Unlike the previous office, only one floor was dedicated to one department in the new office, which can also cause less interaction among other departments. Most participants noted the importance of having non-work-related conversations. Since the social area was located adjacent to the workplaces, they tended to keep the conversations shorter to avoid disturbing their colleagues, which appeared to be another reason for the decline in interaction. Because of that, most of them emphasised the need for a place where they could have spontaneous and private conversations without disturbing others. Additionally, the expectations they developed in the pre-relocation phase seemed not only related to the physical office environment but also the social environment. One participant noted her disappointment with the social interaction because she expected to have more communication among her team in the new office. She emphasised that if she had known the interaction would be less in the new office, she would not have been as excited about the relocation idea at first site.

| Table 5 Components of attitude and behaviour during the Progressive phase. |
|---------------------------------|---------------------------------|-------------------------------|
| **Main Categories**               | **Subcategories**               | **Codes (components)** |
| Impulsive factors (further exploration) | Individual/ cultural characteristics | Individual comfort factors |
| Environment comfort                | Noise (colleagues, ventilation, jacket holder, outside) | Temperature (chilly during summer) |
| Social interaction                | Spontaneous meetings            | Easiness to find colleagues, Proximity to relative departments, Work-related conversations |
| Interventions Actions             | Communication with management (e.g., complaints) | Physical interventions (e.g., hanging umbrella, bringing own jacket holder) |
| Behavioural adaptation            | Team decisions                  | Temporary individual solutions (e.g., wear a jacket, changing the desk) |
| Further appraisal Building         | Solved/unsolved problems        | Prompt and convincing response from management |
| Management                        | Balanced isolated & social interactional workspaces | Innovative (and smart) aspects |
| Motivation & concentration        | Inspirational characteristics (e.g., aesthetical, playfulfulness) |
| Information-based Other           | Being informed about the in-door environment | Feeling safe |

Amount = number of participants that mentioned the relevant code at least once.

Interventions represent participants’ behavioural responses to the new office environment, such as taking actions or adopting a behaviour. Taking actions consisted of making a complaint about a problem in the new office and implementing a physical change to solve a problem. For example, some participants, who experienced a draught problem, hung an umbrella or placed cardboard as a temporary solution to minimise the problem until they received a permanent solution. Some also took temporary individual actions, such as changing workstation when having issues with the lights (either too bright or too dark) or temperature (feeling cold or draught from ventilation). On the other hand, some participants adopted new behaviours to work more efficiently, such as changing their schedule or shifting tasks to late afternoon to avoid distraction or leaving the office early to continue to work on tasks that
require concentration. Participants also adjusted their behaviour on the team level. For instance, one department agreed not to reserve small meeting rooms to have the flexibility to use them anytime they want, resembling a similar arrangement as in the previous office. Some participants noted that they started to keep the meetings shorter in the small meeting rooms since they felt discomfort with the air quality. Such behavioural adaptations (on an individual or team level) seemed to have the potential to evolve as habits throughout this phase.

Participants’ workplace appraisals based on their further experiences during this phase seemed to contribute to their satisfaction. The problems, which were solved, appeared to create a positive appraisal, while the unsolved ones seemed to cause apprehension. The responses and actions taken by the building management appeared to contribute to participants’ satisfaction and workplace appraisals. For instance, the participants, who had acoustical problem in small meeting rooms, seemed to be content since the building management solved the problem by implementing acoustic tiles. On the other hand, some participants appeared to be discontent since they had not received a prompt and convincing response to their complaints.

Participants noted that they sought innovative (and smart) and inspirational office features. Some participants felt disappointment when they could not find these features in the new office. A few participants noted that the office environment was ‘boring’ and ‘uninspiring’ because the office was lacking aesthetical, colourful or playful office features. The presence of plants appeared to create a positive appraisal (i.e., sigh of relief). One participant noted he would even prefer to have more plants, although he was already content with the existing amount. Some participants wanted to know about real-time climate conditions (e.g., temperature and humidity), enabling them to check whether the temperature was colder than usual when they felt chilly indoor temperature. Some participants had concerns as they were feeling unsafe with the fire escape plan and the security of the building, which seemed to be a temporary state due to the ongoing construction outside of the building.

3.4. Stabilised phase

The stabilised phase refers to the time when participants had lasting opinions about their new workplace. During this phase, participants seemed to have less or no willingness to intervene in something in the office environment and had lower expectations for the relevant problems to be solved. The reflective attitude and behaviours were identified and grouped as positive, negative and neutral (Table 6), which appeared to contribute to their satisfaction, and likely to remain the same unless there is a remarkable change in their relationship with the office environment (e.g., physical change in the office environment).

Feeling motivated and waiting for potential solutions for the relevant problems appeared as positive workplace appraisals. However, several participants seemed to have negative appraisals since they noted disappointment as they realised they had been working less efficiently and spending less time at the new office. One participant noted that he started to have headaches because of the noise in the new office. Furthermore, perceiving the office environment as boring or uninspiring seemed to create negative appraisal as it demotivated some participants. Also, several participants seemed to be stressed as they had concerns about the future use of the office facilities (e.g., elevator, workstations) when all floors would be occupied. One participant noted her disappointment as the office did not meet her expectations, and she further discredited the potentials of smart office technology and concepts. Most probably to cope with the problems, some participants developed an attitude for acceptance by seeking persuasive explanations to justify the issues and getting used to new circumstances.

4. Discussion

This case study aimed to provide an understanding of user experiences when relocating to a smart office building by focusing on user behaviour and satisfaction. The results revealed the four phases of experiencing a smart office environment from a user perspective, showing the importance to guide and support users through all these phases of a relocation process, where each phase might require a different approach. Environmental psychologists, in practice and in research, can use and further develop these four phases to increase insights into how users develop their attitudinal and behavioural response to the smart working environment.

The findings show that relocation impacts users, including their reactions to change, the changes in productivity, satisfaction, and organisational dynamics, as in line with the conceptual framework proposed by Christensen and Rothe (2012). This study supports the view on the significance of relocation management on user adoption of the new workplace, as suggested by Inalhan and Finch (2004). The findings further claim that receiving a prompt and persuasive response from the building (or relocation) management can improve user adoption and enhance satisfaction. The findings show that users can have difficulties when they first move into the new office environment, as shown in other studies (Inalhan & Finch, 2004; Milligan, 1998). These difficulties can be about developing a new workplace attachment as well as habituating to alterations, as suggested by others (e.g., Babapour et al., 2018; Blok et al., 2012). The findings claim that the previous work environment and working habits can contribute to user experiences in the new office, as in line with the results by Haapakangas et al. (2019). Therefore, this study has shown that the relocation to a smart office building and appropriation process of this type of office environment is similar to the other office types. Although smart office concepts indicate ‘smarter’ workplaces equipped with technology and thus better support its users, they appear to encounter the same appropriation issues and dissatisfiers (e.g. noise) as other (non-smart) office types.

The findings indicate that individuals’ level of acquaintance with various office types and smart office concepts can shape their expectations for the future smart workplace. In particular, users can get confused when they do not find smart features based on their expectations, which seems to cause stress. Thus, the findings strongly suggest that providing a clear understanding of the future office and a better definition of the smart office concept is important for better habituation of a new (smart) workplace. This study claims that distinctive office features (e.g., colourful, aesthetic, innovative office settings and decorations) equipped with smart technology can enhance user motivation. The findings further suggest that smart office applications should provide real-time information of the office environment (i.e., indoor temperature, available meeting rooms, the presence of a colleague), which can improve the use of workplaces and user satisfaction. The findings also support the importance of providing a variety of workplaces in the office environment, as suggested by other researchers for other (non-smart) office types (Appel-Meulenbroek et al., 2011; Babapour et al.,

Table 6

| Main Categories | Subcategories | Codes (components) | Amount |
|-----------------|---------------|--------------------|--------|
| **Positive**    | Feeling motivated | 2                  |        |
|                  | Waiting for potential solutions | 1 |        |
| **Negative**    | Working less efficient | 3 |        |
|                  | Spending less time at the office | 3 |        |
|                  | Health problems (e.g. regular headaches) | 1 |        |
|                  | Not inspired/boredom/not motivated | 2 |        |
| **Neutral**     | Worry about future use | 4 |        |
|                  | Discredited smart technology | 1 |        |
|                  | Trying to get used to | 3 |        |
|                  | Seeking persuasive explanations | 5 |        |

Amount = number of participants that mentioned the relevant code at least once.
4.1. Limitations and future studies

The data in this study should be considered in the context of the aims of qualitative research, including a small sample of office users (n = 11) from one office building. Therefore, further research is needed to examine the representativity of the users’ perspectives and experiences found in this study.

As participants recalled their memories months after the relevant experiences, the reported perspectives could be subject to bias, such as fading affect bias (Gibbons, Lee, & Walker, 2011). Thus, future studies can measure both immediately after relocation and at a later point to study appropriation behavioural processes. Even though the intra-coder reliability was considered during the coding process, there is still a possibility of missed relevant themes. Some participants were recruited through other participant’s referrals. Thus, there is a possibility some parts of this sample may be more likely to share similar attitudes rather than a random sample. It must be noted that all floors were not occupied at the time of this study, and all installations were not fully operational when users relocated to the building. This could have led to deficient data regarding the expected user and technology interaction.

The duration of four phases revealed in this research was not evaluated fully because this information only emerged during the analysis. Even though this study highlights the importance of the information received about the future office before the relocation, it was not investigated whether users received a different amount of information (i.e., based on the level of authority) and how this could influence their experience. Future studies can investigate the four phases more in detail, which can eventually lead to guidelines for a successful relocation to a (smart) office. Although the aim of this study was not the definition of the smart office concept, the findings indicate that the definition of smart office should be further elaborated from a user perspective, which can eventually lead to guidelines for a successful relocation to a (smart) office.

5. Conclusion

Relocation to a smart office environment can have a variety of effects on users. The four phases of experiencing a smart office environment revealed in this study provide a better understanding of user experiences concerning user behaviour and satisfaction when moving into a smart office building. In particular, smart office concepts may evoke different meanings for each user as well as shaping different expectations. Thus, this study recommends that users should be provided with a definition of a smart concept, including particular smart office features before relocating to a smart office building. This study suggests a better understanding of the relationships between users and workplaces before and after the relocation by highlighting workplace attachment, and shows the relevance of emotional and behavioural responses during the relocation, and the relationship between expectations, emergent needs, and satisfaction when moving into a smart office building. Overall, this study provides new insights for understanding user experience during the relocation process and user perception of the smart office concept. Organisations, relocation managers, environmental psychologists, and designers can use the results of this study to develop guidelines for a successful relocation to a (smart) office.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

Acknowledgements

We thank all the participants for agreeing to be interviewed in this study. We also thank Michel Oomen, Joyce Vercoelen, and Garry Whitrick from the Municipality of Eindhoven, and Marc Horsten from IMPULS B.V. for their assistance in data collection. Thanks to Ruud Bosch from the Department of Human Geography and Planning, Utrecht University for his invaluable inputs for the design of interview guideline. Thanks to Yagmur Amanvermez from the Faculty of Behavioural and Movement Sciences, Vrije Universiteit Amsterdam for her invaluable advice for data analysis.

This work is part of the VerDuS program Smart Urban Regions of the Future with project number 438.18.153, which is (co)financed by the Dutch Research Council. The part of the study was also supported by the YUDAP 2019, Turkey Council of Higher Education.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2021.101578.

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