

# Discrepancies between intended and actual use in Activity-based Flexible Offices - A literature review

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*The purpose of this paper is to provide an overview of the literature addressing A-FOs, with a focus on use patterns and work conditions. The findings show that A-FOs are not always used as intended: territorial behaviours and nesting habits were recurrent in several studies. In this regard, understanding employees' job characteristics is essential for optimal configuration of A-FOs, e.g. the type, attributes and number of workspaces. Additionally, employees' needs, spatial factors and implementation processes require special attention in order to provide supportive office environments.*

*Keywords. A-FO, Activity-Based Flexible Offices, use patterns, work conditions, literature review, office design, office layout, flexible workspace.*

## 1. Introduction

Activity-based Flexible Offices (A-FOs) also known as Activity-based Flexible Working (A-FW) has its origin at the beginning of the 90's and gained great popularity over time (Lanks 2014; Parker, 2016; Van der Voordt, 2004). A-FO concept consists on a shared working space designed to provide the workers with a range of heterogeneous office sceneries, where furniture settings, design, architecture, building technologies, etc., are optimised to support specific activities in the best possible way at each moment (Appel-Meulenbroek, 2015; Wohlers & Hertel, 2016). Thus, activity-based flexible workers are encouraged to switch among workstations to find the most convenient setting for them within the office, or even work remotely from external locations like home (Vos & Van der Voordt, 2001).

Benefits of A-FOs such as occupancy-cost savings are still in discussion. On the one hand, the possibility of increasing the workstation-employee ratio over 1:1, represents an opportunity to reduce the total area occupied and consequently the allocation of resources needed (De Bruyne & Beijer, 2015). On the other hand, such criteria can limit the ability of office users to choose a suitable work setting type simultaneously (ibid.). Implementation of A-FOs impacts organisations on different levels such as leadership, management, work modes and communication technology (De Paoli et al., 2013) and pose diverse challenges to

their users such as privacy and communication trade-offs (De Been & Beijer, 2014). Thus, understanding case-specific and contextual aspects is of crucial importance.

A large number of studies on office buildings address different aspects of the work experience separately e.g. optimisation of productivity (Agha-Hosseini, 2013), dimensions of comfort such as temperature, air quality, lighting, acoustics, etc. (Newsham et al., 2013), ergonomics (Whysall et al., 2006), different aspects of satisfaction (Kim and de Dear, 2013), psychosocial aspects of work (Herbig et al., 2015) and more recently emphasizing the connections with environmental impact and costs (Singh et al., 2011). Relevant literature reviews (De Croon et al., 2005; Wholers & Hertel, 2016) regarding the effects of diverse office concepts -including A-FO- on employees, have provided significant findings. However, the magnitude of those effects differ dramatically among cases, impacting the acceptance of A-FOs among the employees and the extent to which relocation goals are achieved (Brunia et al., 2016). This reveals that key aspects of the conceptualisation and exploitation of the workspace might have been neglected in some cases.

The aim of this paper is to provide an overview about A-FO case studies, focusing on employees' use patterns of the workspaces and their work conditions, in order to make the gap between concept and implementation of A-FOs visible.

## 2. Method

The procedure for the search and selection of relevant material began with the exploration of two databases: Scopus and Web of Science. The inclusion criteria was case studies about A-FOs in relation to their implementation, usage and employees' work conditions. Given the relatively recent expansion of this office typology, the timeframe determined for the searches was 2000 – 2016.

Further criteria for filtering at the first stage was: a) Fields of search: title, keywords and abstract; b) Type of documents: articles and proceeding papers; c) Areas of interest: acoustics, architecture, business, business economics, economics, econometrics and finance, engineering, engineering industrial, environmental studies, environmental science, ergonomics, health care sciences services, health professions, industrial relation labour, management, management and accounting, physiology, planning development, psychology, psychology experimental, psychology educational, psychology clinical, psychology applied, public environmental occupational health, sociology, social sciences interdisciplinary, social issues. Moreover, only studies with first hand info were counted for a second stage, meaning that literature reviews were excluded from results. Then, the following list of keywords and search commands were used for the search:

- One search using OR and one using ""': Activity-Based Office, Activity-Based Working, Activity-Based Work, Activity-Based Flexible Office, Activity-related office, Lean office, Desk sharing, Hot desking, Desk hoteling, Office hoteling, Alternative workplace arrangements, Combi office, Cocoon office, Clean desk.

- One search combining AND and “”: “Activity based”  $\wedge$ <sup>1</sup> office, “Activity based”  $\wedge$  workplace, “Work patterns”  $\wedge$  flexible, “Work patterns”  $\wedge$  office, “Activity patterns”  $\wedge$  office, “new workplace”<sup>2</sup>  $\wedge$  design, “new workplace”  $\wedge$  office, “new office”  $\wedge$  design, “new office”  $\wedge$  concept, “flexible working”  $\wedge$  design.
- One search using “”: Flexible workplace, Flexible workspace, Flexible work design, Flexible office, Flexible working, Shared office, Innovative office, New workplaces, Office sharing, NWoW, NWW, New ways of working.

After the first round of search, 67 papers were identified and screened further. The papers that did not meet the inclusion criteria were discarded, e.g. literature focusing teleworking or flexible work hours. In addition, a few studies that addressed overall satisfaction, work satisfaction, satisfaction with organisation, with remote working and services were also excluded as they address aspects beyond physical boundaries of the A-FOs. As a result, 19 papers were selected for the results. A second round of search was carried out by reviewing the references of the identified 19 papers. After this iteration, 11 papers were identified that fulfilled the inclusion criteria. In total, 30 papers were reviewed for the results.

### 3. Results

Some of the identified papers highlight aspects regarding office employees’ exploitation of workspaces in A-FOs, specifically related to (i) territoriality and (ii) switching patterns among non-assigned workstations. Other studies address employees’ perceptions and experiences when relocating to an A-FO, reporting both short and long-term consequences mainly regarding (iii) health and wellbeing, (iv) productivity, communication and concentration, (v) privacy and (vi) facilities.

#### 3.1. Territoriality

A total of nine studies were identified that report specifically on territorial behaviours at A-FO. For example, Brunia & Gosselnik (2009) present a study on the extent of personalisation in A-FOs and report on the permanency of artefacts used by the employees to personalise and mark a workspace that they returned to. De Been et al. (2015) mention that in 11 out of 20 cases studies instances of claiming workstations were identified. Elsbach (2003) reports on nesting behaviours among employees as a strategy to cope with personal and group identity threats of desk-sharing policies. Brunia et al. (2016) report on four cases in which two lacked vacant workplaces leading to claiming behaviours of employees and managers, further reducing the availability of certain workspaces –mainly the enclosed ones-. Tagliaro et al. (2016) report that 25% of the desks were permanently marked by artefacts and associate this behaviour with certain types of work functions e.g. law and procurement. Other units were associated with unmarked workstations e.g. business, sales and marketing units (ibid.). Appel-Meulenbroek et al. (2011) found that 28% of users claimed workstations with personal belongings, while 35% avoided certain workstations that were regularly used by

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<sup>1</sup> Symbol for the operator AND.

<sup>2</sup> Searches with asterisk at the end of the word include the written word with other suffixes as well e.g. plurals.

another colleague. Hirst et al. (2011) report that half of the available workstations were claimed by either arriving early and/ or leaving belongings behind that denote their roles, which gave rise to socio-spatial habitualisations and the establishment of classes for settlers and mobile workers. Van der Voordt (2004) also mentions that some users arrive earlier or leave belongings behind to claim a workstation in consecutive days. Finally, in a case study by Gorgevsky et al. (2010), workstations were not claimed with belongings, because the office was fully open and any of the numerous visitors could easily steal them.

### **3.2. Switching patterns**

A total of 12 studies present different patterns regarding the use of workspaces: from highly flexible to highly fixed. Highly flexible use patterns were described in two studies. Meijer et al. (2009) report that 86% of the users switched workstations and used several types of workstations per week. The authors argue that the extensive participatory approach in the implementation process, may explain the high rate of compliance to the new office (ibid.). Blok et al. (2009) report on a case in which the employees use on average 2.7 different workstations per day, before and after the relocation, so the A-FO had no impact besides the wider variety of settings. However, the latter study does not mention if users return to the same workstations.

Mixed results regarding use patterns are reported at five studies. Hirst et al. (2011) report on a case where the ratio was 10 employees per 6.5 desks, the office was intensively used and at least half of the desks were settled. This implies that the other half were used by users who potentially switched workstations (ibid.). Appel-Meulenbroek et al. (2011) report that 46% use 1-2 types of workstations in an average week and 68% never switch workstations during a workday. The motives behind users' choices of workstations were: personal preference, privacy, ambiance, comfort, ergonomics, social interactions and technical resources (ibid.). Gorgevsky et al. (2010), report that 45% of respondents did not switch workstations throughout the workday but present no data about the choice of workstations in consecutive days. Block et al. (2012) report that the relocation did not change significantly flexible work behaviour within the office. 40% of the working time was spent at the flexible layout, but beyond the share of hours of occupancy per workstation type, no data on switching patterns is presented (ibid.). Tagliaro et al. (2016) report that 78% of respondents use open flexible spaces, and 13% specifically reported to switch workstations. Whether the majority switch workstations in open spaces is however not mentioned.

Finally, highly fixed use patterns in A-FOs were reported in five studies. In a case study by Qu et al. (2010), 70% of the users chose the same workstations and 20% of the users who switched workstations chose the same or adjacent areas. The motives behind these patterns were to: (i) skip extra work i.e. setting, wrapping up, and moving things around, and (ii) proximity to particular colleagues or units (ibid.). Millward et al. (2007) also identified proximity to colleagues as a main reason to choose a workstation, what derived in the creation of comfort areas for regular interaction. Ekstrand et al. (2016) show that employees changed workstation for specific tasks -e.g. meet a customer- and reported great

autonomy by that, but they kept using the same desk in the back office afterwards. Similarly, Maier et al. (2010) found that users return to the same workstations if they are not scheduled to work in teams in a specific zone. Lastly, Hoendervanger et al. (2016) found that 70% of users do not or rarely switch workstations -25% never, 24% less than once a week, 21% 1-2 times a week-, although users with heterogeneous work activities were more likely to switch workstations frequently. They also found that, proximity to colleagues and teams, and difficulties with moving stuff were leading motives for not switching workstations, while finding a more suitable workspace was a main motive for those who regularly switch (ibid.). These users also reported higher satisfaction with the A-FO in the latter study.

### **3.3. Health & Wellbeing**

A total of six papers address wellbeing and/or health-related questions in A-FOs. For example, Engelen et al. (2016) report an overall reduction of office users' sedentary time - +3% walking, +11% standing time and -14% sitting time- after the implementation of a flexible work environment. Such results are consistent with the increase in general health observed by Meijer et al. (2009) among office users with non-assigned desks. However, Kim et al. (2016) report that the most significant predictor of a negative impact on health was not the desk ownership itself, but the lack of space for breaks and the comfort of furniture. On the other hand, Vink et al. (2012) report that the office relocation barely influenced employees' health and comfort. This is aligned with the office comparison from Seddigh et al. (2014) where no significant changes on general health were found between flex offices and other types. The same study conclude that the employees at flex offices report similar levels of cognitive stress to employees at small and medium open-plan offices, and the situation worsens as more people share the same space. Lastly, Nijp et al. (2016) suggest that the implementation of AFOs may not lead to changes on health.

### **3.4. Productivity, Communication & Concentration**

A total of 20 papers present results about productivity, communication and concentration at A-FOs. The results regarding these 3 topics are usually reported in direct connection to each other, so that the influence of each on the others is clearly established. They are therefore grouped under the same heading. For example, studies by Blok et al. (2009), De Been et al. (2015), Gorgievski et al. (2010), and Vink et al. (2012) among several others in this review, suggest that A-FOs lead to improvements in a diversity of aspects such as interaction -especially in informal contexts-, collaboration, knowledge exchange and accessibility -both physical and digital- between office users and departments. However, Brunberg (2000) highlight that employees whose exposure exceed the real needs for communication, are led to distraction and lower effectiveness.

Seddigh et al. (2014) found cell offices -single and shared- preferable over A-FO for tasks demanding high concentration. Been & Beijer (2014) also emphasise on the value of secluded workspaces for concentration. The same study report levels of satisfaction under the expectations with communication and social interaction in A-FO. A possible explanation

is the inability to sit in sight of co-workers or the troubles to locate and/ or reach them (ibid.). In a similar way, Kim et al. (2016) report that the main predictor of a higher perceived productivity in A-FOs, was spatial factors e.g. layouts that hindered interaction, not customisable or properly adjustable workstations, and lack of storage. Brunia et al. (2016) highlight spatial factors as one of the key aspects explaining great differences in satisfaction with productivity, communication and concentration in A-FOs. Additionally, De Paoli (2013) reports on IT as another key A-FO resource to enable cohesion and a participative atmosphere, and Millward et al. (2007) found that IT was valued as a more relevant and effective communication tool among office users without assigned desks. On the other hand, Nijp et al. (2016) report a significant shift from office working to home working, but no significant effects were found on job-related outcomes after implementing new ways of working. In fact, Meijer et al. (2009) report that quality and quantity of performed work only recovered pre-intervention levels after 15 months, suggesting no significant improvements after all. Adding to these cases, Blok et al. (2012) present that, besides the increased work flexibility, business objectives remained the same and even knowledge sharing dropped significantly -presumably due to the limited impact of an incomplete A-FO implementation-. This is while Blok et al. (2009), De Been et al. (2015) and De Kok (2016), report connections between desk-sharing and a perception of time waste to find/ switch to/ clean up suitable workstations -e.g. to support concentration-.

Bodin Danielsson & Bodin (2009) and Morrison & Macky (2016) present conflicting results regarding social support and interpersonal relations at A-FOs: in the first study social interaction was positively affected by flexible workplaces, while in the latter study negative relationships, distrust and uncooperative behaviour were more recurrent. Another example of divergent results is reported by Van der Voordt (2004), showing two cases of newly flexible workers: the ones moving from cell offices registered a significant drop in their perceived productivity due to e.g. the loss of seclusion, whereas the ones moving from an open-plan office registered a notable increase due to e.g. the ability to move to quieter places. In both cases, older respondents reported poorer work conditions, which is a situation also highlighted by Pullen (2014) in a multigenerational comparison.

Finally, Petrulaitiene & Jylhä (2015) report on six new A-FOs that managed to save costs, reduce vacancy, improve business processes and increase flexibility, effectiveness, motivation and interaction between employees. However, the description of each case is extremely brief and mostly focused on the positive achievements.

### **3.5. Privacy**

A total of 7 papers display results on visual and/ or auditory privacy in A-FOs. De Been et al. (2015), Van der Voordt (2004), Pullen (2014), Gorgievski et al. (2010) and De Been & Beijer (2014) report recurrent dissatisfactions and concerns with privacy mainly due to: (i) difficulties to converse about private/confidential matters with nearby colleagues and talk on the phone without being heard or hearing others; (ii) unwanted visual exposure due to the openness of the space. Bodin Danielsson & Bodin (2009) found privacy together with

noise as the aspect causing most dissatisfactions among office users at different office types. A-FOs were rated in between the best -cell-office- and the worst case -open-plan office-, but they particularly performed well by the possibilities to avoid been observed. The latter findings are consistent with Blok et al. (2009), who report that office users coming from an open-plan office found better privacy at the AFO -from negative score to neutral-. Therefore, the possibility to withdraw temporarily to enclosed spaces is one way of supporting privacy, but depending on the case it appears not enough to pay off the negative effects of office openness. Anyhow, individuals' opinions towards privacy in A-FO, also vary notably with the age, being the youngsters the less negative to this respect (Pullen, 2014).

### **3.6. Facilities**

A total of 11 papers address levels of satisfaction with a large heterogeneity of factors from the indoor environment. Office layout, architecture and interior design tend to be more listed among the best aspects regarding A-FO's facilities as indicated by e.g. Ekstrand et al. (2016), Pullen (2014), De Been I. & Beijer M. (2014) or De Been et al. (2015). On the other hand, studies like Van der Voordt (2004), Bodin Danielsson & Bodin (2009) and Kim J. et al. (2016) report storage limitations and a lack of secluded spaces. Additionally, the lack of doors in an office with many external guests, is reported by Giorgevsky et al. (2010) as dissatisfaction, since personal belongings were exposed to thefts. Other aspects such as share of spaces, indoor climate and work environment in general as well as furniture and spatial openness in particular, present uneven results among the identified papers. In this sense, Brunia et al. (2016), report extreme differences -over 50-60%- in satisfaction with AFOs, that seem to be substantially influenced by the support of the physical environment, the implementation process and organisational management, among other relevant factors.

## **4. Discussion**

This literature review shows that A-FOs are not always used as intended. The reviewed studies report diverse use patterns and territorial behaviours that contradict with A-FO's principles. For example, Qu et al. (2010), Hoendervanger et al. (2016) and Hirst et al. (2011) among others, show that proximity to immediate colleagues and team members was the most recurrent motive to choose a workstation(s) repeatedly in the same or adjacent areas. This, together with other motives e.g. own preferences or differences in job characteristics coexisting within the shared space, may enable the emergence of informal social structures over certain work areas. Thereby, what begins as territorial habits to cope with the new environment seem to become non-written agreements, e.g. people avoid to seat in "others' place" (Hirst et al., 2011). Tactics to address this issue have been employed, e.g. by adopting team-policies and zones (Millward et al., 2007), or booking programs that allocate workspaces in proximity to team members (Maier et al., 2010). This highlights a need to pay attention to employees' activities and needs when implementing A-FO. Other strategies propose to ensure rotation of staff and optimisation of space use through intelligent booking systems and predictive tools (Appel-Meulenbroek et al., 2015; Maraslis et al., 2016).

It is worth mentioning that the reviewed studies present results either from observations -e.g. regarding number and extent of desks claimed or personalised- or self-reported experiences -e.g. data regarding the switching frequency among employees in A-FOs-. One of the implications of such source imparity is shown in Tagliaro et al. (2016), where respondents reported on high occupancy and lack of workspaces, while field observations showed occupancy rates of 50%. Another issue with the reviewed studies is that they partial results regarding the switching behaviour, e.g. the extent of settled desks is provided indicating the switching behaviour, but not how the remaining desks are used. Future work about A-FO use is needed to gain a holistic understanding of use patterns.

Unintended uses of the office space could show a lack of support to specific needs – e.g. psychological, physiological and social-, that may explain the differences reported on work conditions. Several studies, e.g. Kim et al. (2016) and Brunia et al. (2016), highlight that case-specific aspects such as management, intervention approach, job profiles, IT support, spatial factors, and even prior office environments can critically influence users' appraisal of A-FOs. For example, users from opposite office types -open-plan vs cell-office- report divergent reactions after relocation due to their pre-conditions (Van der Voordt, 2004).

Even when A-FOs are implemented to have efficient and fruitful offices, the extra demands to find and set up suitable workstations e.g. De Kok (2016) or unwanted exposure to openness when concentration is needed e.g. Brunnberg (2000) represent compromises for privacy and productivity in most of the cases. Additionally, identity threats such as the hindrance for spatial personalisation e.g. Elsbach (2003), and the assumption that implementing A-FOs does not naturally lead to better health and wellbeing at work e.g. Nijp et al. (2016), represent extra complexities for A-FO developments. Lastly, many studies provide partial data on pre- and post-intervention workspaces and circumstances e.g. the extent to which spatial conditions changed, leaders' roles, building's qualities and even employment conditions. For all this, further research is needed for a more detailed understanding of the interplay between organisation, office environment and individuals.

## **5. Conclusions**

The literature review comprised of 30 papers and addressed different aspects of employees' work experience as well as workspace exploitation when implementing A-FOs. Results show that case-specific aspects can lead to disparate outcomes, suggesting that the A-FO concept is not a guarantee for organisations' success due to discrepancies found in relation to office use patterns and employees' work conditions.

Regarding office use patterns, territorial behaviour was reported e.g. personalisation of workstations or permanent demarcation with artefacts. Additionally, the overall follow-up of flexible working policies was irregular, with a minority of employees switching workstations regularly vs. a majority using persistently the same workstation(s) in consecutive days. This highlights a mismatch between A-FO use and the spaces provided to host and support their working activities. Some of the main reasons behind this mismatch are to stay in proximity to colleagues, personal preferences or the feeling of time loss



associated to search for a suitable workstation, set it and wrap it up. Nonetheless, the level of satisfaction with work conditions was higher among flexible workers –the ones using the office as intended- than in the case of people with the mentioned nesting habits.

Regarding work conditions, discrepancies were found mainly regarding satisfaction with productivity, concentration, privacy and facilities in A-FOs. The reasons behind these discrepancies were linked to both, factors in which the office type has no significant influence and factors in which the A-FO concept is a relevant predictor. In this sense, spatial qualities –e.g. indoor climate, spatial subdivision, comfort of furniture, amount of light-, organisational management and implementation approach are highlighted as critical factors and not necessarily related to the office concept. On the other hand, the lack of opportunity to personalise workspaces, visual and auditory exposure, lack of storage and a feeling of increased job demands are factors related to the particularities of A-FOs. Therefore, further research is needed to find out how A-FOs should be conceived to successfully support (i) job characteristics and tasks mutuality as well as (ii) office users' needs and case-specific circumstances, covering the mismatches highlighted in this literature review.

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