

The spatial dimension of the flexible workplace. Exploring the relationship between utilization practices and architectural space quality

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ABSTRACT

Purpose: The observed gap between intended and actual utilization of activity-based workplaces indicates a lack of insights on what drives the knowledge workers to use the space and which are motivators and attractors in the office. Although there is a body of knowledge exploring the influence of factors like socio - spatial relationships, personal factors and preferences, job feature, functionality of the infrastructure and ambience upon the utilization of the workplace, the influence of the overall architectural quality of the workspace remains not widely explored. Therefore, this paper explores the relationship between workplace utilization practices and the architectural quality of activity-based flexible workspaces. This research aims to identify motivators and attractors in the flexible workplace and their relation to popular work zones, identify which dimensions of the office environment play a role.

Theory: The research builds upon a conceptual framework of current literature in the topic of knowledge work, looking at new ways of working and their influence in the role organizational space in knowledge-based organizations. Furthermore, empirical studies in the areas of workplace utilization and workplace attractiveness were analysed to depict the state of knowledge.

Design/methodology/approach: The research case study followed mixed methods approach integrating continuous occupancy monitoring data with survey and observation data. The data was analysed quantitatively and qualitatively and aggregated by means of data triangulation.

Findings: The association of behavioural practices and behavioural traces within the workplace by means of continuous occupancy monitoring data gave insights into how certain architectural and spatial features influenced workplace attractiveness, with ambience, connection to natural elements, task support and socio-spatial features being dominant. The findings have implications for designers, facility and workplace managers, indicating what factors should be focus points in workplace design and management, to create workplaces that better support the workforce.

Originality/value: The value of this approach lays in the triangulation between sources, integrating data on socio-spatial and technological aspects in the workplace. The findings of this study have implications for the practice of analysing, planning and developing workplace concepts, pointing to factors that influence the quality of the workspace and influence workplace utilization. The results of this research further inform practitioners for the development of evidence-based workplace strategies.

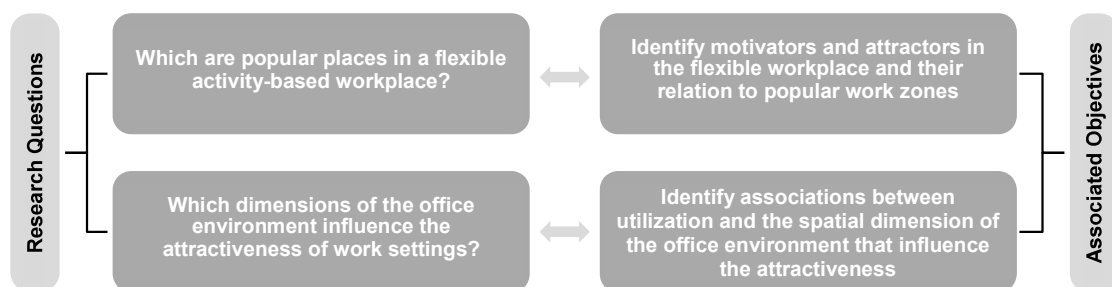
Keywords

Activity-based workplace, workplace utilization, workspace architectural quality

1 INTRODUCTION

Activity-based working assumes that employees work at the most suitable place for the work at hand by switching the setting when they change the work activity (Hoendervanger et al., 2016). However, researchers stated that this type of flexible office is not being used as intended and that users do not switch settings, instead they use the same workstation for different activities (Appel-Meulenbroek et al., 2011). Furthermore, they emphasize the need for further research that examines intended versus actual use, reported against the needs of Corporate Real Estate Management (CREM) for deeper insights into the use of flexible workplaces. Appel-Meulenbroek et al. (2011) also referred to the lack of knowledge on employees' drivers when using the workplace and suggests continuous occupancy monitoring as an alternative method to gather data that can provide evidence of the real use of workplaces. This paper aims to explore how architectural features and indicators of architectural quality in a workspace influence utilization practices and to answer the following research questions (see Figure 1):

Figure 1 Research Questions and Associated Objectives



2 LITERATURE BACKGROUND

With work practices transitioning from a process focus to knowledge focus leading to new paradigms such as New Ways of Working (NWoW). These refer to a philosophy to understand current work practices and the needed support from alternative locations and infrastructure (Ruostela et al., 2014, p. 2). More importantly, the character of the office is also changing and taking the role of a meeting place with new spatial demands and new space typologies (Vos & van der Voordt, 2002, p. 49).

With the recognition of space as a driver of workplace effectiveness and efficiency, its role is transitioning that of a canvas for knowledge transfer that demands active management (Maier et al, 2010). In the workplace, space is a material construction embedded in context in wider network of relationships (Höpfl & Hirst, 2011) that forms an integrated system with people, processes, spatial solutions and technology (Skogland, 2017). Been and Beijer (2014) and de Kok et. al (2016) identified that NWoW promote change in the way people work and behave in the workplace, and combined with technological advances, organizational changes and new business goals trigger the demand for workplace innovation.

This demand for innovation has led to new strategies to configure the workplace with varying levels of flexibility that materialize in different office types that are defined by architectural and

functional features (Bodin Danielson & Bodin, 2009). This paper focuses on the on Activity-based working and the materialized activity-based workplace (ABW). Under the idea of NWoW, knowledge workers should be able to perform distributed work tasks with optimal facility support, regardless of location. ABW concepts enable this support by increasing the space offer within the workplace (de Kok et al., 2016). Hoendervanger et al. (2016) defined ABW environments as those where the employees “work flexibly, using different types of non-assigned activity settings”. Activity settings refer to the different space and workstation typologies that support different work tasks. Been et al. (2015) and Skogland (2017) identified the following as principles of ABW: choice of setting that best fits the work activities; myriad of open, half-open and enclosed settings; stimulated communication and knowledge sharing; large amount of openness and transparency; and non-assigned desks with sharing and common ownership of available space. Other authors referred to the association of spatial aspects and utilization in ABW concepts. For example, Appel-Meulenbroek et al. (2015) reported that ABW concepts had a positive influence in satisfaction with architecture and layout. Brunia et al. (2016) asserted this workplace typology addresses of workers’ need for control over the environment and provides the opportunity to select a place fitting to personal and work needs.

The diversity of settings in ABW implies these different settings vary in character. Consequently, their popularity among employees can vary. This aspect of ABW has not been broadly explored by research yet, with only three studies referring to this. Conversely, factors that influence attractiveness have been explored to a wider extent. Blok et al. (2012) reported the open space followed by the collaborative rooms to be most popular. Babapour & Osvalder (2017) reported low-focus zones, high-focus zones and enclosed communication zones to be the most used. Been et al. (2015) asserted the varying ration in which these settings are available does not allow employees to use the preferred space when needed, this being a negative factor that affects the usability of the concept.

According to other literature reports, the attractiveness of work settings and workstations appeared to be mostly influenced by socio-spatial features. Qu et al. (2010) found employees tended to select workstation near main corridors and close to meeting rooms as they enabled easier face-to-face communication and shorter distances to ancillary spaces. Similarly, Höpfl & Hirst (2011) found that peripheral desks, in combination to closeness to colleagues, were preferred as they supported connection with the outside and accessibility control. Appel-Meulenbroek et al. (2011) also identified relevant factors such as closeness to colleagues, location known to others, unobstructed view outside, closeness to support facilities, number of people passing by and closeness to meeting facilities. Furthermore, visual and auditive privacy, technology support and ergonomics influenced attractiveness. Ekstrand and Damman (2016) concluded that zones with high control over the environment and high level of privacy were regarded as privileged space including ambiance and technology support as key influences. Skogland (2017) found internal mobility to be more dynamic in the absence of physical and visual barriers and that the socio-spatial practices would transfer from one department to another when located in connected zones. Similarly, Göçer et al. (2018) also referred to workstation location, pointing out that employees preferred for direct connection to the outdoors, daylight and view outside. In summary, literature reports on desk location, distances, connection to the outside, and architectural privacy as factors influencing utilization in association to architectural quality.

3 METHODOLOGY

This research followed a **case study research strategy**; which is deemed appropriated for an in-depth analysis of a contemporary phenomenon in a real-life context (Yin, 2014). This case has a **descriptive-explanatory purpose** because it uses description as a precursor to explanation. This research is limited to a **single organization** since it presents unique conditions to observe the phenomenon and gives the option to analyse the phenomenon in ways not previously considered (Saunders et al. 2009). The case concerned is a service organization in Switzerland. The studied environment follows the principles of the ABW concept, where users are motivated to change work setting depending on the task at hand. Two main aspects characterize this workplace:

- **Defined use protocols** including assigned team base, clean desk policy, free choice of workstation, common ownership of space and self-service offer in all floors.
- **Varied array of activity settings** including open space, business garden, silent work area in unoccupied single offices and peripheral workstations, short-time workstations, think tanks, enclosed meeting rooms, open lounges and enclosed lounges.

Primary and secondary Data was collected with a **mixed-method** approach through following methods:

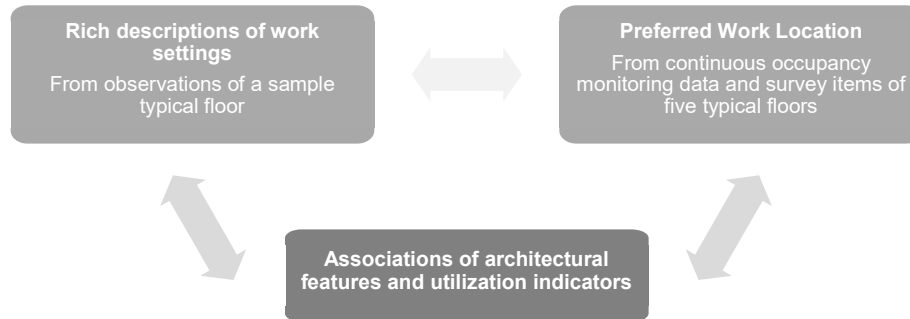
- **Structured observation** of the spatial organization of the office including architectural space characteristics, workspace quality and ambience, and indoor environmental conditions for observable indicators, including acoustics, lighting, control over the environment.
- **Employee survey** with two questionnaire items measuring the importance of work settings and asking about the preferred work location. The sample size was 250 employees.
- **Continuous occupancy monitoring** data including workplace choice data with employees' choice of workplace with a granularity of 5 minute and workplace utilization data with occupancy indicators of the workstations with a granularity of one week. For anonymity and data security, user codes are reassigned every day, thus users can only be followed during one working day. For analysis a period of 22 weeks was considered.

The data was analysed by means of descriptive statistics and through cluster analysis.

4 RESULTS AND DISCUSSION: THE DYNAMICS OF WORK LOCATION CHOICE

The association of behavioural practices and behavioural traces in the workplace with architectural features through data triangulation gave insights into how these features influenced workplace attractiveness. The results of the study are threefold (see Figure 2)

Figure 2 Structure of Results



4.1 Rich descriptions of workplace settings

The settings are characterized by a minimal aesthetic and a regular replicable organization of architectural elements throughout the building (see Figure 3). The work settings can be grouped into three clusters with similar architectural features: standard workstations in open space layout, enclosed spaces and spaces for encounters. See Table 1 for detailed descriptions of the setting including architectural features and task-setting support.

Figure 3 Schematic Configuration of the Office Layout

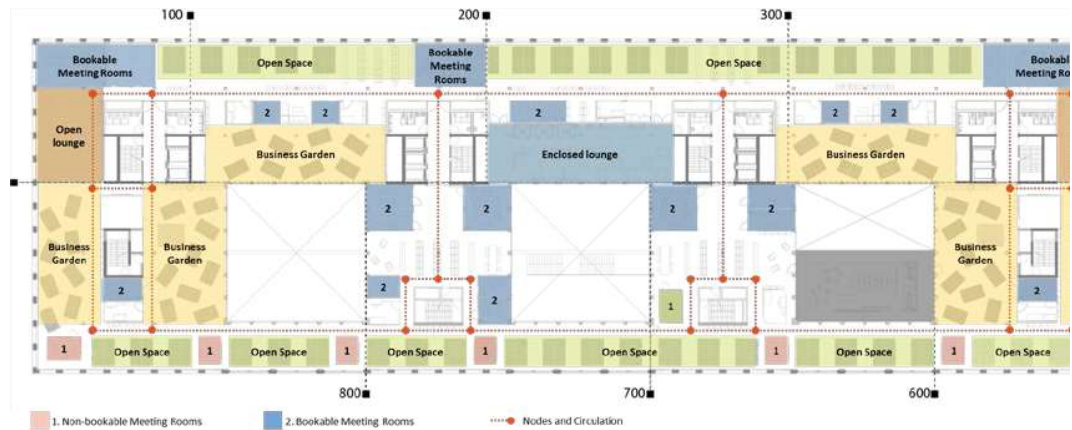


Table 1: Rich Descriptions of Work Settings

Work Setting	Descriptive Architectural Characteristics
Open space	<p>Supports desk-work and unplanned communication</p> <p>Multiple access points, visually connected to adjacent areas and the outside</p> <p>Fixed room, room-in-room elements, and storage units create desks clusters and limit the openness, defining two hierarchies of space</p> <p>Furnished with standard workstations, arranged in a lineal axial symmetry with clear straight lines; formal character</p> <p>Absence of partitions between desk area and circulation ways confers the space a bigger scale in comparison to adjacent areas</p> <p>Two variants: with and without indoor plants</p>
Business Garden	<p>Supports desk work and communication in the adjacent meeting rooms</p> <p>Three variants: semi-enclosed, open space facing the inner courtyard and an open space facing the perimeter of the building</p> <p>Proximity to vertical circulation nodes</p> <p>Above average amount of indoor plants and flexible functional elements</p> <p>Furniture arrangement follows a rhythmic pattern with blocks of two desks, distributed in a pattern of repeating angles; arrangement breaks the formality dominating the spatial arrangement in the workplace</p>
Bookable meeting rooms	<p>Enclosed symmetrical spaces characterized by a minimalistic aesthetic: formal character, none to minimal transparency, minimal ambience, little to no decoration and no storage</p> <p>Visually connected to the indoor courtyard or visual connection to the outside</p> <p>Typical functional meeting room furniture and supporting elements</p> <p>Varying in size: 3 to 15 sqm (6 people), 27 sqm (12 people) and 42 sqm (18 people)</p>
Non-bookable Meeting Rooms	<p>Enclosed space with maximum transparency but with control over privacy, minimalistic aesthetic and minimal furniture</p> <p>Visually connected to the space where they are located</p> <p>Varying in size: 8.5 (4 people) and 10 sqm (6 people)</p>
Enclosed lounge	<p>Supports desk work, collaborative tasks, regeneration and self-service activities</p> <p>Enclosed space with two access points, with a kitchenette, partially flexible lounge furniture and with some supporting elements</p> <p>Four types of furniture elements create four inner zones supporting the different tasks.</p> <p>Decoration elements, including indoor plants and decals on the wall with silhouettes of natural elements.</p>
Open Lounge	<p>Supports communication and regeneration activities</p> <p>Semi-open space delimited by the partitions of the surrounding areas, directly accessible from the adjacent spaces, with minimal transparency to the adjacent areas, whole windows façade with direct view to the outside.</p> <p>Furnished with partially flexible elements and a coffee line</p> <p>Furniture arrangement does not follow a pattern: elements are used to create inner zones supporting different communication modes.</p> <p>The ambience is colourful in contrast to the rest of the office, with neutral base colours and vibrant accent colours for the furnishing elements.</p> <p>Indoor plants in the corners of the space and visual textures of natural birch wood.</p>

4.2 Preferred Work Location

The popularity of work settings was analysed in three variants, namely, number of employees using the space, time of the working day the space was occupied, and reported importance of work settings to employees. The analysis of workplace choice data (see Figure 4) indicated that most of the employees used the open space (30.34%), followed by open space with plants (28.58%) and the business garden (27.74%). The analysis of percentage of occupied time by setting (see Figure 5) indicated the lounge was the most used work setting with 41.23%, followed by the business garden with 40.07%; the least used work settings were the non-bookable meeting rooms with 19.14% and the bookable meeting rooms with 22.23%. The analysis of reported importance of the work settings (see Figure 6) indicated the open space with standard workstations and plants as the most important work setting by 50.34% of the employees, followed by the open space with standard workstations as second most important with 40.10%; think tanks rooms and meeting rooms were third more important with 25.85% each.

The location criteria describing the preferred work location are shown in Figure 7 “Close to team or project partners” (93.67%) and “close to a window” (87.90%) were indicated by the participants as the two most important criteria describing their preferred work location. Having an “unobstructed view of the outside” (50.97%) and “visual privacy” (48.12%) were indicated as the third and fourth most important criteria. The three least important criteria describing the preferred work location were “close to meeting rooms” (10.02%), “close to communication zones” (8.39%), and “close to a corridor” (2.39%). Participants commented on further criteria such as closeness to circulation elements and rest rooms; indoor environment in relation to temperature, oxygen levels and air quality; indoor plants; no heat (e.g. “not too close to the windows”); no disturbing ceiling lights; support for concentrated uninterrupted work (e.g. “no permanent noise pollution”; support for creative work; IT infrastructure (e.g. double screen, practicality of docking station location); and closeness to team corners.

Figure 4 Distribution of users over work settings

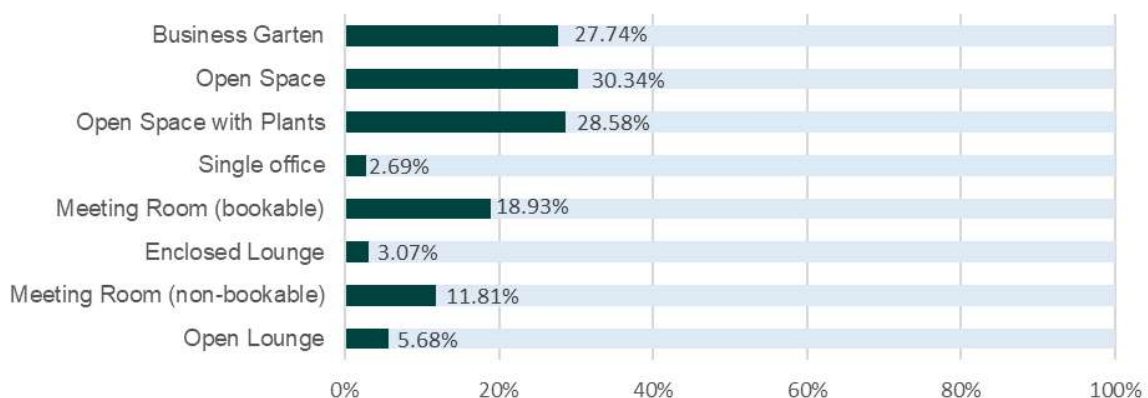


Figure 5 Proportion of usage hours

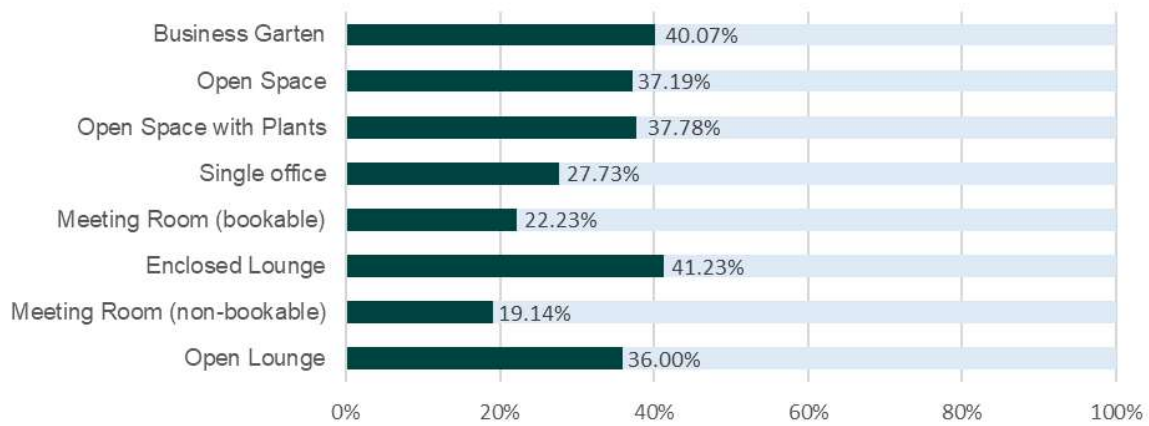


Figure 6 Ranked Importance of Work Settings

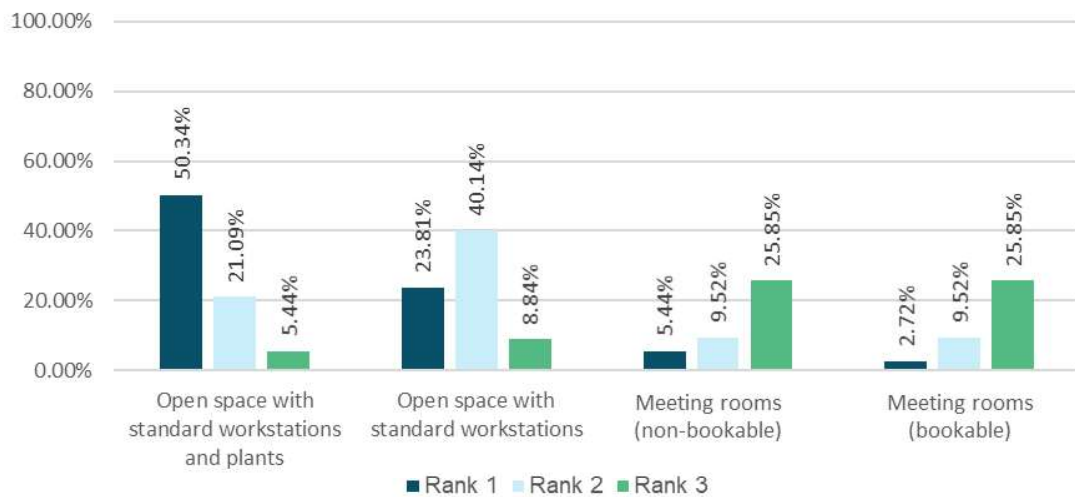
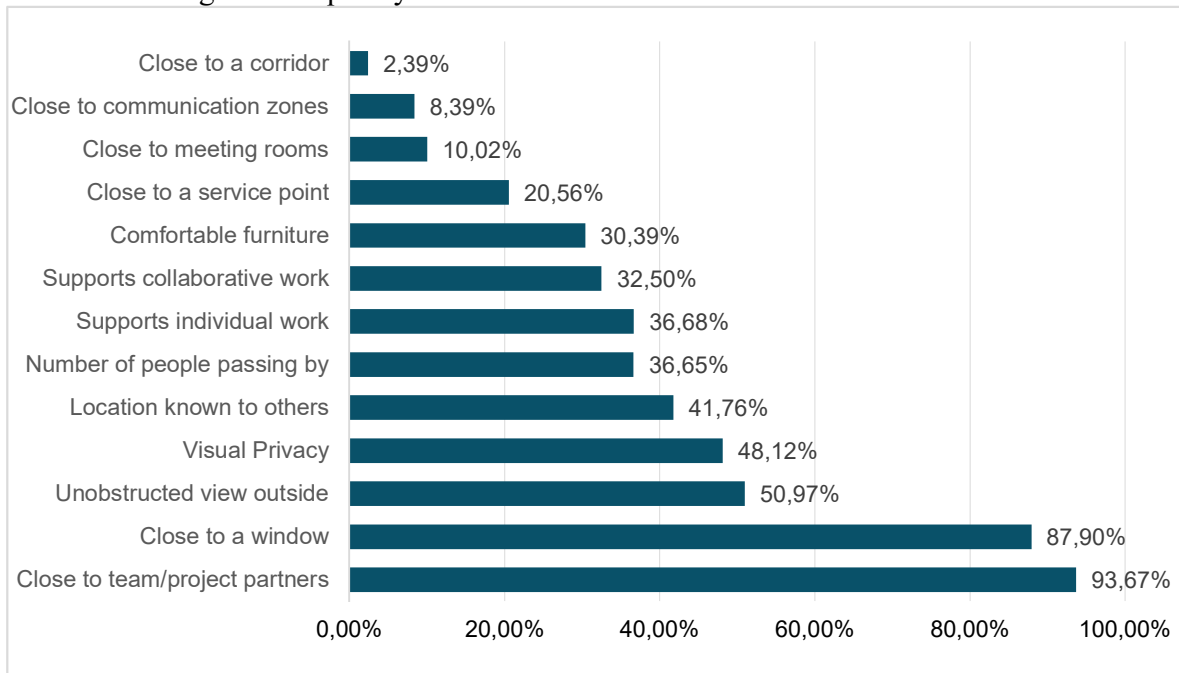


Figure7 Frequency Distribution of Preferred Work Location Criteria



4.3 Association of workplace utilization with indicators of architectural quality

A more detailed analysis of the utilization on the workstation level linked to the rich descriptions in the observed area (300, 400, 500 and 600) of the sample floor showed architectural features that could be positively associated to attractiveness and work location popularity (see Figure 8). The findings in the different observed areas are described separately to enable easier comparison between the work settings.

- Zone 300:** The most used workstations are next to the windows, around the centre of the desk clusters, near a service points and storage spaces. For the workplaces on the side of the corridor, there are plants that provide visual privacy. There were ongoing conversations at higher volume and frequency than in the zone with the least used workstations. The least used workstations are located next to the transition space towards zone 200, the entrance to the enclosed lounge and adjacent to meeting rooms (two of them are marked as reserved). These workplaces are all fully visible from the door.
- Zone 400:** In the open space the most used workstations are next to the windows, near the service points, the storage units and are not visible from the corridor nor from the access to the business garden. In the business garden, the most used workstations are near the storage units and are not directly visible from the think tanks in the middle, as the partition is made of glass panels. Among the meeting rooms, the least used one is reserved as an office.
- Zone 500:** Overall the most used workstations are in the inner business garden. Among these workstations there is an above average amount of plants. There is an adjacent service point and a directly accessible meeting room. That area is also more active and

closer to the windows than the rest of that business garden. In the outer business garden, the most used workstations are right next to the windows and close to the non-bookable meeting room. In the open space the most used workstations are located the closest to the circulation and the storage. The least used workstations were indicated as settled.

- **Zone 600:** This zone had a silent working rule defined by the team and has a different layout, with two workstations towards the façade and ancillary spaces occupying most of the area. The most used workstations are next to windows and located in the silent zone. Following, the least used workstations are in the quiet zone further away from zone 500 where the ambience is more active.

From these descriptions the following architectural features that influence work setting and location attractiveness can be identified, namely: ambience, connection to the outside, transparency of materials, natural elements, controllable privacy, openness and task-setting fit.

Figure 8 Context details of preferred work location in observed building area - Floor A



5 DISCUSSION

The results of this research are comparable to those of previous studies. Similar to Blok et al. (2012) and Babapour & Osvalder (2017), open space, some collaborative spaces, low focus and enclosed communication zones were found to be popular, although to varying levels. The apparent contradiction between setting popularity based on user choice and setting popularity based on usage time, can be explained in the difference in task-setting fit. The settings with low number of users, yet high percentage of use hours support multiple work activities including low focus work, regeneration, planned and unplanned communication, while the settings with more users and usage hours support the core work activity being desk work. As indicated by Been et al. (2015) the varying ratio of availability of the settings might explain the minimal differences between the settings that support desk work (open space and business garden), as in this case study these as well assigned to specific teams and their use is influenced by the use protocols. The preferred location criteria show that socio-spatial factors are the most important reason behind work location choice. The specific location attributes indicate employees highly value privacy regulating elements and connection to the outside and natural elements similar to Höpfl & Hirst (2011), Appel-Meulenbroek et al. (2011), Ekstrand and Damman (2016) and Göçer et al. (2018). Contrary to Qu et al. (2010) corridor workstations were only associated to higher use in combination to closeness to team members and natural elements, in other cases the workstations were avoided. With over 80% of employees in this study having considerable to moderate share of deskwork, it was expected that employees would indicate the desk as the most important work setting/location. Furthermore, this shows that individual desks, even in not territorial offices, are still associated to private use and employees' value highly the possibility to have an assigned workstation for a day.

6 CONCLUSIONS

The results of this study add to the body of knowledge on the relationship of ABW and architecture. Addressing the design of office spaces in association to the empirical study of space utilization and associated factors lead to implications for evidence-based office design. Initially, the results highlight how spaces changes in the created ambience and the multiple task-setting fit influence the popularity of the setting and the length of usage in a positive direction. It also indicated that spaces with mere functional purpose can support well single activities, yet the utilization length is negatively affected. For ancillary spaces, the study indicated, the multifunctionality, inspiring ambience and support for both, work and regeneration activities, positively influence utilization. The implications can assist design practitioners in creating office spaces that drive workplace efficiency and effectiveness.

ACKNOWLEDGMENTS

I thank “Prof. Dr. Name Surname” for his valuable contributions and support in supervising this work and “Company Name” for providing the continuous workplace occupancy data that made this research possible.

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