

Institute of Facility Management Working Paper

Office workplaces in Universities and Hospitals: Literature review

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August 2020

Keywords:

Workplace Management, Workplace Change Management, Workplace Trends, Hospital Workplaces, Hospital Office, University Workplaces, University Office

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ISSN Number: 1662-985X

Online abrufbar auf <https://www.zhaw.ch/de/lifm/forschung/facility-management/working-papers/>

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The Authors

The authors of this working paper are members of the Research Group Workplace Management. The Research Group Workplace Management researches the design and management of work environments with a view to the integration of spatial, human and organizational factors within the context of workplace management. The aim is to achieve a workplace which is both economically and ecologically viable and enjoyed by individuals, for example by analyzing the impacts of workplace environments on employee health, performance and satisfaction. The research group Workplace Management of the Institute of Facility Management researches with a holistic and systemic approach and develops new theoretical and application-oriented knowledge in various projects. The authors educational backgrounds are in business economics, psychology, architecture and interior architecture, and facilities management. Their knowledge is combined and applied in research, development, and consultancy projects of the research group in the field of workplace management.

Abstract

Compared to the rapidly developing commercial offices, office workplaces in universities and hospitals have changed only slightly. However, demands for new office workplaces in universities and hospitals are growing due to changed work processes and communication, changed organizational structures, new technologies, increased cost pressure, and the requirements of a modern knowledge society.

This working paper reviews drivers and barriers of new ways of working in universities' and hospitals' office workplaces. To identify the latest drivers and barriers, this working paper reviews not only academic papers but also industry reports. This literature review determines six drivers of new academic workplaces: New way of working; new methods of teaching and communicating with students; cost pressure and need for space management; generation shift; internationalization; sustainable development and carbon reduction commitments. The literature review also addresses functional, cultural, hierarchical, and emotional reasons for resistance to introducing new academic workplaces. Next, this literature review identifies four drivers of new hospital office workplaces: Shortage of healthcare workforce; development of technologies; constant pressure and need for space management; need for diverse work settings. Besides, the literature review addresses barriers of new office workplaces in hospitals: change-reluctant organizational culture; clear hierarchical organizational structure; rapid change in IT; high perceived risk of first-time application of new office concept; cultural change; and financial restrictions. These findings suggested that Activity-Based Working (ABW) can be appropriate for office workplaces in universities and hospitals since ABW is acknowledged by increasing staff interaction; providing quiet places for solo-concentrated work; improving staff health and well-being; reducing space cost, and flexibility to change. Overall, this working paper emphasizes the need for new ways of working in universities' and hospitals' office workplaces and showed that barriers and resistance to introducing new office workspace should not be overlooked.

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1 Introduction

Workplaces and office space are constantly evolving. Today, not only international corporations and hip start-ups use modern, flexible working environments. SMEs and even public administration work in flexible offices now too. This is the consequence of changed work processes and communication, changed organisational structures, new technologies, increased cost pressure and the requirements of a modern knowledge society. In addition, there is a generational change in the personnel sector that is changing the Swiss labour market. Studies show that the younger generation has high expectations for their jobs and activities (Lüthy & Ehret, 2014). Their acceptance of hierarchies is different, and the young professionals are also very familiar with the technological innovations and can easily apply digital tools. This gives them an edge over older colleagues and can also influence the choice of employer.

These fundamental changes are not stopping at Swiss hospitals and universities and their staff and are also reflected in their infrastructure: the classic examination room, ward rooms and administrative rooms in hospitals and offices, laboratories and teaching rooms at universities are being re-considered in many organisations. Drivers for this are similar to the ones mentioned above, i.e. new ways of working and communicating, the introduction of new technologies into the treatment and therapy processes, new forms of teaching/learning, new cooperation models and working methods at universities, but also constant cost pressure in the health care sector and in the university infrastructure (e.g. space and operation costs). For the future, therefore, new, innovative solutions are needed that meet the high demands.

The challenges, influencing factors but also the possibilities for change are multi-layered and complex. Facility / workplace / real estate managers are currently signalling a great need for know-how and scientific contributions about new working environments in hospitals and campus development in order to exploit possible development potential.

In this working paper we focus on working environments for administrative and communicative work in hospitals and universities. These environments have not yet been studied much and currently the best approach is to transfer knowledge from classical office work and offices from other industries to work and workplaces in hospitals and universities. On this basis, the following currently unused potential for Swiss hospitals and universities can be outlined:

- Increased efficiency: construction costs, space costs, facility management, spatial flexibility, etc.

- Increase of effectiveness: best possible support of work activities (incl. communication, collaboration, individual concentrated work) in the hospital context and at universities
- Strengthening of organisation image: (Employer) branding / attracting talent, displaying and supporting culture (e.g. promote cooperation and exchange between physicians and nursing staff or interdisciplinary cooperation)
- Improvement of sustainability criteria: Sustainability in relation to the environment (reduced space and energy consumption) and social aspects (e.g. health and well-being, knowledge management in generational change)
- Successful change: Accompanying, steering and supporting change (such as new working environments and workplace usage strategies, new ways of working and communicating, new technologies for the treatment and therapy process; new financing situations)

Although there is a great deal of pressure and interest in new working environments in these areas, there is considerable resistance from the users of this category of workplaces. This slows down change, which leads to expensive, inflexible and therefore unsustainable solutions. It is currently unclear what the basis of this vehement resistance is: functional, status-related, cultural, or emotional reasons may play a role.

In this paper, we review drivers and barriers of new ways of working in universities' and hospitals' administrative workplaces.

2 State of the art in academic office workplace

Compared with the rapidly evolving commercial offices, academic office has not changed over a hundred or so years. Academic office is tightly bound to the identity and status of the academic user. Furthermore, individual cell office remains as a norm, and space is allocated on a hierarchical level. However, a movement toward a more open and flexible work environment in academic workplace is emerging to promote cross-disciplinary collaboration and interaction with students, as well as to increase space utilization (Backhouse et al., 2019). This literature review discusses four topics related to state of the art in academic workplace: move to open-plan offices, student-centered approaches, hierarchy-based space allocation, and needs and activities in academic workplace.

2.1 Move to open-plan offices

Academic workplace has not substantially changed over the past century, individual cellular offices off corridors remain as a norm (Parkin et al., 2011). Since providing room for privacy and research focus is traditionally valued high in the academic workplace, the single office space with a desk, shelves, and a small meeting table still dominates the academic workplace culture as a spatial typology (Taylor, 2016). However, traditional academic office has two issues: space utilization and supporting interaction and collaboration.

First, academic workspace with individual cellular office results in low occupant space densities and underutilization (Baldry & Barnes, 2012). Utilization studies have consistently revealed that academics and researchers generally occupy their workspaces only 30-40% (Bach, 2015; Harrison & Cairns, 2008; Parkin et al., 2006; Pinder et al., 2009; Taylor, 2016). The reason for low utilization can be that academics and researchers are teaching, in meetings, on business trips, on annual leave, working at home, or doing other activities outside their desks (Pinder et al., 2009). Besides low space utilization, many universities can no longer afford to offer their employees a large cellular office due to increasing build costs (Parkin et al., 2006).

Second, many academic and administrative workplaces have a limited number of social or interaction space. Social or interaction space is usually restricted to a small tearoom or kitchen area, as a consequence, there is little opportunity to interact and communicate between staff within departments (Harrison & Cairns, 2008). Interaction and communication with peers are essential within academics, as interaction can have positive impacts on creativity, which is relevant to the role of academics (Parkin et al., 2011).

Since traditional academic offices have low space utilization and difficulties in supporting interaction and collaboration between academics, the trend toward open-plan work environments is emerging in academic environments (Harrison & Cairns, 2008). Open-plan offices have various benefits such as flexibility, cost-savings, increased informal interaction, and appearance of concern about sustainability (Wilhoit et al., 2016). However, compared with cellular office, open-plan offices have issues regarding lack of privacy, increased noise, and distraction (Parkin et al., 2011). Also, poor facilitating of work requiring concentration and insufficient storage space tend to be associated with open-plan offices. One study reported similar ambivalent results in academic workplaces, academics appreciated provision for relaxation, informal socialization as well as increased opportunity for interaction by the absence of partition in open-plan offices. Nonetheless, academics complained about poor conditions for concentration, lack of privacy, and loss of storage space. (Gorgievski et al., 2010).

According to Harrison and Cairns (2008, p. 18), the most important quality of the academic workplace is 'a place to do concentrated work' and 'a place that supports quiet reflection and analysis' is the following as the second most important quality. As supporting space for concentrated work

and quiet reflection is crucial to academics, the new academic workplace which can provide not only space for concentrated work, but also space facilitating interaction and collaboration is required.

2.1 Student-centered approaches

The learning approach in Higher Educational Institutions (HEIs) is changing. Traditional teacher-centered approaches, in which good teaching is conceived as the transmission of academic, practical, or professional knowledge, are being replaced by student-centered approaches that highlight building knowledge through shared situations (Marmot, 2006). Besides, a pervaded 'commodity disclosure' resulted that students are perceived as consumers of educational services (Willmott, 1995), showing the need to focus more on students. Thus, HEIs have pressure for higher graduation rates, better retention, and more engaged students. Interaction between students and professors is essential to improve retention, graduation rates, and even success after graduation. Also, Frequent contact between students and professors inside and outside the classes is the main contributor to student motivation and commitment. However, one research found that a significant proportion of students had difficulties visiting their professors in faculty offices within office hours. The traditional faculty offices are designed passively for interaction between students and professors, as professors wait for students to come to them. Professors hole up their offices and keep their doors locked, and it often intimidates students (Selingo, 2018). Similarly, Harrison and Cairns (2008) reported that interaction between students and staff is sub-optimal, students need to queue to see staff in their office, and there are few opportunities for informal interaction within departmental areas. Also, Harrison and Cairns (2008) found that staff put themselves at risk by not being visible in their office and by shutting themselves in their office with the students.

As teaching on many HEIs is transformed with active-learning approaches, interaction between students and professor need to be increased, and designing better space for students and professors to meet can be the starting point (Selingo, 2018).

2.2 Hierarchy based workspace allocation

Harrison & Cairns (2008, p. 4) stated that the academic office has "traditionally been a physical symbol of a person's seniority within the academic community: the more senior one is within the Department or faculty, the larger and better equipped the office is likely to be". Generally, the size of the offices allocated is not only based on occupants' work undertaken but also based on the rank or position of the person within the university hierarchy. Offices for deans or professors are large and individual cell offices and may include a meeting table, soft seating areas in addition to the standard desk, cabinets, and bookshelves. By contrast, more junior academics and postgraduate research students may share offices with several people (Harrison & Cairns, 2008). Hierarchy plays a

significant role in the academic office allocation and can explain the greater acceptance of open plan environments among junior academics compared to senior academics. The reason can be that junior academics never had a private office, so they cannot miss what they never had (Bach, 2015).

2.3 Needs and activities in academic office workplaces

Academics perform various work activities in offices. One study found that in the workplace, academics spend 60% of office work (general, undistributed, interactive), 20% for meetings (planned, unplanned) (Brunia et al., 2012, as cited in Bach, 2015). This finding is in line with non-scientific office workers, the only difference is that academics dedicate 10% more time to undisturbed office work and 6% less time to telephone use (Bach, 2015, p. 37). Likewise, Parkin et al. (2006, p. 7) also revealed that academics spend 43% of their time on computer work, and 21% on paperwork, 22% on meetings. Although activity analyses show that activities from academic and non-academic environments are similar, academics have a more significant need to perform concentrated work (Bach, 2015). Harrison and Cairns (2008) stated that the ability to perform individual, concentrated work is a critical component of the academic work pattern, it is crucial that the workplace supports academics in this.

Parkin et al. (2006) concluded the factors that academics value most in a work environment: supporting formal and informal communication, visual and acoustic privacy, ambient conditions with adequate heating and ventilation, space to relax, access to storage, individual space for displaying notes. Also, Harrison and Cairns (2008) found thirteen key qualities of the workplace through surveys. The most important quality of the work environment is 'a place to do concentrated work', the importance rating attributed by academic staff was slightly higher than that of non-academic staff. The second most important workplace aspect is 'a place that supports quiet reflection and analysis', and all academic staff rated 'a place where you can share knowledge with colleagues' among the top 5 qualities of the 13 listed. Although there is an increased importance of interaction and knowledge transfer within the research community, academics still rated the workplace quality with solo concentrated work as the most important (Harrison & Cairns, 2008).

3 Drivers of new academic office workplace

Accelerating changes in HEIs and changes in academic workplaces promote a new way of working in an academic workplace. This literature review addresses various drivers of new academic office workplace: new way of working, a new method of teaching and communicating with students, cost pressure and need for space management, generation shift, internationalization, sustainable development, and carbon reduction commitments.

3.1 New way of working

Mobile work, technology affecting academic workplace

Over the last three decades, the new information and communication technologies (ICT) have been a driver for developing new academic workspaces. Technologies like digital devices and wireless networks enable academics to work and collaborate across different locations, as well as enable professors to work away from campus (Pinder et al., 2009; Selingo, 2018).

This influenced dramatically on workplace requirements and changed the role of the campus-based office in support day to day working. Wireless technologies have also affected the physical environment, enabling workplace configuration to adapt to changing work settings and practices more flexibly. ICT impacts on the way to collaborate with colleagues as well, face to face collaboration receives less attention from academics (Pinder et al., 2009)

Breaking down barriers between academia and industry

Besides development of technologies, barriers between academia and industry are broken down. Governments seek to encourage industry partners to establish collaborative partnerships with universities to increase the impact and relevance of research and shift the burden of funding from the public to the private sector (Hassell, 2020). HEIs have begun to view the relationship with more inclusively and expansively. Working with Industry partners focused on rapid cross-disciplinary cooperation. Industry partners offer an opportunity to do research and teaching more productive and make careers more varied and rewarding, making it more applicable to specific problems (Hassell, 2016). Partnership with industry transforms the nature of research, the mobility, and tenure of employees and brings inherent changeability in the size and nature of teams, projects, and funding (Hassell, 2016, 2020). As a result, HEIs are required to be more agile than ever before (Hassell, 2020).

Move from individual research to cooperative and applied research

In addition to the partnership between academia and industry, move to more co-operative and applied research is changing the way of working in academic workplace. Growing demands for more interdisciplinary research and increasing focus on collaborative work with other colleagues, students, alumni, and external organizations enable academics to shift from individual research to cooperative and applied research (Hassell, 2016). To align with shifting way of working, supporting an appropriate workplace is therefore required.

3.2 New method of teaching and communicating with students

Student-centered learning approach, evolving digital learning environments

The methods of teaching and communicating with students are rapidly and radically changing (Hassell, 2016). Traditional teacher-centered approaches are being replaced by student-centered approaches that highlight building knowledge through shared situations. The shift from a 'teaching paradigm' to a 'learning paradigm' altered the role of HEIs from a 'place of instruction' to a 'place to produce learning' (Marmot, 2006). Scottish Funding Council (2006, p. 4) reported, "This is partly driven by changing educational requirements. The shift to a knowledge-driven economy is driving demand for a more qualified, highly skilled, creative and flexible workforce". This shift placed more emphasis on the ability to think critically and to solve complex problems, as well as on the process of learning. Besides, the growing student population diversity has led to a new, more tailored learning approach. This shift to student-centered teaching methods has been supported by numerous research and theory indicating the value of a variety of learning styles and individual preferences (Marmot, 2006).

Also, digital learning environments are driving a shift in the learning process from traditional frontal lectures to more interactive lectures. Furthermore, the learning process will move towards virtual environments such as flipped classrooms, Massive Open Online Courses (MOOCs), and online lectures, resulting in more efficient, inspiring, individual, and collective learning. Educational developments may influence on the workplaces of professors and lecturers at HEIs, as the nature of their work and the workplace requirements are likely to change (Bach, 2015).

3.3 Cost pressure and need for space management

The HEIs sector is facing overwhelming financial pressure and, as HEIs budget becomes tight, space efficiency becomes critical (Hassell, 2020). In countries such as Australia and the UK, HEIs have significant pressure to reduce costs due to declining government funding (Baldry & Barnes, 2012).

According to Pinder et al. (2009, p. 7), HEIs in UK occupy approximately 17million m² of floorspace and around 15% of which is occupied by academics. As space provision is estimated between 10-20% of a HEIs' total expenditure, many HEIs have been under pressure to use space more efficiently. Whereas the amount of space per student has decreased throughout the sector in the past few years, the ratio of office space per academic staff member has remained relatively constant. Besides low occupant densities in academic office space, utilization of academic offices tends to be low (Pinder et al., 2009). Numerous utilization studies have consistently revealed that academics and researchers generally occupy their workspaces only 30-40% (Bach, 2015; Harrison & Cairns, 2008; Parkin et al., 2006; Pinder et al., 2009; Taylor, 2016). The reason for low utilization can be that academics are teaching, in meetings, on business trips, on annual leave, working at home, or doing other activities outside their desks (Pinder et al., 2009). Besides low space utilization, many universities can no longer afford to offer their employees a large cellular office due to increasing build costs (Parkin et al., 2006). The budgetary pressure and poorly utilized academic office space drive a rising demand for new workplace concept with space efficiency and effectiveness.

3.4 Generation shift

An upcoming demographic shift in the academic workforce is a driver in the new approach for academic workplaces, which is generally designed to last 30 years or more (Hassell, 2016). One study found that nearly 56% of the academic workforce belonged to the baby boomer generation, and another study similarly reported that the average age of a college professor is 53 years, and the average age of professors is rising (Hannay & Fretwell, 2011, p. 2; Hassell, 2016, p. 9). The reason for that was reported, "large scale hiring in the 1960s, limited growth in total faculty size, slow faculty turnover, good health care, and a decline in the rate of retirement" (Hannay & Fretwell, 2011, p. 2). As this cohort will retire, a staggering recruitment task for HEIs will be created in the coming years, and pressure to attract staff will increase (Hassell, 2016). To attract and retain new staff in younger generations, understanding their values and needs may be required since those of the younger generations are different from those of older generations. Younger generations have differences in values, work styles, and attitudes with older generations (Berk, 2013). For instance, younger generations prefer flexible working and have experience in more informal and technology-rich spaces (Hassell, 2016; Berk, 2013). As academic workforce generation shifts, an academic workplace that accommodate needs and values of academics in younger generations is required.

3.5 Internationalization

Global trends with the importance of knowledge production and information flow leads to the internationalization of HEIs. The international mobility of academics has increased, advanced

technologies link academic communities across the world. In the meantime, English has become the lingua franca of the international community. Internationalization has affected academic workforce as well, foreigners cover a large proportion of academics in advanced countries. A higher proportion of junior academics is found as foreign citizens compared to senior academics in European countries (Teichler et al., 2013). The statistics of co-authored publications also evidences internationalization, Hassel (2020, p. 9) reported, “Between 2000 and 2013, the percentage of publications with authors from multiple countries rose from 13 per cent to 19 per cent, and in Australia between 2008–2014, more than half of Australian scientific publications had an international co-author”. Hassel (2020) also stated that internationalization brings greater mobility of academics and is relevant to the outputs of research, as well as processes it produces. Besides, as academics have become more internationalized, their roles have diversified, often leading to new forms of identity and loyalty (Locke, 2007).

In an increasingly competitive and globalized higher education market, attracting and retaining talented academics is growing demands for new academic workspaces. Given that the demands on higher education are constantly changing over time, a growing need will arise for new academic workspaces, which are flexible enough to meet changing organizational needs and support new ways of working (Pinder et al., 2009).

3.6 Sustainable development, carbon reduction commitments

With the growing demand for sustainable development, HEIs are expected to play a crucial role in sustainable development (Berchin et al., 2017). There are emerging international initiatives addressing the implementation of sustainable development principles for HEIs. Furthermore, the role of education got recognized to foster sustainable development (Casarejos et al., 2017). As a result, HEIs seek to contribute to sustainability, as many campuses are huge resource consumers and waste generators. Besides, the responsibility of HEIs is emphasized to promote sustainable behavior to students and the community (Lambert & Cushing, 2017; Tilbury, 2008). Similarly, Berchin et al. (2017) stated that more and more HEIs are becoming aware of their role in building a sustainability paradigm and are, therefore, adopting and institutionalizing sustainability in their systems. In turn, sustainability challenged the HEIs’ current paradigms and structures as well as predominant practices (Tilbury, 2008).

Besides the growing demand for sustainable development, the pressure to reduce the carbon footprint of HEIs is emerging. According to Pinder et al. (2009) HEIs in the UK emitted more than two million tons of CO₂ emissions, mainly due to space heating and lighting. As the UK Governments proposed Carbon Reduction Commitment Energy Efficient scheme, around half of HEIs will be required to purchase credits equivalent to their CO₂ emission each year. Also, the UK

government set a long-term target to ensure that the UK's CO₂ emissions in 2050 are 80% lower than in 1990 (Pinder et al., 2009, p. 8). Not only government scheme and target, but also rising staff and student expectations will increase the pressure to reduce CO₂ emission in HEIs sectors. Pinder et al. (2009, p. 8) reported, "Educating lecturers and researchers on the environmental impact of their space demands will therefore become an increasingly important issue for estates departments. This has implications for both the building form and materials, as well as the way people work within it". Growing demand for sustainable development and pressure to reduce the carbon footprint may require HEIs to rethink the design and utilization of academic workspace (Pinder et al., 2009), as academic and research space are approximately 50 % of non-residential estate in HEIs (Baldry & Barnes, 2012, p. 23) and those places are poorly utilized (Pinder et al., 2009).

4 Barriers of new academic office workplace

In the literature review, many studies reported resistance to a new academic office workplace, especially resistance to open-plan or shared offices. Wilhoit et al. (2016) reported that faculty are resistant to workspace change, some stated they would leave the university rather than giving up their private offices. This literature review addresses functional, cultural, hierarchical, and emotional reasons for resistance to understand the barriers of academic workplace change.

4.1 Functional reasons

According to Taylor (2016), academic workplace design has not changed significantly over the last century, and single cellular offices with desk, shelves, and a small meeting table are still a norm. One reason for this is that cellular offices offer space for privacy and research focus, which is highly valued in the academic workplace. This is why academics are reluctant to accept open-plan offices or any other form of design deviating from cellular offices (Taylor, 2016).

The academics highly value the workspace qualities related to sole concentrated work despite the greater emphasis on interaction and knowledge transfer within the academics and the increased need for collaborative and interdisciplinary research. In the survey across the seven institutions, regardless of role or function, academics evaluated 'a place to do concentrated work' as the most important work environment quality. The second most important workplace quality was 'a place that supports quiet reflection and analysis' (Harrison & Cairns, 2008).

Similarly, Wilhoit et al. (2016) stated that faculty is resistant to changes to shared or non-permanent space. Faculty reported that they spend most of their working time in their own office, and they consider control over their workspace as important. Furthermore, faculty rated the ability to have private conversations, the ability to conduct quiet and concentrated work, protection from outside noise, and conversation as the most important workplace characteristics. Due to the abovementioned reasons, faculty is resistant to open-plan or shared offices and any office design that was too small, lacked privacy.

For HEIs, retaining academics and faculty members is essential since many academics and faculty with specialized expertise cannot be easily replaced. Besides, primary university goals such as teaching and research would not be possible without faculty. Therefore, it is crucial to understand how academics and faculty use and perceive workspaces (Wilhoit et al., 2016), and resistance to change to any other form of design that differs from cellular offices should not be overlooked.

4.2 Cultural reasons

Changes in the academic workplace are not easy. For academics, the cell office is a coveted and strictly guarded territory. This may explain why many HEIs that have tried innovative spaces without cell offices have had mixed success (Hassell, 2020). According to Bach (2015) and Hassel (2016), academics are more resistant to change in comparison with other organizations. Also, Price and Fortune (2008) stated that academics' prevailing culture is strong and continues to be a barrier to the introduction of different working methods. In the study of Bach (2015, p. 41), respondents reported, "The academic office workplace of the future will look exactly like in the current situation; nothing will change, since academics are labeled as very conservative and stubborn, creating a resistance to change". Similarly, Hassel (2016, p. 21) stated that one respondent reported, "Academic workplace design is much more complex than commercial workplace design because the user group is so entrenched in their way of doing things in the past. Change is really dependent on the prevailing work culture."

Also, academics' change-reluctant behavior, cultural expectation of individual cell office is one barrier against a new academic workplace environment. Academics considered that individual cell office is a right and 'owned'. Moreover, the desire for individual cell offices appeared to be embedded even in the post-doctoral apprenticeship in the first stage of an academic career. Besides academics' cultural expectation of individual cell office, providing individual cell office is considered as 'tools of contract'. One case study revealed that academics expect that providing individual cell offices is part of the informal contract. 79% of those working in an individual cell office reported that providing individual cellular office was part of a contract with the university (Price & Fortune, 2008, p. 13).

Cultural resistance to changes in working practices prevails in the academic world. At the same time, there is a reluctance to give up what is "owned" and yet once experienced. Therefore, support of senior management to deliver the necessary cultural change may be required (Price & Fortune, 2008).

4.3 Hierarchical reasons

In the state of the art of the academic work environment, the hierarchy was already addressed. The academic office has been a symbol of seniority within the academic world, and hierarchy has been a determining factor in allocating offices to academics (Bach, 2015; Harrison & Cairns, 2008). According to Harrison & Cairns (2008), not only the size of offices but also office type and furniture was various depends on the hierarchical level of academics. Also, senior academics such as dean, professors have individual cell offices, whereas junior academics share offices with several people (Harrison & Cairns, 2008).

As changes in the academic workplace environment emerge, demand for equity in the quality of space is growing. Wilhoit et al. (2016) stated that some faculty wanted new offices indicating equality since

different office sizes depend on hierarchy impacts morale negatively. Hassel (2016, p. 13) reported that an open workplace could create a more equitable work environment that can “break down hierarchical structures that creates anxiety for academics who have worked hard for their seniority and status”.

However, reducing individual cell offices did not always receive support from senior management. Furthermore, hierarchy plays a significant role in the academic workplace even after workplace transformation to activity-based working (ABW) (Harrison & Cairns, 2008; Van Marrewijk & Van den Ende, 2018). Van Marrewijk and Van den Ende (2018) reported that some senior academics have their own private offices and occupy the best physical locations. Observation studies in space use revealed that senior academics like dean and professors tend to have their own private offices, whereas other academics avoid using those places, even if they are allowed to use them in principle. Unlike senior academics, student assistants, the lowest in the hierarchy, were instructed not to use one- or two-person workplaces (Van Marrewijk & Van den Ende, 2018).

Van Marrewijk and Van den Ende (2018, p. 1133) stated that “in the selection of work places a clear hierarchy of rooms related to social order could be observed; the higher in rank the more one could claim fixed, private rooms. These practices appeared to be deeply embedded in organizational norms and values”

Since senior staff demarcate a flexible workplace as their own and compel junior staff to adopt it, the organizational hierarchy continues and undermines the concept of flexible working (Van Marrewijk & Van den Ende, 2018).

4.4 Emotional reasons

Many organizational change initiatives with redesigning the physical workplace, seem to generate unintended negative consequences in terms of reduced productivity, satisfaction, and collaboration. The reason for this may be that managers overlook employees’ feelings of attachment to their workplace in the change process. Organizational change with office relocation may cause employees’ negative emotions about their workspaces, worry, uncertainty, frustration, upset, annoyance, dread, fear, and unhappiness. Besides, organizational change towards more non-territorial work arrangements such as hoteling, hot-desking seems to create identity threats for many employees. The reason for that is the confirmation of an individual’s identity may depend on their ability to personalize their workspace to highlight the central dimensions of their identity and the sense of distinctiveness in the workplace (Kromah et al., 2020). According to Kromah et al. (2020, p. 294), 37% of respondents had difficulties to connect closely to their workspaces, and they identify less with workspaces during significant organizational change. Furthermore, employees reported a loss of attachment to their workplaces and stated that they felt less valued, frustrated, and annoyed because

there was no permanent space for them (Kromah et al., 2020). Similarly, Hassel (2016) reported that academics consider that management's desire for new ways of working may devalue the academics' current work and workstyles.

As changes in a workplace environment can cause negative feelings, loss of identity in workplace, loss of attachment to workplace, less valued feeling, those can be emotional reasons for resistance to changes in academic workplace environment. Thus, consideration of academic staff's feelings, identity, and attachment to workplace, as well as support by management, are required in academic workplace change.

4.5 Conclusion

In the state of the art section, it was revealed that academic office remains traditional as individual cell office is a norm, and space is allocated on a hierarchical level. However, a movement toward a more open and flexible work environment in academic workplace is emerging to promote cross-disciplinary collaboration and interaction with students. (Backhouse et al., 2019).

This literature review determined six drivers of new academic workplace. New way of working due to technology development and cross-disciplinary collaboration drive a new workplace environment in HEIs. Also, a student-centered learning approach and evolving digital learning environment require a new workplace in HEIs. Besides, constant cost pressure in HEIs sector and low utilization in academic workplaces drive a need for space management. Generation shift also drives new academic workplace, as an academic workplace that accommodate needs and values of academics in younger generations is required. In addition, internationalization drives new academic workspaces, as attracting and retaining talented academics is increasing demands of HEIs in an increasingly competitive and globalized Higher education market. Lastly, growing demand for sustainable development and pressure to reduce the carbon footprint require HEIs to rethink the design and utilization of academic workspace (Pinder et al., 2009).

This literature review addressed functional, cultural, hierarchical, and emotional reasons for resistance to introducing new academic workplace. As a functional reason, literature reported that academics highly value the workspace qualities related to sole concentrated work. Thus, academics are reluctant to accept open-plan offices or any other form of design deviating from cellular offices (Taylor, 2016). Also, academics' prevailing culture is strong and continues to be a barrier to the introduction of new workplace (Price & Fortune, 2008). Besides, hierarchy affects the introduction of new academic workplace as a barrier and plays a significant role even after workplace transformation to ABW (Van Marrewijk & Van den Ende, 2018). Lastly, changes in a workplace environment can cause negative emotional feelings, loss of identity in workplace, loss of attachment to workplace, less valued feeling, which can create resistance to new academic workplace.

5 State of the art on hospital construction and workplace environments in hospitals

In modern healthcare, hospitals function as complex, highly productive systems that focus on the needs of the users. Given the importance of operational efficiency and the complexity of processes, hospital design must enable healing, safety and efficacy-oriented environments. In addition, regulations and cost pressures resulting from global economic and demographic trends are forcing hospitals to adopt a transformative approach to fulfill their demanding social role.

This enabling role of architecture has long been reported. However, increasing complexity is creating new challenges. This applies not only to the impact on patients, but also to the impact on staff and on the general perception of the quality of healthcare. The literature speaks of the design of a networked health-promoting environment (from English "Total Healing Environment"), in which the premises come together as a network to support the needs of the various users. In this process, relevant architectural elements such as usability, accessibility and controllability as well as spaces to improve the effectiveness of patient-staff interactions are of central importance (Perović & Krklješ, 2017). Good hospital design focuses on the relationship between the users and the building. The methods of hospital development have changed and are now focused on the essential features to make this healing environment possible. Four main topics have been identified from the literature: user-centered approaches (patients and staff), health-promoting environments, standardization and flexibility, and process-oriented planning and design.

5.1 User-oriented approaches (patients and staff)

The most important effect of user-oriented approaches in hospital development is the focus on user safety. In this respect, communication between and within groups of actors is an important variable in ensuring user safety (patient and occupational safety). In Switzerland, it is estimated that 700 and 1700 deaths per year, respectively, are due to medical errors, which in many cases are based on the interaction between people and the built environment (Kobler & Schwappach, 2017, p. 6). Other researchers point out that poor communication and team function are considered the main causes of errors (Kobler & Schwappach, 2017; Rashid, 2009; Rust et al., 2014). In addition, the effectiveness of interactions between medical staff is determined by spatial, social and clinical dimensions. Therefore, good hospital design integrates communication-regulating elements (physical proximity, immediate visual connection, verbal access) to improve patient safety, as communication can be inherently disruptive and ineffective. According to Rashid (2009), the effective communication function is a positive influence on the working practices of medical staff and even contributes to

reducing the risk of death and re-admission of intensive care patients. The literature also reports on the crucial role of design features that regulate the interaction between hospital actors and the way they behave and use space. In practice, these tactics may include physical design, location of people and activities, physical distance between staff, proximity of workspaces, spatial arrangement, visibility and accessibility (Aalto et al., 2019; Fronczek-Munter, 2017; Jensø & Haugen, 2005).

5.2 Health promoting environments

In addition to the safety-promoting elements, there are other features that make this health-promoting environment possible. The environment-related factors influencing health can be grouped into five categories. Overarching factors of workplace management, material environment (furniture, spatial organization and layout), indoor environment (air quality, acoustics, climate, light and the ability to influence or control these factors), social-spatial environment (privacy regulation, crowding, territoriality, interruptions and disturbances), services (support services and offers in the office environment that support working in the office or make work breaks more relaxing). Healthy office environments should not contain any risks of illness and should ensure the well-being of the users. Mental well-being is made up of emotions on the one hand and negative and positive evaluations on the other. The evaluations concern the satisfaction with work and the office environment. Health is also a shared responsibility between employer and employee. It is worthwhile for employees to know the competencies that help them to cope well with the demands of work and to actively develop their competencies. For example, in order to make the material and interior environment health-promoting, biophilia has proven to be a design tactic that enhances the architectural quality and thus the environment has an impact on health not only for the staff but also for the patients. From the integration of natural elements (green plants, odors, light, sound, etc.) into the interior environment to the strategic planning of the transition from inside to outside and the integration of organic forms into the design, biophilia can have different effects on the hospital atmosphere. In addition, reports from the literature show that the health-promoting properties of biophilia contribute in many dimensions: 1) improvement of indoor environment quality by positively influencing air quality, humidity, temperature and the perception and propagation of noise, 2) improvement of physiological and physical well-being by regulating stress response, increasing mental endurance, enhancing mood and arousing the senses, and 3) positive influence on actual and perceived performance and concentration (Cooper & Browning, 2015; McClary, 2015; Nieuwenhuis et al., 2014; Smith et al., 2017; Stringer, 2016; Trott, 2016).

5.3 Standardization and flexibility

Changes in technology and the continually evolving needs of users require hospitals to react quickly when adapting their infrastructure. Nevertheless, hospital planning has long been characterized by extensive planning and construction periods. Therefore, user involvement and analysis must be continuous to ensure that new hospitals meet their requirements. Standardization is one approach to ensure flexibility. The introduction of modular and standardized solutions for the functional program enables hospitals to implement a continuous improvement approach and to remain flexible. This modularity is reflected beyond the design solutions. It is not only present in the hospital design, but also in how the entire functional program of the hospital is arranged and how the individual functions come together in smaller integrated modules. This can also have a positive effect on user-friendliness, as it simplifies route finding, circulation, and localization (Aalto et al., 2019; Kobler & Schwappach, 2017).

5.4 Process oriented planning and design

A process-oriented approach is a possible approach to meet the high demand for usability in hospitals. Hospitals rely on process-oriented planning and design, in which the interaction of the process phases and their physical dimensions are analyzed to define the architectural program. Besides, the most important thing is to work towards process optimization and, at the same time, define the requirements for the new infrastructure in order to prevent the building from becoming prematurely obsolete and to prevent the building structure from impairing the functionality of the hospital.

The explanations show that the challenges, influencing factors, but also the possibilities for change are multi-layered and complex. Those responsible in practice are currently signaling a great need for know-how and scientific contributions on the topic of "New working environments in Swiss hospitals" in order to exploit possible development potential. However, organizational / administrative / communicative work as well as the rooms used for this purpose in hospitals have not yet been studied in detail. Only knowledge from classical office work and offices can be transferred to hospital work and hospital workspaces. Those responsible in practice have also come across this potential, as long-standing concepts are currently being reconsidered and new solutions sought. The reason for this is the renovation wave in the Swiss hospital landscape, which according to Medinside (2016) is underway. Currently, 70 Swiss hospitals are being planned and renovated. Over the next 15 years, almost 14 billion Swiss francs will be spent on renovations. This considerable investment sum is motivating the clients to specifically examine new requirements, possibilities and standards, especially regarding working methods and the appropriate working environment and equipment.

The medical staff's behavior in the workplace environment is characterized by short stays and the rapid change of tasks due to the distributed work. Modern hospitals are still faced with the challenge of providing staff with an environment that meets their individual needs for concentration and retreat, while at the same time making optimum use of the available space and considering their working methods. Open and flexible workplace environments can be a possible solution. Various concepts are reported in the literature: 1) so-called knowledge centers, where medical staff can easily move from patient-related areas to administrative areas; and 2) open room layouts with different functional zones for activity-oriented use. Both approaches are shown to have a positive impact on staff performance (Fröst, 2016; Pradinuk, 2014). Further success factors in the transformation of hospitals and including the workplace environment are: respecting the culture of the hospital, implementing solutions adapted to needs, interdisciplinary and participatory planning and change management processes.

6 Drivers of new office workplace in hospitals

Rapid changes in healthcare environment promote a new office workplace in hospitals. This literature review addresses various drivers of new office workplace in hospitals: Shortage of healthcare workforce, development of technologies, constant cost pressure, and need for space management, need for diverse work settings.

6.1 Shortage of healthcare workforce

The crisis of human resources in healthcare sector is a common challenge across the world (Dastmalchian & Steinke, 2017). According to World Health Organization (2006, p. 6), a global shortage of healthcare workforce is estimated at more than 4 million. Similarly, Deloitte (2019, p. 24) reported that Germany predicts a shortage of 1.3 million healthcare workforce by 2030, and a decrease in healthcare workforce has been observed in the UK. Many countries have difficulty recruiting, training, and retaining the healthcare workforce to deliver healthcare services with quality and improve people's optimal health and well-being. The drivers of workforce shortage in hospitals are various. One driver is changing health needs due to an aging population and increasing incidents of chronic disease, and another driver is changes in health system in terms of technology, financing, governance, changing consumer expectation and preference. Also, changes in the context in which health systems operate are one driver that has led the deficit in workforce shortage in health care (Deloitte, 2019). Furthermore, high rates of turnover can explain the shortage of healthcare professionals. Canada's average annual nurse turnover rate is approximately 20% per year, which means that one in five nurses leaves their job each year. Numerous studies have found that the shortage of healthcare professionals and a high turnover rate are closely related to lower job satisfaction, a higher possibility of medical errors, increased overtime, role conflicts in the unit, extended client stays, and high costs (Dastmalchian & Steinke, 2017, p. 304). To reduce high turnover rate, improving work process and optimizing work environment can be one strategy (Dastmalchian & Steinke, 2017). Likewise, DiNardo (2019) reported that healthcare organizations attempt to design appealing work areas to retain staff. Also, Mroczek, Mikitarian, Vieira, & Rotarius (2005) stated that workplace accommodating staff needs can make employees feel more supported by their physical environment and can lead to reduced turnover rates and less sick days which enable to provide continuous treatment for patient.

As improving workplace can increase healthcare staff satisfaction, retain and attract healthcare workforces, reduce turnover rates (DiNardo, 2019; Mroczek et al., 2005; Ulrich et al., 2004), demand for appealing workplace is growing to solve the shortage of healthcare workforce.

6.2 Development of technologies

Even though ‘Virtual health’ has been heralded as a driver to change the delivery of care for past decades, healthcare stakeholders have been slower to adopt than was anticipated. However, a global pandemic (COVID-19) accelerates virtual health and pushes healthcare stakeholders over the tipping point into widespread adoption of virtual health (Fowkes et al., 2020).

“Virtual health uses telecommunication and networked technologies to connect clinicians with patients (and with other clinicians and stakeholders) to remotely deliver health care services and support well-being” (Deloitte, 2019, p. 17). Virtual health aims to extend access to health services, enhance clinical outcomes, encourage consumer engagement, improve care coordination, reduce costs, and increase efficiency across the care sector (Deloitte, 2019). According to Deloitte (2018, p. 2), 23% of U.S. consumers have already experienced video visits, and 57% of those who have not used virtual health are willing to try them in the future. Not only virtual health but also telehealth and telemedicine get more attention as the way of healthcare delivery. Telehealth is a broader definition of telemedicine and includes clinical and non-clinical services by nurses, pharmacists, and social workers and others, while telemedicine is doctor-provided care via telecommunications technologies. The telehealth market doubles every four years and is estimated to exceed \$9 billion by 2024 (Radford, n.d., p. 1). Both telemedicine and telehealth promise greater healthcare access and efficiencies (Radford, n.d.). Also, various technologies are emerging in hospitals; cloud computing solutions, artificial intelligence (AI), big data analytics, robotics, sensors, internet of medical things (IoMT). Digital transformation in hospitals can shape a predictive, preventive, and personalized future, and promote closer collaboration among industry stakeholders. Moreover, it can drive cheaper, more precise, and less invasive treatments and therapies (Deloitte, 2019).

As technologies in hospitals rapidly develop and digital transformation in hospitals emerges, office workplaces in hospitals are required to adapt to these changes. For example, office workplaces in hospitals can support adopting new technology by providing enclosed telepresence rooms and space for virtual health. Furthermore, office workplaces in hospitals need to be flexible and adaptable since new technologies are emerging, and workplace needs to adapt. This indicates that current workplaces in hospitals are required to be more flexible and provide diverse work settings for various activities with developing technologies.

6.3 Constant cost pressure and need for space management

Many organizations in the healthcare sector are struggling to maintain financial sustainability in uncertain and changing environment (Deloitte, 2019). Deloitte (2019, p. 7) reported that the NHS hospital's underlying financial deficit trust was £5 Billion at the end of 2018-19, which is £0.7 Billion increased compared to the year before. In Germany, 12% of hospitals are in financial distress and

insolvency cases are rising across the sector. Similarly, US healthcare providers estimate a negative operating margin of 3.5% by 2023, based on actuarial analyses and market trends (Deloitte, 2019, p. 7). The aging population, a growing number of people with chronic and long-term illnesses, costly investment in infrastructure and medical technologies, increasing labor costs, and staff shortages are contributing factors to financial challenges in healthcare sector (Deloitte, 2019).

One way to mitigate financial pressure in healthcare sector can be reducing costs of hospital real estate. Fröst (2016) reported that a mapping exercise conducted in Swedish hospitals determined low utilization of non-care-related administrative workplaces. The frequency-of-use mapping showed that administrative workplaces in hospitals are utilized between 10%-60%, and the mean utilization is 30%. Low utilization of workplaces for indirect patient work (e.g., doctors' offices) pulls down this average utilization rate. Especially non-care-related administrative workplaces are observed used of only 10%-15% (Fröst, 2016, p. 72).

As space costs account for the majority of the secondary costs in hospitals (Blöchle & Lennerts, 2012), reducing accommodation costs such as fixed space budget and life-cycle-costs of accommodation, including maintenance and energy cost, can decrease the financial strain in healthcare sector (Van der Zwart, 2015). Thus, a new office workplace concept in hospitals is needed to enable efficient use of the available spaces, which can mitigate financial burden.

6.4 Need for diverse work settings

In today's office in hospitals, individual or shared offices are dominant, and diverse work settings are scarce (Fröst, 2016). Even though hospitals focus on designing clinical areas, their administrative workplaces remain traditional. Office workplaces in hospitals changed slower than other sectors, private offices are provided for doctors or managers, and shared office rooms or workstations are provided for other professions (Fröst, 2016). However, office workplaces in hospitals need to provide diverse workplace settings, as it is necessary to support various needs and work activities in hospitals. First, healthcare organizations can offer a quiet and enclosed place for healthcare professionals to relieve stress. Healthcare professionals are constantly faced with stress in the workplace due to large workload, being "on call", night work, sleep loss and some other reasons (Aziz, 2004; Hammouni, 2020). Also, healthcare professionals frequently encounter stressful incidents involved patient who died or were dying (Aziz, 2004). Similarly, Moores, Castle, Shaw, Stockton, & Bennett (2007) report that doctors suffer guilt, sadness, and stress with patient death.

Also, Haapakangas, Hongisto, Varjo, & Lahtinen (2018) reported that providing quiet spaces is associated with reducing occupants stress in shared offices. Thus, it can be assumed that providing quiet spaces can help healthcare professionals to relieve stress.

Besides, office workplaces in hospitals need to provide more place for collaboration and communication among healthcare professionals, as it is shown that effective teamwork and communication can reduce medical errors and improve care delivery quality (Gharaveis et al., 2018). Technologies in hospitals rapidly develop, and digital transformation in hospitals emerges, office workplaces in hospitals need to providing place supporting new technology such as enclosed telepresence rooms and space for virtual health.

Since it is necessary to support various needs and work activities in hospitals, healthcare organizations are required to provide more diverse workplace settings.

7 Barriers of new office workplace in hospitals

Healthcare sector is facing various changes such as new technologies and business models (e.g., virtual health, telemedicine). Also, more and more patients are involved in decision-making about their care, which indicates partnership-based relationships between patient and care providers (Nilsen et al., 2019).

Even though healthcare sector faces many changes, numerous literature reported that healthcare organizations are well known to be hard to change (Edwards & Saltman, 2017; Gollop et al., 2004). According to Gollop et al. (2004), it is well acknowledged that healthcare organizations have difficulties in managing change. Skepticism and resistance to organizational change is recognized as a barrier of change in healthcare organizations. Similarly, Edwards & Saltman (2017) stated that despite constant demands for improvement, managers and staff in hospitals predict that little will be different tomorrow or next year. Also, Dubois, Bentein, Ben Mansour, Gilbert, & Bédard (2014) reported that although various work reorganization initiatives in hospitals have been implemented, many failed due to change resistance.

Although it was well acknowledged that healthcare organizations are reluctant to change, there are few studies dealing with staff's responses or resistance in new workplace environment in hospitals. Nilsen et al. (2019) investigated healthcare staff's responses to organizational and workplace changes that have affected their work. The research found that many changes are met with passive resistance. Passive resistance is described as "mild opposition to changes, demonstrated by voicing negative views and considering quitting the job"(Coetsee, 1999, as cited in Nilsen et al., 2019). Passive resistance was found in the healthcare staff's complaints about changes and in consideration of quitting the job in response to changes. Even resistance was passive, respondents described how negatively spread and affect others and contribute to a culture of discontent affecting on the productivity negatively. Also, some healthcare staff expressed active resistance, stayed away from changes, or limited their involvement by ignoring the changes (Nilsen et al., 2019).

Despite lack of literature addressing staff's resistance to change in workplace in hospitals, it can be assumed that the characteristic of healthcare organizations that they are hard to change can hinder to adjust to new ways of working or workplace changes.

Besides the change-reluctant characteristic of healthcare organizations, a clear hierarchical structure in healthcare organizations can be a barrier to a new workplace environment in hospitals. According to Green, Oeppen, Smith, & Brennan (2017), hierarchy gradient in healthcare organizations is steep and influences workplace culture significantly. Hierarchy in healthcare organizations seems to influence workspace allocation as well. Fröst (2016) stated that it is dominant that private offices are provided to doctors or managers, and shared office rooms or workstations are provided to other

professionals. Even though there was no literature addressing staff's resistance to change in workplace in hospitals due to hierarchical reason, it can be assumed that the clear hierarchy in healthcare can be a barrier to new workplace in hospitals, as clear hierarchy was found in many literatures as a barrier to new academic workplace.

Besides change-reluctant organizational culture and clear hierarchical organizational structure in hospitals, our own experience in collaboration projects with hospitals ascertained potential barriers of new workplace concepts. Employees in the hospital mentioned as barriers: excessive speed, intensity and change in IT-related development (especially digitization and standardization of processes), too high risk of first-time application of new office concept (no recourse to existing experience with new office concepts in hospitals possible), too much cultural change, and financial restrictions, which could act as a hurdle to a good solution.

7.1 Conclusion

In the state of the art section, it was revealed that hospital workplaces attempt to provide safety, healing, and efficacy oriented environment. Hospital workplaces have user-oriented approaches that are relevant to both patient and staff and aim to provide a workplace environment that can support staff's behavior and work activities. Also, hospital workplaces focus on staff's health and well-being through a health-promoting environment (total healing environment) and needs to promote staff's interaction and collaboration. Besides, hospital workplaces attempt to be flexible to adapt changes quickly.

This literature review determined four drivers of new workplace environment in hospitals. The shortage of healthcare workforce increases a need for improving workplace to retain and attract healthcare workforce. Also, development of technologies requires hospital workplaces to be flexible and adaptable, and constant cost pressure in healthcare sector and low utilization in hospital workplaces drive a need for space management. Besides, the need for diverse work settings is mentioned as a driver of new workplace environment in hospitals.

This literature review addressed barriers of new workplace environment in hospitals: change-reluctant organizational culture, and clear hierarchical organizational structure, rapid change in IT-related development, high risk of first-time application, cultural change, and financial restrictions.

8 Similarities and differences between workplaces in universities and workplaces in hospitals

This literature review found similarities and differences between office workplaces in universities and hospitals. As a similarity, both academic and hospital workplaces attempt to promote staff interaction, communication, and collaboration. Interaction and communication with peers are essential within academics (Parkin et al., 2011), academic workplace focuses on providing places supporting staff interaction. Also, workplaces in hospitals need to offer more place for collaboration and communication among healthcare staff, as it is proved that effective teamwork and communication can reduce medical errors and improve care delivery quality (Gharaveis et al., 2018). The need for places to promote staff interaction requires diverse settings in both academic and hospital workplaces. Besides, both HEIs and healthcare sectors struggle with financial pressure, and space management of workplace may mitigate cost pressure, as both academic and hospital office workplaces have low utilization rates. The need for flexibility was also discussed in literature to adapt to rapid changes in both HEIs and healthcare sectors. Clear hierarchical organization structure was found in academic and hospital workplaces, and literature determined that both academic workspace and administrative workspace in hospital are allocated by hierarchical level. Especially, hierarchy in academic workplace was appointed as a barrier of introducing new workplace and plays a significant role even after workplace transformation (Van Marrewijk & Van den Ende, 2018). Besides, literature reported that both academic and healthcare organizations have a change-reluctant culture, which is another barrier of new office workplace.

Differences between academic workplace and hospital workplaces were also ascertained. Even both academic and hospital workplaces need to provide enclosed places, reasons are different. Work of academics is mainly solo concentrated work; thus, it requires enclosed offices. However, healthcare staff needs to have quiet spaces since they need a place to retreat from stressful work and to recover emotionally. Healthcare staff is continuously faced with stress as their work significantly relates to people's lives (Aziz, 2004; Hammouni, 2020; Moores et al., 2007) and providing quiet spaces is associated with reducing occupants stress in shared offices (Haapakangas et al., 2018).

Another difference between academic and hospital workplaces is the reason for retaining and attracting talents. Since the baby boomer generation is nearly 56% of academic workforce and as this cohort will retire, many HEIs have pressure to attract talents. Furthermore, increasingly competitive and globalized higher education market increase demands to attract and retain talented academics. In contrast, the shortage of workforces is a common challenge in healthcare sector globally, regardless of influx of foreign workers. The higher turnover rate which is related to lower job satisfaction can explain the shortage of healthcare workforces.

8.1 Conclusion

Many abovementioned drivers of a new office workplace in universities and hospitals suggest that Activity-Based Working (ABW) can be appropriate for academic and hospital workplace. ABW is one of the most recent innovative workplace designs and has been the trend in office design in the past few years. ABW is a concept that requires the workspace layout accommodating various work activities (Candido et al., 2016). The key principles of ABW are a provision of a variety of work setting in order to support different tasks optimally, unassigned and shared desks, supporting technology that enables mobility and/or supports mobile working, centralized storage, and inclusion of zoning and/or neighborhoods (Candido et al., 2019). Some reasons underpin the argument that ABW can be appropriate for academic and hospital workplace. First, ABW is acknowledged to improve staff interaction, communication, and collaboration. As employees are no longer confined to a designated location, ABW has the potential to improve teamwork, interaction, and collaboration between co-workers, and contributes to cross-departmental collaboration (Kim et al., 2016). Similarly, a systematic review of Engelen et al. (2018) reported strong positive effects of ABW in interaction, communication, and collaboration, which were reported in 12 out of 17 studies. Since the literature review found that both academic and hospital workplaces focus on promoting staff interaction, communication, and collaboration, it can be assumed that ABW can be appropriate in academic and hospital workplaces.

Second, ABW provides quiet rooms or small enclosed offices which can support academic's and medical staff's solo concentrated work, as well as help healthcare professionals to reduce their stress load.

Third, ABW has positive effects on staff's health and is aligned with the 'health-promoting environment' in hospital workplace. Previous literature found that ABW had positive influences on staff's perceived health, sick leave, sedentary time, and intensity of physical activity in workplace (Arundell et al., 2018; Candido et al., 2016; Danielsson & Bodin, 2008; Kim et al., 2016). As demand to promote staff's health is growing in hospital workplace, implementing ABW can be suitable for a new workplace concept.

Fourth, ABW has the potentials to save costs in office space by reducing occupied space per person. Observation of occupancy in traditional offices show that standard workstations are occupied for less than 70% of the time (Windlinger Inversini et al., 2016, p. 4). Many organizations, therefore, have started to share workplaces and most ABW offices have workstation to employee ratios of 0.7-0.8. ABW thus contributes to cost-saving in office space, including not only reduced space but also general and technical services, and organizational improvement to enhance the efficiency of costly resources (Engelen et al., 2018, p. 1-2). The literature review determined that both, HEIs and healthcare sectors struggle with financial pressure and have low utilization rates of workspace. Furthermore, HEIs have a growing demand for sustainable development and contribution of carbon reduction commitment. Since occupied space per person can be reduced in ABW, introducing ABW may mitigate financial pressure, improve utilization of workspace, and enable sustainable development in HEIs and healthcare sectors.

Lastly, ABW is adaptable and flexible to change. Kim et al. (2016) reported that ABW workplaces are more responsive to organizational change, such as expansion, downsizing, or change in a team structure. By depersonalized workstations in the desk-sharing environment, relocating staff can become easier (and cheaper) compared to conventional workplaces (Kim et al., 2016). The literature review addressed the need for flexibility and adaptability of workplaces due to changes such as a new way of working, technology development, and new communication methods. As ABW is flexible to change, implementing ABW can be helpful to keep academic and hospital workplace flexible and adaptable to changes.

The abovementioned reasons underpinned why ABW is suitable for academic and hospital workplace. To evaluate the suitability of ABW as a new workplace concept of academic and hospital workplace, interviews with workplace practitioners in academic and hospital workplace will be conducted as the next step.

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