Seating preference analysis for hybrid workplaces

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ABSTRACT
Due to the increasing nature of flexible work and the recent requirements from COVID-19 restrictions, workplaces are becoming more hybrid (i.e., allowing workers to work between traditional office spaces and elsewhere including from home). Since workplaces are different in design, layout and available facilities, many workers find it difficult to adjust accordingly. Eventually, this impacts negatively towards work productivity and other related parameters including concentration, stress, and mood while at work. One of the key factors that causes this negative work experience is directly linked to the available seating arrangements. In this paper, we conduct an analysis to understand various seating preferences of 37 workers with varying demographics, using the data collected pre-COVID-19, and analyse the findings in the context of hybrid workplace settings. We also discuss a list of implications illustrating how our findings can be adapted across wider hybrid work settings.

KEYWORDS
Hybrid workplace, seating preference, work from home, work productivity

1 INTRODUCTION AND BACKGROUND
The concept of hybrid workplace is to remove physical barriers among teams by allowing employees to choose to work however and wherever they feel most productive. Workers in a hybrid setting are a mix between co-located and remote workers, (i.e., they spend part of their time working in the traditional office and part of their time working elsewhere) [5]. This trend shift in work arrangements is typically associated with a drive towards business efficiency: saving space, reducing costs and accommodating growing teams [19]. At the same time, prior research highlights additional employee-focused benefits associated with hybrid work settings when workers share their office spaces. This includes greater worker satisfaction [4, 11, 22] and more flexibility in the way they perform their work [6, 15]. The shared workplace also has the potential to enable the exchange of knowledge more effectively among colleagues [11, 12, 16], which can enrich their respective skills and potentially lead to greater work productivity [4]. However, it must be acknowledged that several studies have identified a number of problems [9, 17] associated with shared offices such as increased distrust, distractions, and uncooperative behavior. To measure the success of hybrid workplaces, both active and passive sensing have been used to monitor employees’ organizational behavior [18] and workplace interactions [2, 3, 8, 13, 14]. The outcomes of this research can help better understand the emotions, productivity and team dynamics of employees, which could lead towards overall organizational success.

The majority of previous research primarily investigated various pros and cons of workplaces, but the factors linked to potential limitations of hybrid work settings caused by the real-world work conditions remains under-explored. For instance, due to the current COVID-19 crisis, workers may need to move between home offices and their traditional places of work maintaining staggered timing and social distancing rule imposed by many countries. This new normal forces workers to adjust to different workplace designs, layouts and facilities available which may incur a trade-off with workers’ preferences such as preferred seating arrangement which is very crucial for many workers. In our recent research, we characterised concentration during work based on physical and ambient sensor data including air quality, temperature, humidity, movement, and noise [19]. We also found that the unavailability of preferred seating arrangement at workplace can increase perceived stress and reduce concentration levels of workers while at work. But what preferred seats look like to different people was not characterised. Also, the meaning of preferred seating arrangement is not heavily investigated by recent literature. Therefore, the identification and implications of seating preferences when people choose to work in a hybrid work setting due to COVID-19 crisis is very timely to analyse.
In this study, we investigate what a 'preferred seating' might look like and discuss a set of constraints associated with work productivity, by analyzing a dataset collected pre-COVID-19 from participants with diverse job roles. We present a list of implications leveraging our learning from the past. We also discuss how modern hybrid workplaces would be challenged and could overcome some of the key challenges while meeting these seating preferences and productivity constraints at work, especially given the current and post-COVID-19 crisis situations.

The organization of this paper is as follows: Section 2 discusses the dataset and analyzes seating preferences along with constraints of work productivity; Implications of our research are discussed in Section 3; Finally, the paper concludes in Section 4.

2 SEATING AND PRODUCTIVITY AT WORK

In this section, we discuss a diverse set of seating preferences and several constraints that could influence workers’ productivity. To analyze seating preference and productivity constraints, we built a dataset of 37 volunteer participants at Arup, Melbourne. The dataset was collected in May 2019. This research was approved by Human Research Ethics Committee of RMIT university, Australia. For data collection, we designed a survey in consultation with professional behavioural scientists. We logged responses by asking participants about their preferences related to seating arrangements while performing their work-related tasks. The participants also reported what influenced their perceived work productivity. The participant statistics and responses are analyzed in the following subsections. Note that the pilot site is a traditional open-plan office who practices activity-based working. Since this is not a cubicle or room based office, there is no boundary among seats. Hence, many of the analysis could potentially be applicable to the home office setting as well.

2.1 Participant statistics

The participants in our collected dataset are from a diverse professional backgrounds including mechanical engineers, structural engineers, building scientists, electrical engineers, acoustics and lighting professionals. In our participant cohort, the male and female proportions are 56.75% and 43.24%, respectively. As shown in Figure 1(a), they are aged between 18 and 65 years, with a major portion of participants from 26-35 years age group. The length of service as a professional was also captured. As illustrated in Figure 1(b), the service length of a large proportion of participants (i.e. 59.46%) is under three years. A proportion of 21.6% participants reported that they have worked for more than 10 years in this organization.

2.2 Analyzing seating preferences

A list of seating preferences is given to the participant to select, and they are also allowed to specify their preferences if it was not in the list.

As shown in Figure 2, all participants indicated that they have at least one preference, as "no preference" contributes 0%. We found that 83.78% of participants wanted to sit close to their team members. This is likely due to the fact that these workers need to interact with their team members while performing their work-related tasks. The participants also reported what influenced their perceived work productivity. The participant statistics and responses are analysed in the following subsections. Note that the pilot site is a traditional open-plan office who practices activity-based working. Since this is not a cubic or room based office, there is no boundary among seats. Hence, many of the analysis could potentially be applicable to the home office setting as well.
schools have been in place in Australia to avoid crowding situations on public transport and workplaces [21]. If employees need to do
hot-desking or share common spaces, frequent cleaning needs to be
carried out along with allowing only one person in every 4m²
space
. Given the decreased room capacity due to social distancing
and staggered timing requirement caused by COVID-19 crisis, hav-
ing the all team member being present in the room or nearby would
be much more challenging. To support staggered times of entry and
exit to/from the workplaces, future research could develop solutions
by formulating this problem as a new combinatorial optimisation
problem. Another direction of research is to develop personalised
recommender systems for suggesting a group of workers requiring
entry to the workplaces based on their specific work requirements.

Next, “close to the window” and “in an open area” followed in
preference, which accounted for more than 70.27% and 32.43% of
responses, respectively. This is likely driven by the preference that
many workers prefer to have some amount of natural lights dur-
ing their working hours [7]. Many modern offices are designed to
provide its occupants with enough open areas. However, offices
may find it challenging to arrange seating near the windows if the
number of people with such preference is very large. In our dataset,
a significant proportion of workers preferred to sit close to their
managers or close friends. This may be important for some workers,
however, it is not always easy to allocate workers with such seating
arrangements due to the similar reasons as stated above. If some-
one needs to work from home, this closeness with team members
may not be possible physically, however, could be replaced with
technologies such as online chatroom.

A small proportion of participants (16.22%) chose to specify their
preferences, which is called as “Other”. These includes adjustable
sit/stand desk, desks with one or more large screens, and desks with
good/clean keyboard and mouse. These may indicate the variable
nature of preferences that could be very important to conduct some
specific tasks as part of the nature of their job, or a requirement
from an occupational health and safety point of view. For instance,
one engineer specified seats “wider/multiple screens”, which might
be because they need to perform extensive drafting and analysis
and feel comfortable with wider screens or a seating that provides
multiple screens. Participants might also have pre-existing medical
conditions that mean that height adjustable desks are required to
ensure they don’t get injured, or worsen their existing conditions.

2.3 Analyzing productivity constraints

Figure 3 shows the participants’ identification of constraints to the
work productivity. It is found that seating arrangements can influ-
ence the work productivity of workers. Specifically, 18.92% of
our participant workers reported that preferred seating arrange-
ments effect their productivity at work. Another important point
which could directly be linked to seating arrangement is the face
to face communication with colleagues during work hours. In our
participant cohort, 78.38% reported that there is a direct association
between face to face communication with colleagues and their work
productivity.

3 CURRENT AND FUTURE IMPLICATIONS

Seating arrangements and open plan offices have a direct impact
on workers’ productivity at work. Open-plan offices are usually noisier than tradi-
tional office arrangements as reported by previous literature [10].
Surrounding noise can cause distractions, and have an impact on
the overall perceived concentration abilities of people [1, 20]. In a “working from home” context, it is reasonable to assume that dis-
tractions with kids playing around, or family members doing other
activities would have the same impacts on concentration. Figure 3
shows that 64.86% participants in our study reported this issue as a
constraint to their work-related productivity.

Figure 3: Distribution of productivity constraints

In hybrid workplaces, noise can have a negative impact towards
work productivity. Open-plan offices are usually noisier than tradi-
tional office arrangements as reported by previous literature [10].
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constraints are more associated to how meetings and project re-
sourcing are managed, rather than comfort factors. In addition to
these design factors, the dataset suggests the importance of human
resource management and developing structures and systems to
limit project numbers and meetings for each worker.

In a post-COVID-19 society, it is likely that working from home
will become more commonplace. Ensuring home-based seating con-
fugations are optimised for each employee will become critical for
managing productivity despite employers having limited control
over these arrangements. This research has identified factors re-
lated to seating preferences and productivity at work using a dataset
collected in pre-COVID-19 times that can be actively considered
to address this issue. Regular team meetings via video conference
for connectivity and human resource/project management have
been identified as critical enablers and barriers to productivity. Uti-
limately, working from home arrangements can create the flexibility
and opportunity for employees to tailor their spaces beyond nor-
mal levels. Therefore, hybrid workplaces where more people will
continue working from in the future can presents an opportunity
for employers to improve their workers’ AZ concentration and productive levels beyond what is possible in a commercial office.
Individual workers can track their own constraints using latest
technologies such as pervasive sensing based data collection and
machine learning of their physical work environments [19].

Moreover, the research presented in this paper will direct to
future research in the areas of workplace recommender systems,
constraint-based optimisation of work related preferences, and
human-computer interactions which would lead the development
of new interfaces for digital and physical workplaces.

4 CONCLUSION

This paper discusses various seating preferences and highlighted
how it can impact the work related productivity of workers in a pre-
COVID-19 workplace. From the analysis of our dataset collected
from 37 participant workers, we found that everyone had at least
one seating preference. A majority of the participants reported that
a lack of seating arrangement of their preference can directly affect
their work experience and overall productivity. We also discussed
a list of current and future implications of our findings including the
need for adaptation to home-based seating arrangements through
seating configuration optimisation as working from home will be
more common during and post-COVID-19 society.

We also discussed directions to future research by developing
combinatorial optimisation solutions for staggered entry and exit
to/from workplaces. This solution could be leveraged to develop effi-
cient group recommendations for staggered entry to the workplaces.
Future research also could investigate the effectiveness of adaptive
seating preferences through the identification of employees’ con-
centration, stress and productivity to provide better work support.
To better understand individual requirements and enhanced work
productivity, pervasive sensing and machine learning technologies
developed for traditional workplaces could be transferred to work
from home settings.

ACKNOWLEDGMENTS

This research was supported by Arup and RMIT Enabling Capability
Platform through the provision of an “Opportunity Funding” scheme
(no. 17073).

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