# WORK-FROM-HOME INFLUENCE ON THE COMMERCIAL OFFICE DEMAND: EVIDENCE FROM KLANG VALLEY AFTER THE PANDEMIC

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DECLARATION

I hereby declare that:

(1) This Research Project is the end result of my own work and that due acknowledgement has been given in the references to all sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

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| | |
|---|---|
| DOS | Department of Statistics |
| EPRA | European Public Real Estate Association |
| EASHW | European Agency for Safety and Health at Work |
| GLC | Government-linked Companies |
| JLL | Jones Lang LaSalle Incorporated |
| JPPH | Jabatan Penilaian Dan Perkhidmatan Harta |
| MCO | Movement Control Order |
| MNC | Multinational Companies |
| NWW | New Ways of Working |
| OECD | Organisation for Economic Co-operation |
| REIS | Real Estate Intelligence Services |
| REIT | Real Estate Investment Trust |
| RII | Relative Importance Index |
| SARS | Severe Acute Respiratory Ayndrome |
| VoIP | Voice Over IP |
| WFH | Work-From-Home |
| WHO | World Health Organization |

# ABSTRACT

The challenge of surviving in a highly competitive office market has become even greater as the Klang Valley now faces an overwhelming amount of vacant commercial office space due to the continued decline in occupancy rates, along with work-from-home (WFH) emerging especially after the introduction of Covid-19 pandemic. Thus the paradox situation trigger the need for this paper to identify the main driver and main obstacle influencing the practice of work-from-home toward the commercial office demand. Moreover, this paper also to rank the function of commercial office space after the pandemic. The use of survey questionnaires for data collection is consistent with the chosen research methodology of a positivist and deductive approach with a quantitative research design for this paper. The researcher used the SPSS statistical software and Microsoft Excel for data analysis. There were 250 survey were distributed through Google Form and only 103 survey is returned with valid answers. Next, these feedback comprise of 22 measurement variables within 5 different factors that helps further describe the research question. In the end, the main driver influencing the practice of work-from-home toward the commercial office demand which has concluded in this paper is home office design factor. This paper reported that the improvement in home design associated with the emerging of home office awareness, such as a dual key concept where a unit for family-living purpose while another unit for workplace purpose, or dedicated room for office use in a residential property, has created a stronger driver on influencing work-from-home practice affect the commercial office demand in Klang Valley. Another key fact to remember is, the job characteristics factor is the main obstacle thereby. The higher substantial of the concentration work (i.e. heavy paper work) for a commercial office space user, the poorer of the obstacle force he facing in response to the work-from-home practice, could possibly reduce the demand toward the physical commercial office. Lastly, the commercial office space after the pandemic will be transform as the privileged site for (1) brainstorming and collaborative activities, (2) new hires on boarding, and (3) talent development, rather than the sole place where intend to (4) increasing productivity, (5) building community forming, and (6) use as meeting space.

# CHAPTER 1

# RESEARCH OVERVIEW

## 1.0 Introduction

This chapter will provide the reader of a brief introduction about the subject, outline the problem statement, describe the reason underlying why it is relevant and important to explore. Apart from this, the chapter also includes the objective and significant of this paper, address the research questions, and an explanation of the chapter layout.

## 1.1 Research Background

Predicting the amount of commercial office space for the companies future need is a challenging strive from the outset because it entails foreseeing workforce expansion and its character shift.

To restrain the spread of Covid-19, the Malaysian government has implemented the Movement Control Order (MCO) since March 18, 2020. The order included the closure of public and private institutions, except for some essential services, and the freeze of most economic activities in the country (Karim et al. 2020).

Social and physical distancing is the 'new normal' with the extension of the MCO. Even after the MCO is lifted, whilst work-from-home (WFH) working models are gaining traction because companies and workforce have found it beneficial. With fewer workforce in the commercial office at the period of endemic, how would this impact toward the demand of commercial office?

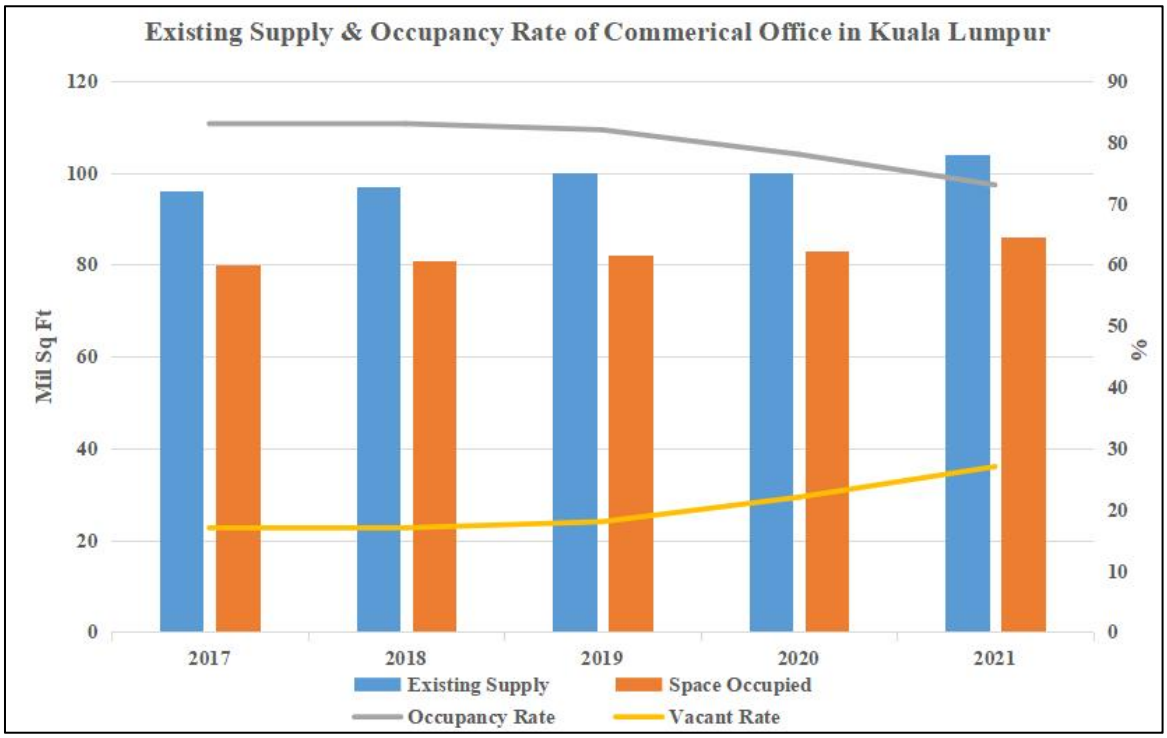
A study by Rahim & Co Research about the commercial office industry in the Property Market Review Report 2021/2022, revealed that challenges remain in terms of commercial office rent growth continued in 2021, coupled with a excess of new supply. With office supply in the Klang Valley including Kuala Lumpur and Selangor, was exceeding 140 million square feet. Likewise, the completion of six additional commercial office buildings located at Kuala Lumpur in the same time, approximately 2.8 million square feet, will heighten supply concerns. It is worth noting that Klang Valley expects to add another 5.2 million square feet of office space in 2023, including the iconic Merdeka PNB 118 tower.

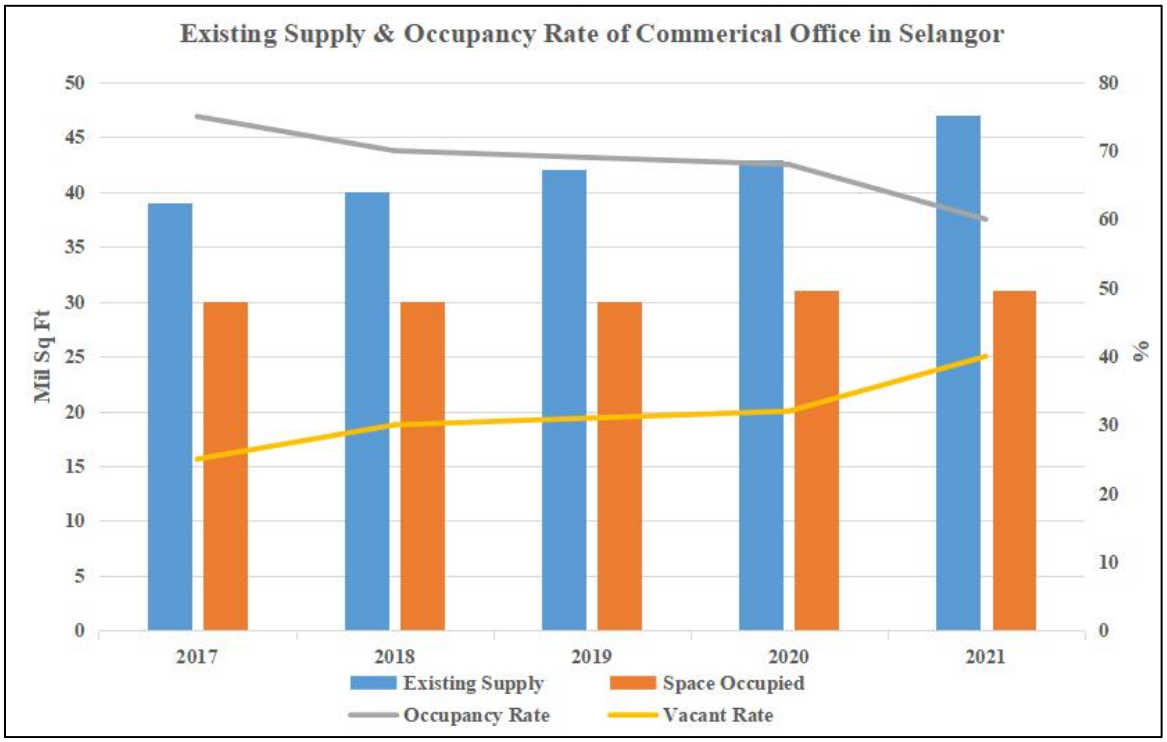
As the capital of Malaysia, Kuala Lumpur has the largest supply of office space in commercial office buildings among all states, reaching 104.39 million square feet in the first half of 2021 with an occupancy rate of 73.8 percent. Although commercial office space has increased, occupancy performance has suffered after falling from 77.2 percent in first half of 2020 and inclining in that direction since 2018. The destructive pandemic has aggravated an already challenging market environment as companies are now forced to re-evaluate their workplace practices and commercial office strategy plan to operate efficiency in a post-pandemic (a.k.a endemic) environment.

On the other hand, Selangor's commercial office market faces similar challenges to the other half of the Klang Valley as competition gets tougher with declining occupancy rates and an increasing supply of commercial office space. In the first half of 2021, commercial office supply in Selangor stood at 46.14 million square feet with an occupancy rate of 60 percent, as a matter of fact, a further decline from 68 percent in the first half of 2020. At this occupancy level, there is 14.57 million square feet of vacant space in Selangor. Additional pressure on market absorption of office space is exerted by the 4.44 million square feet of new commercial office space currently in the pipeline as of first half of 2021 (JPPH and Rahim & Co, 2022).

Such a circumstance that leads toward the picture referred to the decrease in office rents is forecast to grow, due to a decrease in demand, vacant office space and the continuous movement to WFH which is cost-saving for officer user.

Figure 1.1 Existing Supply & Occupancy Rate of Commercial Office in Klang Valley including Kuala Lumpur and Selangor from 2017 to 2021




Source: JPPH (2022). Annual Property Market Report 2021; Rahim & Co Research (2021). Property Market Review Report 2021/2022.

Hence, the main objective of this paper is to discover the impact influenced by Covid-19 pandemic for the commercial office space demand from different perspective including of (1) productivity, (2) office automation, (3) home office design, (4) job characteristics, and (5) reaction by employer-employee, specifically for the Klang Valley context. This pandemic has new form of impact to the future working style from the viewpoint of workforce, also known as respondent, through the quantionaire survey which explain further at chapter 3. It is crucial for the real estate research to understand the commercial office outlook possibly changes due to this latest pandemic, and that is why the quantionaire survey scope is enlarged to time after the pandemic, means phase of endemic.

## 1.2 Problem Statement

The challenge of surviving in a highly competitive office market has become even greater as the Klang Valley now faces an overwhelming amount of vacant commercial office space due to the continued decline in occupancy rates; not including the future injection of another commercial office buildings (refer figure 1.1).

Hence, along with work-from-home (WFH) emerging especially after the introduction of Covid-19 pandemic, there is fresh viewpoint related to the positive and negative consequences about commercial office space prospect and the company wish to mitigate risks in a post-pandemic (a.k.a endemic) environment. An example of this is, if a company accepted that half of its work output could be done from home in most cases, the need to travel to the physical commercial office for reporting and duty are located becomes lessen, subsequently, the companies has a significant justification to use a commercial office space that is available whereby empty for other purpose, or downsizing the commercial office space itself. This will result in lower commercial office space demand and annual rent payable overall (Tumin, 2020).

In addition to the growing mismatch between supply and demand in the commercial office market, the resurgence of the Covid-19 cases is further weakening leasing activity as more companies review or rethink the commercial office space demand related decisions to strike a balance between promoting growth and maintaining cost efficiencies.

Thus, this paper will gives good information to understanding the drivers and obstacles contributed the deployment of WFH, as well its challenge and opportunity not only in commercial sector, but also in another sector, such as residential sector. In addition, this paper will address the possibly function of physical commercial office in future for Malaysia's Klang Vally landscape, with summary of the respondents for the stakeholder (i.e. officer building owner/tenant) choose to response the shift of commercial office demand in the most effective way possible.

## 1.3 Research Question

The research question in this paper will be classified RQ1, RQ2, and RQ3, and also addressed to by these names in the following part of this paper. The research questions in this paper are:

**RQ1:** What are the main driver towards increased work-from-home from the perspective of workforce?
**RQ2:** What are the main obstacle towards decreased work-from-home from the perspective of workforce?
**RQ3:** What is the main function of commercial office space after the pandemic because of the practice of work-from-home (WFH) model?

## 1.4 Research Objective

In answering these research questions, the following research objectives, denoted RO1 and RO2, will be the establish for assessment and research exercise in this paper.

**RO1:** To recognize the main driver and main obstacle influencing the practice of work-from-home toward the commercial office demand in the context of Malaysia's Klang Valley.

**RO2:** To rank the function of commercial office space after the pandemic because of the practice of work-from-home (WFH).

## 1.5 Significant of the Study

This paper highlights the importance of this paper in providing a better understanding of the relationship between commercial office demand and the determinant factors influenced by the work-from-home perspective. While previous studies have focused on the advantages and disadvantages of WFH and the global commercial office outlook, furthermore, this paper specifically examines the commercial office landscape in Malaysia's Klang Valley.

The theoretical framework and key findings developed in this paper can be leveraged by researchers and practitioners in other capital cities as well, such as Jakarta at Indonesia, providing a foundation for further research and analysis.

Additionally, the key findings of this paper can serve as valuable insights for policy makers, urban planners, and real estate developers in planning commercial office pricing strategies to achieve desired results and competitive advantages based on predictable demand influenced by the post-pandemic era. Overall, this paper has the potential to inform and shape both academic and practical perspectives on the future of commercial office space.

## 1.6 Research Flow

The approach to finding evidence to answer the research questions was to conduct a survey following a comprehensive literature review of previous work on the topic.

The literature review is an essential component of any research project. The purpose of the literature review is to gain a deeper understanding of the topic at hand, to show an understanding of the theories, concepts, ideas, issues, and debates surrounding the topic,

which including of (1) productivity, (2) office automation, (3) home office design, (4) job characteristics, and (5) reaction by employer-employee.

In this paper, the research questions are focusing in the way of descriptive approach and therefore the quantitative research method has been adopted. Therefore, a Likert-scale survey is well suited for explaining the large phenomenon that is a strong recommendation for working from home due to the impact of the Covid-19 pandemic, which has only been ongoing for a little over a year and has impacted the commercial office landscape. This type of approach also provides good information about the mindset of end users who planned to move into a new office in the future,such as the main function of the commercial office in the future.

Finally, the paper ends with the main findings that summarize the results as objectively as possible. Conclusions are drawn to answer the research question based on these key findings, followed by suggestions for further researchers.

## 1.7 Chapter Layout

This paper consists of a total of five chapters, which are structured as follows.

**Chapter 1:** This chapter serves as an introduction to the research study, providing readers with a clear understanding of the purpose and significance of the research. It begins with a background of the study, outlining the context and relevance of commercial office space in the pandemic era. The problem statement and research objective are then presented, highlighting the need for research, explaining the specific goals and aims of the study.

**Chapter 2:** This chapter provides a comprehensive review and discussion of existing literature on commercial office space from researchers and industry professionals to avoid bias. Based on this literature, a theoretical framework is proposed as the backbone of the study, and hypotheses are developed to guide the research process.

**Chapter 3:** This chapter describes and explains the research methodology, questionnaire design, execution plan to distribute the questionnaire, instruments survey specifically, and procedures of data collection as well as the mathematics analysis in brief undertaking afterward.

**Chapter 4:** The results of the study are presented objectively and discussed inclusively in detail, further input with the viewpoint by these previous studies, means to explain with curiosity, rather than having a preset preference to avoid alienating potential reader of this paper.

**Chapter 5:** This chapter summarizes the key findings of the study and provides suggestions for future research implications, limitations of the study, and overall conclusions regarding the commercial office space relevant topic discussed in this paper. This chapter aims to answer the research questions posed in chapter 1 and provide valuable insights for academics, practitioners, and policymakers in the field.

## 1.8 Conclusion

In a nutshell, the goal of this paper is to determine and examine the influence of work-from-home (WFH) on commercial office demand, as well as if there is a relationship between commercial office demand and WFH arrangements. This chapter establishes the groundwork for the rest of the investigation, explaining the research problem, justification, and research question, as well as the research goal that this study wants to attain. The remaining chapters will cover the technical aspects of the investigation's methodology, survey data analysis once the data has been acquired, limitation, suggestion for future researcher, and concluding the paper with a conclusion.

# CHAPTER 2

# LITERATURE REVIEW

## 2.0 Introduction

This chapter provides a comprehensive review and discussion of existing literature on commercial office space from researchers and industry professionals to avoid bias. Based on this literature, a theoretical framework is proposed as the backbone of the study, and hypotheses are developed to guide the research process.

## 2.1 Work-from-home and its Growth Trends

In the early 1970s, there is none of the conceptual related to the work-from-home (WFH). A spark created since the terms "teleworking" were coined by Jack Nilles, also knows as father of teleworking, in year 1973 (Jack, 2022). In 1979, five IBM employees were allowed to work from home as an experiment. By 1983, the experiment was expanded to 2,000 people (Useem, 2017).

In the 1990s and 2000s, remote work became facilitated by technology such as collaborative software, virtual private networks, conference calling, videotelephony, internet access, cloud computing, voice over IP (VoIP), mobile telecommunications technology such as a wi-fi-equipped laptop, tablet computers, smartphones, desktop computers, Microsoft Teams, Google Meet, and WhatsApp. Many startups, such as

Google, were founded in the houses of entrepreneurs who lacked financial resources. Afterwards, this trend of "teleworking", also called official as work-from-home (WFH), where distance work is an employment arrangement in which employees do not commute to a central place of work, such as an office building, warehouse, or retail store. Such force also lead to the development of coworking space.

However, WFH also come along the risks such as (1) hindering knowledge sharing, (2) work intensification, (3) hindering teamwork collaboration, (4) create work-family conflict, especially for women, (5) task-related stress, and (6) exhaust of the resources at home (Sarker, 2012; Kelliher and Anderson, 2010; Baruch, 2000; Pearlson and Saunders, 2001; Pyoeriae, 2011; Sullivan and Lewis, 2001; Konradt et al., 2003). To offset these negative effect along the WFH process, even before the pandemic, an increasing number of companies embrace the trend of flexible working style, including created new workplaces, such as open space concept in the office, and other minor entertainment spaces that provide a supportive brain-storming ecosystem of services, notably google-like office (Liegl, 2014; Kojo, 2015; Di Marino, 2018). Correspondingly, the Pinterest made a groundbreaking decision to further promote this kind of flexible working style, meas they are terminating a lease in San Francisco to encourage a pattern namely "more distributed workforce" through new ways of working policy, whereby work-from-anywhere ideology is a main component (The Economist, 2020).

The positive effect of WFH are recognized in a variety of literature reviews, including (1) lowering costs either incur either from corporate level or labour level, (2) promote autonomy that allowing workers to choose where and when they work, (3) improving morale and confidence, (4) increasing productivity and output, and (5) reducing travelling time and commuting stress (Gregg, 2011; Morgan, 2004; Gajendran and Harrison, 2007; Pyoeriae, 2011; Wheatley, 2012; Bloom et al., 2015; Clark et al., 2020). In general, organizations that have had positive experiences with WFH prior to the pandemic have.

During the beginning of the Covid-19 pandemic, millions of workers began WFH model for the first time. Nowadays, in the period of endemic, either theoretically or practically, the new ways of working (NWW) come under the sport light, not only the emergence of digital network infrastructures enables the flexibilization of work practices (Castells, 1996), but also the change in philosophy from a control-based approach to trust-based

approach (Derix, 2003), where transformation of the space design also take place. As proof, intermediary spaces (i.e. guest waiting area in office) would no longer be conceived as mono-functional (transport) spaces, but were turned into useful informal lounge areas or dedicated shared space to facilitating teleworking activities. In other word, the innovated office design after pandemic included the clustering of WFH activities and the use of open staircases for the vertical integration of teleworking facilitate areas.

In brief, the latest commercial office space strategies have been differentiating around three main workplace practice:

(1) work from the office all the time – traditional way of working
(2) work-from-home (WFH) all the time – teleworking
(3) multi-location work – also called smart working (Gastaldi et al., 2014; Iannotta et al., 2020) or new ways of working, also known as NWW (Engelen, 2018)

It is important to note that the adoption rate of work-from-home varies significantly across different national or geographic areas. Before the Covid-19 pandemic, the United States and European Union had an average work-from-home rate of 35 percent to 45 percent, with some countries such as the Nordic countries having a higher rate of above 50 percent, while others like Italy and Portugal had a lower adoption rate of 25 percent (OECD, 2020).

According to Leesman (2017), only 30 percent of workers had experience with mobile-based workplaces, working outside of their headquarter office, while the remaining 70 percent had a traditional workplace. This highlights the need to consider the unique patterns and preferences of each geographic area or country when examining the impact of work-from-home on the demand for commercial office space.

During the initial stage of the Covid-19 pandemic, for the United States context, Brynjolfsson et al. (2020) report that nearly half of the individuals they surveyed said they were working from home during the first week of April 2020, while Bick et al. (2020) report that 35 percent of their United States respondents worked entirely from home in May 2020. The Decision Maker Panel, an entity set up by the Bank of England, conducts a real-time survey of U.K. firms in the 2020 and shows that 37 percent of employees were

reported to be working from home in both April and May 2020. To the best of author knowledge, there is limitation of the research related to the WFH presentation rate to carry out the useful comparison between period of before pandemic, during the pandemic, and post-pandemic (a.k.a endemic) among western country (i.e. United States or European Union) for insight generating. However, based on theses research outcome above-mentioned, both of WFH presentation rate shown at 35 percent to 45 percent, either before pandemic and at the time of pandemic, doubtless there is dynamic factor may investigate further to check out influence by various aspects, such as human right perception, law enforcement, job nature and other.

Consider the situation of eastern country and focus on Malaysia context as research need in the paper, the Department of Statistics (DOS) recently published findings from a study on the effects of Covid-19 pandemic toward workplace outlook when the Malaysian government has introduced the Movement Control Order (MCO) on 18 March 2020. Although the results of the survey are non-representative as it was based on convenient sampling, its found that 44 percent of workers were found to work from home due to the crisis. This research highlight that close to half (49 percent) of private sector workers were working from home, and the shares were higher for workers of multinational companies (MNC) and government-linked companies (GLC). Hence, it concluded that WFH is uncommon among vulnerable private sector workers.

However, the WFH presentation rate by Malaysia is comparatively similar with the result set out by western country (i.e. United States or European Union) based on the research mentioned thereon, notably at the time of pandemic. In other word, WFH is uncommon practice by both of these countries.

Nonetheless, the WFH practice can be viewed through a very different lens generally, that is (1) as a cutting-edge practice with the potential to ease a range of contemporary social problems, (2) by increasing the efficiency of large organizations, (3) by encouraging new businesses, and (4) by supporting economic activity among marginal members of society (Holliss, 2015).

## 2.2 Impact toward Commercial Office during the Covid-19 Pandemic

The Covid-19 pandemic has prompted many government agencies to propose guidelines for ensuring the safety and health of workers in commercial offices. The World Health Organization (WHO, 2020) has produced a workplace measure that includes up-to-date information on the virus, management of workplace activities in emergency cases, and measures for controlling the behavior of office workers. The European Agency for Safety and Health at Work (2020) has also published a guide for workplace risk assessment in both physical and psychosocial environments, emphasizing the need for risk assessment to consider long-term workplace resilience and involve a special group of workers as leaders. The Malaysian National Safety Council (2020) has provided detailed recommendations for employers to mitigate the negative consequences of the Covid-19 pandemic in the workplace.

In addition, real estate consulting companies and professional groups have used their knowledge and resources to provide global standards for workplace professionals to follow during the pandemic's lockdown situation. JLL (2020) has identified eight phases of workplace management since the outbreak of the Covid-19 pandemic, including shock, realization, response, workplace continuity, re-entry, re-imagination, implementation, and flourish. Many organizations have officially entered the fourth phase of "re-entry" after developing a continuity plan for the new normal, but the "re-imagination" phase presents many uncertainties in the post-Covid-19 pandemic period.

The National Institute for Occupational Safety and Health (NIOSH, 2015) has developed a "hierarchy of control" that is commonly used to manage workplace hazards. This framework as below has provided the practical guidance for organizations to prepare for and control workplace hazards, including five levels of control measures ranging from most effective to least effective.

(1) erase, like stay-at-home order for positive employee;
(2) substitution, like use touchless door;
(3) engineering controls, like upgrading the ventilation system/space of the commercial office, or WFH policy;

(4) administrative controls, like personal hygiene education; and
(5) personal protective equipment, like face mask is provided.

The study conducted by Hou et al. (2021) suggests that during the Covid-19 pandemic, most office workplace changes were related to administrative control and personal protective equipment. Companies have responded to the outbreak by redesigning their communication methods and work policies to enable work-from-home as an alternative for both companies and employees. This has resulted in a decrease in the need for office space, which may limit office redesign to minor renovations rather than major projects such as changing layouts or configurations, rearranging staff seating arrangements, or installing additional amenities (e.g., signage that encourages the protection of indoor worker from source of virus which outside office), while option to renovating entire building systems may not. This study highlights the importance of risk control measures and strategic planning in response to external factors such as a pandemic. Therefore, workplace management resources are more likely to be used for office space re-design projects in the future.

Voigtländer (2020) reported Europe commercial office prices will drop by 26 percent (mean value), if one takes into account that not only the cyclical economic upswing as a result of pandemic, but also a structural change can reduce the long-term demand for office space.

Hoesli et al. (2021) used the data provided by European Public Real Estate Association (EPRA) in which a non-profit association representing Europe's publicly listed property companies to access the Europe commercial pricing outlook during the pandemic and its forecast yield. They report that the commercial office sector was decreased in values amounted to more than 40percent at the onset of the pandemic. This is likely due to the expectation that demand for office space will be lower even after the pandemic, as a significant amount of work is likely to continue to be done from home. As in any crisis, there is also a fear of rising unemployment levels. It could also be due to some extent to the securitized real estate market overestimating the post Covid-19 shifts in demand. However, they are arguing the yield of commercial office will stood at 2.7 percent (max 3.3 percent) gradually at the end of 2020 and following years, compare with 2.9 percent (max 3.7 percent) over the 2019 period (2.7 percent at post-pandemic vs. 2.9 percent at

pre-pandemic). The argument made on the ground of the rigidity of leases is a factor that limits supply and rental variations as companies must wait for their leases to end before relocating and possibly reducing their floor areas. Furthermore, it is exceedingly hard to gauge the degree to which teleworking will be used once the health crisis is over, and this will depend on each company in terms of its location, size, business sector and corporate culture.

The remote work policies impact the occupation rate by reporting a 50 percent cut during the pandemic period. As a result, this measure doubles the amount of available space to 398 ft2 /person and 2,500.68 ft2 /person, working and unoccupied hours, accordingly (TRANE, 2020). Moreover, the energy consumption and CO2 emissions tend to decrease, on average, by 11.92 percent and 13.84 percent respectively. This is mainly due to changes in natural ventilation and outdoor airflow per person/area (which enables free cooling), air re-circulation reduction, and Demand-Controlled Ventilation (DCV) disabling, forcing continuous outdoor air supply (Cortiçosat el., 2021; TRANE, 2020)

Several in-depth papers published addresses the commercial REIT (Real Estate Investment Trust) outlook and its related performance. Milcheva (2020) examines REIT returns across a few Asian countries and the United States during the Covid-19 pandemic and finds that the global pandemic shock propagates to real estate markets through financial channels. Van Dijk at el. (2020) document that drops in market liquidity of REIT led to the substantial drops in price drop in commercial real estate markets Ling et al. (2020) show that Covid-19 led to a decrease in the prices of United Stated commercial real estate by looking at REITs containing properties in places impacted by Covid-19. Wang and Zhou (2020) highlighted that retail and residential REITs experienced the largest negative abnormal returns by Covid-19, followed by office and hospitality REITs.

While no much paper discussed literature about the affect pandemic on the urban planning field, remarkably Garcia at el. (2021) addresses the effect on United Stated commercial rents rent gradient falls by roughly 15 percent in transit-orientated cities in which rely heavily on subway and light rail, and the authors do not see a corresponding decline in the commercial rent gradient in more car-oriented cities.

Allan at el. (2021) used the data of Real Estate Intelligence Services (REIS) provided by JLL to examine the consequence of the Covid-19 pandemic on different property sectors across Asia Pacific region. They show that the pandemic has a prominent impact into a market rent, in which the rental amount is expected to bring in every month, approximately 14 percent drop for commercial office in the first six months of 2020. However, some interesting patterns have emerged where some indications that the office sector could be recovering, or at least not dropping further, by the second quarter of 2020.

Machine learning is one of the main technological advances under umbrella of Industry 4.0 that to gain a foothold in real estate business during pandemic. Motuzienė at el. (2022) concluded that ELM–SA (Extreme Learning Machine model combined with Simulated Annealing) methods is reliable and fast for the prediction of the commercial office occupancy (buildings' utilization rate) for different periods of pandemic and also within the weekday or weekend. Their research show the potential for energy savings based on pandemic conditions to increase commercial office's sustainable operation, if ELM–SA does employ.

## 2.3 Work-from-home and Labour Productivity

One of the biggest obstacles telecommuters must overcome is the perception that they are not working. The common cultural belief among managers and employees is the same as the popular saying, "When the cat's away, the mice will play."

However, Gainey's (1999) defense shows that productivity actually increases when employees work from home rather than in the office. Previous research has shown that productivity increases by 20 to 30 percent when telecommuting is allowed. Company sales increase by 20 to 40 percent when salespeople work from home, and the productivity of managers who work from home increases by 8 to 29 percent (McCune, 1998).

Interestingly, one reason for the increase in productivity is the distraction-free environment that the telecommuting model provides. In a traditional office, the proximity

of the workstation often leads to unnecessary interruptions. These distractions can add up over an entire day and lead to a visible drop in productivity. Another factor that contributes to increased productivity is the impact telecommuters have on a company's digital infrastructure. To implement a successful telecommuting program, the company must install an appropriate digital infrastructure system (i.e., email, laptop, and scanner). All of these improved digital infrastructure measures help streamline a company's operations, resulting in an overall increase in productivity (Watad et al., 2000).

The Covid-19 pandemic has made remote work and telecommuting critical for maintaining productivity. However, the impact of these alternative work arrangements on productivity remains unclear, as previous studies on flexible working were conducted in different contexts (OECD, 2020). With the emergence of gray literature and empirical observations, companies and academics are beginning to recognize the need for more in-depth research on the impact of the pandemic on remote work models. It will be interesting to see how the pandemic has influenced attitudes towards alternative work arrangements and whether traditional firms will adopt new workplace strategies in response (Palvalin et al., 2017).

## 2.4 Work-from-home and Office Automation

One of the most important requirements for telecommuting success is a solid technological foundation. Easy access to the office is not enough. To enable effective communication and timely response, the organization must ensure that the teleworker has adequate email access, high-speed communication links (e.g., an Internet connection), and hardware that is sophisticated enough to handle enterprise software and programs. The initial setup of this infrastructure can be extensive (Watad et al., 2000).

Watad et al (2000) presented a detailed case study that a company allocated 6 months for completing program implementation and transforming the business process from an office-based to a remote-based process. To fully integrate one particular company, implementation of the teleworking program progressed simultaneously in the following

three main layers, that is, (1) IT infrastructure upgrade and support as layer one, (2) telework enablers as layer two, and (3) software applications as layer three.

Although there was a significant upfront investment, the company ultimately benefited from the new software's ability to raise productivity, improve managerial control, and streamline operations. The time of the salesperson spends in the field (i.e. meet with client, price negotiate with business partner, and etc) increased by 15 percent since the program's inception. Management determined that a 15 percent increase in field time translated into a 10 percent increase in overall sales. In fact, during the 4 years after the teleworking program began, actual sales and revenues increased more than 10 percent annually, considering that the external and internal environments were relatively stable (i.e. no changes in competitors, company leadership, and services) according to the study by Watad et al (2000).

On the flip side, inadequate equipment support can cost the comapny more than the initial setup due to the loss of productivity and high employee turnover.

## 2.5 Work-from-home and Home Office Design

According to Halford (2005), the house is not just a place for individual living, but also a space that impacts an individual's sense of well-being. With the re-spatialization of work due to the pandemic, the house is becoming increasingly hybrid in nature. This means that the house is no longer just a space for living, but also a space for work. This shift towards hybrid spaces highlights the importance of creating a balance between work and personal life, and the need for appropriate design and layout of the house to accommodate both aspects. As the line between work and personal life continues to blur, it is crucial to prioritize the health and well-being of individuals by creating spaces that promote productivity, creativity, and relaxation.

Next, Holliss (2015) describe all the buildings that combine dwelling (aka home for living) and workplace, as the term of workhome. Despite having existed for hundreds, if not thousands, of years in every country across the globe this dual-use building type has

long gone unnoticed. But now in the context of the digital revolution and more women in employment than ever before, many WFH practitioner ease their job workload by tucking housework and cooking into the working day. Hence, there is a few of the creative and practicable home office design such as (1) doorless extension to the kitchen, (2) self-designed stand-up workstation in the end-of-terrace house, (3) mews office at the bottom of garden, (4) mezzanine living space, and (5) dedicated studio in a house.

Coworking mean that working in shared working environments has increased in popularity as evidenced in a growing number of coworking spaces in cities and, more recently, in towns (Jamal, 2018). Reuschke at el. (2021) identity two coworking meta-networks through internet and social media search, that is, Hoffice and Cohome. Reflecting residential living in small apartments.The Cohome coworking sessions were attended/hosted by young independent professionals, mainly in their 20s and early 30s, also known as those who are more likely to live in central, urban areas. Those hosting or attending Hoffice coworking tended to be older, often in their 50s, also knows as they were those who were most likely to live in suburban or rural areas. The authors reported that temporal structure was facilitated by intended spatial segmentation between work and break activities. By way of illustration, the WFH practitioner spend the work time around the dining table, while move away from the dining table into another part of the house, such as the living area for the break time.

Correspondingly, an emerging the coworking space is adding to the muti-level residential building to create the niche point of the development. The Austin Nichols House located is the case in point to unveil the design of coworking palace in waterfront condominium in which features long shared tables, picnic-style seating, indoor and outdoor working areas, and a private courtyard. There is also a glassed-in children's area so parents can keep an eye on their kids while they work (Kim, 2017). Coworking spaces can bring in revenue in several different ways, include of coworking membership fees from non-residents and short-term office rentals.

## 2.6 Work-from-home and Psychology Elements

Multinational corporations such as Netflix, Bloomberg, and Yahoo view work-from-home as a "pure negative" and are offering higher stipends to entice their workers back to the headquarters to report physically. Despite having experimented with remote working on a large scale previously, these companies have abandoned it at the end, indicating a preference for the traditional way of working as a long-term strategy. This approach suggests that these companies value in-person interaction and collaboration, and believe that it is crucial for maintaining productivity and achieving their goals. While work-from-home may have been a temporary solution during the pandemic, these companies are now focusing on returning to the traditional way of working as a more sustainable approach. It remains to be seen whether this approach will continue to be effective in the long term, especially as more companies embrace remote working as a viable option for their employees.

Although working from home itself is only possible for certain categories of jobs and work activities, the Job Demands & Resources (JDR) model was basically adapted to WFH conceptualized model (Bachtal, 2021).

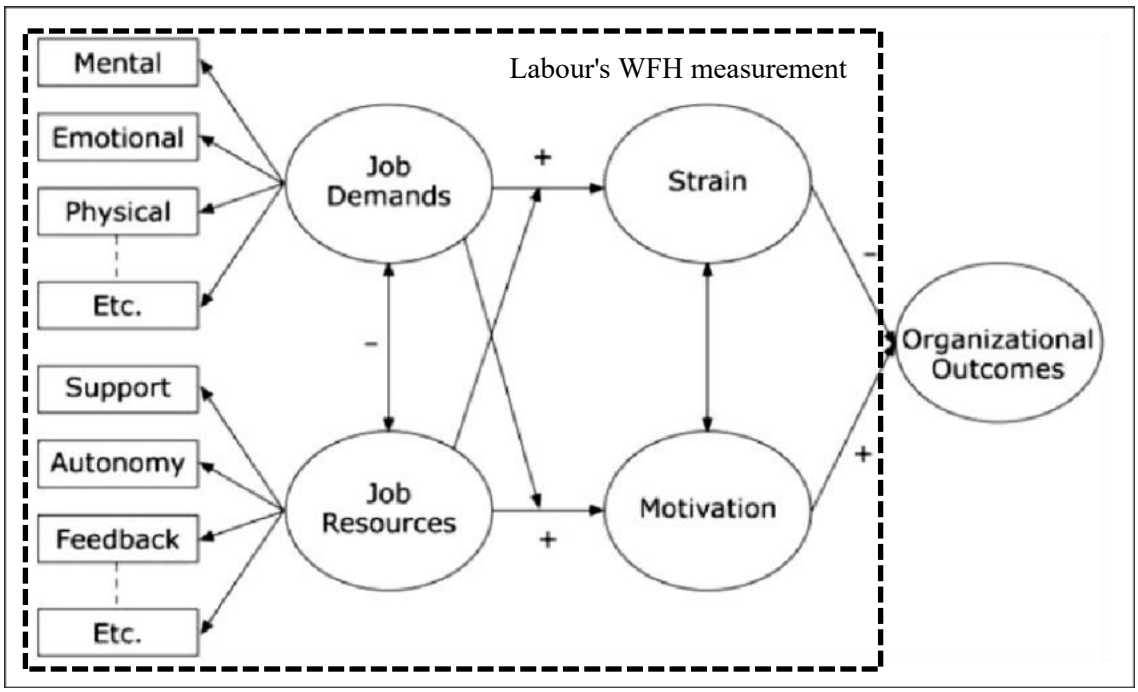
In a dynamic business environment under economics principle, it is important to adapt to changes and to identify and exploit success potentials while minimizing firm (a.k.a employer) risks in order to maintain competitiveness. Hence, firm strive to maximize their outcomes. For that purpose, labour (a.k.a employee) are the most important resources of an firm. The assumption here is a cumulative relationship that assumes an increase in the work success of labour leads to improved organizational outcomes. These aspects are described by the figure 2.1.

According to theory by Bakker & Demerouti (2014), job demands are those physical, psychological, social or organizational aspects of the job that require sustained physical and/or psychological effort or skills and are therefore associated with certain physiological and/or psychological costs. Examples for job demands are increase of the workload due to unclear boundary, or unfavorable physical environment.

In contrast, job resources are those physical, psychological, social or organizational aspects of the job that are either functional in achieving work goals, or reduce job demands and the associated physiological and psychological costs or stimulate personal

growth, learning and development. Examples for job resources are autonomy, skill variety, or work-life balance (Bakker & Demerouti, 2014).

Figure 2.1 Job Demands & Resources for WFH Conceptualized Model




Source: Bachtal, Y. (2021). Work organization and work psychology theories in the context of Work from Home- A literature-based overview (No. 42). Arbeitspapiere zur immobilienwirtschaftlichen Forschung und Praxis.

In other words, simplified that job demands influence individual job satisfaction and productivity negatively, while job resources have a positive impact on job satisfactions and productivity.

The aforesaid model, although feasibly true, is nevertheless yet to tested that developed comprehensively sort of work-from-home model. However, this paper has acknowledge the its contribution and will be further apply its conceptual theory to the research exercise.

### 2.6.1 Job Characteristics

On the other hand, communication is also an essential need for office workers, as it enables collaboration, teamwork, and the sharing of ideas and information. Effective

communication is important for achieving organizational goals and promoting a positive work culture. However, excessive communication can also be a distraction and hinder concentration, leading to decreased productivity and job satisfaction (Roper & Juneia, 2008).

Therefore, it is important for businesses to create a well-functioning and balanced office environment that satisfies both the need for concentration and communication. This can be achieved through the use of appropriate office design, such as open-plan offices with designated quiet areas for concentration, and collaborative spaces for communication and teamwork (Vischer, 2008; Schwartz & Kaplan, 2000).

Additionally, businesses can provide training and support for employees to help them manage distractions and maintain focus during work hours, while also promoting effective communication and collaboration. By prioritizing both concentration and communication needs, businesses can create a positive work environment that promotes productivity, job satisfaction, and employee well-being (Deci & Ryan, 2014; Lieberman, 2013; Ryan & Deci, 2001).

Nonetheless, workers are fascinated by other people, so communication with others is biologically programmed (Csikszentmihalyi, 1990). Communication is expressed in many terms (such as collaboration, interaction, and knowledge sharing) and aims to transfer information from one person to another that is meaningful to the participants (Culnan & Bair, 1983). Studies before the pandemic showed that working from home can lead to negative experiences because there is less unplanned communication. Studies during the pandemic showed that all collaboration and official communication was online-based and therefore more orchestrated and planned, which in turn negatively impacted unoffical communication (Derks, Agterberg, Beumer, & Weel, 2011; Peters, Van den Dulk, & Van der Lippe, 2009; Vos & Van der Voordt, 2001; Waizenegger, McKenna, Cai, & Bendz, 2020). Communication in the workplace is both planned and unplanned communication activities could thus lead people to go to the office anyway, despite WFH work policy has undertaken. .

### 2.6.2 Personal Characteristics

Personal characteristics (demographical, work-related, and home workspace-related) influence workplace preferences and choice behaviors too. For example, Awada Lucas, Becerik-Gerber, and Roll (2021) found that female and older workers felt more productive while working from home during the pandemic than their counterparts and are more inclined towards remote work. Gender also relates to communicative behavior, where men have fewer face-to-face interactions at their desk than women do (Weijs-Perr´ee, Appel-Meulenbroek, & Arentze, 2018).

Regarding age, preferences differ in commuting and for example the adjustability of the indoor climate (Rothe, Lindholm, & Nenonen, 2012) also play the crucial role for WFH practices. In addition, the level of education is related to the importance people give to workplace design and communication (De Been & Beijer, 2014) and their propensity to work from home as well (Ollo-L´opez et al., 2020).

Moreover, adaptation to WFH is more difficult for long-service-period employees than or employees who have been with the organisation for a short time (Fossum, Arvey, Paradise, & Robbins, 1986). Therefore, they may have different preferences if the WFH work model is new to them.

In addition, position in the company could determine preferences as it relates to time spent on specific activities in the office (Brill & Weideman, 2001). In addition, the number of hours worked per week (De Been, Van der Voordt, & Haynes, 2016) and how people spend that time at different types of jobs when they are in the office (Greene & Myerson, 2011) influence workplace preferences. Finally, the likelihood of hybrid working (or WFH) increases with commuting distance (Helminen & Ristim¨aki, 2007; Ollo-L'opez et al., 2020).

## 2.7 Work-from-home and Reaction by Employer-employee

The introduction of work-from-home leads to significant changes in the organization's work processes and workplace design. Any such major change can lead to some

resistance that must be identified and addressed. It has been observed that work-from-home can cause resistance from both the employer and the employee.

### 2.7.1 Response by Employer

The implementation of telework is a matter of employer attitude. There is relevant evidence that the employer's opinion may play a role in the employee's decision to participate in telework (Reinsch, 1999). Traditionally, the employer's attitude toward an external work environment has tended to be unfavorable. One reason for this is the feeling of losing control over the employee if the employer does not see them at work. There is concern that the employee does not have enough work or that they are working too much. Also, the employer may feel that they cannot readily tell if an employee is struggling or needs constructive feedback. Problems can also arise when an employer is unable to recognize conflicts between employees until the problem is already out of control. If he or she is unable to physically see an employee's discomfort or friction with another employee, the employer cannot prevent the conflict from escalating. While these fears may be unfounded to some extent, there can be some legitimate issues with not being able to physically monitor an employee. Given these challenges, it is important that employers be evaluated on their ability to handle the unique situations that arise when they are responsible for teleworkers. It has been shown that a telework program can only be successfully implemented if management trusts the employees as a whole (Harrington, 1999). If the employer is accustomed to walking around and checking on employees, they may not be willing to manage teleworkers. Therefore, if the employer is uncomfortable managing employees off-site, they will not approve the arrangement.

### 2.7.2 Response by Employee

Not only does the employer object to telecommuting, but so does the employee. Certain employees who are not selected to telework might be resentful of their colleagues who telework. In addition, on-site employees may feel that telecommuting interferes with teamwork in the office and that they are difficult to reach (Kurland et al., 2000). Employer resentment will especially increase if they feel that telecommuting has led to job redesign and consequently they have been assigned new and/or more activities. It is

important that the employer be aware of these feelings and find ways to create a productive environment between on-site employees and teleworkers.

## 2.8 Function of the Commercial Office Space

In today's digital age, virtual collaboration has become increasingly popular, but it cannot replace the value of face-to-face interactions that occur in a commercial office space. The physical proximity between workers and the social aspects of collaborative behavior in the workplace are essential to construct meanings, foster a sense of identity belonging, and support the worker experience. Studies have shown that increased communication and interaction is a potential primary benefit of workers in an office building, and it enables the sharing of tacit knowledge. Therefore, although virtual collaboration has its advantages, the commercial office space remains irreplaceable and remains the first place that supports tacit collaboration, prevents social isolation, and fosters a sense of belonging and ownership (Courpasson et al., 2016; Vischer, 2008; Brown, 2009; Kraut, 2002; Gerpott, 2017; Kabo, 2017; Peponis et al., 2007).

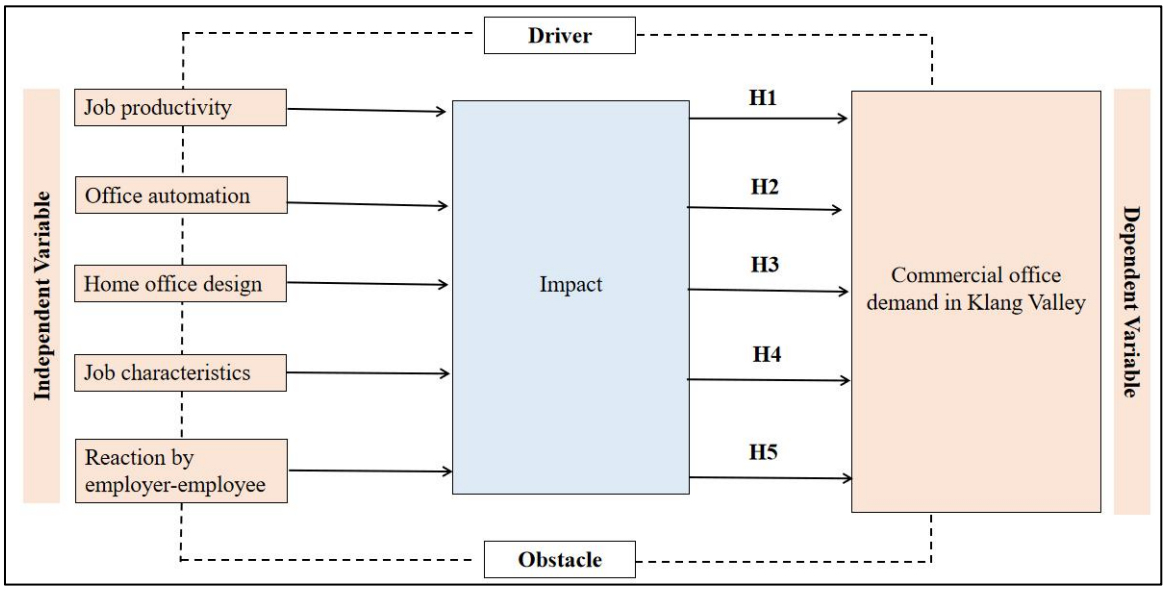
## 2.9 Theoretical Framework and Hypotheses

According to the explanation thereon, these hypothesizes has developed to examine their impact on influencing work-from-home practices, which in turn affects the demand for commercial office space in Klang Valley.

**H1:** Job productivity has an impact on influencing work-from-home practice affect the commercial office demand in Klang Valley
**H2:** Office automation has an impact on influencing work-from-home practice affect the commercial office demand in Klang Valley
**H3:** Home office design has an impact on influencing work-from-home practice affect the commercial office demand in Klang Valley
**H4:** Job characteristics and its content requirement has an impact on influencing work-from-home practice affect the commercial office demand in Klang Valley

**H5:** Reaction by employer-employee has an impact on influencing work-from-home practice affect the commercial office demand in Klang Valley

Figure 2.2 Theoretical Framework for Work-from-home Influence On The Commercial Office Demand




Source: Draft by the author of this paper, to the best of his knowledge.

# CHAPTER 3

# RESEARCH METHODOLOGY

## 3.0 Introduction

This chapter describes and explains the research methodology, questionnaire design, execution plan to distribute the questionnaire, instruments survey specifically, and procedures of data collection as well as the mathematics analysis in brief undertaking afterward.

## 3.1 Research Design

The research methodology chosen for this study is a positivist and deductive approach with a quantitative research design. This approach is appropriate for this study as it aims to understand the key factors that influence work-from-home practices in relation to the demand for commercial office space in Klang Valley. According to Saunders et al. (2012), the positivist approach emphasizes a scientific approach to knowledge development and relies on large samples and structured methodologies to develop law-like generalizations. The deductive approach involves the development of hypotheses based on a thorough review of existing literature, followed by data collection and analysis to verify or falsify the hypotheses (Dawson, 2002; Saunders et al., 2012).

Quantitative research is associated with positivism and involves the collection and analysis of numerical data using highly structured data collection methods such as questionnaires. This approach is appropriate for this study as it aims to analyze the relationships between numerical variables and test the hypotheses using statistical techniques. The descriptive nature of this study also supports the choice of a quantitative research design.

Thus, the chosen research methodology for this study is a positivist, deductive, and quantitative approach, which involves developing hypotheses based on a thorough literature review and collecting numerical data using structured data collection methods to test the hypotheses and analyze the relationships between variables using statistical techniques (Saunders et al., 2012).

Moreover, a survey research method under quantitative research category is used to acquire primary knowledge and collect relevant data for this paper. The questionnaire were created consisting of questions relevant to the research problem. They can be mainly in digital form. And these survey questionnaire are then distributed among the population so that accurate opinions can be obtained.

## 3.2 Data Collection

The process of obtaining and analysing a variety of data to produce an answer that addresses the research questions is known as data collection (Paradis et al., 2016). In other words, the processes of data collection and analysis and generating theories are intrinsically linked, that is, theories lead to data collection (or data analysis), and data collection informs theories. It is one of the most crucial processes in conducting research, more information on primary and secondary data is covered below.

### 3.2.1 Primary Data

The primary data is data collected firsthand from a subject before it is published. They are reliable, authentic, and objective. A research can be conducted without secondary data, but a research based only on secondary data has the least credibility and reliability and can lead to bias because secondary data may have been privately altered before it was published. They can be obtained through interview, questionnaire, survey, and experiment (Heal et al., 2019).

As Sparrow (2012) mentioned there some advantages of using primary data. One of the advantage are the targeted issues are address, this is because the data collected can be control

by the researchers as the questions ask are set to collect data they want. In the question design stage, researchers can ask the researching company to concentrate more on the specific information that need in the research. The next advantage is the process of data interpretation will be better as data collected by researchers in the market are according to what their needs rather than rely on the data collected on secondary data. These primary data can be examine and interpret by the researcher easily as the question was design according to the method that will be used in the interpret process.

Indeed, the primary data in this paper in obtain through survey questionnaire collected from target respondents who are working located in Klang Valley area.

### 3.2.2 Secondary Data

A variety of publication sources, including books, journals/e-journals, magazines, published electronic sources, general websites, and documents by government, can frequently be used to quickly and easily obtain as the source for secondary data.(Johnston, 2017).

Saunders et al. (2012) has state that using secondary data may have an advantage of fewer resource requirement, as it can save time and money in the process of collecting data. Sparrow (2012) stated the same point that less effort will be used in collecting secondary data compare to primary data. He also stated that using secondary data may have the advantage of the researcher can comparing the data collect from different researcher and different regional. Likewise, researcher may discover some unforeseen discoveries by comparing the secondary data.

As such, this paper used journals, research papers, subscribed newsletter, statistics, valuer's annual reports started from year 2019 onwards as a main source of secondary data input as citation.

## 3.3 Sampling Design

An instrument technique can be categorized within 2 main categories which are probability sampling and non-probability sampling. (Taherdoost, 2016)

Probability Sampling suggest the respondents are chosen randomly in the sample but it may also be the most expensive sample in terms of time and energy.

The non-probability sampling, in specific the convenience sampling will be utilized to conduct this research. The rationale behind the specific technique is to obtain the most accurate sample for this research as the research hypothesis mainly zooms into the location based, referring to the Klang Valley, consist of Kuala Lumpur and Selangor. The five non-probability sampling methods includes quota sampling, snowball sampling, convenience sampling and purposive or judgmental sampling. The convenience sampling method being use in this paper because of its speed, cost-effectiveness, and ease of availability of the sample.

### 3.3.1 Target Population

In respect of population, the available commercial office space available in Klang Valley at approximately 150.53 million square feet (JPPH, 2022; Rahim & Co Research, 2021). To fit the context of research, this paper presumes that 199 square feet as the standard for a worker's working desk and his usual workplace activity area including of meeting room, based upon the research by Cortiços et al. (2021) and TRANE (2020). In other word, the number worker of 756,432 (150.53 million/ 199) is represent the well-grounded number of entire population this paper should identify for this paper.

### 3.3.2 Sampling Frame & Elements

The sampling frame is a means of selecting a specific element of the target population. It is one of the most important areas to consider when planning the sample. It is intended to set a limit on the size of the sample from a large population. Nevertheless, a research analysis can have more than one sampling frame (Turner, 2003) because each sampling frame provides different types of information and perspectives to the research subject.

In this paper, there were three groups of sampling frames which consisting of respondents who employed based at the Klang Valley area, that is, (1) blue-collar worker who work in fully remote form, (2) blue-collar worker work in hybrid form, in which is a combination of remote work and psychical office work, and (3) fully mode of the psychical office work, in which happen in face-to-face service line, like service counter of the financial institution.

In addition, the respondents here includes those who are minimum age from 20 years old and to 70 years old, regardless the employment type either is employer, employee, or self-employed.

The definition of commercial office in this paper only cover private-owned office buildings, while government-owned office buildings has excluded. Meanwhile, the research data to study the commercial office characteristic, such as vacant possession rate and size, only covering from year 2017 to 2021.

### 3.3.3 Sampling Location

The sampling location for this paper is set at Klang Valley inluded of Kuala Lumpur and Selangor located at Peninsular Malaysia. The reason of Klang Valley is selected in this paper mainly because it is whereby the majority nation's commercial office supply took place in whole Malaysia, which stood at 60 percent of the nation total supply (150 million square feet/ 250 million square feet), based on report by JPPH (2022) and Rahim & Co Research (2021), following the completions of Tun Razak Exchange, PNB 118, Bukit Bintang City Center, and Empire City in Selangor.

Kuala Lumpur was chosen as the study area due to its rapid growth. The total population of Kuala Lumpur in 2014 is 1.67 million people in an area of 94 square kilometer. This gives the city proper a very high population density of 17,310 people per square mile or 6890 per square kilometer. Greater Kuala Lumpur or the Klang Valley is a large urban agglomeration with an estimated population of 7 million in 2014 with a population density that is nearly equal to that of the city proper (DBKL, 2008). According to the 2010 census, major ethnic groups in Kuala Lumpur included of Malays 44.2 percent, Chinese 43.2 percent, Indians 10.3 percent, and others 1.8 percent. Kuala Lumpur is an aging city as birth rates have fallen in the last decade or two. This has led to a lower percentage of young people under 15, a group that

has fallen from 33 percent in 1980 to under 27 percent in 2000. However, the working age group between 15 and 59, in which potential respondents for this paper, has increased from 63 percent in 1980 to 67 percent in 2000 as more people move to the city for opportunities. By 2020, Kuala Lumpur is projected to have a population of 2.2 million.

The state of Selangor has an area of approximately 800,000 ha, along the west coast of peninsular Malaysia. It borders the states of Perak in the north, Negeri Sembilan in the south and Pahang in the east. Selangor is the most populatedstate in Malaysia (along with Sabah and Sarawak in Borneo) with 3.9 million inhabitants in 2000. This is approximately 17 percent of Malaysia's total population. The population was 1.4 million in 1980, and further increased to 5.4 million in 2010. As of 2015, its population was 5.8 million. The major ethnic groups in Kuala Lumpur included of Malays 55 percent, Chinese 25 percent, Indians 10 percent, and others 10 percent. The population profile is relatively young, with 32 percent below 15 years old, 63 percent in the 15 to 64 age group, and 5 percent aged 65 above (Department of Statistic Malaysia, 2001; KKD, 2015).

### 3.3.4 Sampling Size

The sample size will be calculated based on Slovin Formula developed by Yamane's (1967) on the ground of non-probability sampling technique has undertaken in this paper with the formula as follow.

Slovin Formula: $n = \frac{N}{1+Ne^2}$

N = Population, reporting as 756,432 worker explained at chapter 3.2
e = Margin of error, reporting as 10 percent
n = Sample size

$$n = \frac{756{,}432}{1 + 756{,}432 * 0.1^2}$$

$n = 99.99$ ($\approx 100$)

The calculation working require only the population size which computes to 756,432 workers with 10 percent in margin of error, then computing to a sample size of 100 respondents, based on the Slovin Formula.

## 3.4 Survey/ Research Instruments

The use of survey questionnaires for data collection is consistent with the chosen research methodology of a positivist and deductive approach with a quantitative research design. Survey questionnaires provide standardized quantitative data that can be easily analyzed using statistical techniques, allowing for efficient and cost-effective data collection. This approach aligns with the recommendation of Saunders et al. (2012) for descriptive research, particularly when exploring and clarifying differences within various groups.

The questionnaire was divided into three sections, which is a common practice for survey questionnaires. This helped to organize the questions and make it easier for respondents to navigate through the questionnaire. Pre-coding the questions and answers also streamlined the data input process, making it easier to analyze the data.

Essentially, the use of survey questionnaires is an appropriate method for collecting standardized quantitative data for this study, and the organization of the questionnaire into three sections and pre-coding the questions and answers made data collection and analysis more efficient.

### 3.4.1 Designed of the Questionnaire

A questionnaire should be designed to be user-friendly, visually appealing, and motivational in nature to encourage accurate and correct responses from respondents. It is crucial that the questionnaire is easy to understand, as respondents are more likely to complete questionnaires that are clear and concise. The questionnaire should be well-presented, typed, and carefully crafted. The questions included in the questionnaire should be reliable and accurately measure the intended research objective(s). To ensure respondent engagement, the subject matter should be interesting or intriguing. Providing a summary of the results can also

motivate respondents to complete the questionnaire. It is important to maintain confidentiality and ensure that answers are used only for the analysis and not any other purpose (Shao, 2002).

Section 1 of the questionnaire includes both categorical and list questions, aimed at gathering demographic information about the respondents, such as age range, family size, distance to workplace, type of residence, and access to public transportation.

In section 2, rating questions are used to gauge the respondents' opinions on the importance of different variables related to work-from-home arrangements.

Sections 3 and 4 also consist of rating questions, this time assessing the respondents' overall attitudes towards working from home and the role of commercial office spaces in the future.

To refine the questionnaire and identify any potential issues such as biased, double-barrelled, or leading questions, a pilot test involving up to 30 industry experts and experienced personnel was conducted. After ensuring that the questions were clear and easy to answer and that there were no issues with data collection, the questionnaire was finalized and distributed along with a Personal Data Protection Statement.

#### **3.4.1.1** Ordinal Scale

Figure 3.1 Nominal Scale (Sample)

What is your gender:
1) Male ☐ 2) Female ☐

Source: Draft by the author of this paper, to the best of his knowledge.

In section 1 of the questionnaire, a nominal scale will be utilized through closed-ended questions to categorize and identify objects. A nominal scale is a qualitative measurement that involves naming or assigning categories to objects.

#### **3.4.1.2 Ordinal Scale**

Figure 3.2 Ordinal Scale (Sample)

| Score | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Description | Strongly disagree | disagree | Somewh at disagree | Somewh -at agree | Agree | Strongly Agree |
| **Productivity** | | | | | | |
| I am more productive when I work from home. | | | | | | |

Source: Draft by the author of this paper, to the best of his knowledge.

The ordinal scale in this questionnaire involves arranging statistical data in a specific order based on different measurement points, without including a zero measurement. This scale is used to determine the relative position of each item or category in relation to the others, from highest to lowest. In turn, the respondent may choose to either he is strongly disagree, or disagree, or somewhat disagree, and so forth, for his view referring to the statement explained. This ordinal scale will be used in section 2.

### 3.4.1.3 Likert Scale

Figure 3.3 Likert Scale (Sample)

| Score | 4 | 3 | 2 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| Description | Strongly not important | Not important | Somewhn ot important | Neutral | Somewh- at important | Important | Strongly Important |
| Building community and corporate culture | | | | | | | |

Source: Draft by the author of this paper, to the best of his knowledge.

The Likert scale, developed by psychologist Rensis Likert in 1932. It is a commonly used ordinal scale for measuring attitudes. This scale typically consists of five or seven points, which respondents use to indicate the degree to which they agree or disagree with a statement. The scale measures the linear intensity of respondents' expectations and experiences, allowing for a more nuanced understanding of their attitudes. This likert scale will be used in section 3 and 4.

## 3.5 Data Analysis

After the survey questions have been reviewed for clarity and answerability, the quantitative data collected must be processed and analyzed to transform it into useful information (Saunders et al., 2012). In this study, Statistical Package for the Social Sciences (SPSS) and Microsoft Excel 2013 (Microsoft Excel) software are used to explore, display, and examine the relationships in the data. However, before analyzing the data, several preparatory steps are required to ensure their accuracy, completeness, and suitability for further analysis, as recommended by Sekaran and Bougie (2016).

First, all questions and responses in the questionnaire were pre-coded to facilitate data review and entry into SPSS. Once the raw data were entered, they were checked for inconsistencies, illogical responses, invalid entries, and omissions. Outlier data, observations that differed significantly from other observations, were also identified and eliminated to prevent them from affecting the results of the analysis, such as the mean. However, the authors point out that outliers aren't always errors and require careful examination. Nominal and ordinal variables were checked for scatter by determining the minimum and maximum data values and the number of occurrences or by using the boxplot function of SPSS to eliminate extreme values.

### 3.5.1 Reliability

The reliability of a measure primarily refers to its internal consistency and stability (Sekaran & Bougie, 2016). To test the reliability of the questionnaire in this study, Cronbach's coefficient alpha was used as a measure of internal consistency, with values ranging from 0 to 1 (Saunders et al., 2012). Internal consistency refers to the correlation between responses to different questions in the questionnaire, and this statistic measures the extent to which responses to scale items are grouped to test a particular factor or concept. The calculated value of the alpha coefficient' indicates whether the questions grouped in the scale examine the same variable, factor, or concept, with a threshold value of 0.70 or greater indicating high reliability. Overall, this measure determines how reliable it is to group multiple items within a variable.

#### 3.5.1.1 Cronbach's Coefficient Alpha

The more the results of Cronbach's coefficient alpha approach 1, the higher the internal consistency reliability, indicating a high positive correlation between the items combined in a set. However, if the Cronbach's coefficient alpha is below the threshold for low reliability, i.e., below 0.50, further investigation is required to determine which item is low correlated and needs to be removed from the set (Straub et al., 2004; Hinton et al., 2014).

However, removing a contributing item from the set may negatively impact the validity of the measurement, as suggested by Sekaran and Bougie (2016). In addition, all negatively worded responses in the questionnaire must be reversed before being entered into the Cronbach' coefficient testing system to ensure that the items are measured in the same direction. Otherwise, the resulting values will be incorrect. Therefore, in the context of the questionnaire used in this study, all questions and answers were appropriately worded in the positive. The results of the reliability tests using the Cronbach' coefficient are presented in Chapter 4.

In quantitative research, the relationship between variables is tested numerically and analyzed using various statistical techniques (Saunders et al., 2012). To assess the 'internal validity of the questionnaire, it is necessary to check whether the questionnaire measures what it is supposed to measure.

Validity testing relies on construct validity, which shows whether the results of the measure fit within the theoretical framework (Sekaran & Bougie, 2016). Construct validity was assessed using convergent validity, which is the fact that results from two different instruments measuring the same idea have a high correlation, and discriminant validity, which is the fact that two variables are not correlated.

### 3.5.2 Relative Importance Index (RII)

The seven-Point Likert Scale ranged from 1 (strongly not important) to 7 (strongly important) were adopted in this survey within respondent's response. Hence, Relative Importance Index (RII) was used to reflect a factor which gives it weight in the perceptions of respondents.

$$RII = \frac{\text{weighting given } (N1 + N2 + N3 + N4 + N5 + N6 + N7)}{7(N1 + N2 + N3 + N4 + N5 + N6 + N7)}$$

Where,
N1 = number of respondents who chose "strongly not important"
N2 = number of respondents who chose "not important"
N3 = number of respondents who chose "somewhat not important"
N4 = number of respondents who chose "neutral"
N5 = number of respondents who chose "somewhat important"
N6 = number of respondents who chose "important"
N7 = number of respondents who chose "strongly important"

The Relative Importance Index (RII) was derived for each factor with the formula thereon. The RII value has a range from 0 to 1 (0 not inclusive) and has been categorized into five levels of importance as shown in Table 4.1.

Table 3.1 Relative Importance Index Values

| **RII value** | **Importance level** | |
|---|---|---|
| From 0.8 to 1 | High | **(H)** |
| From 0.6 to 0.8 | High-Medium | **(H-M)** |
| From 0.4 to 0.6 | Medium | **(M)** |
| From 0.2 to 0.4 | Medium-Low | **(M-L)** |
| From 0 to 0.2 | Low | **(L)** |

Source: Holt (2014).

## 3.6 Conclusion

This chapter provides a detailed explanation of the research method used in this study, which is quantitative research. The secondary data were obtained by reviewing relevant literature, which inspired the research design for this paper. In contrast, the primary data were collected through a questionnaire that targeted white-collar workers employed in the Klang Valley to obtain reliable results that would help achieve the research objectives.

For data analysis and testing, the researcher used the SPSS statistical software and Microsoft Excel. The data collection method was specifically adopted to obtain work-from-home-related data and other relevant information. The analysis followed the author's suggested approach and was also inspired by the supervisor's guidance.

# CHAPTER 4

# DATA ANALYSIS RESULT

## 4.0 Introduction

This chapter presents data obtained through conducting the survey and statistical tests upon analysis by the SPSS and also Microsoft Excel. The chapter structure is divided depending on section of the survey questionnaire, and what aspect of work-from-home it regards. The finding and relationship between various aspect of work-from-home and commercial office space demand will explain at the final part of this chapter. The results and data in detailed or not showed in this chapter are found in the appendices at the bottom of the paper.

## 4.1 Respond Rate of the Survey and Outlier

In this paper, a total of 250 surveys were distributed through Google Form, and 110 surveys were returned without any unanswered questions, representing a response rate of 44 percent, which is sufficient for the purpose of the research. However, the researchers had to filter out unusable samples due to outliers.

Sekaran and Bougie (2016) suggest that outliers are not necessarily errors, but they can affect the results if not properly addressed. To ensure that the data used in the study accurately represents the results, the researchers carried out a detailed inspection and used the SPSS box plot function to detect any unusual responses that could be considered extreme values and might affect the results of the research. As a result, seven samples were dropped out due to the presence of outliers, reducing the total number of usable samples to 103.

The process of filtering out unusable samples due to outliers is an important step in ensuring the accuracy and reliability of the research results. The use of detailed inspections and statistical tools such as the SPSS box plot function can help to identify and address outliers effectively.

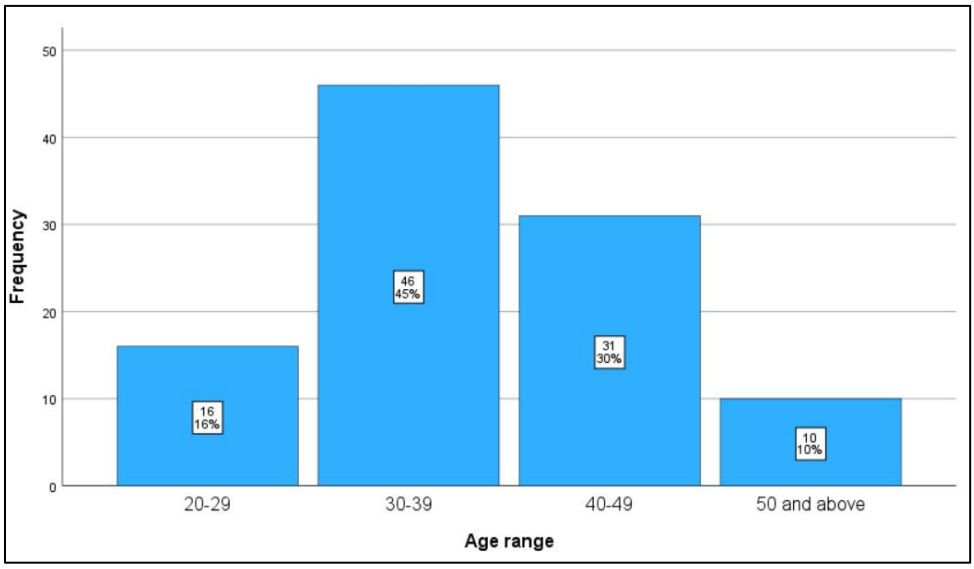
Despite this reduction, the number of samples used in the research still met the data requirement of at least 100 samples, as highlighted in chapter 3.3.1.

## 4.2 Respondent Demographical Profile

Section 1 of the survey questionnaire consisted of 13 categorical questions designed to understand the demographic profiles of each respondent. These questions included details such as the respondent's age range, gender, ethnicity, and highest academic level. Additionally, to gain a better understanding of the respondent's living situation, the questionnaire enquired about the number of members living in the same house, availability of transportation, and distance to the workplace. The survey also included questions about the respondent's house, including its type and built-up size. Overall, these questions were intended to provide a comprehensive understanding of the respondents' backgrounds and living conditions, which could potentially influence their work-from-home experiences. The final demographical questions was service length in current company.

### 4.2.1 Age

Figure 4.1 Respondents' Age Distribution

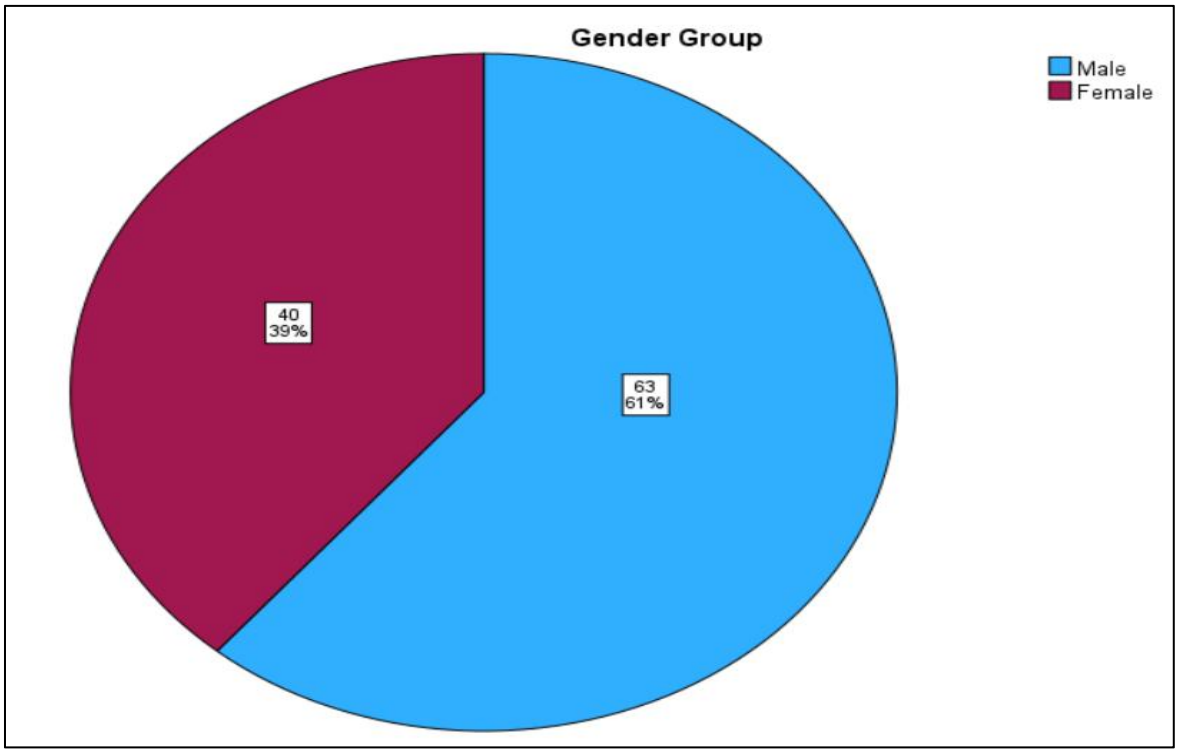



Source: SPSS by this Final Year Project.

From the data presented in Figure 4.1, the majority of respondents fall within the age range of 30 to 49, with 46 respondents between the ages of 30 and 39, and 31 respondents between the ages of 40 and 49. In contrast, the number of respondents in the 20 to 29 and 50 and older age groups was lower, with 16 and 10 respondents, respectively. Overall, 75 percent of respondents were between the ages of 30 and 49, which is the age range in which most workers are found, according to the labor force participation survey conducted by DOSM (2020). These results indicate that the responses collected in this study are representative of the working age population in the labor market.

### 4.2.2 Gender

Figure 4.2 Respondents' Gender Group

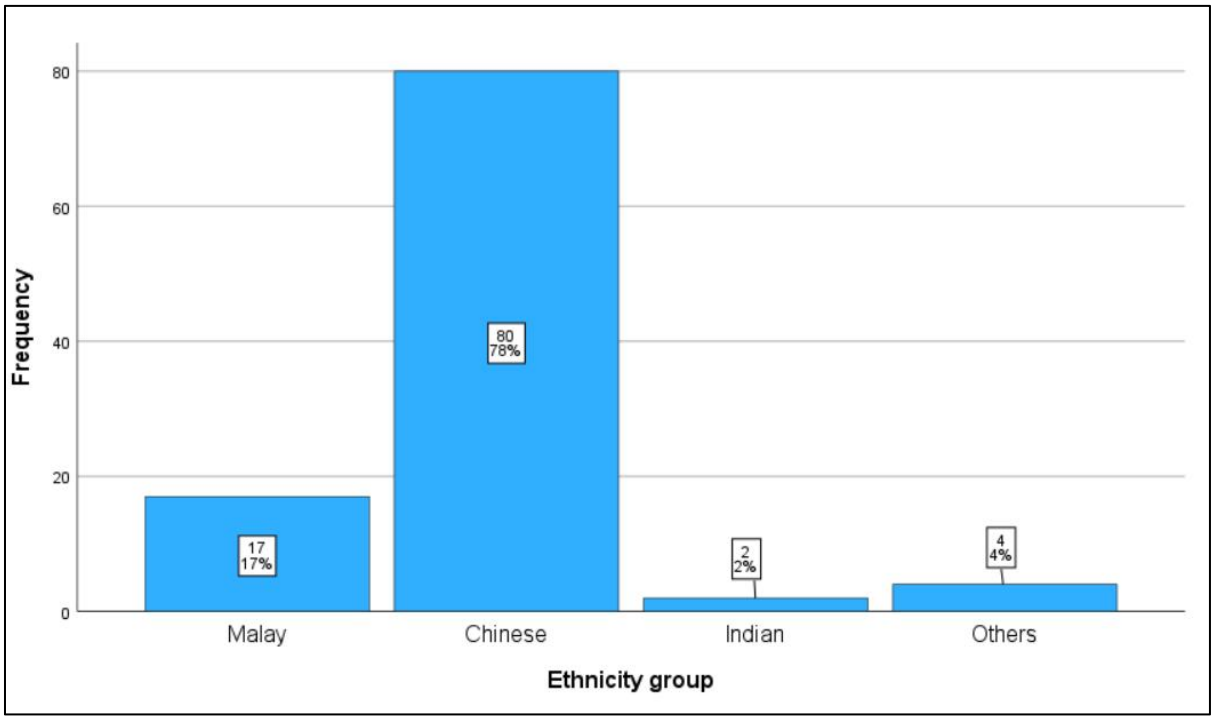



Source: SPSS by this Final Year Project.

he data presented in Figure 4.2 indicates that the respondents were relatively evenly distributed between genders, with 40 respondents or 39 percent identifying as female and 63 respondents or 61 percent identifying as male. These findings suggest that the study had a balanced representation of both genders, allowing for a more comprehensive analysis of the work-from-home experiences across genders.

### 4.2.3 Ethnicity

Figure 4.2 Respondents' Ethnicity Group

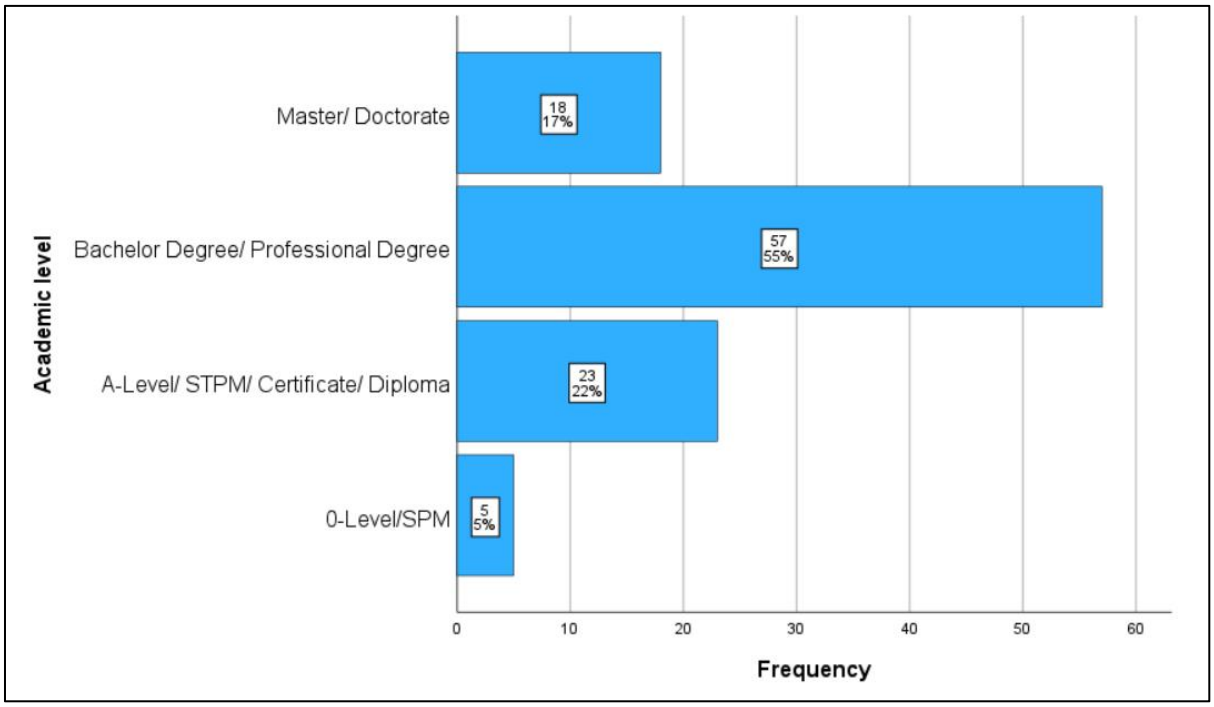



Source: SPSS by this Final Year Project.

Figure 4.3 shows that the majority of respondents in this study identified as Chinese, with 80 persons or 78 percent. Malay respondents comprised 17 persons or 17 percent, while Indian respondents were minimal with only 2 persons or 2 percent. Other ethnicities, such as Kadazan-from-Sabah, were reported as 4 persons or 4 percent. It is important to note that the sample size for Indian and other ethnicities is relatively small, which may limit the generalizability of the findings to these groups. Therefore, it is crucial to interpret the study's output carefully and consider the potential impact of result interpretation when analyzing the results.

### 4.2.4 Education Level

Figure 4.3 Respondents' Education Level




Source: SPSS by this Final Year Project.

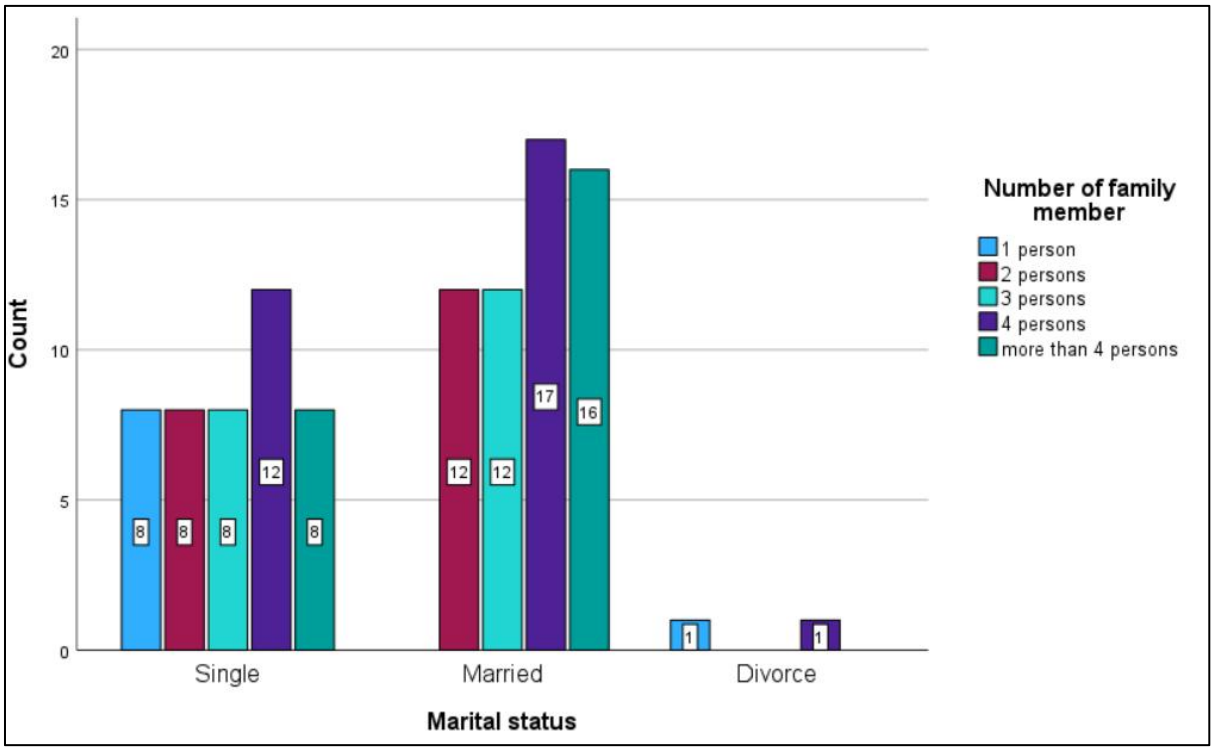
The statistics presented in Figure 4.4 highlight the educational background of the respondents. It is interesting to note that the majority of the respondents, specifically 55 percent, held a bachelor's degree or professional qualification as their highest academic level. This indicates that the sample group is largely composed of individuals with a higher level of education.

In addition, the data shows that 17 percent of the respondents held a master's or doctorate degree, which suggests that a significant proportion of the sample group possess advanced academic qualifications. Meanwhile, 22 percent of the respondents had A-Level, STPM, certificate, or diploma as their highest academic qualification level.

It is worth noting that the sample group also includes a small number of individuals with O-level or SPM qualifications, constituting only 5 percent of the total respondents.

### 4.2.5 Marital Status and Number of Family Member

Figure 4.4 Clustered Bar Chart between Marital Status and Number of Family Member




Source: SPSS by this Final Year Project.

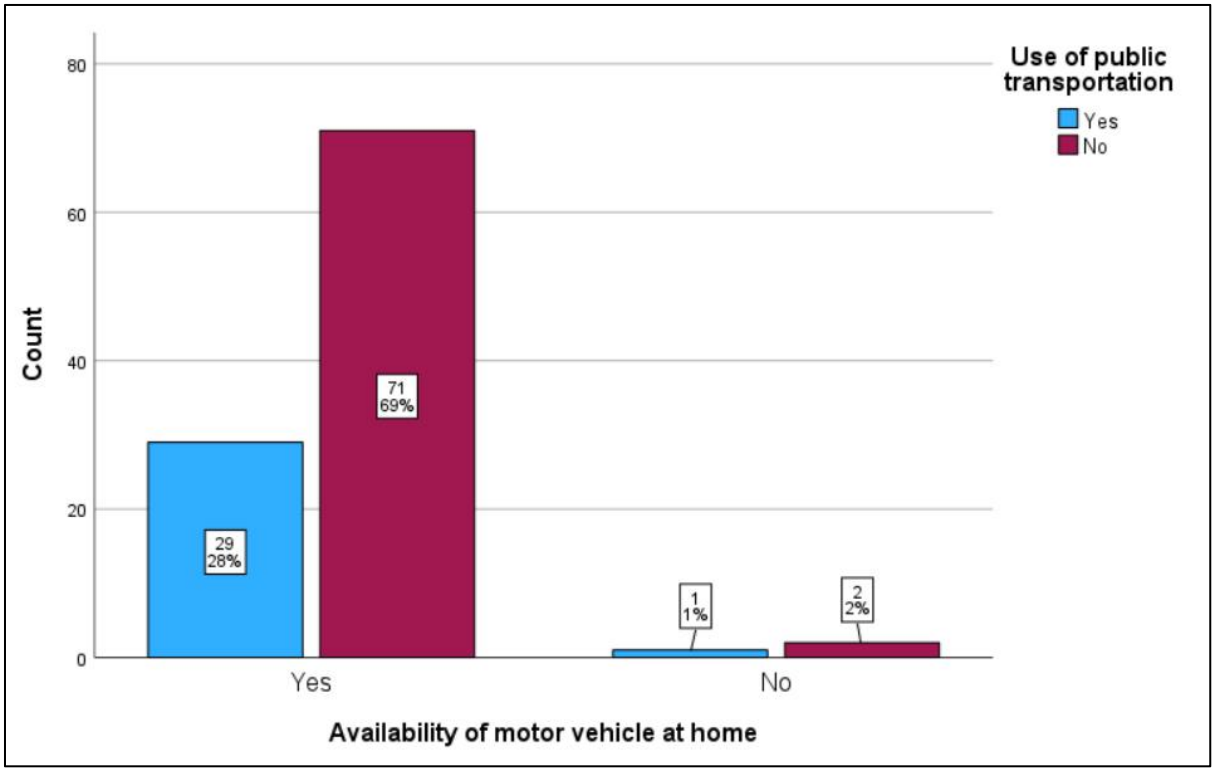
Figure 4.4 provides valuable insights into the marital status and household size of the respondents. The data shows that the majority of the respondents, specifically 57 persons or the significant majority, were married. This indicates that the sample group is mostly composed of individuals who are in a committed relationship or have already settled down.

In terms of household size, the data reveals that the number of family members living in the house varied, but the majority of the respondents had 2 to more than 4 persons living with them. This suggests that the sample group is composed of individuals from different family backgrounds and household sizes.

Interestingly, the data shows that households with a married status tended to have 4 or more family members living with them, with a significant cumulative of 33 respondents falling category.

### 4.2.6 Availability of Motor Vehicle at Home and Use of Public Transportation to Work

Figure 4.5 Clustered Bar Chart between Respondents Who has Motor Vehicle at Home and Use of Public Transportation to Work




Source: SPSS by this Final Year Project.

Figure 4.5 provides valuable insights into the transportation habits of the respondents. The data shows that the vast majority, specifically 100 respondents, had motor vehicles at home, while only 3 persons did not have any. This indicates that motor vehicles are a common mode of transportation for the sample group.

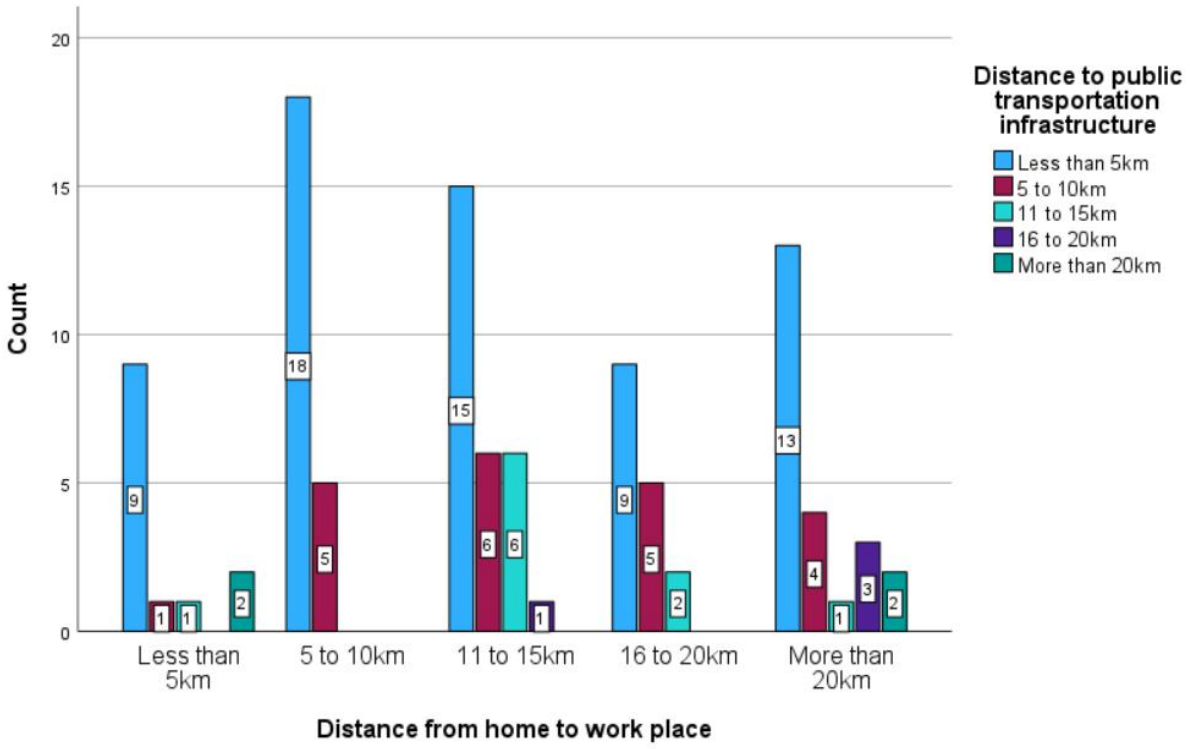
Interestingly, the data reveals that while 71 respondents drove to their workplace, there were still 30 persons who opted to use public transportation to commute to work despite having a motor vehicle at home. This suggests that these individuals may prefer to use public transportation for reasons such as convenience or cost-effectiveness.

Furthermore, the data highlights that there were 2 respondents who neither had a motor vehicle at home nor used public transportation to commute to work. This could potentially

indicate that these individuals either work from home or have a different mode of transportation that was not captured in the survey.

### 4.2.7 Distance to Work Place and Nearest Public Transportation Infrastructure

Figure 4.6 Clustered Bar Chart between between Distance from Home to Work Place and Distance from Home to Nearest Public Transportation Station




Source: SPSS by this Final Year Project.

Figure 4.6 provides important insights into the distance between the respondents' homes and their workplaces, as well as the distance between their homes and the nearest public transportation infrastructure.

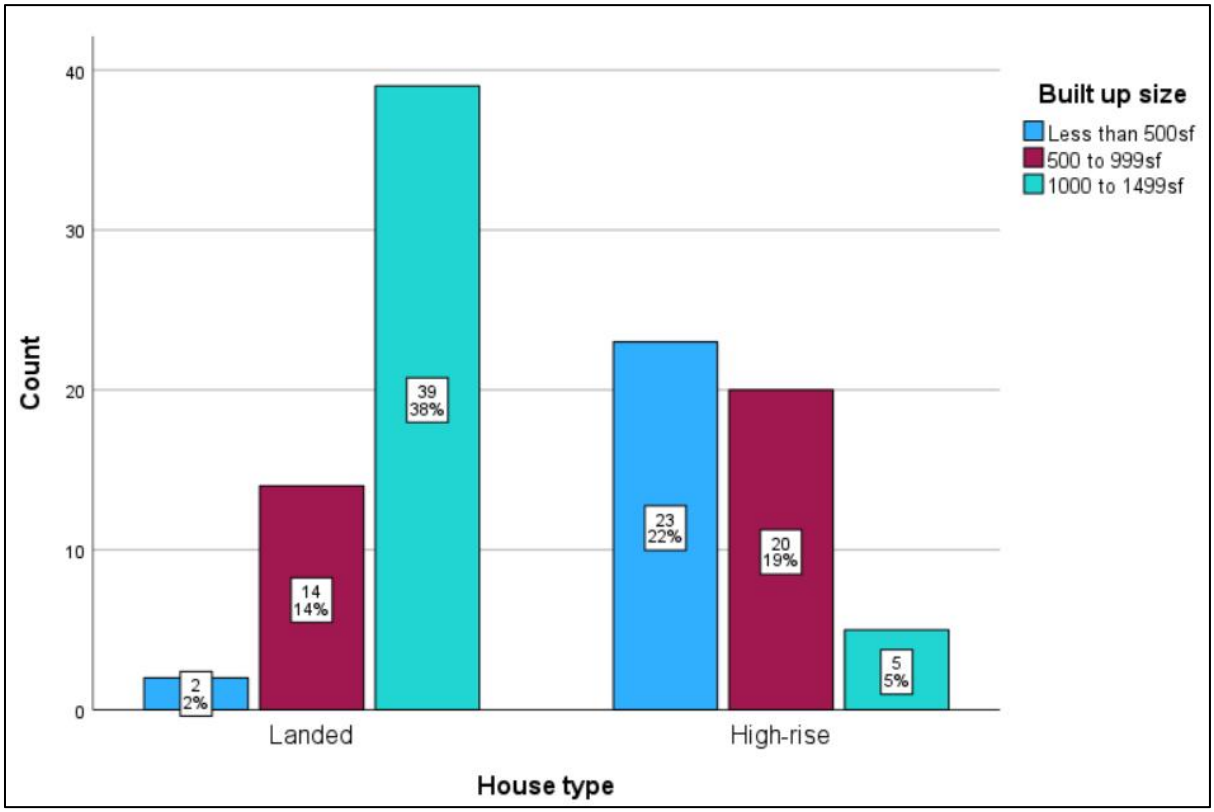
The data shows that the majority of the respondents, specifically 28 persons, had a distance of 11 to 15km between their homes and workplaces. This suggests that a significant portion of the sample group may have a moderate commute to work.

Furthermore, the data reveals that the distance between the respondents' homes and the nearest public transportation infrastructure varied, with a significant 64 respondents recording a distance of less than 5km. This indicates that public transportation infrastructure is accessible for a large portion of the sample group.

Interestingly, the data also highlights that there were 51 respondents whose distance from both their homes to their workplaces and to the nearest public transportation infrastructure was within 5km. This suggests that these individuals may have a relatively short commute and convenient access to public transportation.

### 4.2.8 House Type and Built Up Size

Figure 4.7 Clustered Bar Chart between Respondents' House Type and Built Up Size




Source: SPSS by this Final Year Project.

Figure 4.7 provides valuable insights into the type of residences that the respondents live in, as well as the size of their homes.

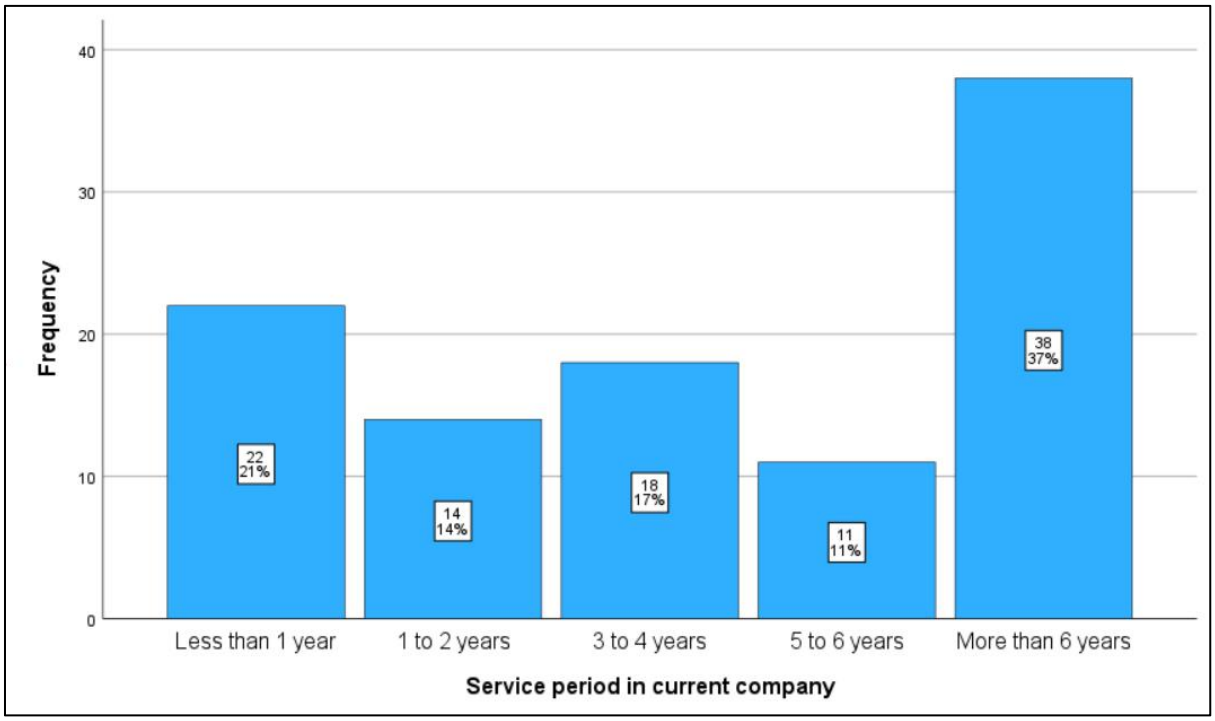
The data shows that while 55 respondents live in landed properties such as terrace houses or semi-detached houses, a significant portion of 48 respondents live in high-rise buildings such as flats, condominiums, or apartments. This suggests that high-rise living is a common choice among the sample group.

Interestingly, the data also reveals that the majority of the respondents living in landed properties have a built-up size range of 1,000 to 1,499 square feet, with 89 percent falling within this range. Furthermore, 41 percent of these respondents have a built-up size range of 500 to 999 square feet. This indicates that the majority of the landed properties in the sample group are of a moderate size.

As for the respondents living in high-rise buildings, the data shows that 23 percent have a built-up size range of less than 500 square feet, while 19 percent fall within the range of 500 to 999 square feet. This suggests that high-rise living may be more common among individuals who prefer smaller living spaces.

### 4.2.9 Service Period in Current Company

Figure 4.8 Respondents' Service Period in Current Company




Source: SPSS by this Final Year Project.

The data presented in this description indicates that the distribution of respondents' work experience is relatively equal among the specified ranges, with no single range having a significantly higher number of respondents than the others.

The largest group of respondents, comprising 38 individuals or 37 percent of the sample, have more than 6 years of experience, while the next largest group consists of respondents with less than 1 year of experience, comprising 21 percent of the sample.

The remaining respondents are spread across the other experience ranges, with 14 percent having 1 to 2 years of experience, 17 percent having 3 to 4 years of experience, and 11 percent having 5 to 6 years of experience.

### 4.2.10 Summary of Distribution of Respondents' Majority Profiles

Table 4.1 provides valuable insights into the most frequent profiles of the respondents in the sample.

The data shows that the majority of the respondents were Chinese, male, and between the ages of 30 to 39 years old. Additionally, many of them were married and had a family size of four persons. This information can be useful for businesses looking to target specific demographics in their marketing or outreach efforts.

As for the educational background of the respondents, the majority had obtained a Bachelor's degree or a Professional degree level, indicating a relatively high level of education among the sample group.

The data also suggests that a high percentage of respondents (69 percent) possess a motor vehicle in their home, and the majority of them (71 percent) do not use public transportation to get to their workplace. This information can be useful for businesses looking to target consumers who may be more likely to drive to their locations.

Furthermore, the majority of the respondents (62 percent) live within 5 km of the nearest public transportation, indicating that public transportation may still be a viable option for some of the sample group.

Finally, the data shows that the majority of the respondents live in landed properties with a built-up size of 1,000 to 1,499 square feet. This information can be useful for businesses looking to target consumers who may be more likely to live in larger homes. On the service period in company, majority respondents were more than 6 years.

Table 4.1 Summary of Distribution of Respondents' Majority Profiles

| Profile | Category | Frequency | Percentage |
|---|---|---|---|
| Age | 30-39 years old | 46 | 45 |

| | | | |
|---|---|---|---|
| Gender | Male | 63 | 61 |
| Ethnicity | Chinese | 80 | 78 |
| Education level | Bachelor degree/ Professional degree | 57 | 55 |
| Married status | Married | 57 | 55 |
| Family size | 4 persons | 30 | 29 |
| Availability of motor vehicle at home | Yes | 71 | 69 |
| Use of public transportation to work | No | 73 | 71 |
| Distance from home to workplace | 11 to 15km | 28 | 27 |
| Distance to nearest transport station | Less than 5km | 64 | 62 |
| House type | Landed | 55 | 53 |
| Built up size of house | 1,000 to 1,499 sf | 44 | 43 |
| Service period in company | More than 6 years | 38 | 37 |

Source: SPSS by this Final Year Project.

## 4.3 Reliability Test

Table 4.2 Reliability Measure of Variables in Different Factors

| Construct | Cronbach's alpha | N of items |
|---|---|---|
| Productivity | 0.762 | 6 |
| Office Automation | 0.812 | 5 |
| home office Design | 0.733 | 3 |
| Job Characteristics | 0.611 | 4 |
| Reaction by Employer-Employee | 0.720 | 4 |

Source: SPSS by this Final Year Project.

Table 4.2 provides important information regarding the reliability and internal consistency of the factors used in the study.

The data shows that the Cronbach's alpha values for the constructs range from 0.61 to 0.81, indicating that all of the factors had acceptable reliability and high consistency. In particular, the acceptable value for measuring internal consistency is 0.50 or more, which means that all of the factors used in the study exceed this threshold.

This information is valuable because it suggests that the factors used in this paper were reliable and consistent in measuring the variables of interest.

## 4.4 Descriptive Analysis

In this section, the aim is to analyze the data that comprises 22 measurement variables within five different factors. These factors will help to further describe and identify the main drivers and obstacles influencing the practice of work-from-home towards the commercial office demand. Additionally, this section aims to summarize the main function of commercial office space after the pandemic.

The 22 measurement variables will be analyzed using statistical tools such as correlation analysis, factor analysis, and regression analysis to identify any significant relationships among the variables. The five different factors will be explored using factor analysis, which will help to group and summarize the variables into meaningful factors.

In these result by Table 4.3 (n=103 valid samples), it is noted that higher mean of 3.4813, and higher standard deviation of of 0.79237 for productivity factor.

Table 4.3 Central Tendency and Variability in Different Factors toward WFH

| Statistics | Factors | Productivity | Office Automation | Home Office | Job Characteristics | Reaction by Employer Employee |
|---|---|---|---|---|---|---|
| Central Tendency | Mean | 3.4813 | 3.2178 | 1.8669 | 2.2635 | 2.2913 |
| | Median | 3.5714 | 3.4286 | 2 | 2.2857 | 2.2857 |
| | Mode | 3.57 | 3.57 | 2.14 | 2.29 | 2.29 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Variability | Std. Deviation | 0.79237 | 0.66401 | 0.45364 | 0.53742 | 0.55542 |
| | Variance | 0.628 | 0.441 | 0.206 | 0.289 | 0.308 |

In these result by Table 4.3 (n=103 valid samples), it is noted that higher mean of 3.4813, and higher standard deviation of of 0.79237 for productivity factor.

Table 4.4 Central Tendency and Variability in Different Functions of Commercial Office Space

| Function | Building community | Increasing productivity | Collaboration | Meeting space | Career development | Equipment and documents | Onboarding new hires | Innovating products | Nurturing talents |
|---|---|---|---|---|---|---|---|---|---|
| Mean | 4.85 | 4.89 | 5.14 | 4.83 | 4.97 | 4.97 | 5.02 | 4.94 | 5.02 |
| Median | 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 |
| Mode | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Std. Deviation | 1.498 | 1.461 | 1.401 | 1.502 | 1.375 | 1.498 | 1.328 | 1.427 | 1.468 |
| Variance | 2.243 | 2.136 | 1.962 | 2.257 | 1.891 | 2.244 | 1.764 | 2.036 | 2.156 |

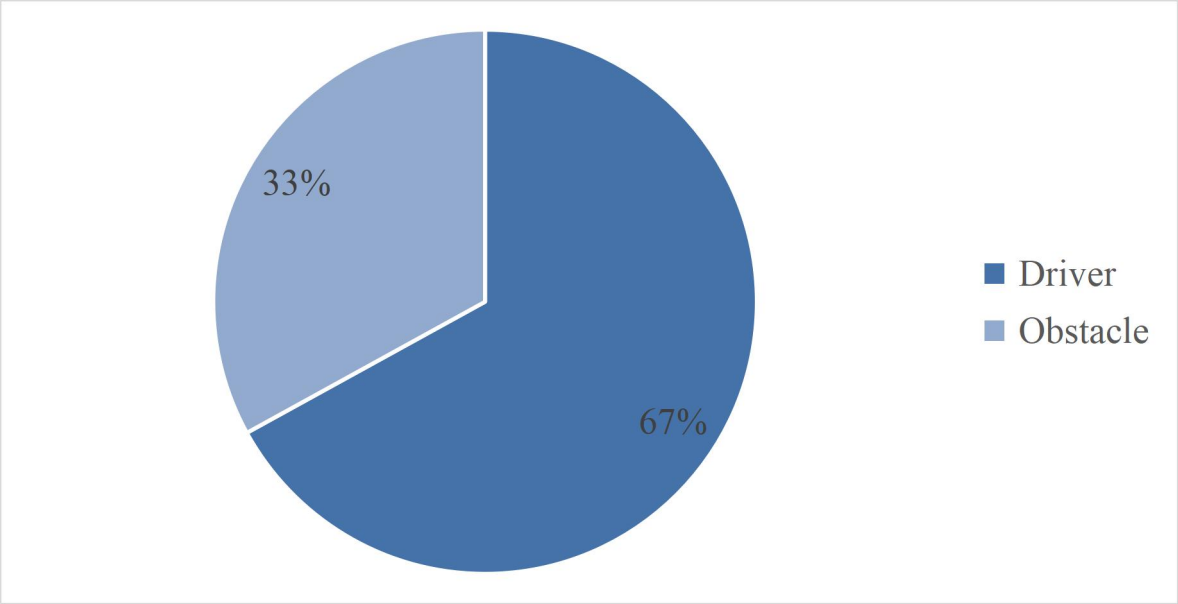
In these result by Table 4.3 (n=103 valid samples), it is noted that higher mean of 5.14 for collaboration (means function of collaboration and socialization of employeess), and lower mean of 4.83 for meeting space (means function of providing space for meetings with clients).

Furthermore, the feedback provided from respondents (1=Strongly disagree to 6=Strongly agree) through the questionnaire under section 2 will be translate to the total number both of the driver and obstacle for different factors in response to the work-from-home practice has explained as follow. In other word, the scale between 1 (equal with strongly disagree) and 3 (equal with somewhat disagree) will be categorized under the force of obstacle. Meanwhile, the scale between 4 (equal with somewhat agree) and 6 (equal with strongly agree) will be categorized under the force of driver.

Meanwhile, the function of the physical commercial office after the pandemic also will elaborate too.

### 4.4.1 Driver or Obstacle - Productivity

Figure 4.9 Driver or Obstacle - Productivity

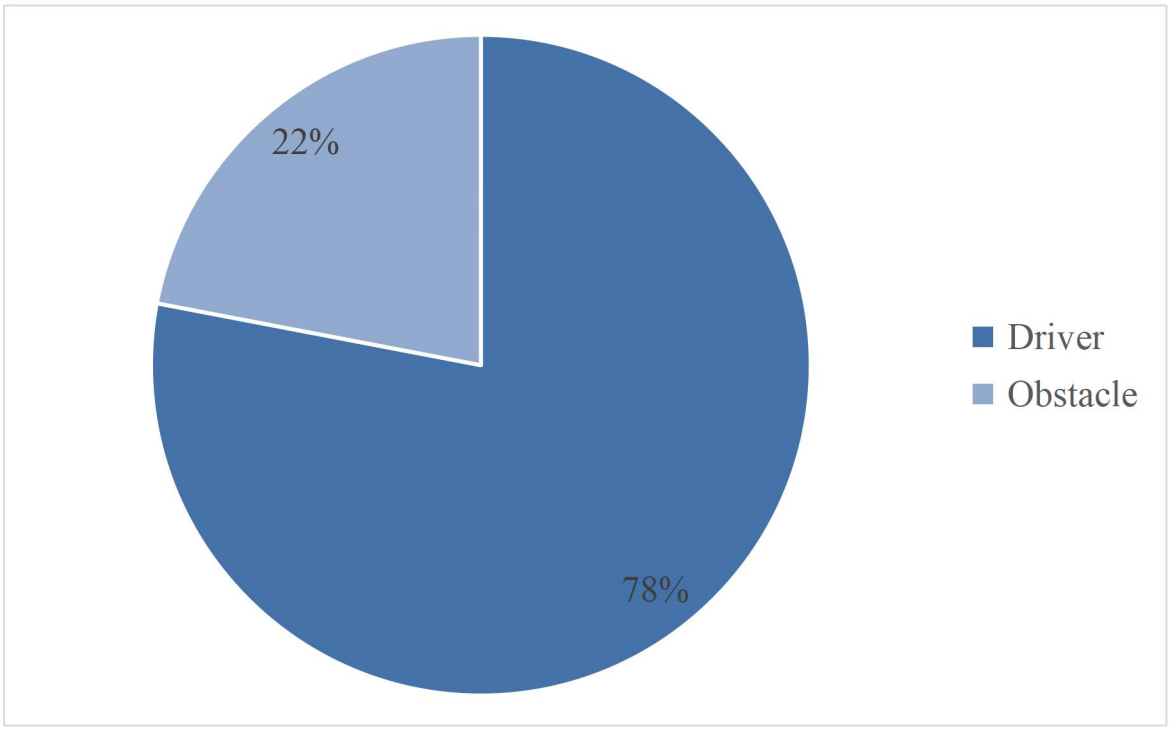



Source: SPSS and Excel by this Final Year Project.

The respondents were asked to report on their perspective of the productivity in response to the work-from-home practice. Over 69 of respondents (67 percent) pinpoint that the productivity factor is the driver force in response to the work-from-home practice, whereas, 34 of respondents (33 percent) pinpoint that the productivity factor is the obstacle force in response to the work-from-home practice.

### 4.4.2 Driver or Obstacle - Office Automation

Figure 5.0 Driver or Obstacle - Office Automation

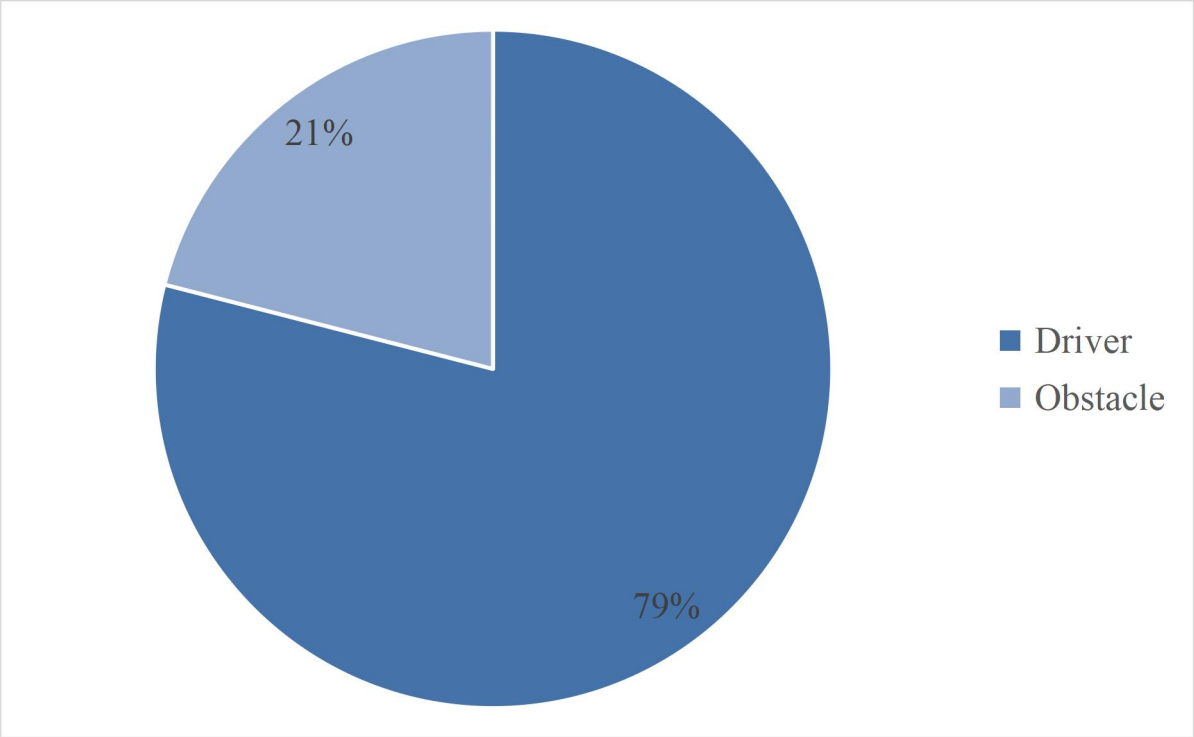



Source: SPSS and Excel by this Final Year Project.

The respondents were asked to report on their perspective of the productivity in response to the work-from-home practice. Over 80 of respondents (78 percent) pinpoint that the office automation factor is the driver force in response to the work-from-home practice, whereas, 23 of respondents (22 percent) pinpoint that the office automation factor is the obstacle force in response to the work-from-home practice.

### 4.4.3 Driver or Obstacle - Home Office Design

Figure 5.1 Driver or Obstacle - Home Office Design

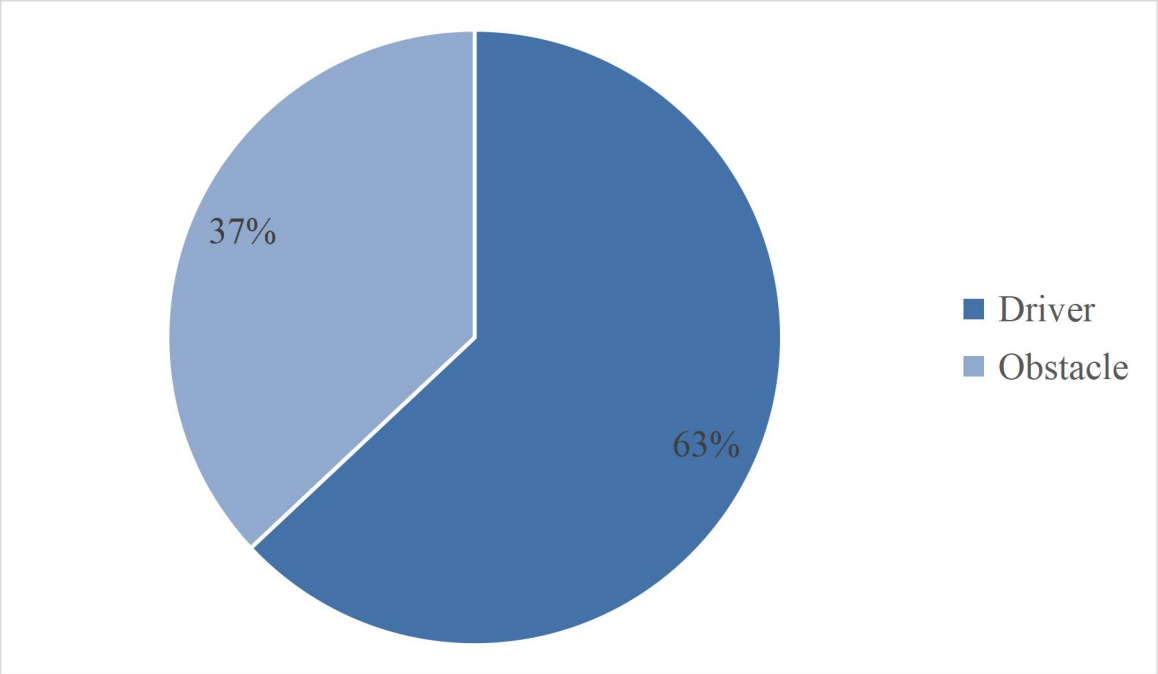



Source: SPSS and Excel by this Final Year Project.

The respondents were asked to report on their perspective of the productivity in response to the work-from-home practice. Over 81 of respondents (79 percent) pinpoint that the home office design factor is the driver force in response to the work-from-home practice, whereas, 22 of respondents (21 percent) pinpoint that the home office design factor is the obstacle force in response to the work-from-home practice. This paper hereby would like to highlighted that home office design factor is the higher percentage scope for the such a driver force among these five factors.

### 4.4.4 Driver or Obstacle - Job Characteristics

Figure 5.2 Driver or Obstacle - Job Characteristics

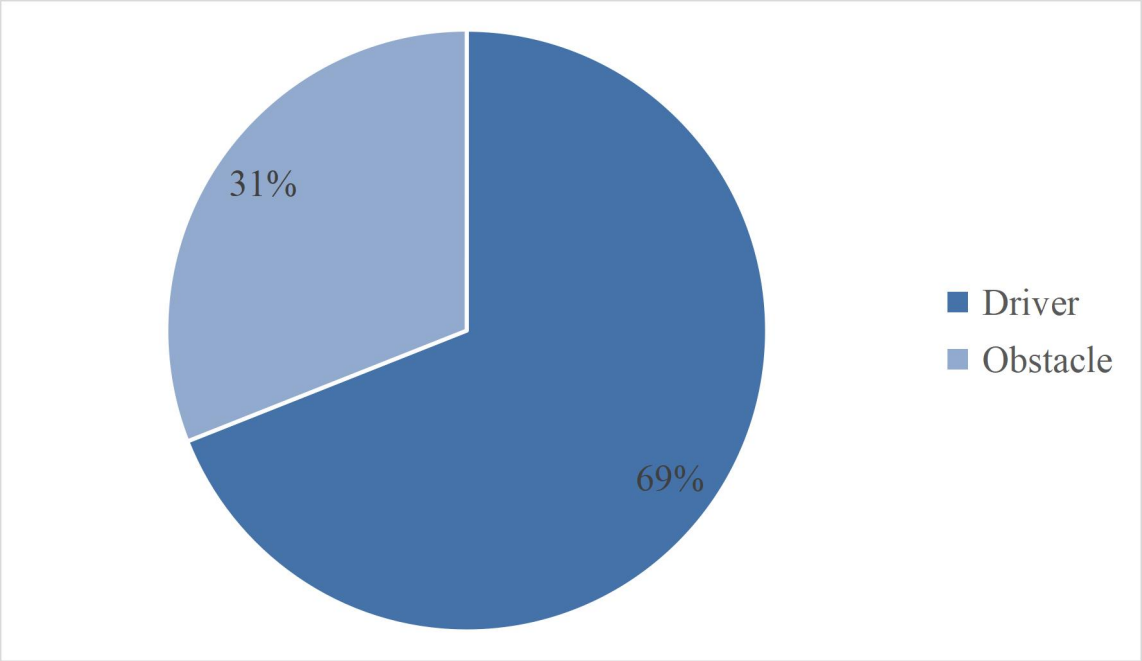



Source: SPSS and Excel by this Final Year Project.

The respondents were asked to report on their perspective of the productivity in response to the work-from-home practice. Over 65 of respondents (63 percent) pinpoint that the job characteristics factor is the driver force in response to the work-from-home practice, whereas, 38 of respondents (37 percent) pinpoint that the job characteristics factor is the obstacle force in response to the work-from-home practice. This paper hereby would like to highlighted that job characteristics factor is the higher percentage scope for the such a obstacle force among these five factors.

### 4.4.5 Driver or Obstacle - Reaction by Employer-Employee

Figure 5.3 Driver or Obstacle - Reaction by Employer-Employee

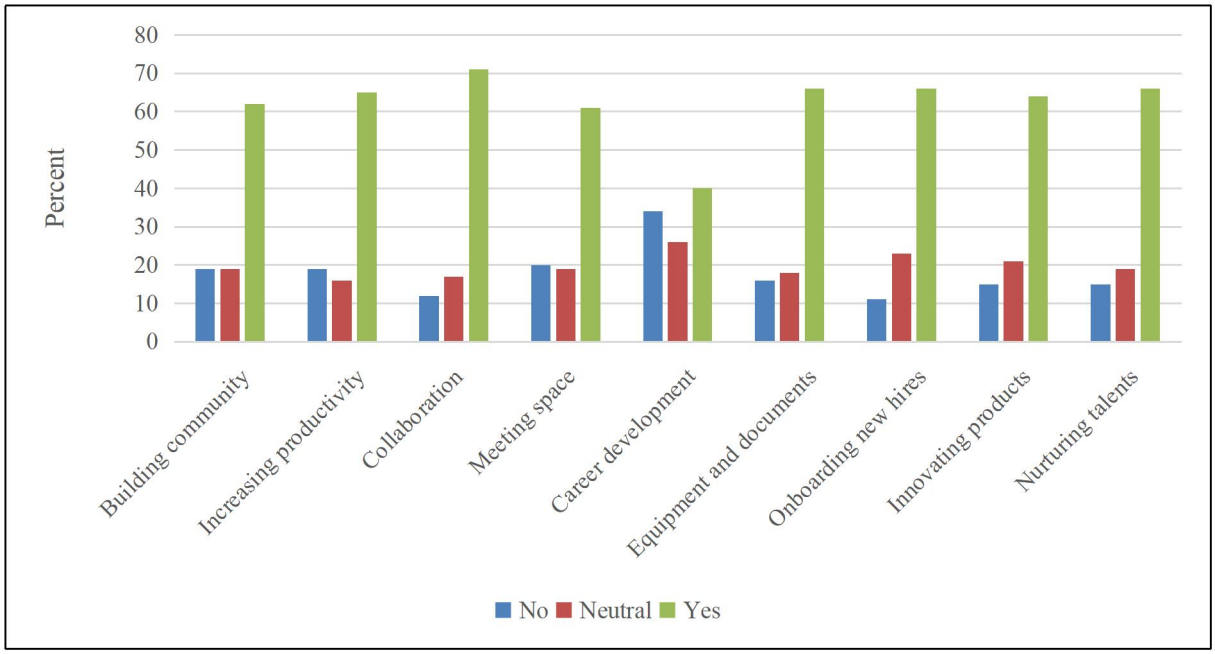



Source: SPSS and Excel by this Final Year Project.

The respondents were asked to report on their perspective of the productivity in response to the work-from-home practice. Over 65 of respondents (63 percent) pinpoint that the reaction by employer-employee factor is the driver force in response to the work-from-home practice, whereas, 38 of respondents (37 percent) pinpoint that the reaction by employer-employee factor is the obstacle force in response to the work-from-home practice.

### 4.4.6 Main Function of Commercial Office Space After the Pandemic.

Figure 5.4 Main Function Of The Commercial Office Space After the Pandemic




Source: SPSS and Excel by this Final Year Project.

Figure 5.7 provides a visual representation of the respondents' opinions on the main functions of commercial office space.

According to the graph, a majority of the respondents (71 percent) agreed that the main function of commercial office space is for collaboration. This suggests that businesses or organizations looking to design or renovate their office space may want to prioritize areas that encourage collaboration, such as open workspaces or conference rooms.

Additionally, the graph shows that a significant percentage of respondents (66 percent for each opinion) believe that commercial office space should be used for (a) equipment and documents, (b) onboarding new hires, and (c) nurturing talents.

On the other hand, a significant percentage of respondents (34 percent) disagreed that the main function of commercial office space is for career development. This suggests that businesses or organizations may want to focus less on career development in their office

space design. This was follow by the meeting space (20 percent), building community (19 percent), and increasing productivity (19 percent).

## 4.5 Relative Importance Index (RII)

In this section aim to identify the main force, or in another way, that influencing the practice of work-from-home toward the commercial office demand, and to rank the function of commercial office space after the pandemic, with the tool of Relative Importance Index (RII).

### 4.5.1 Relative Importance Index (RII) and Ranking of the WFH Factors

Table 4.5 Relative Importance Index (RII) and Ranking of the Factors

| Factor | RII | Rank |
|---|---|---|
| Home office design | 0.767 | 1 |
| Office automation | 0.749 | 2 |
| Reaction by employer-employee | 0.639 | 2 |
| Job characteristics | 0.597 | 4 |
| Productivity | 0.592 | 5 |

Source: SPSS by this Final Year Project.

With reference to the Table 4.5, the respondents reported that home office design (0.767) was the main force that influencing the practice of work-from-home toward the commercial office demand. This was followed by office automation (0.749), reaction by employer-employee (0.639), job characteristics (0.597) and productivity (0.592).

### 4.5.2 Relative Importance Index (RII) and Ranking of the Office Space Function

Table 4.6 Relative Importance Index (RII) and Ranking of the Office Space Function

| Function | RII (each) | Rank |
|---|---|---|
| Collaboration | 0.734 | 1 |
| On-boarding new hires | 0.717 | 2 |
| Nurturing talents | 0.717 | 3 |
| Career development | 0.710 | 4 |
| Equipment and documents | 0.710 | 5 |
| Innovating products | 0.706 | 6 |
| Increasing productivity | 0.699 | 7 |
| Building community | 0.693 | 8 |
| Meeting space | 0.691 | 9 |

Source: SPSS by this Final Year Project.

With reference to the Table 4.6, the respondents reported that collaboration (means collaboration and socialization of employees with value of 0.767) was the main function of commercial office space after the pandemic. This was followed by on-boarding new hires (0.717), nurturing talents (0.717), and career development (0.710).

# CHAPTER 5

# DISCUSSIONS AND RECOMMENDATION

## 5.0 Introduction

This chapter summarizes the key findings of the study and provides suggestions for future research implications, limitations of the study, and overall conclusions regarding the commercial office space relevant topic discussed in this paper. This chapter aims to answer the research questions posed in chapter 1 and provide valuable insights for academics, practitioners, and policymakers in the field.

## 5.1 Discussion of Research Objective 1 - To Recognize the Main Driver and Main Obstacle Influencing the Practice of Work-From-Home Toward the Commercial Office Demand in the Context of Malaysia's Klang Valley

The result of descriptive analysis from chapter 4.4 is concluded that home office design factor is the main driver force among these five factors, which agreed by 81 of respondents (79 percent). This was followed by office automation (78 percent), reaction by employer-employee (69 percent), productivity (67 percent), and job characteristics (63 percent).

In addition, with the input by Important Relative Index (RII) under chapter 4.6.1, the level of important factors was ranked through the value of the index. The Relative Importance Index ranges from 0 to 1. The findings show the highest scope for the home office design factor (0.767) and rank as top one, which means it is most significant factors affecting the practice

of work-from-home toward the commercial office demand in the context of Malaysia's Klang Valley.

Next, to present evidence and answer this Research Objective 1 (RO1), the main driver influencing work-from-home (WFH) which is home office design factor as kickoff at this section is discussed.

As the term indicates, home office refers worker are not on the move but work most of the time from the fixed location of their home, cited by survey at International Business Machines Corporation (Ferris, 2001).

The paper found that prior to the outbreak of the pandemic, the respondents had a traditional approach to work, with a focus on full-time work from a physical office. The questionnaire explored the types of homes that the respondents lived in to understand how well-suited they were for working from home (WFH). Next, the paper also identify that 43 percent (44 respondents) live in properties built up size range from 1,000 to 1,499 square feet, and 33 percent (34 respondents) live in properties built up size range from 500 to 999 square feet, which has meant that these size typically come with three-bedrooms and a kitchen plus living area (Goh et al., 2011). Meanwhile, notable that 24 percent (25 respondents) live in properties built up size less that 500 square feet, apparently is studio design, means one-bedroom. Nobody lives in a properties built up size more that 1,500 square feet.

The data showed that many respondents shared their homes with others (94 respondents), while only a small number lived alone (9 respondents).

Thus, reflect about WFH practice at home,the study found that a significant percentage of respondents (76 percent or 78 respondents) performed their office desk activities mostly in spaces that were typically used for other functions, such as living rooms and kitchens. This suggests that there was a functional overlap in WFH, where some spaces in the house had to become "hybrid" to accommodate temporarily different activities (Halford, 2005), but also a mix of users occurs. As the outcome of questionnaire shown, this situation has lead to the demand of the dedicated space in a house for home office purpose. The co-working space as resident's common facility also is one of these major respondents would be consider for their next house purchasing in future. Swift of such a demand and preference of the co-working

space because of (1) aesthetics of the space, (2) privacy, (3) comfortable indoor environmental quality, and (4) the availability of individual space thus the absence of distractions (Tagliaro et al., 2022). In this end, this paper concluded that the improvement in home design, such a dual key concept where a unit for family-living purpose while another unit for workplace purpose, or dedicated room for office use in a residential property, has created a stronger driver on influencing work-from-home practice affect the commercial office demand in Klang Valley. Such a finding confirms the positive outcome by home office design factor attributed to WFH practice, and further exchange the commercial office design outlook as previous studies cited (Tagliaro et al., 2022; Gandini, 2021; Mayerhoffer, 2021).

Another key finding to remember is, office automation factor which is the next importantly driver as essential in enabling the development of work-from-home practice. There are three main technology tools under scope of office automation factors, consist of (1) high speed network, (2) virtual space, such as file sharing drive, or virtual meeting in Microsoft Team, and (3) equipment sort of laptop or mobile communication device. Both pre-Covid studies (Gschwind, 2016) and studies during the pandemic (Caparrós Ruiz, 2022) have shown the involvement of office automation has driven the transition positively towards increased work-from-home with it.

According to the result of descriptive analysis from chapter 4.5, there is 38 of respondents (37 percent) pinpoint that the job characteristics factor is the obstacle force in response to the work-from-home practice. This was followed by productivity (33 percent), reaction by employer-employee (31 percent), office automation (22 percent), and home office design (21 percent). Thus, this study shows that the job characteristics factor is the main obstacle force among these five factors.

The expected general tendency is to do concentration work (i.e. heavy paper work, or in-depth research work) at home, and communicative work (i.e. brain storm session, or conflict solving) at the office in the future, same as the key finding noted in this paper. In other word, the higher substantial of the concentration work for a commercial office space user, the poorer of the obstacle force he facing in response to the work-from-home practice, could possibly reduce the demand toward the physical commercial office.

In the question of job characteristics factor in further, there is two type of commercial office space user consist of (1) "office-worker" who preferred a workspace with sufficient communication spaces, and (2) "home-worker" who to work from home in all activity-scenario (Appel-Meulenbroek at el., 2022). Theoretically, based on the key finding noted in this paper, in the event of there is a city mainly focus the non-administration job whereby concentration of office-worker (such as Bukit Jalil Technology Park where is science laboratories hub), the greater of the obstacle force the user in response to the work-from-home practice, presumably demand to commercial office space is considered inelastic, means that demand toward commercial office space is no major difference in the long run.

However, the research by Appel-Meulenbroek at el. (2022) report that the work-from-home mechanism is not a one-size-fits-all for each worker, means that demand of the commercial office space could possible unable confirm simply, in which contrast with such a key finding of this paper interpreted. This previous study shown the need to keep a diverse office workplace strategy to satisfy different needs, considering another factors such as office design. The current call in practice to focus back into physical office environments even more on communicative work would not do well as well for the office-worker. Moreover, the home-worker group appears inclined to even do their communicative work from home as well. As mentioned a number studies (Waizeneg, 2020) have shown that quality of the communicative work suffers from working from home. As such, another type of the working mode, such as hybrid work practice, has been introduced. Likewise, this calls for more research on what type of communicative work can be done from home, when workers are working in hybrid mode without lockdown of other restrictions, or fears related to Covid-infections. An additional topic for such studies should be to identify how hybrid working can be done without hurting social well-being.

## 5.2 Discussion of Research Objective 2 - To Rank the Function of Commercial Office Space After the Pandemic Because of the Practice of Work-From-Home (WFH)

The second research question was about the ranking for function of commercial office space after the pandemic because of the practice of work-from-home (WFH). It is rather safe to say that the pandemic has shaken the thinking of physical commercial office space.

As can be seen Relative Importance Index (RII) in Table 4.6, there appears to have been a strong shift of the physical commercial office space mainly used as collaboration and socialization of employees (0.767) on-boarding new hires (0.717), nurturing talents (0.717), and career development (0.710). Conversely, the use of physical commercial office space remain inefficiency for these function included of increasing productivity (0.699), building community (0.693), and use as meeting space (0.691).

To sum it up, this key finding confirms Courpasson's (2016) central point that physical commercial office spaces need to remain good places to brainstorm and collaborate post-pandemic. In other word, the physical commercial office is a special place in which groups and teams can extend their (1) positive social climate, (2) stimulate individualization, (3) demonstrations of trust, acceptance, or respect, and (4) freedom, support and openness may be communicated by quality of the provided space and its resources (Ekvall, 1983).

The physical commercial office empower new hires to be able to carry out work with a clear corporate and personal identity, as the conceptual knowledge developed by Earle (2003). This conceptual knowledge highlight that a company can provide an environment in which new hires enjoy being, that makes them feel energized and valued by their employer, then they will want to stay there. Conversely, if new hires feel they are dragging themselves to an unpleasant environment day after day, even if it is to do work that they find interesting, challenging and rewarding, it cannot help but reinforce negative associations with the position and the company (a.k.a. employer). Moreover, the proper physical commercial office can improve things such as new hires motivation and creativity, investing in workplace improvements rather than higher salaries and more benefits is not only a more viable option for most company, but also yields more far-reaching and pervasive results.

The successful accomplishment of talent development sort of nurturing job ability, as well as career development has depend on the quality of the physical commercial office as this paper suggested, similar with the conclusion make by Rashid (2021) means that the utilization of

physical space is of serious concern in enhancing the giftedness of work and leaning outcome for those main user of the physical space.

The meaningful finding has found in this paper when there is different view regarding the perspective of workplace productivity increasing, not only identity forming through community building exercise, but also social network activity sort of meeting, comparable to the a number of previous studies. Previous studies (Greenaway, 2016; Leaman, 1995) were indicated that people generally experience positive outcome included of productivity improving and supporting of community identity in physical commercial office space. However, research by McCune (1998) shows that physical commercial office space is not a essential factor correlating to the productivity aspect positively, by contrast, office automation means ICT (Information and Communications Technology) is playing the important role for such an aspect mentioned. Similarity, an empirical study has present an alternative perspective that decreasing productivity was provided due to inappropriate physical commercial office space design (Taghipour, 2015). Likewise, referring to conceptual knowledge by Wellman (1997), forming the social network related to the meeting could be replaced by the virtual group, or in the way of online method (i.e. Google Meeting), instead of rely on physical commercial office space.To this end, this paper highlighted that the physical commercial office space is generally inefficiency to use for (1) productivity increasing, (2) building community forming, and (3) use as meeting space .

## 5.3 Limitation of the Research

This paper was made at a time when the starting period of transition to endemic Phase, after the strong effectiveness of public health preventive and control measures during Covid-19 Pandemic Phase, and therefore everything that is used to create this research are quite recent and new. The freshness of the subject and the limited data available make it difficult to draw definitive conclusions about the impact of the pandemic on the use of commercial office space in Malaysia, if we do not count the severe acute respiratory syndrome (SARS) that happened at Asia in November 2002 . Due to the freshness of subject, there is no comparable data of a impact global crisis like this in the context of Malaysia. Likewise, the Malaysia government has instructed the WFH policy as part of the preventive measures against the

virus during Covid-19 pandemic phase. Therefore only assumptions can be made whereby working-from-home remains a possibility and respondents are free to choose where to work, as reflect to the questionnaire given in this paper. This thesis can only make the best assumptions that can be made with the available circumstance.

In addition to the freshness of the subject, due to the source of data mainly retrieved from JPPH (2022), the scope of commercial space only centred on private-owned office buildings, while government-owned office buildings has excluded. Furthermore, a geographical limitation has been made mainly focusing on Klang Valley, which only cover Kuala Lumpur and Selangor, to make sure that the manageability of the paper is reasonable. Although this geographical limitation, the paper mainly focuses on work-from-home and only to a lesser extent to teleworking performed at alternative office spaces such as co-working spaces. Due to the freshness of subject, the sample size and opinion input is fairly limited to these end-users only without extend to the supply side, such as building owner. A bigger sample size covering the supply side would give more perspectives to the subject and therefore make the research better.

## 5.4 Recommendation for Future Research

In further research, a larger sample would be recommended, and it would be interesting to find out whether there are differences in results between different types of organizations, to demonstrate, the WFH impact toward physical office demand between private sector and public sector.

Next, the addition of job variables of the employees would be valuable, to exemplify, management level versus executive level. Another research might be to examine how WFH affects residential outlook matter, for example, individual's preference to live far to the city centre when the need of reporting to the physical commercial office decreases in full force mode of the work-from-home.

Lastly, a suggestion for further research is to examine what urban planning approach and building design is best suited for the teleworking environment.

## 5.5 Conclusion

The work-from-home phenomenon after the Covid-19 pandemic is complex and is still under explored due to its novelty and uniqueness. Two main issues were discussed in this paper, that is, the extent to which such a phenomenon has affected the commercial office demand and outcomes in the case of Klang Valley, and implication of function on future commercial office space. The results derive from a small sample size which allowed only for descriptive statistics and Relative Importance Index (RII), therefore future studies applying more robust methods are desirable to improve generalization.

Nevertheless, this paper allows some initial reflections. In the case of Malaysia's Klang Valley, the current work-from-home practice abruptly changed the commercial space user's mind-set from the traditional office approach to pure work-from-home in general. The main driver influencing the practice of work-from-home toward the commercial office demand which has concluded in this paper is home office design factor. In other word, the improvement in home design, such a dual key concept where a unit for family-living purpose while another unit for workplace purpose, or dedicated room for office use in a residential property, has significance positive impact to work-from-home practice and presumably reduce the commercial office demand. This key finding has confirmed the outcome by previous studies (Tagliaro et al., 2022; Gandini, 2021; Mayerhoffer, 2021).

On other hand, the job characteristics factor is the main obstacle influencing the practice of work-from-home toward the commercial office demand. Most cases, there is two category of the commercial space user, included of "office-worker" who preferred a workspace with sufficient communication spaces, and "home-worker" who to work from home in all activity-scenario. Consequently, the demand of the commercial office space could be justify and predict easily based on the concentration of the user category typify. As an illustration, a home-worker (say, accountant who high-volume paper work) presumably could be full force of work-from-home, thereby reduce the demand toward commercial office space. There is other way round for a case of "office-worker" (say, corporate communication staff with high intensive of face-to-face communication work). However, a previous study (Appel-

Meulenbroek at el., 2022) has contrast position with such a view concluded in this paper, whereby the work-from-home mechanism is not a one-size-fits-all for each worker, conversely, this show the need to keep a diverse office workplace strategy to satisfy different needs. Simply put, this previous study reported job characteristics factor may not the obstacle force influencing the practice of work-from-home toward the commercial office demand, due to another factors such as office design should be considering also.

Commercial office space becomes a preferred place for brainstorming and collaborative activities after the pandemic. This shift seems to be responsible for a change in the role and value of the office, which is increasingly becoming a place for onboarding new employees and talent development, rather than the only place to increase productivity, build community, and serve as a meeting space. Therefore, spatial design must foster creativity, share and produce knowledge (Kraut et al., 2002), and encourage chance and social encounters. For example, the actual layout (e.g., an open design office) could improve its function if it is complemented by some spaces and facilities specifically dedicated to collaboration (e.g., meeting rooms, small break areas, etc.). Programming and design strategies should also focus on improving the aesthetics of the space, privacy, indoor environmental quality, and outdoor views, as all of these factors were rated lower in the office compared to WFH arrangements.

A similar type of research would be good to get a better overview of what happened after the pandemic and whether the Covid 19 pandemic played an important role in changing the demand for office space in Malaysia's Klang Valley, since the data number of this paper has given the limitation of the present work. In simpler terms, a larger sample, a larger factor variable, a more meaningful research.

A good timing for this kind of research would be five years after the pandemic has offically ended, so there would be more information of the phenomenon. New study could be done in qualitative data analysis (i.e. interview), because this will includes their attitude towards the change of demand that Covid-19 has created, and it would be interesting to see how that attitude has developed in future. Most of the organizations do not really know how they will chaneg the working model in their office space strategies in the near future, so there is a good possibility to research that. Also, a completely new perspective towards the Covid-19 and its impact to office space use could be possible. This paper only included one quite scoped perspective to research the subject.

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Waizenegger, L., McKenna, B., Cai, W., & Bendz, T. (2020). An affordance perspective of team collaboration and enforced working from home during COVID-19. European Journal of Information Systems, 29(4), 429–442. https://doi.org/10.1080/

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# APPENDIX A

Approval for Ethical Clearance to Involve Human Subjects in Research

**UNIVERSITI TUNKU ABDUL RAHMAN** DU012(A)
Wholly owned by UTAR Education Foundation Co. No. 578227-M

Re: U/SERC/267/2022

14 December 2022

Ms Puteri Ameera Binti Mentaza Khan
Department of Economics
Faculty of Building and Property Management
Universiti Tunku Abdul Rahman
Jalan Sungai Long
Bandar Sungai Long
43000 Kajang, Selangor

Dear Ms Puteri Ameera,

**Ethical Approval For Research Project/Protocol**

We refer to your application for ethical approval for your research project (Master student's project) and are pleased to inform you that your application has been approved under Expedited Review.

The details of your research project are as follows:

| | |
|---|---|
| **Research Title** | Work-from-home Influence on the Commercial Office Demand: Evidence from Klang Valley After the Pandemic |
| **Investigator(s)** | Ms Puteri Ameera Binti Mentaza Khan<br>Liew Pei Zhi (UTAR Postgraduate Student) |
| **Research Area** | Social Sciences |
| **Research Location** | Klang Valley |
| **No of Participants** | 100 participants (Age: 18 - 65) |
| **Research Costs** | Self-funded |
| **Approval Validity** | 14 December 2022 - 13 December 2023 |

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research,

(2) Confidentiality of participants' personal data must be maintained,

(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines; and

(4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

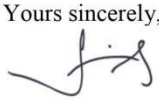
**Kampar Campus** : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 Fax: (605) 466 1313
**Sungai Long Campus** : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
Tel: (603) 9086 0288 Fax: (603) 9019 8868
**Website**: www.utar.edu.my

Should you collect personal data of participants in your study, please have the participants sign the attached Personal Data Protection Statement for your records.

The University wishes you all the best in your research.

Thank you.

Yours sincerely,



**Professor Ts Dr Faidz bin Abd Rahman**
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Accountancy and Management
Director, Institute of Postgraduate Studies and Research

**Kampar Campus** : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
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Tel: (603) 9086 0288 Fax: (603) 9019 8868
**Website**: www.utar.edu.my

# APPENDIX B

## Survey Questionnaire

**FACULTY OF ACCOUNTANCY AND MANAGEMENT**

**ACADEMIC YEAR 2022/2023**

**Survey concerning the work-from-home influencing the commercial office demand in Klang Valley**

Dear Sir & Madam,

I am currently conducting a research to analysis the impact of work-from-home that affect the commercial office demand. As the capital of Malaysia, Kuala Lumpur has the largest supply of office space in commercial office buildings among all states, reaching 104.39 million square meters in the first half of 2021 with an occupancy rate of 73.8 percent. While the supply of commercial office space in Selangor stood at 46.14 million square meters with an occupancy rate of 68 percent. Due to the ongoing Covid-19 endemic, many labour have been forced or encouraged to work-from-home that caused real estate professional to reconsider the market outlook and future of commercial office. To contribute such an insightful knowledge, your feedback and assistance to this research is well appreciated towards completing this survey questionnaire. Information obtained is strictly confidential and will only be used for statistical and mathematical analyses for the purpose of this study.

Please tick and fill in where appropriate

**Section 1: Demography**

A)What is your age group:
1) 20 - 29 ☐ 2) 30 - 39 ☐ 3)40 - 49 ☐ 4) 50 and above☐

B) What is your gender:
1) Male ☐ 2) Female ☐

C)What is your ethnicity:
1) Malay ☐ 2) Chinese ☐ 3) Indian ☐ 4) Others:_____

D) What is your marital status:
1) Single ☐ 2) Married ☐ 3) Divorce ☐

E) What is your highest academic level:
1) Lower than SPM ☐
2) 0-Level/SPM ☐
3) A-Level/ STPM/ Certificate/ Diploma ☐
4) Bachelor Degree/ Professional Degree ☐
5) Master/ Doctorate ☐
6) Others:____

F) How many number of members living in the house:
1) 1 person☐
2) 2 persons ☐
3) 3 persons ☐
4) 4 persons ☐
5) more than 4 persons ☐

G) Does you or your family (within the house) have motor vehicle at home:
1) Yes ☐ 2) No ☐

H) Does you or any of your family (within the house) use the public transportation to work
1) Yes ☐ 2) No ☐

I) What is the distance from home to work place:
1) Less than 5km☐ 2) 5 to 10km ☐
3)11 to 15km ☐ 4) 16 to 20km ☐
5) More than 20km ☐

J) What is the distance from home to nearest public transport (eg. KTM/ LRT/ MRT):
1) Less than 5km☐ 2) 5 to 10km ☐
3)11 to 15km ☐ 4) 16 to 20km ☐
5) More than 20km ☐

K) What is your home type:
1)Landed (eg. Terrace/ Semi-Detached/ Bungalow) ☐
2)High rise (eg. Flat Apartment/ Condominium) ☐

L)How big is the built up size of your house:
1)Less than 500sf ☐
2) 500 to 999sf ☐
3)1000 to 1499sf ☐
4) 1,500sf and above ☐

M) Service period in current company:
1) Less than 1 year ☐
2) 1 to 2 years ☐
3) 3 to 4 years ☐
4) 4 to 5 years ☐
5) More than 5 years ☐

**Section 2: Determination of work-from-home**

Imagine that nowadays is the period after COVID-19 pandemic in which disease will no longer affect the work situation in the office. In addition, working-from-home remains a possibility and you are free to choose where to work. Also, communication and teamwork can continue to take place both online and offline.

In that case, please rate the extent of following variable being measured under work-from-home from various perspective.

| Score | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Description | Strongly disagree | disagree | Somewhat disagree | Somewh-at agree | Agree | Strongly Agree |
| **Productivity** | | | | | | |
| I am more productive when I work from home. | | | | | | |
| The reduction in travel time is important for me in the desire to work from home. | | | | | | |
| I feel that I get more time for my private life when working from home. | | | | | | |
| I feel that my private life and work end up in conflict when working from home. | | | | | | |
| The Covid-19 pandemic has continued to changed my view on working from home becoming more positive. | | | | | | |
| The job productivity is a significant factors exerting I choose to work-from-home. | | | | | | |
| **Office Automation** | | | | | | |
| Technical and digital tools, such as computer, smartphone, Skype, Microsoft Teams and numerous digital platforms are good enough to enable me working from home without hindrance. | | | | | | |
| As technical and digital tools develop, I can imagine extending the time I work from home even more. | | | | | | |
| I believe that IT (information technology) remote support is emerging important after the experience of Covid-19 pandemic. | | | | | | |
| I could set-up my own office automation tools (ie install Microsoft Teams) without assitance of IT officer who duties at the workplace/ office. | | | | | | |
| The availability of IT (information technology) is a significant factors exerting I choose to work-from-home. | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Home Workplace Design** | | | | | | |
| There is dedicated space of my house for own use home office space (ie study room, or studio) | | | | | | |
| Co-working space/facility is one of the factor I would be consider for my next house purchasing (if anything) | | | | | | |
| The availability of home office is a significant factors exerting I choose to work-from-home. | | | | | | |
| **Job Characteristics** | | | | | | |
| Assume that I have a workday where I **have many (un)planned meetings and relatively little individual (concentrated) desk work** that day, in the case of after pandemic, I am comfortable to work-from-home. | | | | | | |
| Assume that I have a workday where I **have a similar amount of time spent on (un)planned meetings as on individual (concentrated) desk work** that day, in the case of after pandemic, I am comfortable to work-from-home. | | | | | | |
| Assume that I have a workday where I **have a few (un)planned meetings and a relatively large amount of individual (concentrated) desk work** that day, in the case of after pandemic, I am comfortable to work-from-home. | | | | | | |
| The requirement of job content (either teamwork-communication based or individual-concentrated based) is a significant factors exerting I choose to work-from-home. | | | | | | |
| **Reaction by Employer-Employee** | | | | | | |
| I am worried that the reduced face-to-face contact with my workplace, managers and colleagues will have a negative impact on my career. | | | | | | |
| I feel isolated from workplace social contexts when working from home. | | | | | | |
| Collaboration & communication with my workplace, managers and colleagues becomes increasingly difficult when working from home. | | | | | | |
| The workplace relationship is a significant factors exerting I choose to work-from-home. | | | | | | |

**Section 3: General response toward variable under work-from-home**

Imagine that nowadays is the period after COVID-19 pandemic in which disease will no longer affect the work situation in the office, please rate the extent the role taken part in general by these variables under work-from-home from your perspective.

| Score | 4 | 3 | 2 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| Description | Essential obstacle | High obstacle | Moderate obstacle | Neutral | Moderate driven | High driver | Essential driver |
| The function assumed by **job productivity** towards work-from-home practice. | | | | | | | |
| The function assumed by **office automation** towards work-from-home practice. | | | | | | | |
| The function assumed by the **availability of home office** towards work-from-home practice. | | | | | | | |
| The function assumed by **requirement of job content (either teamwork-communication based or individual-concentrated based)** towards work-from-home practice. | | | | | | | |
| The function assumed by the **workplace relationship** towards work-from-home practice. | | | | | | | |

**Section 4: Function of the physical commercial office after the pandemic**

Imagine that nowadays is endemic period in which the COVID-19 pandemic will no longer affect the work situation in the office, please rate the extent of important level for the purpose of the physical office after the pandemic.

| Score | 4 | 3 | 2 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| Description | Strongly not important | Not important | Somewhn ot important | Neutral | Somewh-at important | Important | Strongly Important |
| Building community and corporate culture | | | | | | | |
| Increasing productivity of employees | | | | | | | |
| Collaboration and socialization of employees | | | | | | | |
| Providing space for meetings with clients | | | | | | | |
| Providing learning and career development opportunities | | | | | | | |
| Providing access to equipment and documents | | | | | | | |
| Onboarding new hires | | | | | | | |
| Innovating products or services | | | | | | | |
| Attracting, retaining and nurturing talents | | | | | | | |

Thank you for your time sparing to complete this questionnaire.

## APPENDIX C

Raw Data from Excel

(Refer to the next page)

| | | Number | | | | | | Detail | | | | | RII (pre-calculation) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H | I | J | K | L=A*1 | M=B*2 | N=C*3 | O=D*4 | P=E*5 | Q=F*6 | R=G*7 | S | T=S*6 | U=R/T | V=sum(R)/sum (T) |
| | Variable and frequency | Strongly disagree | Disagree | Somewhat disagree | Somewhat agree | Agree | Strongly agree | Mean | Median | Mode | Std. Deviation | Variance | Strongly disagree | Disagree | Somewhat disagree | Somewhat agree | Agree | Strongly agree | Total | N (respondent) | A*N | RII (each) | RII (group) |
| Productivity | [I am more productive when I work from home.] | 6 | 22 | 22 | 27 | 14 | 12 | 3.55 | 4 | 4 | 1.419 | 2.014 | 6 | 44 | 66 | 108 | 70 | 72 | 366 | 103 | 618 | 0.59223301 | 0.59223301 |
| | [The reduction in travel time is important for me in the desire to work from home.] | 2 | 6 | 12 | 17 | 32 | 34 | 4.68 | 5 | 6 | 1.308 | 1.71 | 2 | 12 | 36 | 68 | 160 | 204 | 482 | 103 | 618 | 0.779935275 | |
| | [I feel that I get more time for my private life when working from home.] | 4 | 9 | 9 | 18 | 36 | 27 | 4.5 | 5 | 5 | 1.399 | 1.958 | 4 | 18 | 27 | 72 | 180 | 162 | 463 | 103 | 618 | 0.749190939 | |
| | [I feel that my private life and work end up in conflict when working from home.] | 11 | 15 | 20 | 26 | 22 | 9 | 3.58 | 4 | 4 | 1.465 | 2.148 | 11 | 30 | 60 | 104 | 110 | 54 | 369 | 103 | 618 | 0.597087379 | |
| | [The Covid-19 pandemic has continued to changed my view on working from home becoming more positive.] | 3 | 7 | 19 | 29 | 30 | 15 | 4.17 | 4 | 5 | 1.256 | 1.577 | 3 | 14 | 57 | 116 | 150 | 90 | 430 | 103 | 618 | 0.69579288 | |
| | [The job productivity is a significant factors exerting I choose to work-from-home.] | 6 | 10 | 22 | 28 | 26 | 11 | 3.88 | 4 | 4 | 1.345 | 1.81 | 6 | 20 | 66 | 112 | 130 | 66 | 400 | 103 | 618 | 0.647249191 | |
| Office Automation | [Technical and digital tools, such as computer, smartphone, Skype, Microsoft Teams and numerous digital platforms are good enough to enable me working from home without hindrance.] | 3 | 6 | 12 | 18 | 44 | 20 | 4.5 | 5 | 5 | 1.259 | 1.586 | 3 | 12 | 36 | 72 | 220 | 120 | 463 | 103 | 618 | 0.749190939 | 0.749190939 |
| | [As technical and digital tools develop, I can imagine extending the time I work from home even more.] | 2 | 8 | 16 | 19 | 44 | 14 | 4.33 | 5 | 5 | 1.232 | 1.517 | 2 | 16 | 48 | 76 | 220 | 84 | 446 | 103 | 618 | 0.721682848 | |
| | [I believe that IT (information technology) remote support is emerging important after the experience of Covid-19 pandemic.] | 2 | 4 | 6 | 11 | 45 | 35 | 4.92 | 5 | 5 | 1.161 | 1.347 | 2 | 8 | 18 | 44 | 225 | 210 | 507 | 103 | 618 | 0.82038835 | |
| | [I could set-up my own office automation tools (ie install Microsoft Teams) without assitance of IT officer who duties at the workplace/ office.] | 2 | 14 | 16 | 20 | 34 | 17 | 4.17 | 4 | 5 | 1.361 | 1.852 | 2 | 28 | 48 | 80 | 170 | 102 | 430 | 103 | 618 | 0.69579288 | |
| Home Workplace Design | [The availability of IT (information technology) is a significant factors exerting I choose to work-from-home.] | 1 | 5 | 12 | 17 | 49 | 19 | 4.6 | 5 | 5 | 1.123 | 1.262 | 1 | 10 | 36 | 68 | 245 | 114 | 474 | 103 | 618 | 0.766990291 | 0.766990291 |
| | [There is dedicated space of my house for work-from-home activity (ie study room, or studio)] | 4 | 14 | 10 | 13 | 45 | 17 | 4.28 | 5 | 5 | 1.424 | 2.028 | 4 | 28 | 30 | 52 | 225 | 102 | 441 | 103 | 618 | 0.713592233 | |
| | [Co-working space/facility is one of the factor I would be consider for my next house purchasing (if anything)] | 4 | 10 | 10 | 28 | 34 | 17 | 4.25 | 4 | 5 | 1.334 | 1.779 | 4 | 20 | 30 | 112 | 170 | 102 | 438 | 103 | 618 | 0.708737864 | |
| | [The availability of dedicated working space in a house is a significant factors exerting I choose to work-from-home.] | 3 | 3 | 9 | 29 | 39 | 20 | 4.53 | 5 | 5 | 1.162 | 1.349 | 3 | 6 | 27 | 116 | 195 | 120 | 467 | 103 | 618 | 0.75566343 | |
| Job Characteristics | [When my workload is 80% group meetings and 20% individual paper work/ desk work in a single day, I am comfortable to work-from-home.] | 4 | 25 | 21 | 23 | 20 | 10 | 3.58 | 4 | 2 | 1.397 | 1.951 | 4 | 50 | 63 | 92 | 100 | 60 | 369 | 103 | 618 | 0.597087379 | 0.597087379 |
| | [When my workload is 50% group meetings and 50% individual paper work/ desk work in a single day, I am comfortable to work-from-home.] | 1 | 14 | 26 | 34 | 17 | 11 | 3.83 | 4 | 4 | 1.208 | 1.459 | 1 | 28 | 78 | 136 | 85 | 66 | 394 | 103 | 618 | 0.637540453 | |
| | [When my workload is 20% group meetings and 80% individual paper work/ desk work in a single day, I am comfortable to work-from-home.] | 5 | 15 | 16 | 16 | 32 | 19 | 4.09 | 4 | 5 | 1.496 | 2.237 | 5 | 30 | 48 | 64 | 160 | 114 | 421 | 103 | 618 | 0.681229773 | |
| | [The "quantity of group meeting & individual paperwork/desk work" is a significant factors exerting I choose to work-from-home.] | 4 | 10 | 13 | 19 | 33 | 24 | 4.35 | 5 | 5 | 1.419 | 2.014 | 4 | 20 | 39 | 76 | 165 | 144 | 448 | 103 | 618 | 0.724919094 | |
| Reaction by Employer-Employee | [I am worried that the reduced face-to-face contact with my workplace, managers and colleagues will have a negative impact on my career.] | 7 | 16 | 15 | 27 | 25 | 13 | 3.83 | 4 | 4 | 1.456 | 2.12 | 7 | 32 | 45 | 108 | 125 | 78 | 395 | 103 | 618 | 0.639158576 | 0.639158576 |
| | [I feel isolated from workplace social contexts when working from home.] | 3 | 10 | 17 | 31 | 35 | 7 | 4.03 | 4 | 5 | 1.2 | 1.44 | 3 | 20 | 51 | 124 | 175 | 42 | 415 | 103 | 618 | 0.671521036 | |
| | [Collaboration & communication with my workplace, managers and colleagues becomes increasingly difficult when working from home.] | 4 | 12 | 13 | 31 | 30 | 13 | 4.07 | 4 | 4 | 1.323 | 1.75 | 4 | 24 | 39 | 124 | 150 | 78 | 419 | 103 | 618 | 0.677993528 | |
| | [The workplace relationship is a significant factors exerting I choose to work-from-home.] | 3 | 10 | 18 | 27 | 32 | 13 | 4.11 | 4 | 5 | 1.283 | 1.645 | 3 | 20 | 54 | 108 | 160 | 78 | 423 | 103 | 618 | 0.684466019 | |
| | Court | 84 | 245 | 334 | 508 | 718 | 377 | | | | | | | | | | | | | | | | |
| | Percentage | 4% | 11% | 15% | 22% | 32% | 17% | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

## APPENDIX D

Raw Data from SPSS

Reliability

**Reliability**

**Scale: Productivity**

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 103 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 103 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .762 | 6 |

**Reliability**

**Scale: Job Characteristics**

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 103 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 103 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .611 | 4 |

**Reliability**

**Scale: Office Automation**

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 103 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 103 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .812 | 5 |

**Reliability**

**Scale: Reaction by Employer-Employee**

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 103 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 103 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .720 | 4 |

**Reliability**

**Scale: Home Workplace Design**

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 103 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 103 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .733 | 3 |

Central Tendency and Variability of 22 Measurement Variables under these Five Factors toward WFH

**Statistics**

_[I_am_more_productive_when_I_work_from_home.]

| | | |
|---|---|---|
| N | Valid | 103 |
| | Missing | 0 |
| Mean | | 3.55 |
| Median | | 4.00 |
| Mode | | 4 |
| Std. Deviation | | 1.419 |
| Variance | | 2.014 |

**Statistics**

| | | _[The_reduction_in_travel_time_is_important_for_me_in_the_desire_to_work_from_home.] | _[I_feel_that_I_get_more_time_for_my_private_life_when_working_from_home.] | _[I_feel_that_my_private_life_and_work_end_up_in_conflict_when_working_from_home.] | _[The_Covid-19_pandemic_has_continued_to_changed_my_view_on_working_from_home_becoming_more_positive.] | _[The_job_productivity_is_a_significant_factors_exerting_I_choose_to_work-from-home.] |
|---|---|---|---|---|---|---|
| N | Valid | 103 | 103 | 103 | 103 | 103 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.68 | 4.50 | 3.58 | 4.17 | 3.88 |
| Median | | 5.00 | 5.00 | 4.00 | 4.00 | 4.00 |
| Mode | | 6 | 5 | 4 | 5 | 4 |
| Std. Deviation | | 1.308 | 1.399 | 1.465 | 1.256 | 1.345 |
| Variance | | 1.710 | 1.958 | 2.148 | 1.577 | 1.810 |

| | | _ [Technical_and _digital_tools, _such_as_co mputer, _smartphone, _Skype, _Microsoft_Tea ms_and_num erous_digital_ platforms_are_ good_enough_ to_enable_me _working_from _home_withou t_hindrance.] | _ [As_technical_ and_digital_to ols_develop, _I_can_imagin e_extending_th e_time_I_work _from_home_ even_more.] | _ [I_believe_that _IT_ (information_te chnology) _remote_supp ort_is_emergin g_important_af ter_the_experi ence_of_Covid - 19_pandemic.] | _[I_could_set- up_my_own_of fice_automatio n_tools_ (ie_install_Micr osoft_Teams) _without_assit ance_of_IT_offi cer_who_dutie s_at_the_work place/_office.] | _ [The_availabilit y_of_IT_ (information_te chnology) _is_a_significa nt_factors_exer ting_I_choose _to_work-from- home.] |
|---|---|---|---|---|---|---|
| N | Valid | 103 | 103 | 103 | 103 | 103 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.50 | 4.33 | 4.92 | 4.17 | 4.60 |
| Median | | 5.00 | 5.00 | 5.00 | 4.00 | 5.00 |
| Mode | | 5 | 5 | 5 | 5 | 5 |
| Std. Deviation | | 1.259 | 1.232 | 1.161 | 1.361 | 1.123 |
| Variance | | 1.586 | 1.517 | 1.347 | 1.852 | 1.262 |

| | | _ [There_is_dedicated_space_of_my_house_for_work-from-home_activity_(ie_study_room,_or_studio)] | _[Co-working_space/facility_is_one_of_the_factor_I_would_be_consider_for_my_next_house_purchasing_(if_anything)] | _ [The_availability_of_dedicated_working_space_in_a_house_is_a_significant_factors_exerting_I_choose_to_work-from-home.] | _ [When_my_workload_is_80%_group_meetings_and_20%_individual_paper_work/_desk_work_in_a_single_day,_I_am_comfortable_to_work-from-home.] | _ [When_my_workload_is_50%_group_meetings_and_50%_individual_paper_work/_desk_work_in_a_single_day,_I_am_comfortable_to_work-from-home.] |
|---|---|---|---|---|---|---|
| N | Valid | 103 | 103 | 103 | 103 | 103 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.28 | 4.25 | 4.53 | 3.58 | 3.83 |
| Median | | 5.00 | 4.00 | 5.00 | 4.00 | 4.00 |
| Mode | | 5 | 5 | 5 | 2 | 4 |
| Std. Deviation | | 1.424 | 1.334 | 1.162 | 1.397 | 1.208 |
| Variance | | 2.028 | 1.779 | 1.349 | 1.951 | 1.459 |

| | | _ When_my_workload_is_20%_group_meetings_and_80%_individual_paper_work/_desk_work_in_a_single_day,_I_am_comfortable_to_work-from-home.] | _[The_"quantity_of_group_meeting_&_individual_paperwork/desk_work"_is_a_significant_factors_exerting_I_choose_to_work-from-home.] | _ [I_am_worried_that_the_reduced_face-to-face_contact_with_my_workplace,_managers_and_colleagues_will_have_a_negative_impact_on_my_career.] | _ [I_feel_isolated_from_workplace_social_contexts_when_working_from_home.] | _ [Collaboration_&_communication_with_my_workplace,_managers_and_colleagues_becomes_increasingly_difficult_when_working_from_home.] | _ [The_workplace_relationship_is_a_significant_factors_exerting_I_choose_to_work-from-home.] |
|---|---|---|---|---|---|---|---|
| N | Valid | 103 | 103 | 103 | 103 | 103 | 103 |
| | Missing | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.09 | 4.35 | 3.83 | 4.03 | 4.07 | 4.11 |
| Median | | 4.00 | 5.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | | 5 | 5 | 4 | 5 | 4 | 5 |
| Std. Deviation | | 1.496 | 1.419 | 1.456 | 1.200 | 1.323 | 1.283 |
| Variance | | 2.237 | 2.014 | 2.120 | 1.440 | 1.750 | 1.645 |

Central Tendency and Variability in Different Five Factors toward WFH

**Statistics**

| | | C_Productivity_7 | C_Office_Automation_7 | C_Home_Workplace_7 | C_Job_Characteristics_7 | C_Reaction_by_Employer_Employee_7 |
|---|---|---|---|---|---|---|
| N | Valid | 103 | 103 | 103 | 103 | 103 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 3.4813 | 3.2178 | 1.8669 | 2.2635 | 2.2913 |
| Median | | 3.5714 | 3.4286 | 2.0000 | 2.2857 | 2.2857 |
| Mode | | 3.57[a] | 3.57 | 2.14 | 2.29 | 2.29 |
| Std. Deviation | | .79237 | .66401 | .45364 | .53742 | .55542 |
| Variance | | .628 | .441 | .206 | .289 | .308 |
| Range | | 3.43 | 3.00 | 2.14 | 2.43 | 2.86 |

a. Multiple modes exist. The smallest value is shown

Central Tendency and Variability in Different Functions of Commercial Office Space

| | | _ [The_office's_function_as_Building_community_and_corporate_culture_is_____after_the_pandemic.] | _ [The_office's_function_as_Increasing_productivity_of_employees_is_____after_the_pandemic.] | _ [The_office's_function_as_Collaboration_and_socialization_of_employees_is_____after_the_pandemic.] | _ [The_office's_function_as_Providing_space_for_meetings_with_clients_is_____after_the_pandemic.] | _ [The_office's_function_as_Providing_learning_and_career_development_opportunities_____after_the_pandemic.] | _ [The_office's_function_as_Providing_access_to_physical_filing_and_documents_is_____after_the_pandemic._] | _ [The_office's_function_as_Onboarding_new_hires_is_____after_the_pandemic.] | _ [The_office's_function_as_Innovating_products_or_services_is_____after_the_pandemic.] | _ [The_office's_function_as_Attracting,_retaining_and_nurturing_talents_is_____after_the_pandemic.] |
|---|---|---|---|---|---|---|---|---|---|---|
| N | Valid | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 |
| | Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.85 | 4.89 | 5.14 | 4.83 | 4.97 | 4.97 | 5.02 | 4.94 | 5.02 |
| Median | | 5.00 | 5.00 | 6.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Mode | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Std. Deviation | | 1.498 | 1.461 | 1.401 | 1.502 | 1.375 | 1.498 | 1.328 | 1.427 | 1.468 |
| Variance | | 2.243 | 2.136 | 1.962 | 2.257 | 1.891 | 2.244 | 1.764 | 2.036 | 2.156 |