



Working from Home (WFH): Challenges and Practicality for Construction Professional Personnel

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Abstract: Implementing working from home (WFH) is seen as the most effective approach to control the number of coronavirus disease (COVID-19) infections cases in Malaysia. However, when operating from home, the crucial problem is the need for existing workers to transition from working in an office to home. By doing so, the reliance on the Internet of Things (IoT) technology significantly increases as workers are forced to conduct work online. Hence, this study aims to explore the challenges of WFH among construction professional personnel and their preferences using IoT technology in contributing to their work effectiveness. A questionnaire survey through Google Form was released, and 65 respondents living in Selangor participated in this survey. The data collected was analysed descriptively. The results revealed that respondents experienced some key challenges related to social connectivity, emotional support and sense of belonging, mental and physical health, and fear of job security during WFH. Microsoft Team and Zoom are main platforms always used for virtual meeting. The use of IoT technology for design work and site monitoring during WFH is still very limited. In conclusion, WFH is practical among construction professional personnel despite the challenges they experienced. To overcome the challenges, improvement of WFH policy is required for the future of construction industry practitioners. The finding of this study helps understand Malaysia's key practitioners' experience with WFH and the progress of IoT technology during the pandemic.

Keywords: Working from home, challenges, Internet of Things (IoT)

1. Introduction

In the past, WFH was regarded as the 'new workplace revolution that could change many people's lives (Baruch and Yuen, 2000). In 1973, WFH was first established internationally to control the rising petrol consumption and traffic congestion cases (Saludin and Hassan, 2012). Since then, historians have been looking for new ideas to revolutionize the state of the traditional working environment (Baruch and Yuen, 2000). Despite the initial rejection, a data survey by McKinsey Global Institute (2020) reported that among 2,000 tasks, 800 jobs and within nine countries, one-fifth of the workforce recorded the same amount of success working remotely as in the office for 3 to 5 days a week.

Understandingly, before the novel COVID-19 strike the world, the idea of implementing WFH in Malaysia sounds foreign and complex. When Malaysia was first discovered with cases of COVID-19, people did not know how to react and what to do. Over time, after more people were found positively infected, the workplace scenery among Malaysians' dramatically changes. One of the sectors that were affected was the construction industry. As of March 2020, 54.9% of workers in construction industry being able to work from home (DOS, 2020).

People working from the office (WFO) had to work from home (WFH). The transition caused confusion and challenges to many people, mainly because they had to adjust to using Internet of Things (IoT) technology to do their work. In technical term, IoT is a computing device that helps human, animals and objects through mechanical and digital machines using identifiers that is unique to transfer data (McClelland, 2020). IoT is a technology that can provide ease for the construction industry in many aspects including in terms of sustainability, solving remote access problems and connecting workers on-site and off-site.

The course of action caused by the spreading of COVID-19 in Malaysia changes the workplace's whole scenery. In 2020, it created a new routine and opportunity for people to work from home for every business sector affected during this crisis. WFH is the change needed for professionals to perform their work remotely as an alternative besides being present physically in an office environment (Brown, 2020). Previously, a research was carried out by the government on WFH in the Malaysian construction industry when the Malaysia's Ministry of Public Works launched a 3-month program on the premise of Work from Home in 2010. This program created new initiatives for understanding the level of productivity, cost, and employees' satisfaction with flexibility and work-life balance (Saludin and Hassan, 2012). In Malaysia, WFH was evidently more common among high-skill occupations than mid-skill and low-skill jobs. High-skill occupations include managers, professionals and technicians (Tumin, 2020). According to CIDB Act 520, Section 33, any person employed in the construction industry and undertaking construction work is eligible to be considered as a construction practitioner, and this includes site supervisors, project managers and consultants (CIDB, 2015).

Implementing WFH is the most effective approach to control the number of infections among workers in Malaysia physically. However, some issues may have occurred among the employees practising this remote working method. Since practitioners are forced to continue working from home, other challenges also arise during the transition from early 2020 to 2021. According to Putri & Irwansyah (2020) and Sharma & Vaish (2020), the challenge that most significantly impacts the workers in all sectors is adapting to online communication quickly. While reshaping their lifestyle, workers also experienced mental health problems, issues regarding their self-belonging in an organization, and fear resulting from an unstable work environment. Another issue identified is the impact of limited resources at home to create a conducive environment to enhance workers' level of productivity. Since workers are expected to WFH, the availability of these resources is dependent on the organization in giving access to the real-time solution to workers at home. Hence, the ever-changing IoT technology is seen as the following solution for reducing tension in information (Nichols, 2020). It is a known fact that historically people had tried WFH but with minor success. However, due to the pandemic, the current situation pushes the industry to pursue a different means of working. Hence, new technology is used and discovered daily to help Malaysia's economy and the construction industry survive.

This study aims to identify how much of these changes affect the construction practitioners, especially professional personnel, in which civil engineers and architects were the focus. Both mainly involved in producing design, resolving design and construction problems, as well as monitoring the on-site work progress which in the absent of pandemic, normally carried out in the office and construction site. Are they well-adjusted to WFH? This study also focuses on the use of IoT technology based on specific activities conducted while WFH, such as meeting, design, and site monitoring. The challenges experienced by construction personnel and their preferences for using IoT for practical work is discussed. The nature of this study is essential to create a proper understanding of working and adapting within the industry for the continuation of employment.

2. Challenges of Working from Home

Generally, WFH requires many preparations at home, such as a quiet place, a dedicated space with a high internet connection and an understanding within family members (Vyas and Butakhieo, 2021). There are several restrictions and constraints that WFH causes that inhibit social occasions when connecting employers and employees online. It is important to create moments between employees. By creating special bonding moments between employees online, a survey carried out in the US, Germany and India, found out that workers feel that their work productivity improves with good communication and collaboration between their partners and co-workers (Dahik, et al., 2020). Workers that feel out of touch with their manager experience more challenging work due to lack of managerial support or two-way communication with their workers (Larson, et al., 2020). Some workers at home feel WFH is a day in and out of a job with limited informal interaction with colleagues. If they have families, the social engagement they received creates a limitation of knowledge exchange even with the best technological video conferencing tool being improved day by day (Grewal, 2020). Common perception dictates that career development is highly dependent on the suggestion by colleagues and supervisor. Bear in mind; workers cannot demonstrate their loyalty, integrity, and success without being face-to-face (Wong, et al, 2020).

In Singapore, some workers WFH have reported that their working arrangement exceeds 50 hours weekly, which is more than the government's 48 hours weekly limit set. Their decision to work longer hours is because they feel pressured to attend calls and entertain clients all day due to their responsibilities at home. Sadly, this decision causes a toll on the mental and physical health of workers (Lim, 2020). Their lack of daily work balance causes immense pressure and stress, especially onto women in India. Besides being mentally strained, physically, they experience more strain in their eyes, pain in the neck and lower back pain (Sharma and Vaish, 2020). Additionally, they also struggle to keep a balanced schedule between work and home, which took a toll on their sleeping schedule (Westfall, 2020).

Another aspect of challenges is in terms of fear of job security. A six-month study on career advancement had shown that 9% of workers experienced a lack of career advancement, and 41% stated that their career growth had stalled during the pandemic era (Mendoza, 2020). A survey by the Department of Statistics found that 95% of the self-employed reported lower earnings than pre-COVID-19, and nearly half of the self-employed (47%) lost their work during the crisis (DOS, 2020).

3. Importance of IoT Technology for WFH

Year 2020 is the year identified as the potential bloom for IoT technology and its effectiveness on workers. Thus, workers are now working smarter and safer at home away from the pandemic COVID-19 (Roe, 2020). The application of IoT has continuously grown with the rising number of workers forced to WFH. In terms of usage, activities such as meetings might use IoT technology like Google Meet, Microsoft Team, Cisco WebEx and Zoom. As for design, augmented reality (AR), building information modelling (BIM) and 3D printing are also an application of IoT according to the construction industry (Burger, 2019). Furthermore, site monitoring is another activity that applies IoT usage, such as in remote operation, supply replenishment, construction tools, equipment tracking, servicing and repair, and power and fuel savings (CREAM, 2020). IoT has significantly helped manufacturing companies monitor operations smoothly by delivering real-time solutions if any malfunction is found during activity (Poo, 2021). In South Korea, the government uses IoT technology to monitor the citizens to ensure everyone implements social distancing (Lax, 2020). Smart IoT leads to intelligent cities that use IoT for monitoring work and conditions, including traffic, air quality, water, and electrical usage. The data collected can be used for finding a solution to environmental problems (Fong, 2017). With the application of IoT in construction industry, may put an end to the whole paper process, late or lost forms, low accuracy, and unwanted intervals and delays (Srikanth, 2019).

Some people favour WFH expanding beyond movement control order (MCO). Some requested a hybrid form of WFH that values the expansion of digitalization, the flexibility of the current role, and options to work remotely (Poo, 2021). According to IBM (2020), WFH enables workers to be engaged in a safe, collaborative, and productive environment from secure and remote access. Since the construction industry is an essential sector, there are certain standard operating procedures that they must adhere to. Those present on site must be limited, practice social distancing, wear masks, and take PCR tests before entering the site (Lara, 2020).

The concept of IoT benefitting workers WFH correlates with three values whereby usage of IoT will improve productivity, value of work and acceptance of IoT in working environment (Fong, 2017). Nichols (2020) stated that behind every issue at home is the lack of productivity WFH created and the solution can be found in the ever-changing IoT technology. Workers values of works can be explained in a situation such as the intensity of stress and their performance are highly impacted by the lack of employer's "reward power" concept which is disconnected while implementing WFH (Raghuram & Fang, 2014) (Karanikas & Cauchi, 2020). Acceptance of IoT in a working environment can be seen through social interaction, design and exchange of information among workers (Fong, 2017).

IoT assists workers to work smarter and safer at any location away from the office (Roe, 2020). IoT technology can improve workers effectiveness especially in terms of productivity in few ways such as improved collaboration, IoT-enabled solutions can harness connected devices, allowing them to collaborate better. Now, employees do not need to be in the same physical space to stay in sync. According to Harvard Business Review, 58% of respondents said IoT had improved collaboration within their organization. IoT in the construction industry provides timely information to create a lot of accurate and precise forecasts, data-driven options. It tells about altering projects that might have based on manual processes (Srikanth, 2019). It eliminates the need for the traditional method of interaction while maximizing the quickness of receiving the latest news and information (Fong, 2017). Besides connectivity, IoT is also efficient, convenience and personalise for each user. Hence it can improve workers acceptance of IoT (Fong, 2017).

4. Methodology

A questionnaire form was developed with aimed to gain feedback on the challenges experienced by professional construction personnel, and the preferences of using of specific IoT technologies and their importance in ensuring work can be done effectively while WFH. Five-point Likert Scale with options ranging from such as "strongly disagree" to "strongly agree", "never" to "always", and "not important at all" to "extremely important" were adopted to gain this feedback. The sample size of targeted respondents was 186, to represent the total population of 360 consultant companies (about 50% civil engineering and 50% architecture firms) in Selangor recorded by the Ministry of Finance Malaysia (2021). The respondents were approached through personal call, email, WhatsApp Messenger, and LinkedIn.

5. Results and Discussion

Out of 186 selected respondents, 65 of them participated in the surveys with completed responses. Hence, the valid overall response rate is 34.1%, which is acceptable as the range of normal response rates for construction research is 25 – 30% (Fellows & Liu, 2008). For normality test, data collected are considered normal when the skewness and kurtosis values are within the range of -2 to 2 and -7 to 7, respectively (Mardia, 2006). As shown in Table 1 all the data collected are in

the range of normal distribution. As for reliability analysis, Cronbach’s Alpha is used to indicate the level of unbiased and error-free data collected whereby any value greater than and equals 0.7 is deemed acceptable (Mardia, 2006). In this study, all the data collected have high internal consistency with α value beyond 0.8.

Table 1 - Working experience in construction industry

Variables	Normality Test (N=65)		Reliability Test (N = 65)	
	Skewness	Kurtosis	No. of Item	Cronbach's Coefficient Alpha
Challenges experienced	0.219	-0.339	36	0.947
IoT's preferences	0.722	0.732	22	0.856
Work effectiveness	-1.028	1.714	25	0.887

5.1 Background of the Respondent

50 civil engineers and 15 architects made up the 65 respondents of this study. Respondents with civil engineering background, 22 of them hold position as civil engineers, 19 are site engineers and 9 are structural engineers. The respondents’ working experience is shown in Table 2. Most of respondents had been involved in the construction industry for 6 to 10 years (38.5%), and more than 10 years (30.7%). With this kind of respondents’ working experience profile, it should provide substantial reliability of the data collected for this study to understand the challenges and adaptability of respondents towards WFH and usage of IoT technology in handling and managing construction projects.

Table 2 - Working experience in construction industry

Years of working experience	No. of respondents, %
Less than or 5 years	20, 30.8%
6 to 10 years	25, 38.5%
11 to 20 years	9, 13.8%
More than 20 years	11, 16.9%

5.2 Challenges experienced by practitioners WFH

Figure 1 shows the challenges experienced by construction industry practitioners based on a Likert scale ranging from “strongly disagree” to “agree”. Challenges were categorized under four subcategories, i.e. social connectivity (C1), emotional support and sense of belonging (C2), mental and physical health (C3) and fear of job security (C4). The first challenge (C1) is in terms of social connectivity through online communication. 58.5% and 7.7% of respondents agree and strongly agree respectively that WFH is a day in and out of a job. This correlates with the comment on the same idea of the perception of WFH (Grewal, 2020). Moreover, 32.3% and 10.8% of respondents agree and strongly agree respectively that they cannot convey their opinion while working remotely. In addition, a total of 47.7% respondents agreed and strongly agreed that it is difficult to create connection with boss and workers through online communication. These are consistent with the statement on two-way communications being essential to improve relationships between workers (Larson, et al., 2020).

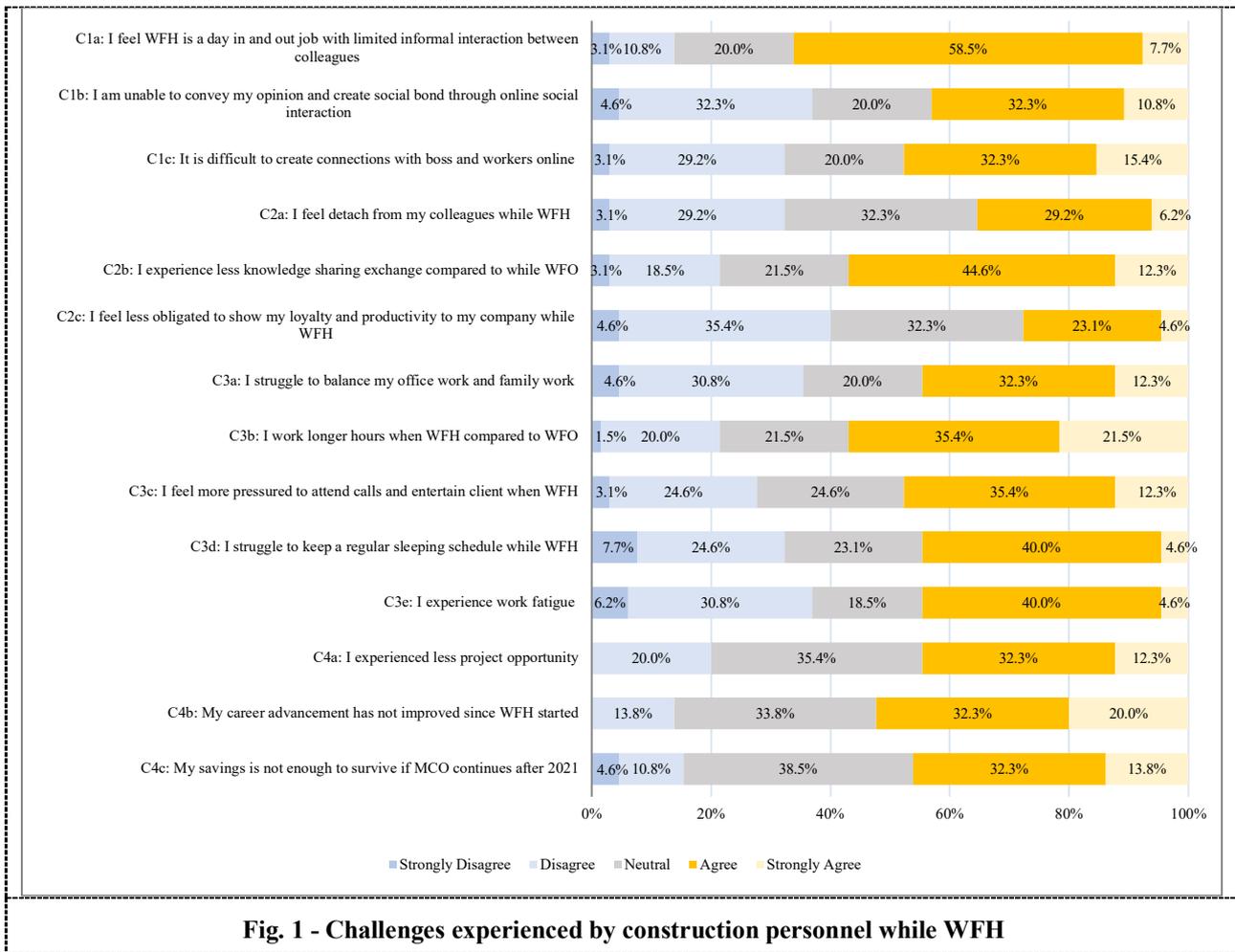


Fig. 1 - Challenges experienced by construction personnel while WFH

Challenge 2 identified lack of emotional support and sense of belonging as among the challenge’s respondents experienced. A total of 35.4% of respondents feel that they are detached from their colleagues during WFH. With 44.6% and 12.3% of respondents agree and strongly agree respectively that they experience less knowledge sharing transfer while WFH than WFO is linked to the social environment and limitations they experienced while at home. Even with the best technological advancement, limitations will exist among practitioners (Grewal, 2020; Westfall, 2020). Majority of respondents (40%) disagree that WFH make them feel less obligated to show their loyalty and productivity to their company. This means that they do not feel detached from their company and they confident that their boss or supervisor can fairly assess their performance although WFH. This is in contrast with the statements on the limitations of workers in demonstrating their work while WFH (Westfall, 2020; Wong, et al., 2020).

In term of challenge 3, which is on mental and physical health, 32.3% (agree) and 12.3% (strongly agree) of respondents struggle to balance work and family life. This correlates with the concept of a life balance between responsibilities at home and work schedules (Lim, 2020). Furthermore, 35.4% of respondents also feel that they work longer hours, and the pressure to attend calls and entertain clients, increased immensely while WFH. Whereas, to keep a regular sleeping schedule at home, is also a challenge proven through this study, with majority (40%) of respondents unable to do so while continuing WFH. Additionally, work fatigues were also experienced by majority (40%) of respondents more when WFH, which is similar to the highlight on physical health decline, including issues such as lower back pain (Sharma and Vaish, 2020).

Challenge 4 discloses fear of job security among the respondents. Although 35.4% of respondents are neutral, a total of 44.6% of respondents agree and strongly agree that while WFH, they experienced fewer project opportunities. 52.3% of respondents revealed that their career advancement had stalled since WFH started. 46.1% of respondents worry that their saving is not enough to survive if the MCO, hence WFH also are prolonged. These findings are in agreement with a study that highlighted that the construction industry professionals are significantly affected by the pandemic since more workers are experiencing low career advancement opportunities during the COVID-19 pandemic (Mendoza, 2020).

5.3 Preferences of IoT Technology

Figure 2 shows the preference of using IoT technology in certain activities such as virtual meeting, design, information exchange and sharing, and site monitoring while respondents WFH based on a Likert scale ranging from “never” to “always”. There are three main platforms for virtual meeting used often (three to four times a week) and always (daily) by majority of the respondents. Microsoft Team and Zoom each recorded the highest preference which is 40% (often and always), and Google Meet recorded 35.4%. Whereas, for Cisco Webex majority of the respondents revealed that they never used them. As an alternative, a small number of respondents also sometimes use BlueJeans and Whatsapp video call for meeting.

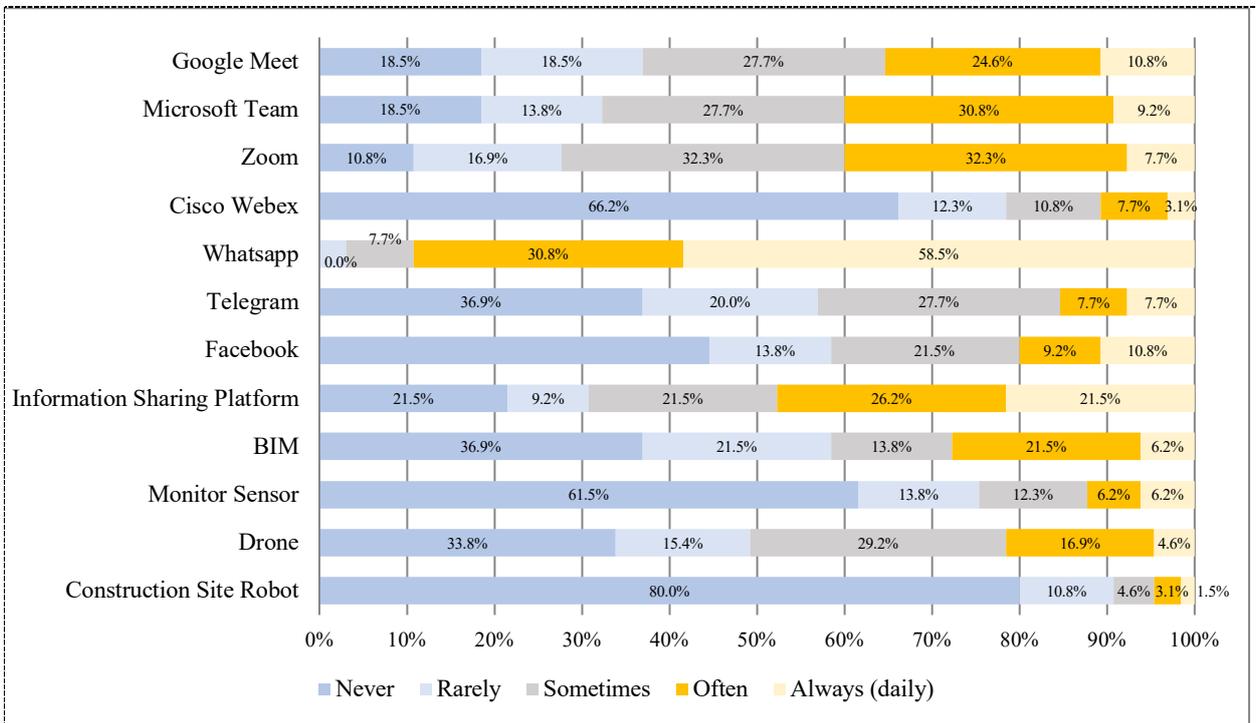


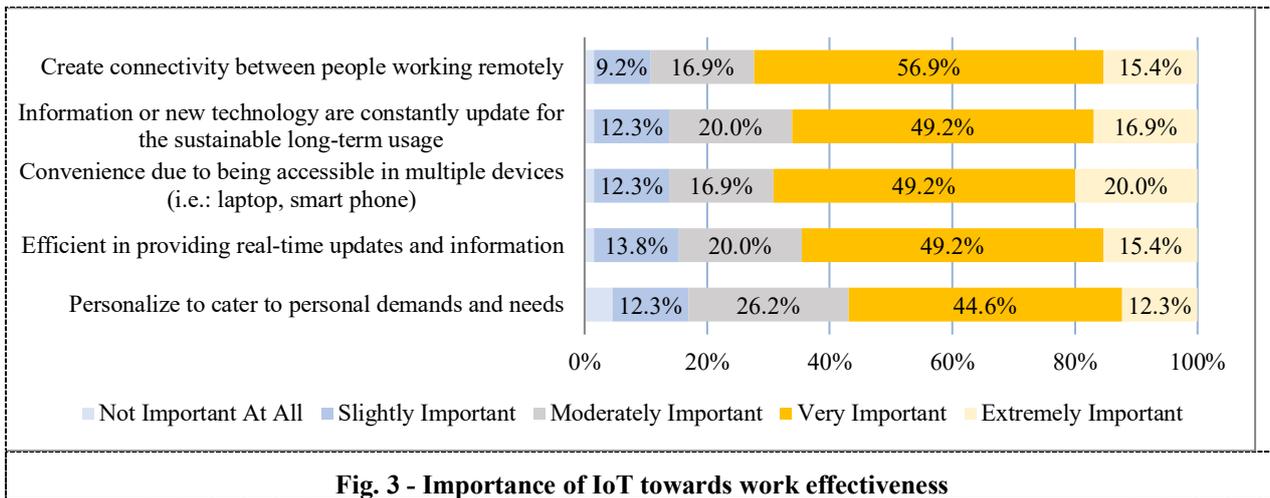
Fig. 2 - Preferences of IoT Technology

As for exchanging and sharing information, Whatsapp recorded the highest preference of 89.3% (often and always) among the respondents. Telegram was far behind with only 15.4% for the same level of usage frequencies. It is interesting to note that some of respondents, although only minority, also utilise Facebook for this purpose. The same goes with other social media applications or platforms such as Instagram, WeChat, WeShare, Discord and Twitter. In order to share big size data, majority of respondents (47.7%) often and always use cloud-based information sharing platform such as Google Drive, and around 6% of respondents, still use email.

As for the preferences of BIM technology for design, 21.5% of respondents use BIM technology often, only 6.2% use it daily, while 36.9% of respondents have not used BIM. IoT technology applications include drone, construction site robot, monitor sensor such as RFID are useful for site monitoring. However, each application received significant amount of “never” feedback from respondents. These findings indicate that there is still limited usage of IoT technological applications for site monitoring and design activities in the industry. These findings acknowledge the type of IoT technology commonly being used in the industry. This helps in understanding the progress of technology within the pandemic.

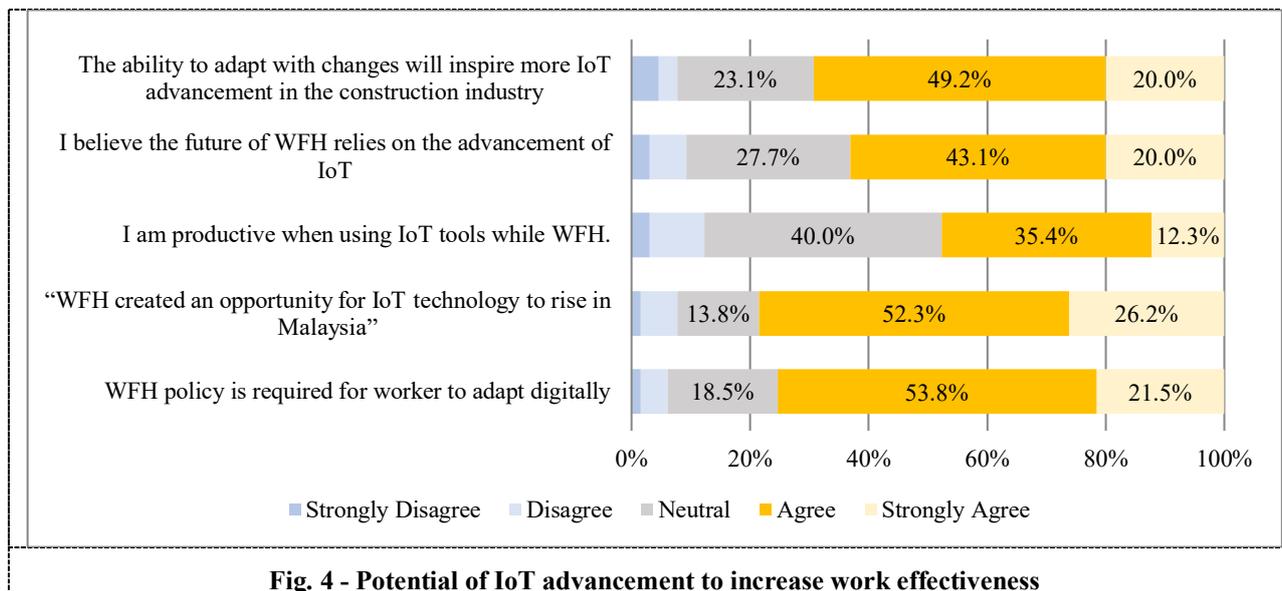
5.4 Importance of IoT Towards Work Effectiveness

Figures 3 shows the respondents’ views on the importance of IoT technology in ensuring their work effectiveness while WFH based on a scale ranging from “not important at all” to “extremely important”. All the five elements of importance recorded a resounding “very important” feedback from majority of the respondents. They are well understood and aware of the importance of IoT for aiding effective work while WFH. The ability of IoT in creating connectivity between people working remotely is the prominent importance of IoT experienced by most of the respondents.



5.5 Potential of IoT Advancement to Increase WFH Effectiveness

Figure 4 shows the potential of IoT advancement in increasing work effectiveness during WFH based on a scale ranging from “strongly disagree” to “strongly agree”. In overall, more than 50% of respondents agree that WFH policy is required for workers to adapt digitally during this challenging time. They also agree that current phenomenon like WFH creates an opportunity for more IoT technology advancement and awareness among Malaysians in the construction industry. Furthermore, in terms of WFH future, they believe that IoT technology will surely help them. Lastly, as for productivity, 35.4% or 23 out of 65 respondents agree that their productivity has improved when using IoT tools while WFH. This finding has proven that workers’ productivity at home is influenced by IoT tools available to them.



6. Conclusion

The challenges of WFH experienced by construction workers comprise social connectivity, knowledge transfer, physical health, stress, and fear of job security. These challenges are found to most significantly impact the progress of workers working remotely. To overcome these challenges, identifying the challenge is the first step towards the continual success of WFH among Malaysia’s industry. Additionally, in terms of preferences of IoT, there is still a lack of application of IoT technology in the construction industry. The activity that is most affected during the pandemic is site monitoring. Even when other sectors are forced to WFH, workers working in the site must continue their work on-site, contributing to the number of infected cases exposed to COVID-19. Due to this limitation, continual improvements of WFH policy are still required for the construction industry, especially compared to other more adapted sectors in Malaysia.

This research proves that professional construction personnel in the construction industry do experience challenges WFH compared to WFO. However, based on the data collected and analyzed, the researcher was able to disclose that the

difficulties experienced by the construction industry workers require more research and understanding regarding their condition of work. Through that, the researcher concluded at least three challenges that the respondents experienced while WFH. The first challenge or difficulty that was found is creating social connection through online communication. Secondly, a challenge in time contributes to the deterioration of physical health and stress. Lastly, a challenge in terms of project opportunity and long-term saving will shape the future of their career.

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