

Working from Home (WFH): Practicality and Challenges 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 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 research aims to explore the challenges of WFH 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 research. Based on the data collected, reliability analysis, normality test, descriptive statistical test, and correlation analysis was run by the researcher to analyse the data among key aspects of workers conditions at home that this research highlighted is online social connectivity. This research also indicates that IoT technology is limited in Malaysia, but its usage has improved the transition to WFH. An example of such activity is site monitoring, which is most affected during the pandemic. The finding of this research helps understand Malaysia's key practitioners' experience with WFH and the progress of IoT technology during the pandemic. 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.

Keywords: Working From Home, Construction Industry, Challenges, Preferences, Effectiveness, Internet of Things, Pandemic, Covid-19

1. Introduction

When Malaysia was first discovered with cases of Covid-19 pandemic, 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. 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. One of the sectors that were affected was the construction industry. In the past, WFH was regarded as the 'new workplace revolution that could change many people's lives [1]. In 1973, WFH was first established internationally to control the rising petrol consumption and traffic congestion cases [2]. Since then, historians have been looking for new ideas to revolutionize the state of the traditional working environment. IoT is a technology that aims to provide ease for the construction industry in terms of sustainability, solving remote access problems and connecting workers on-site and off-site.

This research aims to identify how much of these changes affect the overall satisfaction among practitioners. Are they well-adjusted WFH, or do they still require to be physically present on-site? This research is essential in identifying the relationship between WFH, IoT technology, and its impact on construction industry practitioners. 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. According to CIDB, Act 520, section 33, licensed construction professional personnel are recognized as all employees engaging in construction work. Construction employees are also classified as general construction workers, semi-skilled and skilled construction workers, site supervisors, project managers, and construction workers named the Board of Engineering [3]. In this research, construction practitioners in Selangor were selected as the focus group.

2. Working from home and its impact on construction industry practitioners

Understandingly, before the novel Coronavirus (Covid-19) strike the world, the idea of implementing WFH in Malaysia sounds foreign and complex because this practice requires many preparations at home, such as a quiet place, a dedicated space with a high internet connection and an understanding within family members [4]. Despite the initial rejection, a data survey by McKinsey Global Institute 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. Even with this success, there is still limited study on WFH among the construction sector in Malaysia. Additionally, some people favour WFH expanding beyond 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 [5]. According to IBM Malaysia, 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 [6].

In this research, the critical factors pursued determined the challenges experienced by construction personnel and their preferences for using IoT for practical work. The nature of this study is essential to create a proper understanding of working and adapting within the industry for the continuation of employment. In technical term, Internet of things (IoT) is a computing device that helps human, animals and objects through mechanical and digital machines using identifiers that is unique to transfer data. [7] Reneon Technologies, a green technology leader in Malaysia, uses IoT innovative building interface in various projects, including one in Malaysian Green Technology and Climate Change Centre (MGTC). Using IoT to improve green technology, this system creates a path for showcasing consumption patterns in a building with minimum modification required on the building's network [8]. Hence, the value of IoT is essential for this research to create an effective working atmosphere for working from home

workers. This research uses IoT technology based on specific activities conducted while WFH, such as meeting, design, and site monitoring.

The culture of long working hours with limited weekends off is a social norm among workers in the construction industry. Hence, when the Ministry of Public Works launched a 3-month program on the premise of Work from Home in 2010, it created new initiatives for understanding the level of productivity, cost, employee's satisfaction with flexibility and work-life balance. This research was specific to the construction industry. According to the authors, the theoretical development of WFH in the Malaysian construction industry is the reason for launching this research. The model considers the key literature parameter that will provide historical results on the future success of WFH. However, the government stopped this research after a 2011-salary hike [9]. This research is the continual application of WFH based on workers' perspectives during the pandemic. The main issues revolving around WFH is the productivity level among consultants within the construction industry and its importance for future application of remote working within Malaysia's construction industry. Whether there is a future for WFH within the industry or the potential negative impact WFH creates on consultants' quality of work. This study focuses on WFH issues that impacted workers' adaptability to communicate remotely, emotional belonging, mental health, and the fear of job security.

3. Challenges of working from home experienced by construction professional personnel

There are several restrictions and constraints that WFH causes that inhibit social occasions when connecting employers and employees online. Knowing this, external resources are acknowledged as one of the requirements to create moments between employees. Countries such as the US, India, and Germany implement external resources in creating special bonding moments between employees online and found out that at least 50% of workers feel that their work productivity improves with good communication and collaboration between their partners and co-workers [10]. In Harvard Business Review, 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 [11]. 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 [12]. 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. [13]

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 [14]. 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 [15]. Additionally, they also struggle to keep a balanced schedule between work and home, which took a toll on their sleeping schedule [16].

Another aspect that this research approach 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 [17]. Statistics by the department survey showed 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. As Malaysians are forced to WFH, workers in the property and construction industries are affected mainly by remuneration than job loss. Although more than 70 per cent of high-skilled workers can work from home, only 23% of semi-skilled jobs and 4 per cent of low-skilled jobs can work from home [18].

In this study, the researcher identified the potentials of IoT technology in improving workers work effectiveness, especially in terms of productivity, the value of work and acceptance of working. IoT has significantly helped manufacturing companies monitor operations smoothly by delivering real-time solutions if any malfunction is found during activity [19]. In South Korea, the government uses IoT technology to monitor the citizens to ensure everyone implements social distancing [20]. Additionally, 2020 is the year where the application of IoT has continuously grown with the rising number of workers forced to WFH. IoT forces workers to work smarter and safer at any location away from the office [21]. 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 [22]. 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 [23]. Besides that, IoT technology has its benefits, as seen in Table 1.

Table 1: Benefits of IoT technology towards workers WFH

Benefits of IoT technology towards workers WFH	
a. It provides preventive support for maintenance.	a. <u>Connectivity</u> Ability to connect multiple things into one device.
b. Reduce administrative complications.	b. <u>Efficiency</u> Eliminate the need for the traditional method of interaction while maximizing the quickness of receiving the latest news and information.
c. Real-time monitoring	c. <u>Convenience</u> Able to use anywhere, especially at home, which saves time and makes life easier.
d. Precise construction management	d. <u>Wellness</u> Ability to record time, physical health, and more.
e. Accurate tracking labour hours	e. <u>Conservation</u> 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.
f. Locating Capital Materials (shipment and placement)	f. <u>Personalization</u> IoT gathers data from users and uses this data for identifying the preference and needs of an individual.
g. Waste management and structural health management	
h. IoT sensors in the construction (wearable)	
i. IoT in build design example: BIM and Optical Character Acknowledgement (OCR)	

[24]

[25]

4. Methodology

4.1 Questionnaire Development

The questionnaire survey aimed to gain feedback on the challenges experienced by professional construction personnel and effective work using IoT. Challenges were categorized under four subcategories, i.e. social connectivity, emotional support and sense of belonging, mental health and fear of job security. A five-point Likert Scale with options ranging from “strongly disagree” to “strongly agree” was adopted to gain this feedback. Another focus for this research is in terms of effective work

using IoT, its importance and potential. The effective work was categorized into three parts, i.e., meeting, design, and site monitoring, followed by a five-point Likert Scale of range “never” to “always”. As for the other aspect of the questionnaire, which is the importance of IoT, a Likert Scale ranging from “not import at all” to “extremely important” was used, whereas IoT’s potential follows the range of “strongly disagree” to “strongly agree”.

4.2 Data Collection and Data Analysis

The key parties involved in this research study to achieve the objective is construction workers. The questionnaire survey was released through Google Form to 186 respondents (i.e. public and private sectors) located in Selangor, Malaysia. The total number of respondents chosen was based on the overall number of practitioners engaged in WFH around Selangor. Therefore, the 186 respondents fit the role of construction professional personal as recorded by the Ministry of Finance Malaysia in 2021 [26]. After thorough checking of the 65 returned surveys, all the responses were considered valid. Hence an overall 34.1% response rate is seen in Table 2.

Table 2: Questionnaire sent and received, and the response rate

Respondents	Questionnaires		
	Required (No.)	Returned (No., %)	Response Rate (No., %)
Civil Engineer	186	22, 11.1%	65, 34.1%
Structural Engineer		9, 4.8%	
Site Engineer		19, 10.2%	
Architect		15, 8.1%	

5. Results and Discussion

5.1 Background of the respondent

Based on the number of respondents, the profile comprises the working experience, as shown in Table 3. This data should provide substantial reliability of the data collected for this research to understand the challenges and adaptability of respondents towards WFH and usage of IoT technology. Additionally, the data shows that most respondents have a minimum of 6 to 10 years of working experience (38.5%), which is reasonably balanced compared to practitioners with more than 10 years of working experience (30.7%).

Table 3: Respondents’ Working Experience in the 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 Data Analysis

Through normality test, the data collected are considered normally when skewness and kurtosis values are within the range of -2 to 2 and -7 to 7, respectively [25]. Based on the normality test, challenges received skewness of -0.127 and kurtosis of -0.894 while IoT technology received -0.313 and 0.551. Thus, both data is 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 α value greater than and equals 0.7 is deemed acceptable [27]. In this research, challenges received Cronbach’s alpha of 0.847 while IoT technology received 0.738, which means both aspects are acceptable.

5.3 Challenges experienced by practitioners WFH.

Figure 1 shows the challenges experienced by construction industry practitioners against the number of respondents based on a Likert scale ranging from “strongly disagree” to “agree”. In total, there are four challenges identified in this research.

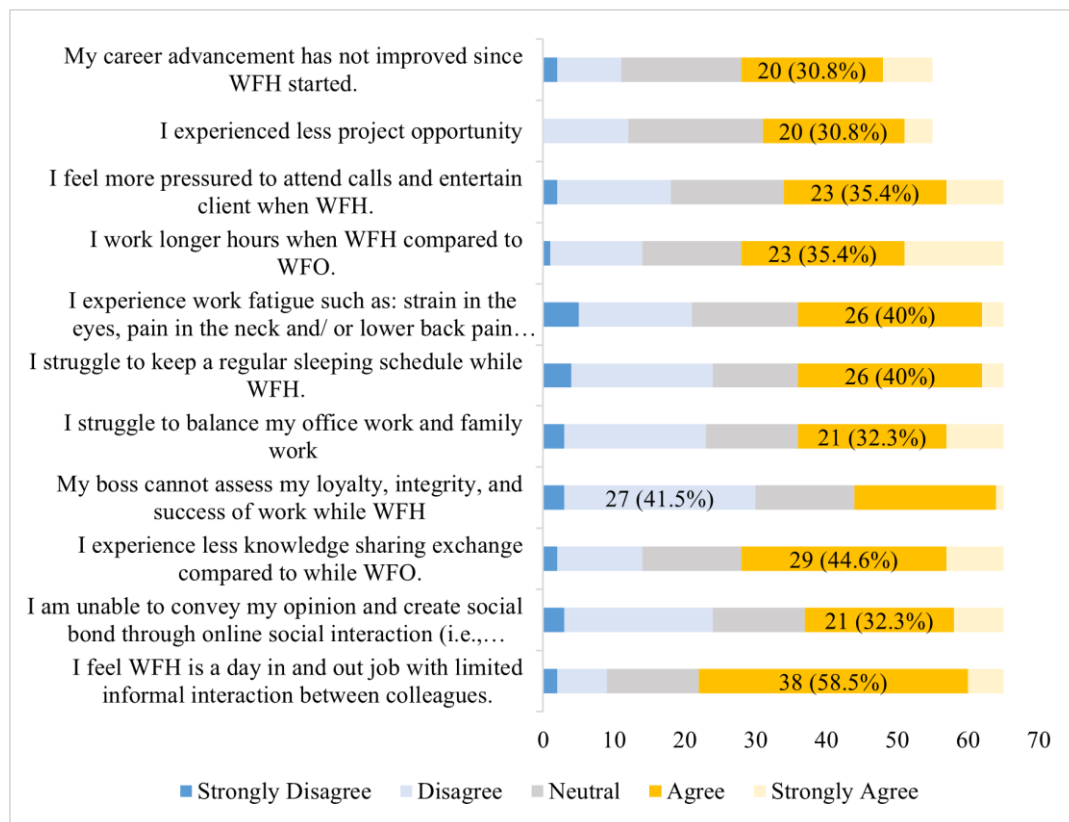


Figure 1: Challenges experienced by construction personnel WFH

The first challenge is in terms of social connectivity through online communication. Statement 1 showed that 58.5% of respondents agree WFH is a day in and out of a job which correlates with the comment on the same idea of the perception of WFH [12]. Moreover, 32.3% of respondents agree that they cannot convey their opinion while working remotely. This is consistent with the statement on two-way communications being essential to improve relationships between workers [11].

Next is challenge 2; this challenge identified lack of emotional support as a challenge practitioner experienced. The statement that 44.6% of respondents agree they experience less knowledge sharing transfer 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 [12][16]. In contrast with the assessment of loyalty, integrity, and success, 41.5% of respondents disagree that their boss or supervisor can assess these integral criteria for a successful work which was different to the statement on the limitations of workers in demonstrating their work while WFH [16][13].

Besides that, in terms of challenge 3, which is on physical health. 32.3% of respondents struggle to balance work and family life. This statement correlates with the concept of a life balance between responsibilities at home and work schedules [14]. Whereas, to keep a regular sleeping schedule at home, an irregular sleeping schedule is also proven through this study, with 40% of respondents unable to do so while continuing WFH. Additionally, work fatigues were also experienced by 40% of respondents more when WFH, similarly to the statement on physical health decline, including issues such as lower back pain [15]. 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 despite the 48 hours weekly limits set by the government of Singapore [14].

The last challenge this research studied is challenge 4 regarding fear of job security. 30.8% of respondents agree that while WFH, they experienced fewer project opportunities, and their career advancement had stalled. The association of this challenge with the idea identified had proven 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 [17].

5.4 Preferences of IoT technology

Figure 2 shows the type of IoT technology used in certain activities while respondents WFH against the number of respondents based on a Likert scale ranging from “never” to “always”.

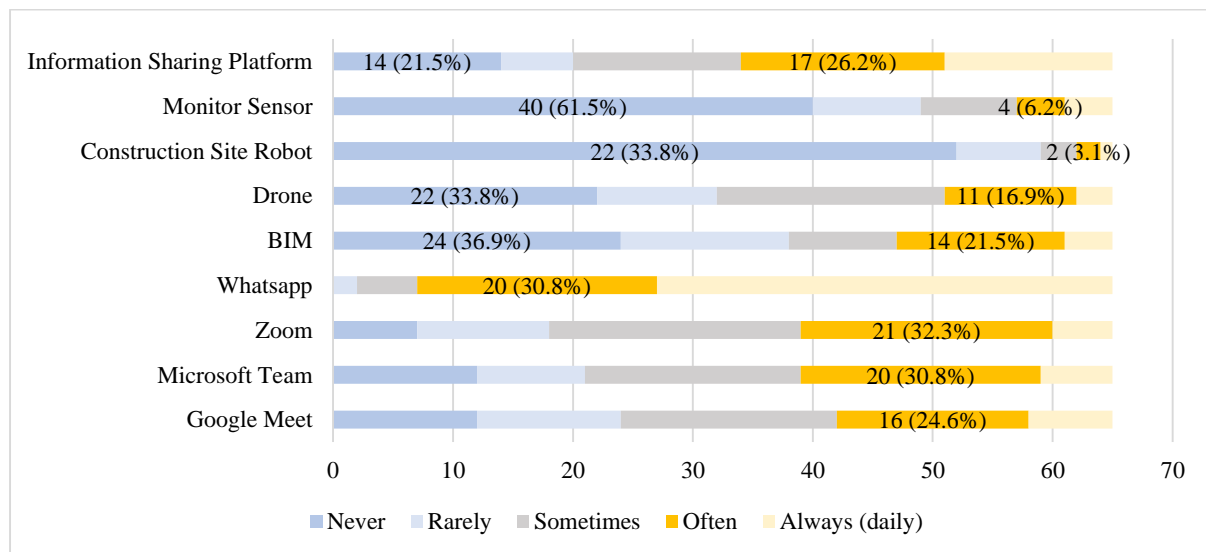


Figure 2: Preferences of IoT technology

In this part, there are 3 activities chosen for this aspect of the study. The first activity is meeting. There are four applications of a meeting used often (three to four times a week) by the 65 respondents. Google Meet recorded 24.6%, Microsoft Team 30.8%, Zoom 32.3% and WhatsApp 30.8%. Based on the result of preferences of IoT, the acknowledgement of the type of IoT technology commonly being used in the industry helps in understanding the progress of technology within the pandemic [22]. As for the preferences of BIM technology for design, 21.5% of users use BIM technology often, while 36.9% of Malaysians have not used BIM. Despite so, this is the general identified usage of BIM in Selangor, Malaysia found in this research.

Another activity approached in this research is site monitoring. IoT technology applications include a drone, construction site robot, monitor sensor such as RFID, and the usage of information sharing platforms such as Google Drive. However, each application received an astounding “never”. So, there is still limited usage in site monitoring and design regarding IoT technological applications in Malaysia. Additionally, the statement identified in Figure 2 regarding other IoT technology during site monitoring relates well with the value of sustainability. Sustainable value requires time and the advancement of life cycle projects to improve the conditions of the construction industry [28].

5.5 Importance of IoT towards work effectiveness.

Figures 3 shows the importance of IoT technology identified in this research against the number of respondents based on a scale ranging from “not important at all” to “extremely important”.

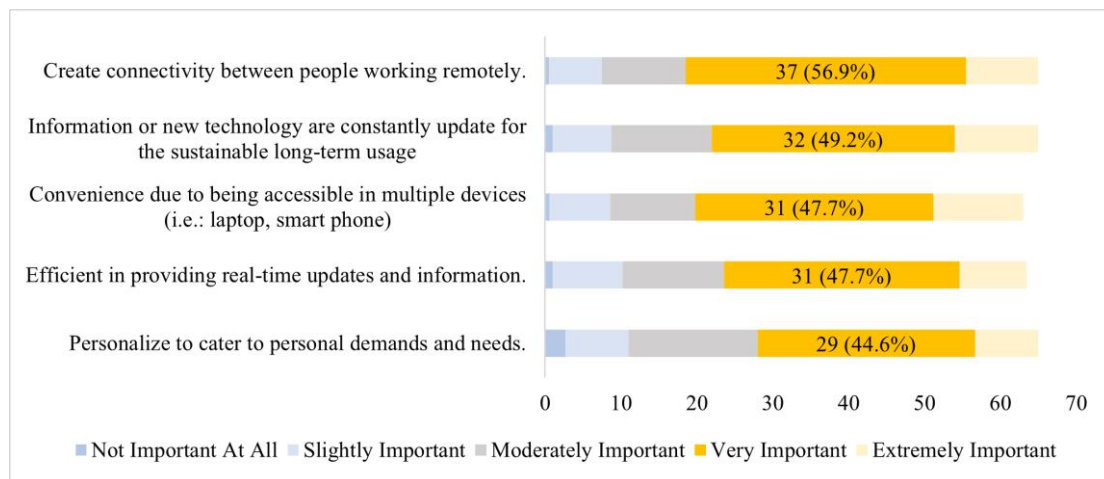


Figure 3: Importance of work effectiveness

Regarding the importance of work effectiveness, five elements of importance were asked in the survey. A resounding “very important” was recorded in each aspect. This shows that in terms of understanding IoT’s concept, most workers in the construction industry are well aware of the importance of IoT for aiding effective work. The correlation between the number of workers WFH and the effect of the pandemic on the growth of IoT technologies application is the direct application of Figure 3 [21] and its importance of IoT’s technological towards WFH workers [25].

5.6 Potential of IoT to increase work effectiveness.

Figure 4 shows the potential of IoT identified in this research against the number of respondents based on a scale ranging from “strongly disagree” to “strongly agree”.

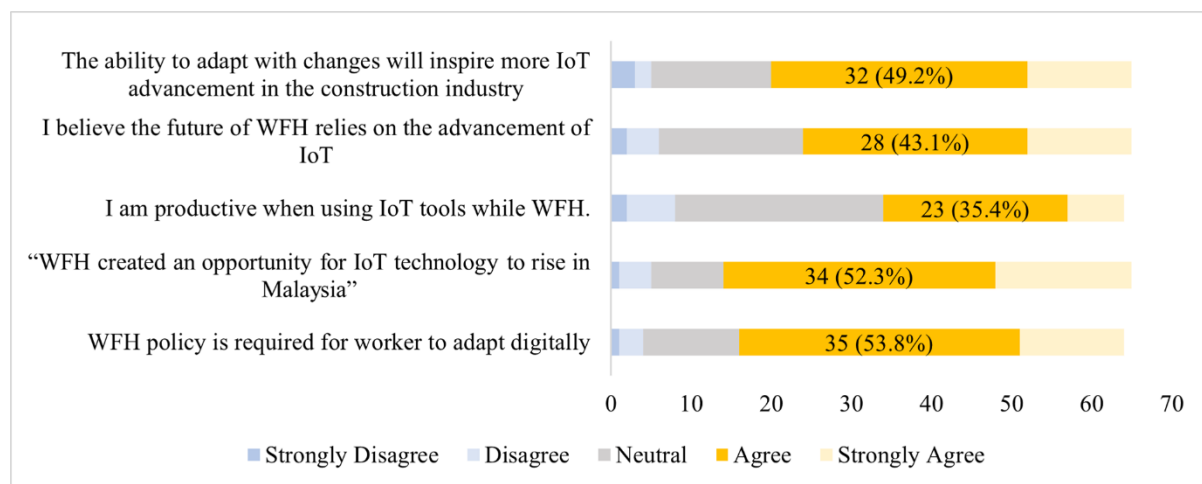


Figure 4: Potential of IoT to increase work effectiveness

This part of the research identifies the potential advancement of IoT if the development continues beyond WFH. An 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, in terms of productivity, 35.4%, 23 of 65 respondents, agree that their productivity has improved when using IoT tools while WFH. After all, 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 [21].

6. Conclusion

The five 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. Overall, this research has proven that workers' productivity at home is influenced by IoT tools available to them.

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