THE APPLICATION OF SMARTWATCH IN MANAGING EMPLOYEE HEALTH MONITORING

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ABSTRACT

Workplace health issues have continued to increase, and this has caused problems such as increasing medical cost and medical leaves. In response to these issues, employers are starting to adopt health technology to overcome the problem such as smartwatch. Smartwatch technology is a wrist-worn device provided with a variety of sensors that are available for collecting physical activity and location data in real time. This paper aims to explore the future drivers of the smartwatch application in monitoring and managing employees' health. The research study used exploratory research design utilizing the foresight methods. STEEPV analysis was used to identify the key drivers of smartwatch application and to develop a descriptive survey for assessing the impact and uncertainty of each driver. The survey was distributed to human resources managers of medium-sized companies in Malaysia. Technology readiness of smart watch adoption was evaluated using Technology Readiness Index (TRI). Thirty-five respondents took part in online survey. From the data analysis, top two drivers had been identified which are "social interaction" and "data transparency". These drivers were used for developing future scenario of the smartwatch application in monitoring and managing employee health in the next 5 to 10 years. Four scenarios had been discussed in this paper which are healthy workplace environment, unattainable technology adoption, inefficient technology, and low adoption of smartwatch. This research would provide additional information about the future scenario of smartwatch application in managing employee health monitoring in Malaysia.

Keywords*: Smartwatch; Employee Health Monitoring; Technological Readiness*

1.0 INTRODUCTION

In recent years, workplace health issues have become serious issues that require intervention. The workplace health diseases that reported to Occupational Safety and Health Department (DOSH) has increased about 30% every year ("Office Workers, Avoid These Health Risk", 2020). In addition, the workplace health problems had caused the economic loss of 4-6% of GDP for most countries (World Health Organization, 2017). In 2019, Malaysia's workforce has lost an average of 73.3 days per employee per year and caused lose an average of RM146 per organization due to employee health-related absenteeism and poor attendance. These statistics show that organizations need to continuously monitor the health of their employees to ensure that their productivity and performance are not affected.

In order to manage and overcome employees' health issues, many companies have implemented wellness strategies or intervention. However, most of these initiatives do not achieve optimal result in monitoring employee's health performance. According to Subramanian et al (2017), Malaysia's comprehensive occupational safety and health framework which includes safety legislation, regulations guidelines, and health functional systems are still insufficient in managing and monitoring employee health. In addition, organization's annual health screening program is only beneficial if employees adhere to their scheduled health checkups. Furthermore, these health screening programme can only provide employee's health report for employers once or twice a year (Kumar & Hussain, 2018). Hence, these methods failed to provide a continuous real time employee's health data for their employers for effective monitoring purpose.

With advances in smartwatch technology for continuous health monitoring capabilities, employers are starting to see this technology as an opportunity to address health-related challenges in the workplace by integrating this technology into their company's wellness programs (Stepanovic et al., 2019). Smartwatch allow to collect near real time continuous data and monitor more than one criterion continuously, store and later generate the data to assist employers for monitoring employee's health condition anywhere-anytime. Besides, ssmartwatches also have received extensive publicity for a variety of features that are of interest to a wide range of consumers, including location tracking, and enhanced smart functions such as communication (Almuraqab, 2021). However, Gensler (2014) claimed that there is still limited evidence to prove the benefits of the use of smartwatch for employers in monitoring

employee health performance, thus lead to its low adoption. According to Muller (2021), a German-based online portal for statistics, only 22 percent of the respondents in Malaysia stated that they owned a smartwatch in 2019 survey. Hence, the readiness level of organizations to adopt the smartwatch is still questionable and there is a need to explore the future drivers of smartwatch application in managing employee health monitoring.

Thus, this paper is aimed to identify future drivers of smartwatch application in managing employee health monitoring, future scenario of smartwatch applications and level of readiness of smartwatch application in managing employee health monitoring.

2.0 LITERATURE REVIEW

The literature review is one of the important parts in a research study where the researchers carried out a study based on previous studies to acquire information which is related to the current research.

2.1 Overview of Smartwatch

The first digital watch that arrived in market is the Halmilton Pulsar P1created by Seiko, a Japanese company in 1972 (Wang, 2017). Due to technological development, miniaturization and low mass production costs, digital watches have begun to include high computing performance and more smart features (Kim & Shin, 2015). Then, the first smartwatch, IBM Linux Watch has been successful launched (Choi & Kim 2016), followed by Pebble Smartwatch provide with several features such as fingerprint scanner, connected to Android or iOS device via Bluetooth technology and, vibrate and display notifications messages when received from the paired device (Isacson, 2015). Driven by the popularity of smart watches, this technology continues keeping developed and provide better features (Cecchinato & The, 2015). According to Enamamu et al. (2017), the first generation of smartwatches were fitted with just fewer sensors compared to the nowadays smartwatches. Smartwatches are still technologically advanced and have continued to enter features such as built-in accelerometer and gyroscope sensors that can more adequately capture and analyze the user's hand and arm movements than ever before, also it developed and improved the health monitoring features from only measure steps and physiological parameters and now provided the capabilities for detecting the early signs of diseases through detecting the pulse rate and

body temperature (Patrick, 2019). The evolution of smartwatch technology throughout these years has bring more markets opportunities and increase the intention of consumer adoption.

The relevant published research does not provide any clarifying description of smartwatch technology. Based on Kim & Shin (2015), wrist-worn devices such as Samsung Galaxy Gear and Fitbit Flex also known as smartwatch, even there are distinct difference between wrist-worn and smartwatch technology. Wrist-worn devices, such as smart wristbands, smart bracelets, and fitness trackers, demonstrate the ability to track a user's physical activity capabilities, and can analyse limited data via computer devices and smartphones. This statement is supported by Addo and Almuraqab (2021) stating that wristband has limited capabilities to present information and it's not available for installation apps function.

In contrast, smartwatch is provided with more larger display size than wristband and traditional watch. Smartwatch is providing with the advance technology such as touch screen capability which allow for installing apps. Other remarkable difference among wristband and smartwatch is the ability of connecting with Internet (Abdo & Almuraqab, 2021). Although wristband primary purpose is to collect user's data, however the function of presenting relevant information such as Facebook notification, email etc, still is the primary purpose of smartwatch (Chuah et al., 2016). From the differentiation between wristband and smartwatch and aligned with the conclusion from Cecchinato & The. (2015), the common idea of the smartwatch definitions is a mini device that wore same as traditional watch and provide with computational power that allows for apps installation and utilize the relevant features.

2.2 Advantages of Smartwatch

Rawassizadeh et al. (2015) state that smartwatch have two major strong advantages which are mount location, and continual connection to the skin. Smartwatches is hands free, unlike smartphone which will occupied at least one of user hand to hold the device. In addition, smartwatches mostly are mounted on our body, thus it has standard know location and this could solve barriers associated with smartphones. For example, smartphone device in pocket will affects the accelerometer data that is used to measure the user's activities. Meanwhile, the continuous connection surface with the skin helps to record heart rate, heart rate variability, body temperature, blood oxygen and skin electrical response (GSR). The GSR is benefit on determine physiological

arousal, especially when combined with heart rate and heart rate variability (Rawassizadeh et al., 2015). Apart from these two strong advantages, another general advantage of smartwatch in daily life is its enable self-monitoring of user activity, obtain feedback from activity measures, and allow for on-site surveys to determine user's patterns of behaviour (Reeder & David, 2016). Furthermore, other advantages that increase the intention of consumer adoption is smartwatch able to connect with wireless communication technology such as Bluetooth, GPS, and Internet connection. This advanced technology allows users to share smartwatch data with computer devices and smartphones while simultaneously locating, receiving social media notifications, emails and more.

2.3 Disadvantages of Smartwatch

Although smartwatch has benefited a lot for user in their daily life, however there are still several disadvantages that may affect the intention of consumer to adopt smartwatch. Firstly, is screen size problem. Even the display screen of smartwatches larger than traditional watch, but it still unfair when compare with smartphones. Aniket Bagore (2021) state that usually smartphone have exceeded the 6-inch threshold, but smartwatch only have screen size within 1.7 inch. This small screen may cause the error when pressing any button on the screen and user will not feel satisfy and enjoyable to watch video on a small screen. Furthermore, the potential for privacy threats can arise from the process of using wireless connection types such as Bluetooth and Wi-Fi to transmit GPS-tracked locations between other devices. Most wearable devices record and use geolocation services, allowing users to track places they have visited, and more. This can be a personal issue, as not everyone wants multiple people to have access to personal data, such as their location, through a smartwatch (Alrababah, 2020). In addition, smartwatch has the limitation on its battery life. Smartwatch typically can use at least 4 days each time finish charging. Users need to remember give them a charge, if not the smartwatch unavailable to tracking user's daily activities.

2.4 The Applications of Smartwatch

Smartwatch has become useful in solving health problems, and it's also arisen popularity in healthcare. However, the advancement of smartwatch has expanded its usefulness in other purposes and sectors as well. Tejaswini Salunkhe (2016) suggested to made smartwatch application to incorporate

industrial automation into the plant. Smartwatch applications are uniquely customized and are better suited than software applications for in-depth analysis of industrial infrastructure scenarios. In addition, the ability to provide real-time information on smartwatch is also useful for internal logistics. Smartwatches can assist employees. The smartwatch application can be used to send replenishment orders from the production line. The driver will then receive a replenishment alert from his smartwatch and prepare for the next task. Meanwhile, smartwatch can be used to track an individual's behaviour. Studies show that smartwatches can detect human activity, which helps reduce behaviour. (Visuri et al., 2017). For example, the users will not be disturbed when they are typing or sleeping, but they might be interrupted at other time. The application of smartwatch wide as it has various function that mostly could be use in all purpose.

2.5 Smartwatch in Managing Employee Health

Greg Okhifun (2019) state that 37% has growth in the percentage of employers who offered wearable technology as part of employee wellness initiatives. Employee health screening programs, which include various tests and medical screening to determine health-related risk factors, are generally the traditional method of health initiative offered by an organization. Employers receive an employee's health report only once from the health screening program. As a result, this method of health monitoring has limitations. In addition, conventional practice makes it difficult for people to keep track of their basic physical health characteristics.

However, wearable devices such as smartwatch for health monitoring has shown excellent performance. The common ways that smartwatch monitoring health is through heart rate, body temperature, sleeping quality etc. It has proven to be useful in a variety of healthcare applications and most commonly focuses on health and fitness monitoring (Lu et al, 2016). By featuring small biosensors and computing technology, smartwatches become portable and non-invasive with the ability to transfer massive amounts of user physiological data continuously and automatically to other smart devices such as smartphones and tablets (Beh et al., 2021). For example, smartwatches can combine all sensor information, such as accelerometer, gyroscopes, and heart rate, with GPS data. This feature has a positive effect on applications that require continuous physical activity monitoring to see unexpected pattern changes.

If employees do not take off the smartwatch from their wrist, their near-real time health data will then send to their employers anytime and anywhere. Thus, employers can easily monitor and detect the health status of their employees, and in case of an employee felt with illness, they can immediately determine the placement arrangement of the employee. Smartwatch monitoring also allows employees to maintain self-motivation and self-discipline to stay healthy. Gubler (2016) states that employees who improve their health increase productivity by about 10%.

2.6 Readiness to Adopt Smartwatch in Managing Employee Health

The innovation in wearable technology is gaining great traction as an important component of an organization's health strategy. Especially for large organizations, wearable technology can help bring valuable employee data, impact health care costs, and redefine engagement programs. According to Chiradeep BasuMallick (2019), the benefits of integrating wearable technology into an organization's well-being strategy have led to a significant increase in investments in wearable technology by organizations around the world. Hence, it is expected that the readiness of wearable in organization health programs will continue to rise. However, even if the smartwatch is one of the types of wearable technology, few studies evaluate the readiness for adoption of smartwatch for monitoring and managing employee's health.

Technology readiness index is one of the common methods that was used to measure organization's propensity to embrace new technology. Based on Parasuraman, the technology readiness index (TRI) is composed of four-dimensions that are optimism, innovativeness, discomfort, and insecurity (Shim et al., 2021). Most of the previous literature review, TRI has been used for determining the readiness adoption of technology such as wireless technology, IoT, and cloud computing (Chang & Kannan, 2006; Faizal & Zaidi, 2017; and Amron et al., 2019). However, there is no studies that have applied on the TRI of smartwatch adoption among organizations for employee's health monitoring. So, there is a research gap on evaluate the readiness of smartwatch adoption for employee's health monitoring. Hence, there is a need to do research on the TRI of smartwatch adoption in health monitoring which could allow organizations to identify employees most receptive to smartwatch technology.

2.7 Future Drivers of the Application of Smartwatch in Managing Employee Health Monitoring using STEEPV Analysis

Below discussion based on the review of literature using STEEPV as a tool discovering driver of the smartwatch application in managing employee health monitoring based on the theme of STEEPV.

2.7.1 Social Driver

Social interactions are such that the individual's obvious movements, covert movements, convert deliberations and basic physiology affect other individuals and vice versa (Girginov et al., 2020). In the context of present study, smartwatch could improve affordances for social interactions. People become interest to interact to others through smartwatch applications that support communication, internet and social (Visuri et al., 2017). Sullivan & Lachman (2017) have supported the discussion where social contacts are being promoted on most fitness wearable devices, and by making these contacts they can build a "team" that encourages each other to achieve their goals. Besides, the wearable technology users and those that they interact with will learn to build social practice and norms around them. Another literature study has proposed wearable technology from an organizational perspective that can facilitate social interaction between employees (Maltseva, 2020). For example, when managers encourage health and fitness competition between organizational units, employees want to determine and choose winning strategies and support each other in the competition, so take advantage of the conditions of social cohesion. Employers can create an opportunity to improve the social cohesion among employees. As a result, it improves employee productivity and enables effective communication between employees and employers.

2.7.2 Technological Driver

The accuracy of health data provided by wearable technologies, such as smartwatches, positively affects users' motivation to make health-related decisions by referencing data obtained from wearable devices (Cheung et al., 2019). From the findings of Sigcha et al., (2018) and Weiss et al. (2016), smartwatch's accelerometer function can provide accurate and real-time data to trigger a satisfactory recognition of activities. Hence, it has demonstrated that the current state of smartwatch technology can provide adequate

performance for health status monitoring and wellness trend analysis (Emil Jovanov, 2015). Besides, the innovation of smartwatch technology and features such as gyroscope, microphones, optical sensor, vibration sensor, etc, has contribute for more purpose. Hence, the accuracy and features of smartwatch will lead the future technology-supported interventions for health and well-being also will require the data collected from smartwatches to be integrate with other sources of information (Reeder & David, 2016).

2.7.3 Economic Driver

Zwetsloot et al. (2010) argued that the implementation of health programs and incentives would help organizations reduce costs and create added value. Cost reductions include compensation costs for workers, replacement costs for sick employees, health insurance, and reductions in failure costs and production disabilities. The smartwatch feature, which continuously monitors daily activities with physiological parameters, has reduced medical costs by encouraging people to lead a healthier lifestyle (Siepmann & Kowalczuk, 2021). Maltseva (2020) concluded that organizations expect wearable technologies, such as smartwatches, to engage employees better in more physical activity which will improve their health. Employee physical and mental health can reduce sick leave and medical expenses for an organization.

2.7.4 Environmental Driver

The most concerning point of the wearable culture is it has a significant environment impact on the environment as it generates large amount of e-waste (Quang et al., 2020). However, some previous study has proposed positive environment impact of wearable technology. Kheirkhahan et al., (2019) point out that the computational power and available sensors of smartwatches are sufficient to detect non-wear time immediately and accurately. Real-time non-wear time detection is used to realize energy-efficient data collection. For example, a framework for increasing battery life based on an informed decision to collect data only during wearing period could be used for longer-term activity monitoring. Valizadeh (2015) also proposes the similar discussion with the example of Moto 360 which is one of the android wear smartwatches that also contribute positive environment. The Moto 360 has an ambient light sensor that detects the brightness of the surrounding environment and adjusts the brightness of the display accordingly. The goal is to strike a balance

between being able to see the display clearly and not being overwhelming and wasting battery life. Therefore, smartwatches can still contribute to the green environment and continuous encourage people to adopt it without worrying about produce environment pollution due to wear the technology.

2.7.5 Political Driver

Previous research has shown that organizations who are looking for implementing wearable technology on their employees should prioritize the workplace safety use cases where data is only logged at the workplace and foster a positive safety environment (Jacobs et al., 2019). Policies, user's guidelines, and network protocol has been implemented to control and reduce the risk of information leakage, privacy and third parties' issues. In the literature from Kheirkhahan et al., (2019) and S. Kumar et al. (2020), both has discussed the implementation of HTTPS communication protocol and MiWi wireless network protocol towards wearable technology. These two protocols contributed to ensure the security of data transmission by offering low data rate, low power, low complexity, and data are transmitted are only revealed to registered smartwatches. Alrababah (2020) has supported policies and user guidelines that can resolve user personal information issues and prevent legal issues in the future. Besides, governments also play an important role in regulating the type of data that may be collected, the ways of collection, and how and when the data may be transferred to the third parties (Spann, S, 2016). Hence, by implemented the privacy protection methods and supervise from government, it can allow organizations and employees to use it with peace of mind.

2.7.6 Value Driver

Self-quantification or self-efficacy could be created through the usage of smartwatch. Siepmann & Kowalczuk (2021) present a study that suggested smartwatch self-tracking capabilities allow health and fitness-conscious users to quantify themselves. In addition, Pal et al (2020) and Rieder et al. (2021) said that smartwatch allow users to set their own goals, and the informational data provided by self-monitoring functions can increase the self-efficacy of tasks that users exceed goals. From an employee's perspective, self-monitoring for progress and goal achievement through fitness technology can increase self-efficacy and control for exercise and encourage long-term lifestyle changes

(Sullivan & Lachman, 2017). Thus, smartwatch have the potential to improve the well-being of employees and increase the productivity.

Consequently, ten merged drivers were identified and then develop in questionnaires for data collection purpose. Identified drivers were as follows;

1. Clear rules and policy of smartwatch technology
2. Accuracy of health data increase tracking efficiency
3. Sustainability of smartwatch technology
4. Improve employee productivity
5. Social interaction among employee in sharing about health
6. Change employee behavior
7. Reduce organization medical cost
8. Real-time health data access possibilities
9. Contribute organization efficiency
10. Improve data transparency

3.0 METHODOLOGY

This study used exploratory research design as study with regard to smartwatch technology adoption is very limited in Malaysia. Foresight methods were used to analyse the data and identify future drivers and possible future scenarios. This research was conducted to find out the readiness of medium-sized companies to adopt smartwatch in managing employee health monitoring. The targeted respondents for this study were 20,612 Human Resource practitioners from medium-sized companies in Malaysia. This figure is based on the number of medium-sized companies reported by SME Corp in 2021. Medium sized companies have been chosen as the target respondents since they are more likely to adopt smartwatch technology compared to small sized companies. Small sized companies have below 75 employees and they can manage health monitoring without smart watch technology. On the other hand, majority of medium sized companies have employees more 200 which increase the need to improve efficiency of health monitoring.

STEEPV analysis was used to analyses the literature using content analysis. STEEPV analysis is one of the foresight tools that able to determine the potential factors and trends of the research with multidimensional (Nazarko & Kuźmicz, 2017). STEEPV stands for social, technological, economy, environmental, politic, and value. The analysis was based on categorized key drivers of the smartwatch application in monitoring and managing employee's

health extracted from journals and online articles. The identified drivers serve as data for further discussion in the foresight study. The timeframe of research paper used in this study was from 2010 to 2021. "Foresight horizon" from the next decade to the next ten-year is used to predict the potential outcomes of smartwatch adoption in managing employee health.

Once the drivers had been identified, descriptive questionnaires were developed for data collection purposes. There are four sub-sections which are Section A, Section B, Section C, and Section D. Section A is the demographic of respondent which include gender, age, monthly income, race, and education level. Section B is about the impacts of drivers towards smartwatch application in managing employee health monitoring. The third section which is section C is about the uncertainty of drivers towards smartwatch application in managing employee health monitoring. Lastly, section D is about the readiness of employees to use smartwatch application in managing and monitoring their health performance. As the nature of this study is exploratory, the sampling was done based on companies' willingness to participate, thus it is purposive in nature. A total of 35 medium-sized companies' human resource practitioners agreed to answer the questionnaires.

Descriptive analysis using Microsoft Excel was done to further analyse the impact-uncertainty analysis and building scenarios. For the impact-uncertainty analysis, 'impacts' refer to the extent each driver would influence the application of smartwatch in managing employee heath monitoring in future, meanwhile 'uncertainty' means the equivocal evolution of driver in application of smartwatch in managing employee heath monitoring. The drivers with highest impact and uncertainty were selected from the critical scenario area.

Finally, scenarios were written to describe a clear vision of situation in the future. In this research, the scenario development was used to produce four different future events of the application of smartwatch in managing employee heath monitoring through top two drivers of the impact and uncertainty analysis. There will be four alternative scenarios that can delivery future vision that will occur in the next 5 to 10 years.

4.0 FINDINGS AND DISCUSSIONS

Majority of the respondents were female which consists of 25 people (71.40%) and the rest 28.60% (10) is male. Most of the respondent's is aged between 31-35 which is 14 (40%). Besides, the highest education attainment was degree

holder which show of 27 people (77.10%). 51.4% of the respondents (n=18) had the 5 to 10 years' experiences followed with 37.1% were below 5 years experiences. Moreover, over half of the respondents were from services sector which is 25 people (71.40%).

In addition, it was noted that 100% of respondents know about smartwatch. Meanwhile 85.70% (n=30) believe that implementation of smartwatch in organization could help to increase efficiency in managing employee health. There are 68.6% of respondents who will considered to implement smartwatch in the next 5 - 8 year, however there were also reported that 25.70% of them are not considered to implement smartwatch in their company for managing employee's health purpose.

Table 1: Mean score of Impact and Uncertainty drivers

Code	Drivers	Mean	
		Impact	Uncertainty
D1	Clear rules and policy of smartwatch technology	3.57143	3.42857
D2	Accuracy of health data in increasing tracking efficiency	4.11429	3.25714
D3	Sustainability of smartwatch technology	3.80	3.57143
D4	Improvement of employee productivity	3.91429	3.34286
D5	Social interaction among employee in sharing about health	3.82857	3.77143
D6	Change employee behavior	3.68571	3.48571
D7	Reduce organization medical cost	3.97143	3.28571
D8	Real-time health data access possibilities	4.11429	3.22857
D9	Contribute organization efficiency	3.94286	3.51429
D10	Improve data transparency	4.02857	3.68571

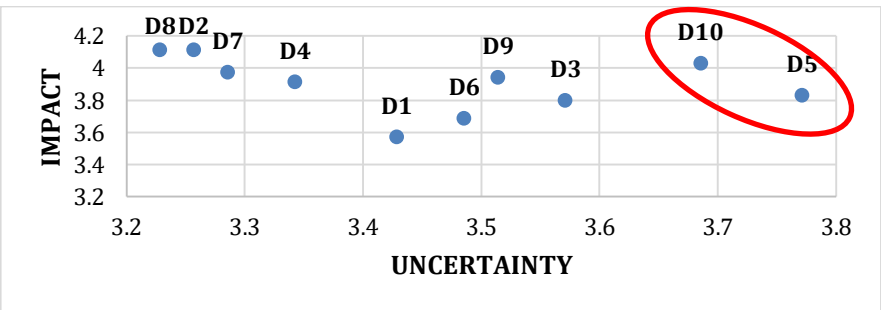

Figure 1: Impact-Uncertainty Analysis

Table 1 shows the mean value of impact and uncertainty drivers which used to execute the impact-uncertainty analysis as shown in Figure 1. From the figure above we can see that D5 (3.7714, 3.8286) and D10 (3.6857,4.0286) was chosen as top two drivers with high mean value impact and uncertainty which is "Social interaction among employee in sharing about health" and "Improve data transparency". As noted by Matt Straz (2016), culture of transparency is important to encourage employees to share their wellness and productivity with their employers or organization, along with the data their wearable technology collected. The transparency shows the importance of trust and openness when organizations collecting and analysing data. Meanwhile, social interaction among employee in sharing about health reflect to their attention towards wellness which help employers to implement wellness strategies with the combination of technology easier.

In terms of Technology Readiness Index (TRI), discomfort (3.85) has the highest means score, followed by insecurity (3.79), and then optimism (3.74). Whereas innovativeness (3.17) had medium level of central tendency. Thus. the technology readiness index of participated medium sized organization in adopt smartwatch is at the medium level of central tendency (3.64). Although all the three dimensions of readiness showed high central tendency, it should be noted that this study involved on 35 medium sized companies which might not representative to all other medium-sized companies in Malaysia. Thus, it could be concluded that the participated medium-sized companies incline to use smartwatch to monitor their employees' health.

This analysis can be supported by the demographic where 68.6% of the medium sized companies are still in consideration to adopt smartwatch in the next 5-8 years. This might be impacted by the respondent's age as most of them is between the age of 31-40. Generally, technology adoption is more popular and acceptable among young consumers, meanwhile elder consumers are less confident with technology (Pang, Zhang, Law & Foo, 2016). Since smartwatch has numerous endorsements in managing health and lifestyle, whereas it enables self-monitoring, obtain feedback from activity measures, and allow for on-site surveys to determine user's patterns of behaviour (Reeder & David, 2016). Thus, optimism still recorded as high. Most of the respondents is concern about their privacy and security of information. Therefore, the reliability in data sharing that might lead to unforeseeable and unsecure data need to improve, so that employees especially elder employees have high willingness sharing their data with employers.

4.1 Future Scenario of Application of Smartwatch in Managing Employee Health

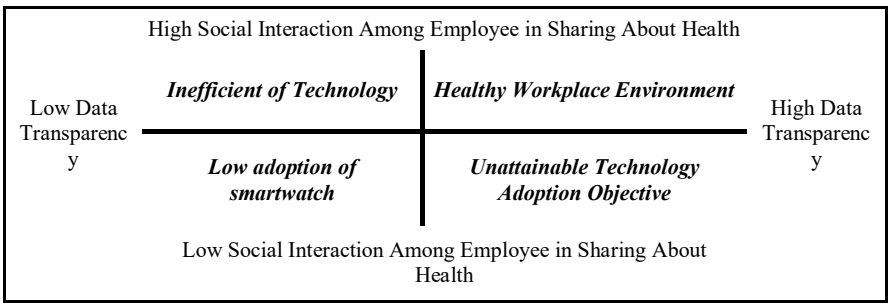

Figure 2: Future Scenario Building

The four possible scenarios that computed from the impact-uncertainty analysis are shown in Figure 2. In addition, the four alternative scenarios were developed from the top two selected drivers which are "Social Interaction Among Employee in Sharing About Health" and "Improve Data Transparency".

Scenario 1: Healthy Workplace Environment

The first scenario is the ideal scenario where the smartwatch has high data transparency and promote high social interaction among employees in sharing about health. Transparency of data allows more interaction by encouraging employees to feel empowered to share their wellness and productivity goals with their employers with the data that their smartwatch collect. As noted by Natelie Holmes (2020), the data collected from smartwatches can be used by the company's human resources teams to develop more accurate, responsive, and cost-effective health insurance and wellness benefit plans. Besides, behaviour changes of employees are important for an organization to improve their well-being level and approach an efficient workforce. Hence, smartwatch technologies that promote and support social interaction among workers may predict a more sustainable change in worker behaviour (Interdisciplinary Center for Healthy Workplaces, 2015). Social interaction among employees would increase their attention to their lifestyle and wellness situation. With the adoption of the smartwatch in monitoring employee health, a healthy work environment will develop as employees are being highly motivated for health improvement which leads to productivity increases. In conclusion, this is the best scenario while comparing with another three scenarios. Therefore,

organization believed that implementing smartwatch for managing employee health will enhance organization performance and enhance employee health monitoring management.

Scenario 2: Unattainable Technology Adoption Objective

The second scenario relates to results of the application of smartwatch in monitoring employee health were high data transparency and low social interaction among employees cause for unattainable technology adoption objective. The purpose of an organization adopting smartwatch technology is to provide positive achievement on employee health and well-being as it serves as a source of personal feedback about the current physical and psychological state and as a source of real-time data designed to change employee behaviour. High data transparency of smartwatch technology enables employers to access employees' real-time health data whereas leading to efficient monitoring processes and faster data-driven decisions. Rieder et al. (2021) stated that the data collected can give a sense of accomplishment and increase the user's task self-efficacy in their work. They can better understand their ability to contribute to their health, better adapt to wearable prompts and lead a healthy behaviour. However, if smartwatch technology does not support social interaction between employees and their employers, it will cause the failure of obtaining the smartwatches' implementation objective. This is because even the smartwatch with high data transparency does not indicate a high intention for employees to engage in behaviour change.

Scenario 3: Inefficient of Technology

The third scenario indicates that high social interaction among employees in sharing about health and low data transparency creates inefficient smartwatch technology. Data transparency establishes the trust of employees which leads to the availability of employers to barrier-free access to their health data generated by the smartwatch. As stated by Lousie Fordham (2015), employers can use health data to identify problem areas, better understand how employees are dealing with health and wellness issues, and ultimately inform health and wellness strategies. However, low data transparency will cause less trust in employers resulting in insufficient data quality, lack of data, poor analysis, and wrong interpretation (Marheus, et al, 2020). Even smartwatches provide features that highly promote social interaction among employees which motivate them to achieve healthy behaviour, however low

data transparency will cause low participation among employees. Hence, employers failed to implement effective monitoring.

Scenario 4: Low Adoption of Smartwatch

The fourth scenario is low adoption of smartwatch will occur when there is poor data transparency and low social interaction among employees in sharing about health. Observing data on fitness and well-being over time is key because it highlights any health improvements in the workforce and certainly helps when attempting to demonstrate ROI. However, low data transparency will lose employees' trust because they do not clear on what data will collecting and delivered to their employers (Reid Blackman, 2020). As mentioned by Patrick Nelson (2015), trust is a big sticking point for the willingness of a company to implement a smartwatch for monitoring their employee's health. There was resistance to sharing data, in part because employees think the data will be used against them "in some way." Besides, social interaction and connection are one of the greatest motivators for behaviour change since employees consider social aspects of the workplace to be valuable and rewarding. As result, smartwatch technology that low promote social interaction among employees will decrease the efficiency in implementing wellness programs. In a nutshell, this is the worst scenario in the future. Organization think that implementing smartwatch failed to create added value for them and turn into low adoption behavior.

Based on the scenario discussion above, it can be concluded that adoption smartwatch technology for managing employee health could improve employee productivity and attention towards workplace health issues. Healthy workplace environment is important for a company as it could directly impact the company daily operation. When employees are highly motivated to share and improve their health together with employers, then employers will be easier to take action to employees' health issues by follow-up their health data through smartwatch. However, privacy and security still are the concern issues when come to data transmission through technology. So, employers who plan to adopt smartwatch for employee need to ensure the transparency during data sharing. Only when the trust of employee to share their data increase, the purpose of improve health monitoring could be achieved. Adoption of smartwatch for managing employee health is still encouraged, but employers need to solve the concern issues among employee first.

5.0 CONCLUSION

The aim of this study is to discover the future drivers and future scenario of smartwatch adoption in managing employee health monitoring that will inevitably occur in the near future and analyze the technology readiness of smartwatch adoption. The research objective was achieved through STEEPV analysis, scenario building, and technology readiness index (TRI) analysis which can bring knowledge and information about smartwatch and perception of respondent on implementing smartwatch in monitoring employee health in Malaysia. Although this study managed to get data from only 35 medium-sized companies, it still give an insight that privacy and data security are of high concerns which may decrease employees' willingness to share their health data with employers. However, most of the past research had proposed for the benefit of smartwatch and high intention of organizations to apply smartwatch among employees in other countries. Thus, there is a need to have more research on these issues and analyses the major factors that leads for low level of readiness among Malaysia's employers and employees to adopt smartwatch in future.

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