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Aging Through Advancing Computers: A Phenomenology on Middle-Aged Information Technology Workers During the COVID-19 Pandemic

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ABSTRACT: Background: Information Technology (IT) is a profession that has been in demand during the COVID-19. Due to its high demand and evolving technologies, older IT workers have difficulties adapting to new technologies compared to their younger counterparts. **Methods:** A qualitative phenomenology approach was used in this study that focused on the lived experiences of middle-aged IT workers on the advancement of technology during the pandemic. **Findings:** There were four major themes generated from the verbalizations of the participants. These are: *(1) Myriad Innovations pertaining to the numerous technological developments participants have acquired while working in the information technology sector; (2) Novel Impressions which include the initial impressions regarding technological innovations; (3) Occupational Responses referring to how middle-aged IT workers master new technology in order to keep up with the IT sector; and (4) Lifestyle Impact that specifies how new technology impacts their lifestyle as middle-aged IT workers living in a digitalized society.* **Conclusion:** The middle-aged IT workers successfully adapted to the technological innovations while continuously adapted to the rigors of their professions during the Covid-19 Pandemic. **Recommendations:** This paper suggests to future researchers to further specify the qualifications of the participants to discover a variety of experiences and responses to fill the literature gap.

Keywords: Information Technology, Lifestyle Impact, Middle-aged Information Technology Workers, Technological Innovations, Myriad Technology, Novel Impressions, Occupational Responses

INTRODUCTION

Information Technology (IT) is a profession that is responsible for developing and supporting both computer software and hardware. Information Technology is growing at a rapid rate due to the demands and requirements of multiple industries, especially in this day and age during the Covid-19 pandemic. The COVID 19 pandemic has greatly affected the direct interactions, which is why most people relied on online communication (Real et al., 2021). It has caused people to stay at home and resort to using technology to facilitate their everyday lives. Information Technology jobs are not only in demand in the technology sector, but also in professional, financial, and manufacturing services. Technology has been helping people with the creation of smart home security, high speed wireless internet, wearable health monitors, and etc. As such, demand for capable workers in the industry has risen. Every year, newer technologies get introduced to the general public. As more years pass by and more technological advancements are found, the age of certain I.T. workers also grow older. Many daily activities are now supported by technology and this ongoing technological advancement is occurring in conjunction with the world populations' aging, providing possibilities for technology to guide older people with everyday tasks and activities such as financial planning and communicating with family and friends. Middle-aged adults acquire new technologies more slowly than younger people and are less likely to adopt new technology unless they see benefits to themselves (Heinz et al., 2013; Lee et al., 2019; ten Bruggencate et al., 2019). Middle-aged People who are unable to use technology such as computers are at a disadvantage in terms of their capacity to live freely and do daily activities. For middle-aged individuals, technology offers the potential to improve their quality of life. The internet can assist in the reduction of disconnectedness, the strengthening of bonds with family and friends, and the facilitation of critical activities such as banking and shopping.

With the rapid development and continuous advancement of technology, older I.T. workers may struggle to cope with these newer innovations compared to their younger counterparts. Middle-aged workers who have been replaced by technology will have a difficult time retraining since they have not had formal schooling in many years or have never completed any higher education, and they may have unfavorable views toward technology or a lack of self-efficacy in dealing with it. The workers are increasingly aging, with the number of elderly people rapidly growing at the age of 60 and above. In companies, interruptions mediated by current information technologies are becoming more common. Emails and text messages are examples of disruptions that have been demonstrated to have negative effects on employees' stress levels. These disruptions may have a particularly negative impact on middle-aged workers, meaning major issues for this rapidly rising user group in terms of their well-being and productivity. As a result of disparities in mood regulation between middle-aged and younger adults, middle-aged workers feel greater intervention technostress than their younger colleagues (Tams, 2017).

Considering its possibilities, technology can sometimes introduce new issues, adding to the difficulties experienced by older employees. Such issues could be caused by a lack of usefulness or attitudinal impediments to technology adoption. To overcome these difficulties, technology design and training are essential areas to explore. Paying attention to these issues can help older persons who want to stay in the workforce succeed, as well as those who want to re-enter the workforce after retirement. Workers' demographic traits interact differentially with one another and, in particular, with the diverse manifestations of technostress. More specifically, older individuals or those with more professional experience reported having more difficulty executing duties as technological complexity increased (Marchiori, 2018).

The increasing cases of COVID-19 around the world have hugely affected the lives of families, workers, children, the government, and the community (Real et al., 2022). Older workers, those who are 60 years or older, have major difficulties using current information technology. While using technology, such concerns include increased anxiety and tension. For them, the growth of IT mediated interruptions is particularly worrisome (Tams and Hill, 2016). In addition to this, Tams et al. (2017) also stated that many organizations require employees to remain available and respond to technology-mediated interruptions even after regular work hours. As a result, role stress may result from the demands of work interruptions particularly affecting middle-aged workers stronger far more than their younger counterparts. They are individuals who are in the age range of 40 to 60 years old who have held jobs pertaining to the Information Technology field such as security specialist, computer programmer, quality assurance tester, etc. during the start of the Pandemic until now. During the pandemic, most jobs had to be performed at home to lessen the risk of contracting COVID-19. Jobs in the Information Technology sector contribute to helping people to fight COVID-19. He et al., (2021) stated that Information Technology workers help in developing products to track, predict, and fight the virus.

The Information Technology field is known to have a sedentary lifestyle, this further increases due to the pandemic with having little to no physical interaction. In the study of Nasui, et al. (2022) the time of IT workers using their computers increased as they went beyond the regular work hours during the pandemic.

This study aims to answer the central question: "How can the experiences of middle-aged Information Technology workers be described when faced with advanced technology?", investigating the perspectives of middle-aged Information Technology workers when they are faced with new technological innovations. The specific question "How do middle-aged Information Technology workers cope when faced with new technological innovations?" is related to the acclimation and adaptation of middle-aged Information technology workers towards the changes in technology that they face while working.

METHOD

The method used is qualitative phenomenological study that aims to understand the lived experiences of the participants. Qualitative research is an enquiry that aims to gain a deeper knowledge of social phenomena in their natural environment. Qualitative research is a process that is used to have a better understanding and it is done by creating new important differences as a result of being closer to the phenomenon studied (Aspers and Corte, 2019). This study will be approached through the lens of phenomenological research as it is devised to understand the participants' experiences and circumstances, as I.T. workers are almost reaching their age of retirement and experiencing new technological innovations during the COVID-19 pandemic. Phenomenological research is a strong design that develops strength and enhances philosophical origins that helps situate in one's own research (Wilson, 2015). Phenomenological research will help shed light on how exactly middle-aged Information Technology workers deal with technological innovations.

The research aims to represent and express the participants' perspectives through the methods used and by asking questions and listening to the answers. The questions are all tied to a central question which is: "How can the experiences of middle-aged Information Technology workers be described when faced with advanced technology?" After the collection of data, the researchers utilized the first level of data analysis to make sense of the set of information collected. A dendrogram formed from transcriptions to reflect the created themes and sub-themes.

Research Locale and Sample

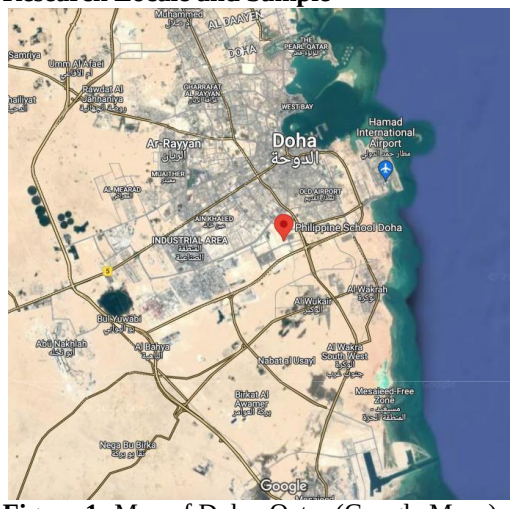

Figure 1: Map of Doha, Qatar (Google Maps)

This research study is conducted at Philippine School Doha (PSD), a learning institution located in Doha, Qatar providing basic education catered to a Filipino Curriculum. This study immersed participation of middle-aged information technology workers. The participants were chosen through a purposeful sampling technique based on the following set criteria: (a) must be 45 years old to 60 years old; (b) must have working experience in the information technology field in Qatar for five years or more; and (c) must have been employed in the field of I.T. during the pandemic. A total of ten middle-aged Information Technology workers were chosen to be participants of the study.

Data Collection and Ethical Consideration

This data collection is at foremost a set of questions gathered for the participants to answer during the interview. The questions are composed for the information - technology worker participants to be answered at ease and a formal interaction. The imposed questionnaires will then be handed to teachers with a suitable background of profession for verification. Thereupon, Consent forms will be sent to participants as a notice of request to be approved. Interviews will be held through Zoom application; the order of time and day are dependent on the participants availability. Data gathering took place during the interview. In addition, the Zoom recording aspect will be used for the recording in gathering data to be transcribed after the end of the interview.

The robotfoto and interview guide assisted the participants in communicating their lived experiences with the researchers. A short brief orientation was also given to the participants to provide them with the necessary information relating to the interview procedure and an introduction to what the purpose of this interview is about. As for the recordings of the interviews which the participants consented to, the researchers made use of the Zoom recording feature. The researcher asked permission to record the meeting for transcribing purposes. The recordings were necessary for the transcription of the shared experiences of the participants. Along with the transcription of the oral responses, interpretation and analysis of data would be utilized thoroughly as part of the qualitative research process. In the transcription, the confidentiality of the participants was observed, therefore, their names were not manifested, instead, they will be referred to as P1, P2, P3, and so on.

Data Analysis

This study used data collected directly from the participants' perspectives and feelings. From their responses gathered through the designed interview, the research flow is then observed by using the following steps in data analysis: (1) Emic data transcription;

Emic to Etic transcription; (3) Cool to Warm Analysis; (4) identifying and analyzing themes through the dendrogram tool; (5) and the integration of these themes to the simulacrum of this research. This study gained a thorough and deep understanding of the topic through this systematic procedure, analyzing the experiences of the frontliners' children through thematizing. The first level of data analysis made sense of the set of information incurred, initially done by direct transcriptions then proceeded by data cleaning. The data treatment follows after, with the cool-warm analysis clustered and reflected to form the dendrogram, which then extracts the themes and the sub-themes created. The study's conceptual framework is embodied in the research's simulacrum that shows how the parts are interconnected. Then, the second level of data analysis reinforces the themes and subthemes via the lenses of related literature and studies. A simulacrum was created to visualize the themes and sub-themes.

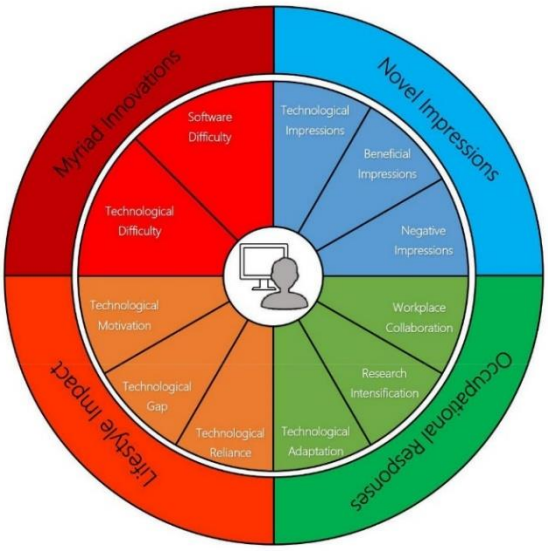

Figure 2: Simulacrum

The simulacrum shows the 4 themes of the study and each of their sub-themes: Myriad Innovations, which includes Software Difficulty and Technological Difficulty; Novel Impressions, which includes Beneficial Impressions, Technological Impressions, and Negative Impressions; Occupational Responses, which include Workplace Collaboration, Research Intensification, and Technological Adaptation; and Lifestyle Impact, which includes Technological Reliance, Technological Gap, and Technological Motivation.

RESULTS

The impact of the pandemic had led to a heavy loss of employees, creating a predicament and technological demand for a generated and innovative use to cope from the Covid - 19. However, present times have led to a significant change to technology since the pandemic. Technological advancement was used through E - Commerce such as promotion and advertisement of businesses to minimize the movement of people and controlling the pandemic widespread. Slowly recovering from the pandemic, the technological job market has gotten into a predicament as high-tech businesses transition to rapid changes, which technology can easily replace with an employee. Increasing the likelihood of technology eliminating jobs as a result of technological demands.

This phenomenological study discusses the experiences of Information Technology workers, specifically middle-aged Filipino Information Technology workers during the pandemic. It aims to understand the experiences and perceptions of middle-aged Filipino Information Technology workers concerning the struggles and adjustments relative to the central question, “What are the experiences of middle-aged Information Technology workers when faced with advanced technology during the pandemic?” Furthermore, this study focused on the specific question, “How do middle-aged information Technology workers familiarize with the new technology?” The change in their work environment as the technology used also changes how they manage with this situation.

Based on the verbal thoughts of the middle-aged Filipino Information Technology workers in the State of Qatar, the answer to knowing their untold lived experiences rely on four main classes, namely: (1) Myriad Innovations, the new technological innovations that the middle-aged Information Technology workers encountered during their work; (2) Novel Impressions, the first thoughts the middle-aged Information Technology workers formulated when encountering new technological innovations; (3) Occupational Responses, the process of discovering and mastering the new technological innovations; (4) Lifestyle Impact, the culminating ideas the middle-aged Information Technology workers gained about technological innovations.

MYRIAD INNOVATIONS

Technology is rapidly advancing, and this refers to all types of technology which vary greatly. The numerous technological developments in each category that the respondents have acquired while working in the information technology sector. These developments may offer indication of the technological challenges the middle-aged IT workers face and how they are resolved.

Software Difficulty

When there are technological difficulties in software, middle-aged IT personnel often struggle to resolve the issues and wish to learn how to fix and solve them. This advancement in technology resulted in software difficulties and technological difficulties that implied significant hurdles to middle-aged IT workers. Those in the field of information technology experienced great difficulty when it came to the software used.

"Most of the applications are online, and if you want to work on an online application, you need to have programming experience to adopt those new technologies. " (P10)

"I am having difficulty with media technology since it is difficult for us to know about the new technology." (P3)

"Operating system of windows and Mac. I don't know much about Mac OS since it's a bit complicated because it's not in my field. For Microsoft, artificial intelligence is developing since they keep upgrading their applications." (P7)

Three respondents shared that they had difficulties operating technology based on software. Specifically, these are web applications, media technology, and artificial intelligence. In summary, software difficulty as part of myriad innovations encompasses the difficulties middle-aged technological workers experience in new and unfamiliar software, and their resolve to overcome these amidst the challenges.

Technological Difficulty

Technological Difficulty are new or enhanced technologies that are more advanced than prior ones. Middle-aged IT workers are captivated by new technologies and eager to study and comprehend them. The innovations mentioned are new data and software tools that require more knowledge on how to use them consistently because new technologies are released frequently.

"There are new data and software tools that I have encountered that alter my skills. For example, in adding technological innovations, hardware, and software tools services, I involve myself in doing research and training to learn more." (P3)

"Every department has its own sections so every section has their own specialization. So most probably I might not be aware of that certain specialization of a certain section of that department." (P6)

"For me, there are technical innovations that may require a specific bit of study before you would be able to comprehend the entire solution." (P5)

The participants claimed that certain technological innovations such as new devices or new hardware may be harder to use and maneuver. Moreover, there are instances wherein they are not aware of the new technologies. To sum up, technological difficulty as part of myriad innovations are the advanced technologies middle-aged IT workers may have difficulties to utilize and require more knowledge to do so. The participants showed difficulties in operating the latest technologies due to advanced skills required and the lack of knowledge with the technology, surfacing in both difficulties in utilizing new software and new technology in general.

NOVEL IMPRESSIONS

When middle-aged IT workers encounter technological innovations, they have initial impressions regarding these innovations. These impressions can range from positive–as an intrigue and curiosity on how technological innovations will impact them, as well as having a beneficial outlook on the perks and benefits gained from using new technology, to negative–thoughts on how new technology will be used incorrectly and how new technology will steal jobs from humans.

Technological Impressions

Curiosity is what defines Technological Impressions. Whenever new technology is revealed or introduced into the workplace, middle-aged IT workers are intrigued by the new developments. Working in the Information Technology sector requires a base fascination with technology, but the fascination that new technology presents to these middle-aged IT workers is not only because they are interested in the developments of technology, but also what this new technology will provide to their work. They expressed that:

"Actually, I feel amazed when I see technological innovations. This just shows how the mind of everyone is, how we think. We are able to see almost every year-more and more innovation when it comes to technology and of course, it amazes me." (P1)

"I feel excited. There is excitement whenever there is a new device or technology that will be handled in our work or even in the company." (P4)

The participants claimed that there is amazement and excitement whenever encountering and handling new technology in the workplace. In addition, they experience curiosity on the functionality of new technology. As such, technological impressions as part of novel impressions encompasses the intrigue and curious reactions of middle-aged IT workers in technological advancements.

Beneficial Impressions

Beneficial Impressions are the positive impressions and perspectives that middle-aged IT workers have towards new technologies. Specifically, it is how middle-aged IT workers view new technologies in a beneficial way, as help in the workplace.

"There is a big advantage, through zoom for example you do not have to attend a physical meeting." (P2)

"I would say technical innovations would help individuals' tasks and for the benefits of the company." (P5)

"It has benefited not only in my work but for me as well to know more about these new technologies by training." (P7)

The participants claimed technologies made their jobs easier by being able to attend meetings online and getting help from their task. Middle-aged IT workers perceive new technology as tools that can benefit them in the workplace.

Negative Impressions

Negative Impressions is the negative impressions that middle-aged IT workers have toward new technology. It is how middle-aged IT workers perceive the negative effects of new technologies, this includes how new technologies come with bugs and problems when it is being implemented. New technologies also invite certain individuals to abuse it, which worries middle-aged IT workers. Middle-aged Information Technology workers also fear that new technology will take away people's jobs, due to technology doing tasks just as well as a human could without needing rest, water, or food.

"I think that every innovative technology has advantages and disadvantages, it just depends on the people who are using it." (P6)

One participant shared that it always depends on the user because technology can have its advantages and disadvantages. Other participants shared more negative impressions:

"Disappointment maybe there are some bugs or problems occurred during this implementation especially on our business operation." (P4)

"If there is a new technology that affects the job availability for many people it saddens me. Because technology should be used to create jobs not to lose them, that's my point of view." (P9)

"There are many people who develop new technology for bad intentions." (P7)

However, three participants stated that technology causes distress, due to the complications they encountered. The participants claimed that they fear losing their jobs and being replaced by technology, technology being abused, and disappointment that new technology might fail. They show a negative perception of new technology in terms of their work.

Most participants show excitement when they are introduced to new technologies because of their amazement and benefits they get from the innovations. Although most of them are impressed, some of the participants are alarmed with these new technologies. It gives them anxiety due to the possibility of technologies getting their jobs. Whether their impressions of new technology is positive or negative, they still make time to adapt to new technology using a multitude of strategies.

OCCUPATIONAL RESPONSES

Middle-aged IT workers that encounter new technology will not be able to utilize it initially. However, as workers whose job is a technologically centered occupation, middle-aged IT workers are required to master new technology in order to keep up with the IT sector. Middle-aged IT workers have multiple ways in which they are able to respond and master new technology, such as collaborating with colleagues, learning about new technology, and exposing themselves to new technology in order to become familiar with it.

Workplace Collaboration

Workplace collaboration is one of the ways that middle-aged IT workers are able to cope with handling new technology. Working together in the workplace allows middle-aged IT workers to learn about new technology. They are able to ask questions to coworkers who have knowledge in new technology and colleagues can also lend their expertise.

"Asking another colleague helps me know more information about the new technology as well as attend training and seminars." (P3)

"It requires teamwork within this certain section. There must be teamwork and a united mind to attain that solution that we want to solve." (P6)

"If I know about it, I can even help other people. But if I don't know about it, I have to ask other people who know how to use it. I don't have to pretend that I know everything. I have to ask somebody else who knows it and I can be a better help for others as well." (P6)

The participants claimed that working together with your colleagues is crucial. Teamwork helps Information Technology workers find solutions to current problems. Collaboration in the workplace allows middle-aged workers to learn how to handle new technology by asking help from colleagues and in turn, become proficient in new technology.

Research Intensification

Research is another way middle-aged IT worker can master new technology. They reviewed the technology before they started to utilize new technology. Just like how a person would approach studies or instruments they are not familiar with, they have to research whatever novel item they are going to utilize.

> *"I do advanced research, buy books online, search on YouTube and Google, and sometimes buy books on Amazon." (P10)*

> *"I research them and train myself to know the technological innovations that I am unfamiliar with." (P3)*

> *"Whenever new technology is released, I still need some time to discover and understand it through studying and researching about it, it's not an immediate understanding." (P1)*

The participants claimed that research is one of the components to be able to adapt with the new technology. Middle aged IT workers stated that along with research, training and studying goes hand in hand.

Technological Adaptation

Adaptation is another way middle-aged Information Technology worker can master new technologies. Technological change and innovation is unavoidable, it's even more unavoidable in the IT sector, where people work with technology as closely as possible. Familiarization to new technology through various ways such as Youtube or Google, as well as slowly getting used to new technology by regularly using it and becoming familiarized with it.

> *"We just have to adapt since technological innovation is unavoidable." (P1)*

> *"It's all about getting used to the normal operation and then whatever ropes along with it, you have to learn as fast as possible." (P5)*

> *"The first few months, I was not familiar with these technologies and I was being cautious at work double checking. However, it took me two - three months to familiarize myself." (P8)*

The participants claimed that working with technology helps with adapting. In order to become familiar with the updated technology, Information Technology workers will need some time to adapt.

By using these three strategies, middle-aged IT workers were able to adapt to new technology they encountered in the workplace. Workplace Collaboration, Research Intensification, and Technological Adaptation were used to adapt to new technology as adapting to new technology is not an easy task or an overnight process, so such strategies were employed to make adapting easier. Additionally, the adaptation of new technology in the workplace has provided significant effects to the lifestyle of middle-aged Information Technology workers.

LIFESTYLE IMPACT

After utilizing, familiarizing, and mastering new technology, middle-aged IT workers gain a different understanding of not only new technology, but also of how new technology impacts their lifestyle as middle-aged adults, IT workers, and individuals living in a digitalized society. There were realizations on how human beings are reliant on technology since the latest technological innovations have been beneficial as a whole. There were also realizations about the clear gap of the technology used before and now, and how both realizations act as stimuli for middle-aged IT workers to start adapting to new technology.

Technological Reliance

As the usage of technology is becoming more and more regular, so is the assistance that technology provides to workers. Latest technologies become advantageous to the participant because it lessens the workloads and improves the operation in work, such as new programs or updated versions of programs such as Microsoft Excel with far more features allowing easier file creation and data management or applications like Zoom that consolidate. These innovations are favorable to them because it is useful since it helps them lessen and solve the tasks easily. Not only workers in this field benefited, but also other people because the revolution of technology made the lives of the people easier and convenient. Other responses from the respondents include voicing their thoughts on their reliance on new technology when it comes to their lifestyles as middle-aged Information Technology workers. This shows that the usage of new technological innovations benefitted the respondents in terms of work in the office.

> *"I think the enhancement that Microsoft Office is doing is very helpful to the office staff because it helps with consolidating and making the data in an orderly manner. Yes of course it is very beneficial especially to the office work." (P6)*

> *"Now it's much better because you can do work from home and reach your customers like collaboration with communication through zoom for example you need to set up the meeting and place." (P9)*

> *"I would say it will definitely expedite your task at the same time you will execute certain things in a new and different approach and in general definitely it would be a big help to our company." (P5)*

The participants claimed that with the emergence of new technologies many tasks can be completed more rapidly and in a more efficient manner. Furthermore, relying on newer technologies is beneficial in the work setting, particularly in the company or office.

Technological Gap

On the other hand, their reliance on new technology does not correlate with their ability to use new technology. As middle-aged IT workers grow older and the technology used in the workplace becomes newer, a clear difference in how middle-aged IT workers utilize new technology and what their actual expertise in new technology are becomes visible. Older people have difficulties to adapt with the new technology particularly if they do not have any knowledge on how to use these new technologies. It always depends on the people on how they can adapt with the advancement of technology, but usually younger people will be able to adapt fast due to them being exposed to technologies at a younger age than the older generation. The participants shared similar concerns regarding such a gap:

> *"Old people have more difficulty adjusting to new technology. But maybe for a younger generation it is easier for them to adapt from existing technology to new technology." (P6)*

> *"There is a big gap especially in the older adults like let's say 50s and 60s until 80s. They will have difficulty to cope with how to use it, especially when there's no training or person who introduces how to use this new technology to them." (P4)*

These responses indicate that middle-aged IT workers notice that there is a gap between their knowledge and the functions of technology now. They also recognize that there is a clear contrast in how quickly younger adults are able to adapt to new technology compared to them. However, this knowledge is a driving force for middle-aged IT workers to try and quickly adapt to new technologies.

Technological Motivation

The existence of a technological gap leads middle-aged IT workers to adapt to new technology, acting as their motivation. Although the challenge to adapt to new technology is difficult, it gives the middle-aged IT workers motivation and inspiration to learn new technology and adapt to it. It can even give a boost in the happiness of the workers, as they feel like they're ahead of the curve when it comes to handling technology because they were able to deal with its latest innovations. Learning new technology also is becoming a job requirement because more and more tasks in the workplace utilize new technology, so workers are motivated to adapt so as to be better workers. Two participants voiced out their thoughts:

> *"Every time there is advanced technology it gives me a boost especially when you're having a technology handling it feels like I'm ahead." (P4)*

> *"For me, it's just motivation to overcome those challenges, especially at my age, like I'm about to retire. So, it's just motivation for me to gain knowledge to have another experience, and at the same time, we need extra income to survive." (P10)*

These responses show a clear motive as to why middle-aged IT workers want to adapt to new technology, because there are a multitude of benefits IT workers gain from adopting new technology, whether it is a professional benefit or a personal benefit.

Middle-aged IT workers recognize their reliance on technology. However, there is a large gap in their skills when it comes to utilizing new technology and the existence of a gap drives middle-aged IT workers to quickly adapt in a multitude of ways. New technology impacts the work and attitudes of middle-aged IT workers.

DISCUSSION

Being middle-aged Information Technology workers in an era where technology is constantly changing, the participants are bound to encounter situations with technological innovations that impact them in a multitude of ways: such as mental and occupational. The primary purpose of this study was to bring to light the unveiled experiences of the middle-aged Filipino Information Technology workers. The participants have conveyed insights, changes, thoughts, and adjustments throughout the process. Hence, they have highlighted the following aspects:

MYRIAD INNOVATIONS

Myriad Innovations refers to the technologies that middle-aged Information Technology workers have encountered and their benefits and downsides. As stated by Renu (2021), technology can ease difficulties encountered while working during the pandemic by facilitating remote working through virtual private networks, enabling virtual meeting through Applications like Zoom or Google Meeting, as well as voice over Internet protocols. This shows that new technology has benefited workers especially through the pandemic. In a workplace, technological advancements frequently have contradictory effects, facilitating accessibility and

efficiency while increasing interruptions and unpredictability (Hoeven, Zoonen, & Fonner 2014). These innovations not only benefited the workers during the pandemic but also numerous people. In the study of Dananjayan & Raj (2020), during the fight against COVID-19, Artificial Intelligence was used to monitor people for COVID-19 symptoms and predict the virus structure.

However, working with advanced software can be an unpredictable task, and there is often a lack of understanding of how software programs are built, maintained, and updated. As a result, many Information Technology workers found themselves in a difficult position when they face software issues that can be difficult to diagnose and repair. Since the pandemic, the majority of workers had to work from home. Despite the ability to work remotely, from the absence of working from their designated workstations. Many Information Technology workers suffer from the lack of proper equipment and facilities, as well as poor internet bandwidth (Ford et al., 2021). Communication amongst co- workers was also a major problem.

However, present Middle - aged Information Technology workers occupy the working in the technological industry. Many can be more susceptible to technological barriers than younger generations are. The dependency on technology and technology use can lead to exhaustion, stress in the workplace, and reduced productivity in working (Nisafani et al., 2019). As workers in a heavily technological industry, middle-aged Information Technology workers have a risk of burnouts due to the usage of technology, whether it is because of an uncertainty in the ability to use new technology, or an apprehension when being introduced to new technologies. Thus a growing consensus that is viewed as a transactional process between the demands of the individual and their environment. Which asserts stress and difficulty of the ability to perceive and cope with the demands. In other words, the mismatch between the person's ability to comprehend and cope with environmental demands causes overload, which is considered a main overload to stress strain (Lee, Son, & Kim, 2016).

Software Difficulty

Information Technology positions aren't limited to just support, and provide data information efficiency. But also creates an adversity to technology being used. However, working with Software, Information Technology workers encounter software programs and meta-analysis on a daily basis. In a study conducted by Kasu (2018), it was found that developers can face difficulties in the software they use, mainly from the lack of understanding of designing a program to solve tasks as well as debugging their own program. IT workers who are introduced to software they are not experienced with can face difficulties such as not being able to operate the software and the risks of bugs in the software occurring. Additionally, data cleaning, management, collection, and availability were considered as top challenges faced by Microsoft teams when utilizing new technology, no matter the pre-existing knowledge or experience the workers had on technology (Amershi et al., 2019).

As of now, hardware is being replaced by software. Virtual routers are an example: by enabling their free movement, simplify management tasks such as planned maintenance, and carriers can separate the logical configurations from physical routers. However, the transition from hardware to software is also something middle-aged IT workers have difficulties in. Using dedicated hardware appliances, it is relatively easy to identify which component is malfunctioning and resolve the situation. However, when deploying network functions in software at different locations, things like troubleshooting and fault isolation become harder (Han et al., 2015). Another example of software that has emerged during the pandemic is the Artificial Intelligence chatbot. Virtual chatbot is known for its human-machine interaction, programmed to answer questions, and its accessibility 24/7 (Battineni et al., 2020).

Technological Difficulty

Information Technology workers do require physical work practices with technological advances, products, services and programs to orderly do their job. Adopting new technologies, such as smart devices, may mean radically overhauling your existing operations to compete with more agile companies and serve demanding customers
(Wilson, 2020). However, the pandemic has given a distance towards specific changes and alterations that goes through a process of transition to technology itself. This is an opportunity for Information Technology workers to deeply absorb information management and examine research about advanced technological innovations. (Sein, 2020). According to Sein, the pandemic has changed our way of working. Changing ways of how Information technology workers will be able to put through physical interactions and alternatives to procession. Thus, making ways for brand new implications of designing technology and the use of technologies. However, the prevalence of design and use of technology has led to its advancement during the pandemic, becoming the reliance during the pandemic. (Dwivedi et al., 2020) According to (Sipior, 2020) technology emphasizes on critical necessity for team diversity. Alike technological innovations require team efforts are critical handling advancements during the pandemic. An Experiment conducted by (Pereira et al., 2022) contrasted the process of ten different technological models before and during the pandemic. Results showed how supported by digital technology, is one of the strategies used to respond to disruptive environmental changes. Digital technologies and digitization are an adequate response to the disruptive changes caused by the pandemic COVID-19. Organizations need to ensure that they overcome the cultural obstacles holding back progress, provide the right support, and make decisions that will both secure and future proof their organizations (Wilson, 2020).

NOVEL IMPRESSION

Novel impression pertains to the initial reactions middle-aged individuals have when encountering new situations, things, events that they have not encountered prior. In terms of technology, the emergence of new technology in the Information Technology sector and the reactions of middle-aged workers upon encountering them.

The Computer Proficiency Questionnaire introduced by Boot et al. (2015) shows that there are multiple factors which impact how middle-aged adults adopt and use new technology. Two of such factors include confidence and comfort in using technology. The difference between the technological skills of middle-aged adults and younger adults is not related to actual knowledge, but rather

it is related to the concerns and the tendency of middle-aged adults to underestimate their own abilities in terms of technology. (Mitzner et al., 2010). middle-aged adults who are not confident in their ability to utilize technology are less likely to adopt new technology. As middle-aged adults who already have an experience with utilizing technology, middle-aged Information Technology workers may not face this, but instead be more motivated to adapt to the new technology that is presented.

Middle-aged adults may also be apprehensive when introduced to new technology for a more practical reason, as stated by Heinz et al. (2013), Lee et al. (2019), and ten Bruggencate et al. (2019), middle-aged people acquire new technologies slower compared to younger people, they are also less likely to adopt the usage of new technology unless they see benefits in doing so. As Information technology workers themselves, middle-aged individuals have an interest in learning new technology as it directly affects their work. Additionally as individuals that interact intimately with many forms of technology, the middle-aged Information technology workers have built a knowledgeable foundation in terms of technology. middle-aged adults with greater self-assessed computer and Internet skills reported a greater willingness to adopt a new technology (Berkowsky et al., 2018). Middle-aged Information Technology workers that have prior experience in handling technology and see the benefits in adopting new technology are more likely to have positive initial attitudes concerning the emergence of new technology and encountering new technology in the workplace.

Technological Impressions

Technological Impressions refers to the enthusiastic reaction that middle-aged Information Technology professionals have when they come across new technology. One of technology's most intriguing aspects is how it affects various aspects of our existence. The development of technology is intricately related to human prosperity as a race, and this is a highly genuine relationship. A small sample of the tens of thousands of technologies that have had a significant impact on human history include agriculture, animal domestication, language, metallurgy, money, water and steam power, printing, transportation, communication, health and medicine, and electricity (Surry & Baker, 2015).

Peek et al. (2015) explained that technologies such as fall detection, emergency assistance systems, and vitals monitors are all created expressly to facilitate aging in place. Several people refer to these technologies as "smart home technology". There is also e-Health, which covers a wide range of technology and offers online solutions to assist middle-aged individuals in managing their chronic health conditions. These technologies have not yet been widely adopted for a variety of reasons. Among the reasons is that middle-aged individuals have an ambivalent view about these technologies: on the one hand, they acknowledge that such technologies could benefit middle-aged people in living independently. According to Wang et al. (2019), the existence of a sizable perceived benefit is a crucial motivator in middle-aged individuals' adoption of technology.
Many nationalities around the world may likely benefit from Nye's insight about Americans: American tales and sense of place have always incorporated machines, which are social creations. Americans have constructed machines in their own ways, appropriated them, and incorporated them into social structures, landscapes, and historical narratives. With regard to Germans and technology, in my opinion in particular, the workers, the function of technology becomes even more crucial in the process of place-making. New technologies are the lifeblood of Silicon locations like Silicon Valley and Silicon Allee. The people who work in these fields are among the most involved and attached in these new technologies as both producers and users of them (Nye, 1997, as cited in Phillips, 2016).

Researchers Salanova et al. (2019) indicated that other cognitive and affective factors in our study, such as job-related enthusiasm and comfort, job satisfaction, and organizational commitment, demonstrate that employees of organizations that are implementing information technology for the first time see these as good job demands.

Beneficial Impressions

Beneficial Impressions pertain to the perception of the advantages brought forth by the middle-aged Information Technology workers with a particular action. There are beliefs regarding the favorable outcomes connected to a conduct in response to a genuine or perceived consequence. It is crucial to ensure that middle-aged people may reap benefits in a world where Information Technology is developing quickly.

A major source of competitive advantage in a worldwide market was demonstrated by improved capabilities, knowledge, and skills of the skilled workforce. Effective training programs enable employees to get familiar with desirable new technical advancements, as well as to fully grasp the competences and skills necessary to succeed at a certain position and avoid on-the-job blunders. (Elnaga & Imran, 2013). middle-aged individuals are a very diverse population and are not always viewed as tech averse. Furthermore, there appears to be a pragmatic evaluation of whether the technology will deliver specific desired value and of the relationship between this and the sense of learning difficulties. Use of technology for middle-aged people can frequently be more dependent on the availability of training. (Barnard et al., 2013).

The use of technology to address the problems brought on by the aging of the population has just lately started to be investigated. Despite the fact that there are numerous technology systems available for middle-aged people, and the potential benefits they could offer, they are not widely used. The economic state demonstrates that middle-aged peoples' adoption of technology is a significant challenge that is influenced by a variety of factors rather than simply being a matter of performance and cost. Ten characteristics are recognized as the facilitators of middle-aged individuals adopting technology: value, usability, affordability, accessibility, technical support, social support, emotion, independence, experience, and confidence. (Lee & Coughlin, 2014). Three key jobs for humans to fulfill. They must program computer systems to carry out certain jobs, explain the results of those activities, particularly when the conclusions are illogical or debatable, and maintain the appropriate use of technology. (Wilson & Daugherty, 2018). Besides presenting opportunities for advancing technology-based solutions, the pandemic has also provided a rare opportunity to study technology research and practice, including information management, work practices, and technology design and use. (Sein,

2020). These technological factors make it appealing for middle-aged IT workers to adopt new technology as it is appealing to them.

Negative Impressions

Organizations may decide against providing middle-aged employees with training on new systems, apps, or software because they think the expenditure would not be worthwhile. There is a belief that these employees won't be able to learn how to use newer systems and software, and that they might leave the company before their employer can take advantage of their training (Zachary, 2014, as cited in McIntosh, 2020). Although it is generally believed that using information technology will benefit people, there are also potential negative effects with varying degrees of seriousness. According to dual-system theories, reflective (control) and reflexive (automatic) systems, which typically function in unison, direct human behavior. However, when the two systems clash, they both work together to assert their impact over behavior. Since the reflexive system is represented in our study by mobile phones use habits and the reflective system is reflected by self-regulation, we see the negative effects of mobile phones use as the result of the struggle between the two systems that influence our daily behaviors. (Soror et al., 2015).
Woessner et al. (2021) stated that machines have reduced or taken the place of physical activities that were formerly performed as part of a "normal" working day (active transportation, labor, etc.) or as part of household chores (cleaning and cooking). Our level of physical activity has been significantly impacted by the internet's relatively recent existence and the ease with which it is accessible on mobile devices (such as phones and tablets). There are well-established links between using the internet for leisure and obesity in both children and adults as well as sedentary behavior. We have discovered that a lot of the health information technology issues we are researching include the interaction of user interfaces, content (such clinical data and computer-generated decision support), and software and hardware (Sittig & Singh, 2015). This can give a negative impression on middle-aged workers, as the jobs they were regularly tasked to do are now being done by machines and technology, effectively ‘replacing’ them.

OCCUPATIONAL RESPONSES

Occupational responses refer to the strategies and methods used by the middle-aged Information Technology workers to cope up with the advancements they encounter in the workplace. To cope with technological innovation difficulties, Information Technology workers need to stay up to date on the latest technology advancements, understand best practices for software maintenance, and develop strategies for resolving difficult software issues. Information Technology workers use different types of methods to cope up with the advancements of technology. In the study of Hauk et al., (2019), adapting to the situation, asking for assistance, and formulating a plan are the main strategies that the workers used in coping with the new technology. These coping mechanisms are used to manage difficult situations that can result in stress, anxiety, depression, and anger to each individual.

Additionally, these techniques are dependent on how each individual reacts to a situation. Ferreira et al., (2021), stated that the major contributors to the actions of the workers are their emotions and environment. This shows how significant are the feelings and the surroundings of the people because it greatly affects their actions in the circumstances. The attitude of workers during particularly stressful times plays a crucial part. While stressful situations are bound to occur, stress levels are lower when there is a positive attitude. In fact, a positive attitude was the strongest protective factor against distress among coping styles (Babore et al., 2020).

Furthermore, mastery of a situation in the workplace requires proactive and diligent efforts that adheres towards one’s responsibility; facing and managing it head on. Directattempts are made to control or improve the stressful circumstance as part of problem-focused coping (D’Arcy, et al. 2014). According to Klapproth et al., (2020), functional coping strategies are coping strategies that include active coping (concentrated efforts), suppression of competing activities (devoted focus) , restraint coping (initiative taking), planning and seeking social support. These are coping strategies deemed functional as workers exert more effort to minimize difficulties in the workplace.

Workplace Collaboration

In the workplace, collaboration is important and happens regularly. In a study conducted by Liu et al., (2014), it was found that team collaboration decreases work content redundancy, boosts team efficiency, coordinates everyone's efforts, streamlines internal processes, and expedites innovation of new ideas.

Often, information technology facilitates collective decision making, which will lead to collective decisions. Being a competent IT worker involves successfully interacting with information-related activities that reflect specific and situated knowledge built by people working collaboratively (Ligurgo, 2016). As workers age, they find alternative means of maintaining their desired level of functioning. This was often attained through the assistance of support systems by fellow colleagues (Ng & Law, 2013). In particular, middle-aged workers would work together, ask other more knowledgeable coworkers and receive help from them to fully become proficient in the new technologies; as collaboration and success in a team are dependent on learning and knowledge sharing (Waizenegger et al., 2020).

With the onset of the COVID-19 pandemic, working from home has become the new mode of work enabling collaborative digital efforts. This included the emergence of virtual meetings and online communications. To subsequently improve work performance, it has been crucial to communicate about mistakes, share feedback and look for ways to improve work processes between team members (Mayo, 2020). Altogether, collaborative efforts with constant communication is needed for middle-aged information technological workers to underlie an effective response to the pandemic.

Research Intensification

In a consistently improving field, research is most crucial as it is inevitable. Continuous research and training go hand in hand as lifelong learning is a professional's fundamental tool to maintain both knowledge and skills in their respective fields (Curran et al., 2019). The high pace of knowledge growth in the knowledge-intensive industry of IT would naturally encourage its employees to engage in vigorous ongoing professional development (Ha & Tak 2015). These professional developments include job training. In a study done by Lee, et al. (2022), middle-aged workers through adequate use of ICT and job training obtain greater productivity increase in comparison to younger workers. However, professional developments do not only involve training but also through self-study.

Essentially, the responsibility to learn lies within the individual themselves (Lemmetty & Collin, 2022) as workplace learning is not entirely formal training but is also focused on the activities at work (Billett, 2014) wherein learning shows itself to be practice based and self-directed. Initiative is of utmost importance when it comes to studying and learning, especially about new technology as it may take some time for an individual to get used to said technology. Self-Directed Learning, a process where the person takes initiative in identifying what they need to learn and does so accordingly, is acknowledged as a significant component of workplace learning research and practice, particularly when the learning's goal is to increase employees' competency.

Technological Adaptation

Technological Adaptation refers to the process of learning, catching up, and familiarizing oneself in a technological environment. The ability to adapt is critical, especially in a field with continually emerging ideas and innovations. An environment with constant change also means a need for constant adaptation, so are the resources required by the organization (Hagsall et al., 2019).

As such, technological workers who are able to react and respond accordingly to new IT changes in work settings have a better chance of utilizing IT systems and tasks effectively (Rabiul, 2020). The success of a technology is largely determined by the workers' attitude; that is, how well they accept, adopt, and implement it.

Consequently, a study conducted by Ng and Law (2013) showed that there is little link between age and work performance; instead, adaptation skills are of much more importance. Since middle-aged workers have witnessed many change cycles, they are bearers of workplace memories and are able to put things in perspective. Therefore, this allows them to adapt to new situations and unfamiliar technologies with accumulated knowledge, wisdom, and experience. This includes adapting to unfamiliar softwares such as Microsoft's Office 365 and Apple's iWork, different types of hardware or devices, and new email services (Ryo & Mides, 2021).

Furthermore, during the pandemic, the ubiquitous nature of technology changed the nature and duration of work. The new mode of work challenged people's capabilities and competencies (Dey et al., 2020). Both young and middle-aged IT workers alike were obligated to keep up with the latest technological innovations as it is unavoidable. To stay on track, the consistency to learn and adapt in uncertain times was vital to suit ever-changing environments. Thus, enhancing the performance of information technology workers and improving their competency in the workplace.

LIFESTYLE IMPACT

Lifestyle impact pertains to the effects learning new technology has on the lifestyle and mindset of middle-aged Information Technology workers. A study has shown that the usage of an application has benefited middle-aged adults, specifically when it comes to communication and interaction with their communities, friends, and family (BarbarosaNeves et al., 2019). Work-related benefits have also been shown to exist. middle-aged adults did not prefer working with work technologies with too few features or programming options such as telephones and fax machines, and preferred technology that allowed them to be more efficient workers.

For instance, greater instances of data, analysis tools, and telecommunications allows many workers to focus instead on social interaction, collaborations, and improvement. Additionally, technology makes many high-skill jobs more motivating and appealing, empowering more working skills and tasks (Goos et al., 2019). Big data and machine learning are increasing machines' ability to perform cognitive and physical tasks, allowing workers to work on non-routine tasks and increase productivity, quality, and innovation (Gibbs & Bazylik, 2017). There are also clear benefits in adopting technological innovations to middle-aged IT workers. Namely, a significant decrease in fatigue, stress, and anxiety. Adopting new technology and technological innovations in both the workplace and everyday life has a positive impact on middle-aged workers in the Information Technology sector in terms of mental health. Technological innovations and solutions are being considered to address the scale of the mental health crisis worldwide (Bucci et al., 2019). Simply put, technological innovation and solutions are being weighed in how they can help deal with poor mental health.

Technological Reliance

Multiple studies have shown that technological advancements in the workplace have benefitted workers greatly and that the usage of ICT for work-related tasks, anytime and anywhere, has benefits in terms of flexibility, productivity, and efficiency. In the studies of Danaher, 2016; Huang & Rust, 2018, new technologies will considerably change the overall workforce structure. Specifically, in the study of Huang & Rust, 2018, AI technology was attributed to large-scale innovations that assist and replace human workers in certain jobs or tasks in the workplace such as the utilization of big data applications to calculate big data and expedite data calculation and collection. An example of this is the use of crowdsourced data combined with big data analytics to accelerate clinical trials which was impactful in dealing with the Coronavirus (Wang et al., 2018).

During the pandemic when people were confined to their homes, meetings and discussions were done through videoconferencing. Teleworking and video conferencing tools such as Cisco's Webex, Apple's FaceTime, or Zoom, Microsoft's Skype, which have already been in the market for many years (Zec and Matthes, 2018) have experienced huge growth (Brem et al., 2021). This shows a reliance on technology in the workplace to accommodate tasks which humans may not be able to do and supplement a human worker's ability to work at their highest level even against hurdles such as confinement in their homes due to the pandemic.

Technological Gap

Middle-aged people are prone to have difficulty adapting to new technologies. Sensory, motor, and cognitive problems are the main issues when aging, thus making middle-aged people have trouble adapting to new technologies. An example of sensory problems would be visual impairment, which affects people as early as 40 years old and are more pronounced in elders (Iancu & Iancu, 2020).

Aside from that, Fischer et al. (2014) states that middle-aged workers usually fall behind when it comes to technology due to the fact that they have limited interaction with technology, thus lacking in the development of necessary skills important for using technology. Rapid technological advancements combined with the physical aging of middle-aged adults may exacerbate feelings of being unable to keep up with others, in a study by Pirhonen et al. (2020), middle-aged workers have a sense of rapidly advancing technology, and these rapid changes caused anxiety in the participants.

However, contrary to the assumption that middle-aged workers are not technologically savvy or technologically proficient, new IT trends focus on an increased involvement and inclusion of middle-aged adults in IT society (Östlund et al., 2015). New technology has also modified social interaction in the workplace. Iivari et al., (2020) stated that there are various ways to integrate ICT in work practice like emails and video conferences in conjunction with face-to-face interaction. In this regard, the pandemic has accelerated the modification of social interaction through a digital space due to factors such as quarantine and risk of COVID-19. New technological advancements in the workplace benefit middle-aged adults just as much as it benefits younger adults, especially in a pandemic setting.

Technological Motivation

Changes in technology have motivated middle-aged IT workers to adapt. Motivation is a process where someone's efforts are energized, maintained, and directed in order to achieve goals (Medina Nilasari et al., 2021). In the workplace, this can be used as a catalyst for employees to improve their performance as well as the overall performance of the organization, as was stated by Sekhar et al. (2013).

Stimulus to adapt can be linked to motivation. According to Medina Nilasari et al. (2021), there are two types of motivation: extrinsic and intrinsic motivation. Extrinsic motivation is motivation that leads individuals to seek and achieve external results, the task does not give inherent satisfaction, but rather it is the task's consequence which gives motivation. For middle-aged Information Technology workers, not being able to cope with new technologies presented in the workplace will lead to a decreased level of efficiency in their work, which will impact their job performance. Conversely, intrinsic motivation is motivation that leads individuals to seek self-betterment, develop one's capabilities and capacity, seek challenges, and explore possibilities. Middle-aged Information Technology workers have motivation to immerse themselves in new technology, because it increases their knowledge and improves their ability in their craft.

There are benefits to adapting to new technologies, specifically benefits in the workplace, which can prove to be a stimulant to adaptation. Middle aged individuals engage in various strategies aimed at self-regulation and continuously maintaining a person-environment fit (Kooji et al., 2020; Taneva and Arnold, 2018). This helps middle age individuals age successfully in the workplace and allow themselves to be better workers. These include practices such as extensive training, teamwork, decentralized decision making, information sharing, flexible job descriptions, career development, feedback, and job rotation, which promotes flexibility, proactivity, and involvement among workers.

CONCLUSION

This study attempts to obtain the universal perspective on the lived experiences of a select group of middle-aged Information technology workers, represented by Filipino middle-aged Information Technology workers working in Qatar. Though many people around the world experienced the same situation regarding the pandemic in the year 2022, these workers encountered unique challenges that only they, themselves, had different outlooks to. Myriad Innovations, as in the technological innovations that were introduced to the middle-aged Information Technology workers in their workplace and life. Then, novel impressions take into account the first impressions of all the middle-aged I.T. works have when first encountering technological innovations and help them recognize positive responses to the advent of new technology. Acknowledging this means understanding the initial feelings of middle-aged Information Technology workers when encountering new variables that may be important in their work. Then, occupational responses, as in the multitude of ways the middle-aged Information Technology workers utilized to cope with the understanding and usage of technological innovations**.** Furthermore, lifestyle impact, recognizes the after effects on the life and mindset of middle-aged Information Technology workers after dealing with new technological innovation in various ways, such as the middle-aged Information Technology workers gaining a positive outlook on technological innovations. The middle-aged Information Technology workers also gained an understanding on the reliance of technology in daily life and work, as well as the gap between the technology used now and the technology used years ago.

This research has established the foundation for future research regarding the experiences of participants with similar backgrounds. The pandemic and its effects unfolding the lived experiences of middle-aged Information Technology workers have shown that the participants are able to gain positive experiences from interacting and mastering the technological innovations that emerged in their

work. With the constant improvements and changes in technology, those that work in the technology, such as the participant should be able to seamlessly integrate themselves with the innovations happening.

This study broadens the middle-aged Information Technology workers ability and capacity to handle situations in their life where they are introduced to new technological innovations, especially since working with technology is a vital part of their job description. The results show that the most effective ways for middle-aged IT workers to cope with new technology is through collaboration in the workplace, intensive study of new technology, and constant exposure to new technology. The researchers recommend that middle-aged IT workers do two of the three effective ways of coping with new technology for middle-aged IT workers to quickly master new technology.

With cooperation from coworkers and members of the community surrounding these workers, the transition for these middle-aged Information Technology workers from utilizing old technology to mastering new technology will be seamless and exemplary. The workers have the capability to understand new technologies introduced to them, they only need some assistance to become masters of technologies they have not yet been exposed to.

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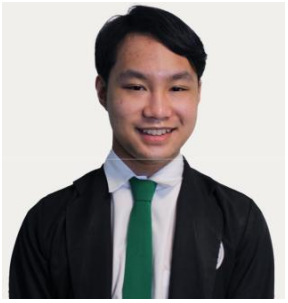
BIOGRAPHICAL SKETCH



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