FACTORS INFLUENCING COVID-19 PREVENTION EFFECTIVENESS: A CASE STUDY OF SEMICONDUCTOR FIRM IN WELLGROW INDUSTRIAL ESTATE

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ABSTRACT

In 2021, the COVID-19 pandemic has resulted in a significant economic breakdown for the whole world economy, as supply and demand for numerous industrial operations have collapsed. Thailand's business activities are also experiencing a major slowdown and breakdown in every industry, which has had a direct and indirect impact in a variety of ways. The recent epidemic has had a direct significant influence on the semiconductor sector. The objective of this research is to determine the factors which affect COVID-19 prevention effectiveness (CPE) at a semiconductor firm in Thailand's Wellgrow industrial estate. The simple sampling method was used to acquire research data from 352 respondents. This study found that the effectiveness of COVID-19 preventative measures, such as the requirement and prohibition for COVID-19 (CRP), and employee welfare support measures (EWM). The results of the survey conducted with employees in the semiconductor industry at the Wellgrow industrial estate show that employees are extremely adept in preventing COVID-19. This study demonstrates the effect of COVID-19 prevention effectiveness which is the Requirement and prohibition for COVID-19 Employee's welfare support measures. In addition, the company's COVID-19 Preventive measures have no effect on the COVID-19 prevention effectiveness in the semiconductor firm. The survey findings may be utilized by managers and supervisors to enhance a number of areas in order to increase productivity and the efficacy of COVID-19 prevention.

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Thaicom Phiwpankaew

TABLE OF CONTENTS

TABLE OF CONTENTS (Continue)

TABLE OF CONTENTS (Continue)

LIST OF TABLES

LIST OF FIGURES

Figure **Page**

CHAPTER 1
INTRODUCTION

1.1 Background

The COVID-19 pandemic, also known as the coronavirus pandemic, is an ongoing global pandemic that was first identified in December 2019 in Wuhan, China; a lockdown in Wuhan and other cities in Hubei province failed to contain the outbreak, and it spread to other parts of mainland China and around the world (Page, Hinshaw, & Mckey, 2021). On 30 January 2020, the World Health Organization (WHO) declared a Public Health Emergency of International Concern, and on 11 March 2020, a pandemic (World Health Organization, 2021). Virus variants have developed and grown prevalent in several nations since 2021, virus variants have emerged and become common in a number of countries, with the Delta, Alpha, and Beta forms being the most dangerous. As of November 1, 2022, more than 630 million cases and 6.59 million deaths have been confirmed, making it one of the worst pandemics in history (The ecconomist, 2022).

COVID-19 signs are diverse, ranging from moderate to critical sickness. Headache, loss of smell and taste, nasal congestion and runny nose, cough, muscular discomfort, hoarseness, fever, diarrhea, and breathing difficulties are all common symptoms. People with the same virus may experience distinct symptoms, which may alter over time. (Adom Agyeman, Chin, Landersdorfer, Liew, & Ofori-Asenso, 2020) A respiratory illness cluster characterized by cough, sputum, shortness of breath, and fever has been discovered; as well as a musculoskeletal symptom cluster characterized by muscle and joint pain, headache, and exhaustion; and a digestive symptom cluster characterized by stomach discomfort, vomiting, and diarrhea. COVID-19 is related with lack of taste and smell in persons who never experienced ear, nose, or throat problems (Saniasaiya, Islam, & Abdullah, 2020). There is a time lag between when a person becomes infected and when the first symptoms appear, as is typical with infections. COVID-19 delay is typically four to five days. The majority of symptomatic persons develop symptoms between two to seven days of exposure, and nearly all develop at least one symptom by twelve days. The majority of patients recover from the disease's acute phase. Unfortunately, some people — more than half of a cohort of home-isolated young patients – continue to have a variety of consequences, such as weariness, months after treatment, a condition known as chronic COVID; long-term organ injury has been documented. Long-term implications of the condition are being investigated in muti-year research

(Australian goverment department of health and age care, 2021).

The SARS-CoV-2 virus, which spreads between humans in a variety of ways, is what the World Health Organization (WHO) claims is to blame for the sickness. The virus can spread in small liquid particles from a person's lips or nose when they talk, sing, sneeze, cough, or breathe. From large respiratory droplets to small aerosols, these particles come in a variety of sizes. According to current knowledge, the virus mostly spreads among people who are near to one another, frequently within a meter (short-range). When aerosols or droplets that carry viruses are inhaled or come into direct contact with the eyes, nose, or mouth, infection may result. Additionally, the virus can spread in crowded, poorly ventilated indoor spaces where individuals spend more time (European Centre for Disease Prevention and Control, n.d.).

Unfortunately, no drug has been licensed by the FDA, has undergone controlled research, and has shown an effect on the virus for this worldwide epidemic. Although there are currently medicines for diseases, the most powerful and efficient weapon against the virus is preventing its spread in society (Reed, Bartoszko, & Dena, 2020).

According to the HCA Healthcare Universal Protection Framework Domain: core infection prevention measures, access control, distance, and patient flow. The Universal Protection Framework is a tool for conveying to facility directors in an easy-to-implement style the complicated and shifting standards for COVID-19 infection prevention (Sands, et al., 2021).

Due to the rising incidence of COVID-19 spread in Thailand, the Thailand's Centre for COVID-19 Situation Administration (CCSA) has offered several measures to keep people safe from COVID-19 by following these fundamental precautions known as "DMHTT" since August 2020, as follows (The Tourism Authority of Thailand, 2021);

D = Distance: Stay at least 1 meter away from other people, even if they don't have any symptoms or appear to be sick, because COVID-19 viruses can grow in the body without having symptoms.

M = Mask wearing: Always wearing a well-fitting three-layer mask, especially in crowded places, or indoors with others. And also clean your hands before putting on and taking off a mask.

H = Hand washing with soap and water: Always wash hands with water and soup or an alcohol-based hand gel, after touching any surface or covering your cough and sneezing.

T = Temperature measure and COVID-19 testing: Should measure body temperature and testing for COVID-19, if notice for symptoms or have close contact with patients.

T = Thai cha na application: Using Thai cha na application for scanning after in-out public places to help the government collect data and control area of spreading in case of people infected.

Thailand was largely effective in limiting the pandemic for the majority of 2020, but has been dealing with an uncontrollable resurgence epidemic since April 2021. An early wave of infections, largely linked to Bangkok nightclubs and a boxing event, peaked on March 22, 2020, with one hundred and eighty-eight newly confirmed cases each day. As preventative methods were put in place, the crisis abated by May, and the country recorded nearly no domestically transmitted illnesses until December, when there was a rise of cases, particularly in Samut Sakhon Province, centered on big migrant worker groups. The current outbreak extended to numerous regions, with a daily maximum of nine hundred and fifty-nine cases recorded on January 26, 2021, and declining slightly in February (Ritchie, et al., 2020).

However, in April 2021, a new surge of infections emerged from Bangkok's Thonglor–area nightclubs and quickly spread throughout the city and over the country. It was determined to be the highly infectious Alpha variant, which was initially identified in the United Kingdom, and by 14 April, more than a thousand cases per day were being found, resulting in a hospital bed scarcity since national policy demanded admittance of all confirmed cases (Bangkok biz newspaper, 2020).

COVID-19 pandemic has resulted in a massive economic breakdown for the whole world economy, with supply and demand, as well as numerous industry operations, collapsing. Thailand's business operations are likewise experiencing a significant slowdown and collapse (Krungsri research team, 2020). Thailand's tourist and corporate travel sectors have seen extraordinary shrinkage since foreign travel ceased nearly totally in March 2020. Many SMEs and small enterprises have permanently shuttered due to the economic hardship caused by COVID-19 lockdowns and travel restrictions. A million workers face unemployment and a loss of household income. Especially in the third wave of the pandemic outbreak in March 2021, Thailand had about a thousand new infected and dramatically increased to the highest number, twenty-four thousand new infected per day in July 2021 due to the outbreak of the Delta variants, which has three to four times faster infection rate than other previous COVID-19 variants and many vaccines cannot prevent (Apornrath, 2021).

Since the Covid-19 epidemic, every industry has had a direct and indirect impact in a variety of ways. The current epidemic has had a direct and significant influence on the semiconductor sector. An electronic component whose operation is reliant on the electronic properties of a semiconductor material is known as a semiconductor device (mainly silicon, germanium, gallium arsenide, and organic semiconductors). As well as being produced as several discrete devices joined together on a single semiconductor wafer, integrated circuit (IC)

chips are also constructed of two or more discrete devices, ranging from hundreds to billions. Semiconductors, sometimes referred to as semis or chips, are a component of numerous products, including computers, smartphones, appliances, gaming devices, and medical supplies (Saint & Saint, n.d.).

Demand for integrated circuits devices (also known as semiconductor chips) is currently more than supply, affecting over one hundred and sixty-nine industries and resulting in significant price increases, shortages, and consumer queues for vehicles, graphics cards, video game consoles, computers, and other products that require semiconductors.

Lockdowns during the COVID-19 pandemic were the primary cause of the global chip scarcity in the months after the coronavirus's outbreak. Because of these global lockdowns, chip production facilities were shut down, causing stockpiles to deplete. With more individuals learning and working from home during the epidemic, demand for computers, monitors, network peripherals, and internet services has increased. The traditional computer sales increased by 26.1 percent year on year in the fourth quarter of 2020 (Bauer, Burkacky, Kenevan, Mahindroo, & Patel, 2020).

Semiconductor businesses must act decisively to safeguard their employees, secure their supply networks, and solve other important issues. Every component of the company model, including product portfolio composition, capital expenditures (capex), R&D strategy, demand predictions, supply-chain footprints, production decisions, and merger and acquisition alternatives, might change (M&A). COVID-19 has dramatically affected the sector's fundamentals, including consumer behavior, business revenues, and a variety of corporate processes.

Many firms' future prospects are uncertain, and others may not survive the crisis. Depending on prospective government initiatives and other circumstances that are presently impossible to anticipate, many recovery scenarios are possible. Although the situation remains critical, and many countries continue to impose physical-distance limitations, semiconductor leaders are already anticipating the day when the epidemic will end and the next normal will begin. To prepare for that time, semiconductor executives must mobilize swiftly and make short-term decisions while also considering long-term plans for reinventing and changing their business models (Fortune business insights, 2022).

Many semiconductor firms in Thailand are located in Wellgrow industrial Estate, a general composite industrial estate in Chachoengsao province, including Fagor electronics (Thailand) ltd. and UTAC Thai company ltd., which have been affected in various ways by the COVID-19 epidemic. These semiconductor firms that have been impacted COVID-19 have been causing outbreaks in Thailand since 2020. Although Thailand's health care agency has taken control of the COVID-19 infection scenario, these semiconductor businesses are nonetheless aware of the outbreak situation. The company's board of directors has put in place

many safeguards to protect staff and consumers against the pandemic virus. The COVID-19 situation of the study semiconductor company was still uncontrollable in early 2022, when I collected the research data. At least 3-5 new infected employees were founded each week by the company. Despite the fact that a preventive measure had been implemented to manage 100% of employees to do antigen testing twice a week since 2021.

Refer to fundamental precautions WHO and Thailand's Ministry of Public Health, such as social separation and wearing a face mask at work. Most enterprises in the Wellgrow industrial estate have also begun checking employees and contacting individuals by using an infrared thermometer to measure body temperature.

After the end of April 2021, when Alpha and Delta variants began to spread in Thailand (WHO, 2022), several firms in the Wellgrow industrial estate discovered the first COVID-19 case in a manufacturing factory, which was infected by a patient's family from outside the company. Following that, new cases at the firm increased in tandem with the country's infection problem, with new infection cases each day increasing from fewer than ten to more than forty in a matter of weeks. The increased number of COVID-19 cases in the industry has significant consequences for employee wellbeing, work attendance, and corporate production.

The impact of COVID-19 on the welfare of semiconductor company employees in many ways, such as a lack of personal protective equipment (PPE), employees having to protect themselves from spreading virus both inside and outside company, many PPE such as face mask and glove and COVID-19 test kit in the market are too expensive for them to effort, some of employee cannot effort for the proper quality of PPE, making a risk of infection from outside to inside company. Another effect is that the working atmosphere is more stressful and anxious, because workers are always concerned about the unclear COVID-19 news, and their working behavior has altered as a result of social distancing. They can't work as closely with their friends and coworkers as they used to, which means less unity and collaboration and less performance.

Other impacts on employee welfare, for example, before COVID-19 began to spread in Thailand. The firm has scheduled a variety of amusement events for its employees, including an off-site seminar, an annual party celebration, and a sports day. However, due to Thai government measures at the time (The Tourism Authority of Thailand, 2021), the corporate board must cease all of these activities in order to prevent new infections from spreading among employees.

For the firm, lower production performance and productivity due to infected employee isolation and treatment cause a reduction in the workforce. COVID-19 has an impact not only on production, but also on the firm's finances, since the corporation must give a budget to support the COVID-19 issue and acquire tools and equipment to prevent staff from infection. Other departments in the organization have also been impacted, such as the Human Resources

department, which must recruit more new hires to boost manufacturing performance, and the security department, which must test employee body temperature before entering the company.

Following the outbreak situation of COVID-19 in Thailand (WHO, 2022), the firm began to introduce several restrictions and preventative measures to protect employees from infection, such as wearing face masks in the workplace and supplying portable hand sanitizer to staff to clean their hands often. The effects of COVID-19 on employee work attendance are very significant, because in the covid-19 situation, many employees are required to quarantine for notice symptom and work from home as social distancing measures, resulting in a 20% decrease in employee work attendance per day compared to the average work attendance record prior to the pandemic situation period.

In September 2021, several semiconductor firms in the Wellgrow industrial estate adopted stronger preventative measures to deal with the COVID-19 epidemic, which increased. For example, UTAC Thai company ltd. began to supply and execute more COVID-19 management measures in the organization, which can be categorized into three categories: 1.) Company's Requirement and Prohibition 2.) COVID-19 prevention actions implemented by the company 3.) Employee welfare assistance measures Each company's offered measures have been developed in accordance with Thailand's Department of Disease Control and the World Health Organization, in order to accommodate employees' daily routines and the company's operational system. To maximize COVID-19 prevention efficiency while minimizing the impact on corporate productivity.

This study focuses on analyzing the effectiveness of a firm's COVID-19 prevention measures in order to make the company recognize the weaknesses in the measures in order to improve and increase the efficiency of the current company's COVID-19 prevention measures. This research result may also be utilized as a case study and example for other companies to increase the efficacy of their preventative measures for controlling the future pandemic situation and allowing the firm to run normally in the COVID-19 situation.

1.2 Research Objectives

1.1.1 To find the company's COVID-19 preventive measures influencing the COVID-19 prevention effectiveness in the Semiconductor firm in Wellgrow industrial estate.

1.1.2 To find the company's requirement and prohibition influencing the COVID-19 prevention effectiveness in the Semiconductor firm in Wellgrow industrial estate.

1.1.3 To find the company's employee welfare support measures influencing the COVID-19 prevention effectiveness in the Semiconductor firm in Wellgrow industrial estate.

1.3 Research Hypothesis

Hypothesis 1: Company's COVID-19 preventive measures could influence the effectiveness of COVID-19 prevention in the Semiconductor firm in Wellgrow industrial estate.

Hypothesis 2: Company's requirement and prohibition could influence the effectiveness of COVID-19 prevention in the Semiconductor firm in Wellgrow industrial estate.

Hypothesis 3: Company's employee welfare support measures could influence the effectiveness of COVID-19 prevention in the Semiconductor firm in Wellgrow industrial estate.

1.4 Conceptual Framework

The conceptual framework for this study describes independent and dependent variables as follows.

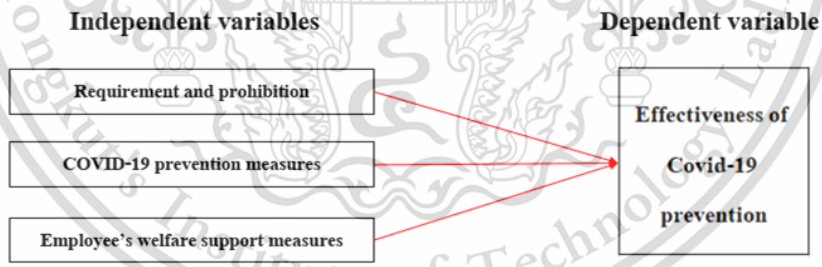

Figure 1.1: conceptual framework

1.5 Scope of Study

The target population of the research study includes 2,907 operational level employees in the Semiconductor firm in wellgrow industrial estate. The sample size was determined according to the criteria of (Yamane, 1973)at a confidence level of 0.95, therefore 352 employees were identified.

1.5.1 Scope of Content. The information obtained includes demographic data, independent variables, and dependent variables as follows.

1.5.1.1 Independent variable

Company's COVID-19 measures:

1. Requirement and prohibition for COVID-19
2. COVID-19 Preventive measures
3. Employee's welfare support measures

1.5.1.2 Dependent variable

Effectiveness of COVID-19 prevention

1.5.2 Timeframe of Research: January – February, 2022

1.6 Definition of key terms

1. The requirement and prohibition for COVID-19 is to rule something important to the existence or occurrence of something else, as well as the act of formally not permitting something, or an order that does so (wikidiff, 2022). In this study, it is the company's requirement and prohibition for any employees not to do an activity that increases the risk of COVID-19 spreading refer to the company's announcments, such as getting vaccinated, putting on a facial mask in public and company areas, avoiding crowded places, keeping distance from other people, keeping indoor areas ventilated, washing hands with water and soap frequently and for 20 seconds minimum, and avoiding touching the eye.

2. Company's COVID-19 Preventive measures are the measures provided by employer or company to reduce the chances of COVID-19 infection and spareding, apart from COVID-19 preventive measures provided by Thailand's government agency (The Tourism Authority of Thailand, 2021), such as installing virus killer and partition in the risky area, working from home, body temperature measure before entry the company, managing potential exposure durations, etc.

3. Employee's welfare support measures is the measure that employers take actions to improve employee welfare in an effort to motivate and satisfy their workforce and achieve the desired results. The measures must improve the perks and benefits offered to employees of the company in addition to their base pay or compensation, as the primary goal of providing employee benefits services is to improve or enhance the well-being of the employee (Quite genius, 2022). This research focuses on the employee welfare related to COVID-19, such as providing employees with COVID-19 test kits, Personal Protective Equipment, and vaccines.

4. Effectiveness of COVID-19 prevention is the efficiency to reduce infection rate and death rate of COVID-19 patients by the preventive measures of company and local government and also reducing infection risk and spreading area of SARS-CoV-2 virus transmission to keep it under control and providing the treatments for patients as soon as possible (Girum, Lentiro, Geremew, Migora, & Shewamare, 2020).

5. Wellgrow industrial estate is the general composite industrial estate located in Chachoengsao province, Thailand that was established in 1989. Total project area 3,508 rai (approximately 1,386 acres) is divided into General industrial zone 2,569 rai, commercial area 6 rai and area of utilities and facilities 822 rai. The total number of industrial factories located is 176 factories. Worth an investment of 14,024 million baht per year, export value 15,421 million baht per year (IEAT, 2006).

CHAPTER 2

LITERATURE REVIEW

This study intends to examine the effectiveness of the COVID-19 preventative measures used by the semiconductor industry's Wellgrow Industrial Estate business. The researcher has studied the following topics in documents, publications, and related research.

2.1 COVID-19 pandemic

2.1.1 COVID-19 history

2.1.2 Signs and Symptoms

2.1.3 Transmission

2.1.4 Variants of SARS-CoV-2

2.1.5 Diagnosis

2.1.6 Universal protection for operationalizing infection prevention

2.1.7 COVID-19 Prevention

2.1.8 Treatment and management

2.2 Occupational safety and health management

2.2.1 Concept and history

2.2.2 Workplace Hazard

2.2.3 Hazard identification and controlling

2.2.5 Concept and Theories of COVID-19 preventive measures

2.2.6 Concept and Theories of COVID-19 requirement and prohibition

2.2.7 Concept and Theories of employee's welfare support

2.3 General information about Semiconductor firm in Wellgrow industrial estate

2.4 Related research

2.1 COVID-19 pandemic

The COVID-19 epidemic, commonly referred as the coronavirus pandemic, is a worldwide coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case was discovered in the Wuhan, city of China in December 2019; a lockdown policy in Wuhan and other surrounding towns near Hubei province was unsuccessful to stop the epidemic, which swiftly outbreak to other regions of China and throughout to the other countries (Page, Hinshaw, & Mckey, 2021). On 30 January 2020, the World Health Organization (WHO) announced a Public Health Emergency of International Concern, and on 11 March 2020, a pandemic (World Health Organization, 2021)

The epidemic has caused widespread social and economic upheaval, including the worst worldwide recession since the Great Depression of the 1930s. It has resulted in widespread supply shortages aggravated by panic purchasing, agricultural disturbance, food shortages, and lower pollution emissions. Many schools and public locations have been shuttered in part or whole, and many activities have been canceled or postponed (Gopinath, 2020).

2.1.1 COVID-19 history

Although the actual origin of the virus is uncertain (To, et al., 2021), the first epidemic occurred in November 2019 in Wuhan, Hubei, China. Many early instances of COVID-19 were connected to persons who attended the Huanan Seafood Wholesale Market (Sun, et al., 2020), although human-to-human transmission may have occurred prior to this (Hu, Guo, Zhou, & Shi, 2021). The World Health Organization (WHO) called the disease "COVID-19," which stands for "coronavirus disease 2019," on February 11, 2020 (Lovelace, 2020).

The virus that triggered the outbreak is known as SARS-CoV-2, a recently identified virus that is near linked to bat coronaviruses, pangolin coronaviruses, and SARS-CoV. The virus is most probably zoonotic in the first place, originating in bats and some related mammals (Fox, 2021). There are various names for the pandemic. Even with the presence of other coronaviruses in humans that have produced pandemics and outbreaks (e.g., SARS), it is sometimes referred to as "the coronavirus pandemic". It had been called "the coronavirus epidemic" and "Wuhan coronavirus outbreak" before it was designated a pandemic. (Zhu, Wei, & Ping, 2020).

Many people who have been tested for COVID-19 and whose results have been verified to be infected according to official procedures are referred to as the official case count (WHO, 2020). Early on, several nations had government regulations against testing persons with just minor symptoms (Parodi, Jewkes, Cha, & Park, 2020). According to an examination of the first

stage of the epidemic up to 23 January 2020, eighty six percent of COVID-19 infections were not discovered, and these unreported infections were the source of 79 percent of recorded cases (Li, et al., 2020). Many additional researches, using other approaches, have indicated that the number of infections in numerous nations is likely to be far higher than the recorded cases (Flaxman, et al., 2020).

2.1.2 Signs and Symptoms

COVID-19 symptoms vary in severity, ranging from moderate to severe. Lack of smell and taste, nasal congestion and runny nose, headache, cough, muscular pain, fever, diarrhea, sore throat and breathing difficulties are all common symptoms (U.S. CDC, 2022). People with the same virus may experience distinct symptoms, which may alter over time. A cluster of respiratory symptoms with cough, sputum, shortness of breath, and fever has been found; A cluster of musculoskeletal symptom include with headache, muscle and joint pain and exhaustion; and a cluster of digestive symptom with stomach ache, diarrhea and vomiting (ECDC, 2022). COVID-19 is related to a lack of taste and smell in patients who have never had ear, nose, or throat problems (Chabot & Huntwork, 2021).

Of those who develop symptoms, eighty percent have low to medium symptoms (up to mild pneumonia), fourteen percent have terrible symptoms (hypoxia, dyspnea, or more than fifty percent lung involvement on imaging), and five percent have critical symptoms (shock, respiratory failure, or multiorgan dysfunction) (National Center for Immunization and Respiratory Diseases (U.S.). Division of Viral Diseases., 2020). At least one-third of those infected people do not show any symptoms at any point in time. These carriers who show no symptoms are less likely to get verified and hence transmit the illness. Other infected persons will acquire symptoms later, referred to as "pre-symptomatic," or will have minor signs and can spread the virus to others (Oran & Topol, 2020).

As is usual with infections, there is a time lag between when people infect the viruses and when the first symptoms occur. The average COVID-19 delay is four to five days. The majority of symptomatic patients develop symptoms after two to seven days of exposure, and nearly all develop at least one symptom by twelve days (Gandhi, Lynch, & Del Rio, 2020).

The most typical signs of COVID-19 are fever, dry cough, and exhaustion, while some symptoms might be somewhat vague. Among individuals who experience symptoms, around one in five might get sicker and have respiratory problems. Emergency signs include breathing difficulties, ongoing chest discomfort or pressure, abrupt disorientation, trouble walking, and blue skin or lips; if these symptoms are present, it is urged to seek emergency medical assistance. Complications from the disease's continued progression might include renal failure, sepsis, acute respiratory distress syndrome, pneumonia, and acute respiratory distress syndrome (U.S. CDC, 2022).

The majority of patients recover from the disease's acute phase. Some patients, however, remain to feel a variety of consequences, for example weariness, for a couple of months following recovery, a condition known as chronic COVID; long-term organ damage has been seen. Long-term implications of the condition are being studied in multi-year studies (U.S. CDC, 2022).

2.1.3 Transmission

COVID-19 transmission is the spread of coronavirus illness 2019 from person to person. The illness is mostly spread by the respiratory pathway, when individuals breathe in droplets and minute airborne particles (that create an aerosol) that infected persons expel while breathing, talking, coughing, sneezing, or singing. When infected persons are physically near, they are more likely to transfer COVID-19. Infection can, however, spread across greater ranges, particularly indoors (Wang, et al., 2021).

Infection might begin a couple days prior to the appearance of symptoms. Infected people can disperse the illness no matter whether they are asymptomatic or pre-symptomatic. Typically, the peak viral load in samples from the upper respiratory tract happens during the time of symptom start and falls following the first week. Recent data supports a period of infectiousness and viral shedding of up to ten days after symptoms start for people with low to medium level COVID-19, and up to twenty days for people with critical COVID-19, including infected people (U.S. CDC, 2022).

The size of infectious particles ranges from aerosols that float airborne for extended intervals of time to bigger droplets that float or drop to the floor. Furthermore, COVID-19 study has revised the old knowledge of respiratory virus spread mechanisms. The largest respiratory fluid droplets do not go very far. and can infect when breathed or arrive at mucous membranes in the eyes, nose, or mouth. Aerosols are most concentrated when humans are close together, making viral transmission simpler. However, airborne transmission may happen over greater ranges, especially in locations with limited ventilation where tiny particles can remain in the air for a few minutes to several hours (WHO, 2021).

2.1.4 Variants of SARS-CoV-2

The virus that causes coronavirus disease 2019(COVID-19) is known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has several variations; a few of them are thought to be of special concern considering their potential for enhanced transmissibility, higher virulence, or lower efficiency of immunizations against them (Briggs, 2021).

To determine the ancestral human coronavirus type, Chinese researchers compared the earliest available human virus genomes with those of bat and pangolin coronavirus strains. The

identified ancestral genome type was designated "S," and its dominant derived type was designated "L" to reflect the mutant amino acid changes. Western researchers conducted comparable investigations independently, but designated the ancestral type "A" and the developed form "B." The B-type changed into other kinds, notably B.1, which is the progenitor of the principal worldwide variations of concern, named alpha, beta, gamma, and delta by the WHO in 2021. SARS-CoV-2 strains have evolved and are spreading extensively. The most common, all of which carry the highly contagious D614G mutation, are as follows: (Tang, et al., 2020)

- *B.1.1.7*, commonly referred to as the Alpha variety, which was discovered in the UK and has now spread to over one hundred and ninety countries.
- *P.1*, sometimes referred to as the Gamma variation, which was initially discovered in Brazil and has now spread to over ninety countries.
- *B.1.351*,sometimes referred to as the Beta variant, which was discovered in South Africa and has now spread to over one hundred and forty countries.
- *B.1.617.2,* sometimes referred to as the Delta variation, which was initially discovered in India and has now spread to over one hundred and seventy countries.

Because of the tiny number of persons infected during the early stages of the pandemic, few mutant variant viruses existed. (i.e. there were fewer opportunities for escape mutants to emerge). SARS-CoV-2 began to evolve over time, becoming more contagious. Particularly, the Alpha and Delta variants are both more contagious compared to the original virus discovered near Wuhan, China. Concerning SARS-CoV-2 variations can change in order to maintain replication fitness while propagating despite heightened population immunity (Gallagher, 2021).

2.1.5 Diagnostic

COVID-19 testing entails examining materials to determine the present or previous existence of SARS-CoV-2. The virus or antibodies produced in response to infection are both detected by the two main branches. (U.S. CDC, 2022)

1. Molecular testing for determining individual infections and assisting public health professionals in locating and controlling outbreaks, viral presence is utilized.

2. Antibody testing (serology immunoassays) rather tells if a person has ever experienced the condition. Since weeks after infection may pass before antibodies appear, they are less effective for identifying current illnesses. It is used to estimate the infection fatality rate by assessing illness prevalence.

The primary methods for detecting SARS-CoV-2 are nucleic acid tests, which show the presence of viral RNA fragments. These tests can only estimate a patient's period of infection because they only detect RNA, not live viruses. The test is often run on respiratory samples obtained through nasopharyngeal swabs, but sputum samples or nasal swabs may also be used. Results are often available in a short period of time (WHO, 2020).

COVID-19 exams were created individually and collaboratively by countries throughout the world, as shown below.

Nucleic acid amplification tests (NAATs): Testing check for the "E" gene, which is shared by all beta coronaviruses, as well as the RdRp gene, which is unique to SARS-CoV-2. Testing involves amplifying a specific portion of the virus's RdRp gene and detecting the generated copies with "fluorescently-labeled molecular beacons." Different regions of the viral genome were targeted by tests created in Hong Kong, Japan, France, Germany, the United States, the United Kingdom, and China. In order to develop kits for distribution to low-income countries without the resources to do so, WHO adopted the German method (U.S. CDC, 2021).

Antigen tests: This lateral flow method employs monoclonal antibodies to recognize the nucleocapsid (N) protein of the virus. The company's Sofia 2 instruments analyze the outcome using immunofluorescence. Compared to nucleic acid tests, the test is simpler and less costly, but it is less precise. It may be used at the point of care or in laboratories, and it provides results in 15 minutes. When the antigen level in the sample is positive but below the test's detection limit, a false negative result occurs, necessitating confirmation with a nucleic acid test (Mettle, 2020).

Antibody tests: antibodies are often detected 14 days after the infection begins. Several governments use these exams to assess their people. A blood sample is required for the test. Certain antibody tests are accessible in a number of European nations as well as the United States (Mandavilli & Thomas, 2020).

Even after the initial tests were developed, availability remained restricted. As a result, no countries had solid statistics on the virus's prevalence early in the epidemic. The WHO and other experts recommended more testing as the best approach to prevent the virus's spread. The WHO has established multiple testing techniques for the illness, which are shown below; (Emma Farge, 2020)

Drive-through testing: The individual being tested remains in a car and taking all essential measures, such as donning personal protective equipment (PPE), the healthcare professional approaches the vehicle and obtains a sample (Kiger, 2020) (Hawkins, 2020).

Home collection: subjects can get a specimen tube while staying at home. Then they return it after spitting into it, and they wait for the findings (Beaubein, 2020).

Pooled testing: combining many samples for evaluation all at once If the pool result is negative, all samples are also negative. The samples must be evaluated independently if the test is positive (Tang, Bobenchik, & Lu, 2020).

Multi-tiered testing: In one study, a rapid immune response assay was recommended as a screening test, followed by a nucleic acid confirmation test for diagnosis, a rapid antibody test to determine the next course of action, and a population exposure/herd immunity estimate test (Pulia, O'Brien, Hou, Schuman, & Samburskye, 2020).

Snapshot mass-testing: Over the course of a weekend, 80 percent of the population was tested for COVID-19. This strategy was extremely effective, reducing observed prevalence by 58 percent after one week and by 70 percent when compared to a hypothetical situation with no snapshot mass-testing. The considerable reduction was the consequence of a series of complementary lockdown and quarantine procedures, in which residents who tested positive were confined concurrently for many weeks (Lewis, 2021).

2.1.6 Universal protection for operationalizing infection prevention

During the first surge of COVID-19 admissions, HCA Healthcare developed a leadership team to coordinate actions throughout the firm. The COVID-19 leadership team was constantly updated on field feedback on COVID-19 rules and procedures. A typical problem in this assessment was the presence of too many distinct advising items without a coherent overarching structure. This lack of structure, caused by the demand to handle many domains such as visiting, screening, social distance, and cohorting, resulted in a lack of a unified message for staff and concerns about different interpretations of infection control measures (Sands, et al., 2021).

The COVID-19 leadership team developed the Universal Protection Framework idea in response to this criticism. This approach builds on existing infection control tactics such as universal precautions (considered all blood and body fluids to be potentially infectious) and standard precautions, which cover additional illnesses that may be transmitted by droplets and aerosols. The use of personal protective equipment (PPE) is successful when standard measures are taken such as respiratory protection (face masks and respirators), eye protection (facial shields and goggles), gowns, and gloves, resulting in safe and protected health care worker practice (Adams, 2020).

The Universal Protection Framework is a comprehensive strategy that includes four categories and is supported by substantial communication, education, and support programs. The four domains are as follows (Sands, et al., 2021):

1. The principles of infection control, the use of universal masking (for staff, visitors, and patients when tolerated), personal protective equipment, environmental safety, and bedside practice rules and procedures in the COVID-19 population are all critical components.

2. Access control. This domain incorporates guidance relating to visitation, personnel screening, and physical security.

3. Distancing, which outlines policies relating to social distancing, the setup of public spaces, and patient cohorting.

4. Patient flow. The area of focus here is the management of patients as they traverse the building so as to minimize risk of exposure.

2.1.7 COVID-19 Prevention

COVID-19 prevention strategies include getting immunized, staying at home, putting a mask in public, avoiding crowded areas, keeping a safe distance from people, ventilating indoor spaces, controlling potential exposure periods, washing hands frequently and for at least 20 seconds, maintaining good respiratory hygiene, and avoiding touching the eyes, nose, or mouth with unwashed hands (U.S. CDC, 2022).

The U.S. Centers for Disease Control and Prevention (CDC) advises those with COVID-19 or who assume they may be infected to stay at home except for medical care, call ahead before visiting a doctor, wear a face mask before going into the doctor's office and whenever they are in a room or vehicle with someone else, cover their coughs and sneezes with tissues, regularly wash their hands with soap and water, avoid sharing personal household items, and avoid traveling (U.S. CDC, 2022).

1. **COVID-19 vaccine**: a vaccination designed to confer developed resistance to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Initially, SARS-CoV-2 vaccines were focused on avoiding symptomatic, frequently severe sickness. COVID-19 vaccinations are now largely recognized with lowering the COVID-19's prevalence, severity, and mortality. Numerous countries have developed staggered distribution plans that give priority to individuals most vulnerable to problems, such as the elderly, as well as those most vulnerable to exposure and transmission, such as healthcare workers (Beaumont, 2020).

2. **Face masks and respiratory hygiene:** According to the WHO and the US CDC, people should wear non-medical facial coverings in public settings where there is a higher risk of transmission and social distancing practices are challenging to uphold. This recommendation is designed to reduce the spread of illness by asymptomatic and presymptomatic individuals and to support other effective preventive measures like social isolation.

Covering your face when speaking, inhaling, or coughing will lessen the quantity and path of your exhalatory droplets. The danger of infection is reduced by a face mask that has no vents or holes, which helps filter out virus particles from air that

is breathed in and exhaled. Facial masks are also strongly advised for persons who have been sick or who are caring for someone who has the condition (Adams, 2020).

The CDC advises using a tissue to cover the mouth and nose while coughing or sneezing without a mask, or, if none are available, the inside of the elbow. It's advised to wash your hands after every cough and sneeze. Healthcare workers who interact directly with individuals who have COVID-19 are urged to use respirators that are at least as protective as NIOSH-certified N95 or similar, in addition to extra personal protective equipment.

3. **Avoiding crowded indoor spaces and ventilation:** According to the CDC, crowded interior locations ought to be avoided (U.S. CDC, 2022). Transmission can be reduced indoors by speeding up air changes, reducing air recirculation, and using more outside air. To remove infectious aerosols from public areas.

The WHO advises ventilation and air filtration, exhaled respiratory particles can accumulate in confined environments with insufficient ventilation. COVID-19 infection is more likely in places where individuals exercise or raise their vocal cords (e.g., exercising, screaming, singing), as this enhances respiratory droplets exhaling. Contact with these settings for an extended period of time, often more than 15 minutes, increases the chance of infection (WHO, 2021).

4. **Hand-washing and hygiene:** The WHO also suggests that individuals wash their hands often, especially after using the toilet or when their hands are noticeably filthy, before dining, and after blowing their nose, for at least twenty seconds. The CDC suggests using an alcohol-based hand sanitizer with at least sixty percent alcohol when soap and water are not accessible (U.S. CDC, 2022).

The WHO supplies two formulas for local manufacturing in locations where commercial hand sanitizers are not easily accessible. The antibacterial action in these compositions is derived from isopropyl or ethanol. Using hydrogen peroxide as a remedy to aid in the elimination of bacterial spores in alcohol (WHO, 2021).

5. **Social distancing or physical distancing:** measures aimed at slowing disease spread by reducing close contact between persons quarantines, travel restrictions, and the closure of schools, workplaces, stadiums, theaters, or supermarkets are some of the methods used. Individuals can practice social distance by remaining at home, restricting their travel, avoiding busy areas, employing no-contact greetings, and physically separating oneself from other people (U.S. CDC, 2022).

6. Surface cleaning: Coronaviruses may remain for hours to days on surfaces. If someone touches an infected surface, the virus may be deposited in the eyes, nose, or mouth, where it may go inside the body and harm you. The virus may remain infectious on numerous surfaces, including glass, some types of plastic, stainless steel, and skin, for many days indoors at room temperature, or even for nearly a week under optimal conditions. The virus normally dies within a few hours on particular surfaces, such as cotton cloth and copper. Because of capillary action within pores, on porous surfaces, viruses decompose more quickly than on non-porous ones, and they die even faster as a result of heat-induced aerosol droplet evaporation (WHO, 2021).

In most situations, cleaning surfaces with soap or detergent rather than disinfecting them is adequate to reduce the risk of transmission, according to the U.S. CDC. sanitizing all locations are advised including offices, restrooms, common spaces, shared electronic equipment such as tablets, touch screens, keyboards, remote controls, and ATM machines used by the sick persons if a COVID-19 case is suspected or confirmed at a facility such as a daycare or workplace. 62–71% ethanol, 50–100% isopropanol, 0.1% sodium hypochlorite, 0.5% hydrogen peroxide, and 0.2–7.5% povidone-iodine are some of the decontamination agents. Other solutions, such benzalkonium chloride and chlorhexidine gluconate, are less efficient. Additionally, ultraviolet germicidal irradiation is utilized (U.S. CDC, 2022).

7. Self-isolation: For people with a COVID-19 diagnosis and those who have the virus, self-isolation at home has been advised. Health organizations have published comprehensive guidelines for appropriate self-isolation. Many governments have required or advised population-wide self-quarantine. Those who are members of high-risk categories have received the strictest self-quarantine guidelines. It has been suggested that persons who may have been exposed to someone with COVID-19 and those who have recently visited a nation or region where the disease is widely transmitted self-quarantine for 14 days starting from the time of their last probable exposure (U.S. CDC, 2022).

8. Healthy diet and lifestyle: A nutritious diet, physical activity, stress management, and adequate sleep are all recommended by the Harvard T.H. Chan School of Public Health. Consistently fulfilling scientific criteria of 150+ minutes per week of exercise or equivalent physical activity has been linked to a lower risk of COVID-19 hospitalization and mortality, even when other risk factors such as increased BMI are taken into account (Harvard T.H. Chan, 2020).

9. **International travel-related control measures:** According to a Cochrane rapid review published in 2021, foreign travel-related control measures such as limiting cross-border travel may assist to curb the outbreak of COVID-19. Furthermore, border screening methods based on symptoms or exposures could miss a lot of positive instances. While test-based border screening techniques may be more successful, they may potentially miss many positive cases if performed solely upon arrival with no further action. The analysis indicated that a least 10-day quarantine might be beneficial in limiting COVID-19 transmission and may be more successful when supplemented with an additional control strategy such as border screening (Burns, et al., 2021).

2.1.8 Treatment and management

COVID-19 has no particular, efficient therapy or treatment. Despite the fact that, one year into the epidemic, extremely potent vaccinations have been released and are starting to restrict the outbreak of SARS-CoV-2, good treatment remains critical. As a result of the lack of progress in developing effective treatments, supportive care has not been the cornerstone of COVID-19 management, it incorporates medicine to support other afflicted important organs together with treatment to ease symptoms, hydration therapy, oxygen support, and prone posture when necessary.

The majority of COVID-19 cases are moderate. Supportive therapy in these cases comprises medicines such as paracetamol or NSAIDs to ease symptoms (fever, body pains, and cough), enough fluid intake, rest, and nasal breathing (U.S. CDC, 2022). A balanced diet and good personal cleanliness are also advised. The CDC in the United States advises anyone who fears they have the infection to remain at home alone and use a face mask (U.S. CDC, 2022).

People with more serious cases should require hospitalization. The use of the glucocorticoid dexamethasone is strongly advised in patients with low oxygen levels, since it can lower the risk of mortality. Noninvasive ventilation, followed by admission to an intensive care unit for mechanical ventilation, may be required to preserve breathing. Extracorporeal membrane oxygenation (ECMO) has been used to treat respiratory failure, although its merits are still being debated. Some severe illness cases are triggered by systemic hyper-inflammation. (U.S. CDC, 2022).

1. **Medication treatments**

Several antiviral medications are being studied for COVID-19, but none have been shown to be demonstrably efficacious in published randomized controlled studies. Convalescent plasma was explored as a therapy option and found to be ineffective (Sanders, Monogue, Jodlowski, & Cutrell, 2020). Other trials are looking at whether current drugs can be used to combat the body's immunological response to SARS-CoV-2 infection. Several of the

drugs being examined have previously been licensed for other applications or are in advanced stages of development. Patients with severe illness may be given antiviral treatment.

The monoclonal antibody medicines bamlanivimab/etesevimab and casirivimab/imdevimab have been shown to minimize hospitalizations, ER visits, and fatalities. The US Food and Drug Administration (FDA) has approved both combo medications for emergency use . Over-the-counter medications such as paracetamol or ibuprofen, as well as drinks and rest, may help relieve symptoms. Oxygen treatment and intravenous fluids may be needed depending on the severity (U.S. FDA, 2022).

2. Respiratory support

The majority of COVID-19 instances are not serious enough to necessitate mechanical breathing or other solutions, but small minorities of them are. For persons in the hospital, the kind of respiratory assistance for people with respiratory failure brought on by COVID-19 is being aggressively explored, there is some evidence suggesting that using a high flow nasal cannula or bi-level positive airway pressure helps prevent intubation. It is unknown whether each of these two provides the same benefit to critically sick patients. When invasive mechanical ventilation is available, some clinicians prefer it because it inhibits the distribution of aerosol particles more than a high flow nasal cannula (WHO, 2020).

3. Personal protective equipment

The Centers for Disease Control and Prevention (CDC) presents the requirements for using personal protective equipment (PPE) during the epidemic. A respirator or facemask, eye protection, and medical gloves and a PPE gown, are all advised. When available, respirators are preferable over face masks. The CDC advises wearing a mask in community areas, when unable to maintain social distance, and while engaging with persons other than those with whom the person resides. N95 respirators are permitted for use in industrial environments, but the FDA has cleared the masks for use in emergency situations (EUA). They are intended to guard against aerosol particles such as dust, but their efficiency against a specific biological agent is not guaranteed for off-label use. In the absence of masks, the CDC suggests utilizing face shields or, as a last resort, handmade masks (Adams, 2020).

4. Psychological support

People may be distressed by quarantine, travel limitations, medication negative impact, or dread of the virus itself. In response to these concerns, China's Nationwide Health Commission issued a national standard for handling psychological crises on January 27, 2020. The Lancet issued a 14-page call to action centered on the United Kingdom, stating that given the circumstances, it was anticipated that a number of mental health disorders would become increasingly prevalent. "Increased social isolation, loneliness, health concerns, stress, and an economic slump are a perfect storm to affect people's mental health and well-being," Rory O'Connor told the BBC (Holmes, et al., 2020).

2.2 Occupational safety and health

Occupational safety and health (OSH) is a multidisciplinary area that is concerned with the safety, health, and well-being of workers. These phrases also relate to human resource management goals; for example, to provide a secure and healthy work environment, an occupational safety and health program's goal.

Additionally, OSH protects those in the wider public who could be harmed by the workplace. Employers have a common law obligation (sometimes known as a duty of care) to use due caution of their workers' safety in common-law countries (ILO, n.d.).

2.2.1 Concept and history

The World Health Organization (WHO) defines occupational health as "all elements of health and safety in the workplace, with a strong emphasis on primary prevention of risks." Health has been described as "a full condition of physical, mental, and social well-being, rather than the absence of sickness or infirmity." Occupational health is a multidisciplinary discipline of healthcare concerned with helping people to do their employment in the healthiest method possible. The promotion of workplace health and safety is congruent with it, which cares about preventing injury from working dangers.

The International Labor Organization (ILO) and the World Health Organization (WHO) have agreed on a definition of occupational health since 1950. The Joint ILO/WHO Committee on Occupational Health approved it at its first session in 1950 and amended it at its eleventh session in 1995. The definition is as follows (Coppee, 2011)

"The main focus in occupational health is on three different objectives: (i) the maintenance and promotion of workers' health and working capacity; (ii) the improvement of working environment and work to become conducive to safety and health and (iii) development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings. The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking."

A wide range of disciplines and professions, including medicine, psychology, epidemiology, physiotherapy and rehabilitation, occupational therapy, occupational medicine, human factors and ergonomics, and many more, are represented among occupational health specialists. These include ways to stop certain early existing issues from becoming issues at work, proper work posture, how often you take breaks, preventative measures that might be

used, and so on. The following are the characteristics of workplace safety quality as follwed (Koryakov, Zhemerikin, & Prazauskas, 2020):

(1) the indicators reflecting the level of industrial injuries,

(2) the average number of days of incapacity for work per employer,

(3) employees' satisfaction with their work conditions

(4) employees' motivation to work safely.

2.2.2 Workplace hazard

While there are many financial and non-financial advantages to employment, there are a number of workplace dangers (also known as hazardous working circumstances) that put people's health and safety at risk. Among them include chemicals, biological agents, physical elements, poor ergonomic conditions, allergies, a complicated web of safety risks, and a wide range of psychological risk factors. Occupational hazards, which include both long-term and short-term risks associated with the workplace environment, are a topic of research in occupational safety and health and public health. Short-term risks include physical injury, but long-term worries include a higher risk of getting cancer or heart disease (Ramos, et al., 2018).

Chemical hazards: are a category of occupational risks involving hazardous substances. Chemical exposure in the workplace can have both immediate and long-term negative health consequences. Hazardous chemicals are classified as neurotoxins, immunological agents, dermatologic agents, carcinogens, reproductive toxins, systemic toxins, asthmagens, pneumoconiotic agents, and sensitizers (U.S. NIOSH, 2017).

The National Institute of Occupational Safety and Health (NIOSH) establishes recommended exposure limits (RELs) and preventative actions for certain chemicals in order to decrease or eliminate negative health consequences associated with those substances. Furthermore, NIOSH maintains a database of chemical risks organized by chemical name, Chemical Abstracts Service Registry Number (CAS No.), and RTECS Number (U.S. NIOSH, 2007).

Biological hazards: A biological hazard, often known as a biohazard, is a biological contaminant that endangers the health of living creatures, particularly humans. This might be a sample of a microbe, virus, or toxin that is harmful to human health. A biohazard might also be an animal-harming material. Biological agents, such as germs and poisons created by living creatures, can harm employees' health. Influenza is an example of a biohazard that impacts a large number of employees.

For people who labor outside, typical risks include bug, spider, snake, and scorpion bites and stings, contact dermatitis from urushiol exposure from lethal Toxicodendron plants, Lyme disease, West Nile virus, and coccidioidomycosis. According to NIOSH, every employee who works outside, including farmers, loggers, landscapers, groundskeepers, gardeners,

painters, roofers, pavers, construction workers, laborers, mechanics, and others, is at risk for these hazards (U.S. NIOSH, 2020).

Health care providers are vulnerable to blood-borne infections (such as HIV, hepatitis B, and hepatitis C) and, in particular, new infectious conditions, particularly when there are insufficient materials to restrict disease transmission. Veterinary health professionals, especially veterinarians, are at risk of zoonotic disease exposure (U.S. NIOSH, 2020).

Those who perform necropsies on infected birds or otherwise work with contaminated tissue in the field or in a laboratory risk being exposed to West Nile virus. Poultry workers, who are exposed to germs, and tattooists and piercers, who are exposed to blood-borne infections, are two more vocations at risk of biological hazard exposure (U.S. NIOSH, 2020).

Psychosocial hazards: any occupational risk related to the creation of work, organized, and managed, as well as the economic and social surroundings of work, is referred to as a psychosocial hazard or work stressor. They are not caused by a tangible substance or item, unlike the other three categories of workplace dangers (chemical, biological, and physical).

The psychological and physical health of employees as well as their ability to interact with others in a work setting are all impacted by psychosocial hazards. They can cause physical harm or illness like cardiovascular disease or musculoskeletal injury in addition to mental and psychological repercussions including depression, anxiety disorders, and professional burnout. Psychosocial risks are significant dangers to occupational safety, health, and productivity that are connected to workplace organization and violence (Brun & Milczarek, 2007).

Physical hazards: Environmental risks that might cause injury with or without touch are a subtype of occupational hazards. Ergonomic risks, radiation, heat and cold stress, vibration hazards, and noise hazards are examples of physical dangers. A physical danger is an agent, element, or event that, upon contact, can cause injury. Ergonomic risks, radiation, heat and cold stress, vibration hazards, and noise hazards are examples of physical dangers (Ramos, et al., 2018). In many sectors, physical risks are a common cause of injury. They may be inevitable in some areas, such as building and mining, but humans have evolved safety measures and procedures to manage the hazards of physical danger in the workplace throughout time. In the construction, extraction, transportation, healthcare, and building cleaning and maintenance industries, falls are a major cause of industrial injuries and fatalities. When used improperly, machines' moving parts, sharp edges, hot surfaces, and other hazards can crush, burn, cut, shear, stab, or otherwise strike or hurt employees (ILO, n.d.).

2.2.3 Hazard identification and controlling

The identification and assessment of hazards is a critical phase in the whole risk assessment and risk management process. Individual job risks are recognized, analyzed, and controlled/eliminated as near to the source (hazard site) as practically practicable. Danger analysis focuses more closely on the source of the hazard when technology, resources, societal expectations, or legal requirements change (ILO, n.d.).

The information that must be acquired from sources should be relevant to the specific sort of job from which the dangers may arise. As previously stated, interviews with persons who have worked in the field of the danger, history and analysis of prior events, and official records of work and the hazards encountered are examples of these sources. Personnel interviews might be the most important in discovering undocumented procedures, events, releases, risks, and other pertinent information. Once the information has been acquired from a variety of sources, it is advised that it be digitally saved (to allow for easy searching) as well as having a physical set of the same information to make it more accessible.

Prior to performing an intervention, modern occupational safety and health law normally requires a risk assessment. It should be remembered that risk management necessitates managing risk to as low a level as is practically practicable. An occupational risk assessment evaluates the possible harm that a hazard poses to a worker in the job. The evaluation considers various situations as well as the likelihood of their occurrence, as well as the outcomes (Grainger, n.d.).

Risks in the workplace might have disastrous repercussions. It is extremely risky when a person is repeatedly exposed to the same threats. To safeguard personnel, dangers must first be identified and their severity determined. Occupational risk evaluations give this information, allowing safe levels to be set. Employees' well-being is preserved by maintaining suitable standards.

The first stage in conducting an occupational risk assessment is identifying a hazard, which is a situation, a cause, or an activity that has the potential to cause harm, whether through injury or sickness. It is any hazard in the workplace that can cause injury to an employee. The consequences must be understood, as well as who may be vulnerable. To effectively estimate safe levels, all co-factors must be known, including situations that influence the impact and uncertainty factors .

Finding the level of the chemical that has little to no impact—also known as the point of departure—is the second step in the risk assessment process (PoD). Using epidemiological data and toxicological understanding, statisticians must create models to estimate the PoD (Nunes, 2022).

Risk characterization is the final stage in an occupational risk assessment. This is where the collected data is integrated to get estimates of safe levels. While NIOSH establishes

Recommended Exposure Limits (REL), other organizations may establish occupational exposure limits (OEL). The distinction is due to NIOSH's power to simply provide advice. The approximate risk that an employee may encounter while working comprises both the chance of the event and the severity of the negative impact on health.

The likelihood that harm may occur and the gravity of the repercussions are used to quantify risk. This might be expressed qualitatively as a description of the potential damaging circumstances or quantitatively as a quantitative evaluation. Every time there is a significant change in working practices, the evaluation should be reviewed and documented. Realistic risk management advice must be included in the evaluation. The risk should be reassessed to check if it has been decreased to an acceptable level after applying the suggested remedies (Nunes, 2022).

2.2.4 Concept and Theories of COVID-19 preventive measures (CPM)

COVID-19 preventive measures in company (CPM) start from The Occupational Safety and Health Administration (OSHA) in the United States, which continues to suggest implementing numerous levels of controls, including flexible schedules and work from home, engineering controls (particularly increased ventilation), administrative policies such as vaccination policies, personal protection equipment (PPE), face coverings, physical distancing, and improved cleaning programs with a focus on high-touch surfaces (OHSA, 2021).

Vaccination is the most effective strategy to prevent against COVID-19 related disease or death. Infections in completely vaccinated persons occur in just a small fraction of totally vaccinated people, even with the Delta variation. According to preliminary research, the tiny percentage of completely vaccinated persons who become sick with the Delta variant can transmit the virus to others (OHSA, 2021)

The Centers for Disease Control and Prevention (CDC) have suggested that those who have had all of their vaccinations have a lower chance of contracting the Delta version and perhaps passing it on to others; 1.) Wearing a mask when the transmission is strong or high indoors. 2.) Selecting to wear a mask, regardless of the amount of transmission, especially if one is at risk, has a family member who is at higher risk of contracting a serious illness, or is not completely vaccinated, and 3.) Getting tested three to five days after being aware of an exposure to a person with suspected or confirmed COVID-19, and using a mask in open-air settings for 14 days, or until a negative test is obtained. (Verbeek, et al., 2020)

The COVID-19 vaccine will bring an end to the pandemic in the future. Until then, the best way to prevent infection is to avoid being exposed to the virus. Prevention measures such as those described below should be taken, regardless of whether COVID-19 countermeasures are in place in your community and company.

The measures should be included in the workplace risk assessment that covers all risks, including those caused by biological agents, as set out in the Member States of the European Union (EU) and national occupational health and safety legislation (ECDC, 2021).

Employers should adopt the following preventative measures to their businesses in addition to the local department measures to improve the efficiency of the primary preventive measures:

1. Post posters encouraging sick leave, cough and sneeze manner, and hand hygiene at the office entrance and in other locations where they will be seen.
2. Provide tissue papers and rubbish containers lined with a plastic bag so that they will be emptied without coming into touch with the contents.
3. Remind workers to often wash their hands with soap and water for at least 20 seconds or with an alcohol-based hand sanitizer (at least 60-95 percent alcohol).
4. Encourage hand hygiene by providing soap, water, and alcohol-based hand rubs in different places and common spaces.
5. Maintain routine environmental cleaning while also considering extra actions as outlined later in this article.
6. Promote the use of surgical or 'hygienic' face masks in the workplace as well as in all enclosed, shared environments such as vehicles, vans, and public transportation. These facial masks are intended to limit the transmission of the coronavirus by droplets produced by coughing or sneezing that fall on surfaces touched by others, as well as through aerosol that is exhaled and remains in the air until inhaled by others.
7. Inform employees, contractors, and clients that anyone with a minor cough or a low level fever (37.3 C or above) should stay at home. They should also stay at home (or work from home) if they've had to take basic drugs.
8. Any worker who experiences flu-like symptoms (cough, shortness of breath, fever) need to go home for quarantine and notify the public health department immediately.

2.2.5 Concept and Theories of COVID-19 Requirement and Prohibition

To determine the key factor to aid in the protection of unvaccinated and other vulnerable workers, the COVID-19 requirement and prohibition (CRP) includes eliminating all infected persons from the workplace, all people starting to experience COVID-19 symptoms, as well as anyone who has had close contact with someone who has COVID-19 and has not been completely vaccinated, tested negative for the virus, or both, if symptoms appear at least five days after the initial exposure and then again. People who have been fully vaccinated and close should wear facial coverings for 14 following days of infection and should be checked for COVID-19 3–5 days of exposure until they test negative for COVID-19.

Management of ventilation systems, adopting physical distance, and appropriately employing masks for cover face, as well as adequate cleaning, are other key measures that protect non-immunized workers and other vulnerable staff. Inside, fully vaccinated persons in regions with significant or elevated transmission must be supposed to wear facial coverings as well. Staff who are unable to comply with safety regulations due to a handicap may request reasonable modifications, unless an unreasonable hardship exists (OHSA, 2021).

To regulate employees and improve prevention effectiveness, the organization must establish requirements and prohibitions for employees to obey. Employees who disobey the company's requirements and prohibitions will be cautioned, reported to their supervisor, and may be punished in accordance with the company's policy.

Applying safe work practices to meet regulations and ban COVID-19 exposure at work demands first identifying the risks and then implementing the hierarchy of controls. This entails implementing control measures to first remove the risk and, if it is not practicable, to reduce worker exposure. Begin with collective measures, then complement with individual measures such as personal protective equipment if necessary (PPE). More standards and prohibitions for workers and employees are listed below (OHSA, 2021).

1. As far as possible, limit physical contact between workers. Isolate personnel who can complete their duties safely on their own and do not require specialized equipment or machinery that cannot be transferred.
2. When receiving or transporting goods, do so outside the premises through pick-up or delivery. Inform drivers on proper taxi hygiene and equip them with adequate sanitation gel and wipes. Delivery personnel must be permitted to use facilities such as bathrooms, cafeterias, changing rooms, and showers while taking the necessary measures (such as allowing only one user at a time and regular cleaning).
3. Depending on the regulations in your region, the use of surgical or 'hygienic' face masks in the workplace and any enclosed, shared areas, such as vehicles, vans, and public transportation, may be considered.

2.2.6 Concept and Theories of Employee's Welfare Support Measures

Refer to the novel coronavirus disease 2019 (COVID-2019) pandemic for the concept and theories of employee welfare support measures for COVID-19 (EWM). To combat the virus's spread, the Member States of the European Union (EU) have put in place a number of measures, including those affecting workplaces. Because the labor market has been significantly impacted by the crisis, all sectors of society, including companies, employers, and social partners, must play a role in protecting employees, their families, and society overall (ECDC, 2021).

The type and scope of the measures range from restrictions on movement and suspension of non-essential activities to limits on the number of people using a place, prohibitions on particular activities, and the necessity to adhere to individual hygiene measures. Their implementation may alter depending on the pandemic's progress, the industry, employment, or a health-related attribute of the individual.

Workers may be obliged to work from home or, if their task cannot be accomplished remotely, to stay at home as a result of these actions. The continuation of work operations is approved after the measures achieve a sufficient reduction in COVID-19 transmission rates. Often, this is done in stages, with work that is considered important for health and the economy being permitted first. While vaccination will eventually lead to a relaxation of measures, it is unclear when or to what degree 'regular' job activities will return. Certain measures are quite likely to remain in place or be restored at some point in the future to minimize future increases in infection rates.

The COVID-19 situation is placing companies and workers under strain since they must adapt new processes and practices in a short period of time or stop their work and commercial operations. In this context, occupational safety and health provides practical advice for returning to or keeping employment, as well as contributing to the control of COVID-19 transmission (OHSA, 2021).

The following are some examples of employee welfare support measures that companies should apply at their workplace; however, due to their nature, not all of them will be suitable to all workplaces or jobs (ECDC, 2021).

1. Use an impermeable barrier between employees, especially if they can't keep a two-meter space between them. Barriers can be purpose-built or improvised with materials like plastic sheeting, walls, movable drawers, or storage containers. Things that are not solid or have holes, such as pot plants or trolleys, or that introduce additional risks, such as tripping or falling things, should be avoided. If a barrier cannot be used, more space should be established between employees.
2. If close contact is necessary, limit it to 15 minutes. Reduce communication across departments in your company at the start and conclusion of shifts. Plan lunch times

to decrease the amount of individuals sharing a cafeteria, staff room, or kitchen. Clean-up and sanitation work should be divided into shifts.

3. Make soap and water or adequate hand sanitizer available in handy locations, and encourage employees to wash their hands often. Clean your premises on a regular basis, especially countertops, door knobs, tools, and other surfaces that people come into contact with.
4. As much as possible, provide proper ventilation by opening windows and doors to enable fresh air to come in from outside.
5. Provide workers with the essential PPE. It is necessary to teach personnel in the proper use of PPE, ensuring that they comply with the principles and guidelines for the use of face masks and gloves.
6. Put rules in place for flexible leave and remote working to reduce your presence at the office when necessary.

2.3 General Information about Wellgrow industrial estate

2.3.1 Location area and size

Wellgrow industrial estate located on 78 Moo 1 Bangna-Trad Road. 36 Km. Bang samak sub district, Bang pakong district, Chachoengsao province 24180 Thailand, established in 1989. Total project area 3,508 rai (approx. 1,386 acres) is divided into General industrial zone 2,569 rai, commercial area 6 rai and area of utilities and facilities 822 rai.

The total number of industrial factories located is 176 factories. worth an investment of 14,024 million baht/year, export value 15,421 million baht per year (IEAT, 2006).

2.3.2 Semiconductor firms in the industrial estate

Fagor Electronics (Thailand) Co., Ltd. is a firm that manufactures electrical and automotive parts for export, has a parent company in Spain, and has grown its business to many countries across the world, including Thailand, after being in business for more than 35 years. It has been devoted to innovation, assisting its clients in the creation of new products and giving its technological know-how and managerial expertise to build solutions that are directed and optimized for mass production, in addition to meeting their functional requirements (Fargor electronics, n.d.).

UTAC Thai company Limited , previously NS Electronics Bangkok, Thailand's first IC assembly and test manufacturing company, joined the UTAC Group. Over 40 years of experience and ISO 9001, TS 16949, ISO 14001, and OHSAS18001 certifications attest to the company's track record. It is still expanding and developing products to satisfy the market's

shifting expectations. Today, UTAC Thai employs about 6,000 people, including engineers, employees, and support staff. Thailand has three manufacturing plants. The firm manufactures and tests several types of integrated circuits (ICs) not just for National Semiconductor Corporation, but also for numerous other companies in the United States, Europe, and Asia (UTAC Group, 2022).

2.4 Related research

The goal of Vokó and Pitter (2020) is to identify the turning point in the COVID-19 pandemic's progression in each European nation and to investigate the link between the degree of social segregation and the observed decline in the number of national epidemics. Their analysis identified the 28 European countries' most likely change points. The average daily rise in new COVID-19 cases prior to the change point was 24%. By raising the social distance quartiles, this growth rate was decreased from the change point to 0.9 percent, 0.3 percent rise, 0.7 percent decline, and 1.7 percent decrease. The fourth quartile benefited statistically significantly from higher social distance quartiles (i.e., the rise became a drop). It is noteworthy that several nations in the lower quartiles likewise attained a flat epidemic curve. Numerous COVID-19 containment strategies that might be used in these nations could help to slow the spread of the disease's initial wave (Vokó & Pitter, 2020).

According to GÜNER et al. (2020), prevention of the spread of this virus, which is affecting not only health but also economics, politics, and social order, is the strongest and most effective weapon society has against it. This virus affects not only health but also economics, politics, and social order. The main strategies for preventing the spread in society are hand hygiene, social seclusion, and quarantine. Greater testing capacity will enable the detection of more COVID-19 positive patients in the community, which will also enable a decrease in secondary cases with stricter quarantine regulations (GÜNER, HASANOĞLU, & AKTAŞ, 2020).

In order to develop an efficient viral inactivation system, Balachandar et al. (2020) aim to include respiratory masks made of nano-fiber with active components from naturally occurring medicinal plants. They want to build a three-layered fiber filtering system that uses compounds from medicinal plants to inactivate viruses. The general public as well as healthcare workers will benefit from these masks. Productive masks can be used to stop the transmission of infectious diseases and dangerous aerosols in the absence of vaccination (Vellingiri, et al., 2020).

According to Agalar and Engin, COVID-19 suspects or patients who have been diagnosed with the virus should be told to wear a surgical mask. Patients with severe respiratory symptoms should also have contact distances of at least 2 meters. Healthcare professionals (HCP) should use proper hand hygiene when treating these patients and should always use personal protective equipment (PPE). The samples from patients who have COVID-19 should be considered problematic in terms of contamination, and a risk assessment for the lab operations that will be carried out should be done (Ağalar & Engin, 2020).

The goal of Natsu Sasaki et al. research's in 2021 is to examine the number of workplace responses to the COVID-19 outbreak that employees in Japan reported, as well as how these responses relate to firm size and industry. The results suggest Respondents from smaller businesses in the retail, wholesale, and transportation industries often reported fewer/smaller numbers of workplace measures announced and put into effect. Conclusion: While the majority of respondents stated that their organizations provided information on workplace measures, adopting workplace measures in smaller businesses and those in the retail, wholesale, and transportation industries may be more difficult (Sasaki, Kuroda, Tsuno, & Kawakami, 2020).

Taking into consideration company size, Tomohiro Ishimaru (Ishimaru, et al., 2021) sought to offer an overview of the current situation of anti-COVID-19 measures in Japanese enterprises during the winter. An online cross-sectional poll of the entire nation was used for the study. Those who were officially listed as full-time employees were invited to do the poll. Data were gathered in December 2020 via an online self-administered survey. The chi squared test for trend for each workplace metric across firm sizes was used to get the P-value for trend. Promoting mask use at work was the most popular workplace measure for the 27,036 participants across all business sizes, followed by advising workers not to report to work while they are sick and minimizing work-related social activities and entertainment.

Over 40% of micro and small businesses as well as 90% of large corporations used these tactics. On the other hand, less than half of large companies and only 20% of micro and small businesses have encouraged remote working. The research came to the conclusion that the various COVID-19 responses had been collected at work. Other approaches, including remote working, weren't well taken up, especially in smaller organizations. The results show that supporting MSMEs' occupational health is essential for containing the present COVID-19 pandemic.

Based on time series data with cross correlations between the Stringency Index and number of confirmed cases during the early period of outbreaks and increased efforts to pool coronavirus data and control measures from countries and regions to compare the effectiveness of state policies, Sylvia Xiaohua Chen et al. (2021) examine whether control measures strategies can explain East Asia's successful control of the COVID-19 pandemic. Researchers

have created a bio psychosocial model of behavioral medicine to go beyond a narrow focus on the medical aspects of health and illness and to take into account biological, individual (psychological), and environmental (primarily social) aspects of medical practice. They argue that to gain a clear understanding of how cultural values, social norms, and personal preferences interact with policy to influence lifesaving behavioral changes in various societies, multidisciplinary empirical research in healthcare and social sciences, personality, and social psychology is necessary (Chen, et al., 2021)

CHAPTER 3
RESEARCH METHODOLOGY

This study is a survey that uses the data gathered to explain how participants in following studies and surveys about the COVID-19 preventive efficacy of corporate actions. Impact of COVID-19 with a case study of Semiconductor Company, located in Wellgrow industrial estate personnel and information about the research's methodology, included with the following procedures.

3.1 Population and Sample

3.2 Research tools

3.3 Data Collection

3.4 Method of data analysis

3.1 Population and Sample

3.1.1 Population: From all of the 4,495 employees of UTAC Thai company limited in Thailand, the target population in this study, there were 2,907 of the employees and management level in the UTAC Thai company limited, plant located in Wellgrow industrial estate.

3.1.2 Sample: The sample used for this study's sample groups are taken from that demographic. Employees were given questionnaires as part of the study, and convenience sampling was used to collect the data. The sample size utilized in this study was determined by putting the confidence level at 95% and calculating the sample size using Taro Yamane's formula (Yamane, 1973). Yielded a sample size that was based on percentage evaluation with an error limit of 5%.

$n = N / (1+Ne\text{^}2)$

n = sample size

e = represents the tolerance of tolerance

N = total population

From the following conditions in this case study, the tolerance was not greater than ± 5%, estimated percentage values have an error of not more than 0.05 (5.0%) at a 95% confidence level. When substituting the values in the formula, the number of samples that should be used is as follows:

n = 2,907/(1+2,907x(0.05)^2)

n =352

The sample groups of at least 352 samples are required with an error of not more than 0.05 (or 5.0%) with a 95% confidence level, considering the total sampling, the samples were considered qualified and increasing reliance on information.

The sampling method to choose samples of semiconductor employees is a stratified sampling method, by divide a population into homogeneous subpopulations called strata (the plural of stratum) based on specific characteristics and every member of the population studied should be in exactly one stratum (Thomas, 2022). In this study, 2,907 employee populations are classified by position level as follows: management level employees are 152 people and are sampled for 15 people, supervisor level employees are 291 people and are sampled for 29 people, and the remaining sample group is chosen from operational level employees for 308 people. Then I used a random sampling method to select respondents from each group to complete the survey.

3.2 Research Instrument

To gather data from the sample, the researcher employed questionnaires. Information regarding the design of a questionnaire with 5 parts of questions is provided below; (1) demographic characteristics (2) COVID-19 preventive measures, (3) requirements and prohibition for COVID-19 situation, (4) employee's welfare support measures for COVID-19 situation and (5) the effectiveness of COVID-19 prevention. 352 samples were utilized to gather data for the questionnaires, which were built using relevant research publications and theories. It is a 5-point Likert scale (Likert, 1932), with 1 indicating the lowest level and 5 the highest level, and the criteria for assigning each score are 1 meaning strongly disagree and 5 meaning strongly agree.

A questionnaire with questions that respondents read and manually completed with answers separated into two sections was the instrument used to gather data for this investigation.

3.2.1 Questionnaire part 1: Personal factors of the respondents

As a questionnaire, by giving marks on the personal factors of the respondents the questionnaire consisted of 7 items; gender, age, position level, duration of work, transportation to work, educational level, and monthly income.

3.2.2 Questionnaire part 2: Company's measures and COVID-19 prevention effectiveness

It is a question about the COVID-19 preventive measures in the company, based on the effectiveness of the COVID-19 prevention measurement, form from the thesis personal factors on COVID-19 measures of operational level and management level employees for case study in Semiconductor firm in Wellgrow industrial estate, to measure the COVID-19 prevention effectiveness in 4 areas, 29 numbers of questions.

1. Company's Requirements and prohibition for COVID-19 situation, 11 items
2. Company's COVID-19 preventive measures, 7 items
3. Employee's welfare support measures for COVID-19 situation, 7 items
4. COVID-19 prevention Effectiveness in company, 4 items

3.2.3 Instrument testing

The validity and reliability of the questionnaire used in this research have been evaluated as follows.

Validity: Validity refers to the degree to which an instrument accurately measures what it intends to measure. Three common types of validity for researchers and evaluators to consider are content, construct, and criterion validities (Li Y. , 2016). Before using the questionnaire to gather data, the researcher considered and checked the questionnaire's content validity as well as the adequacy of the language (wording) used to make it legible and understandable in light of the research's goals and recommendations.

To assure the content validity and item consistency, the questionnaires were submitted to three professors to consider and review whether all details were simple to comprehend and meet the points or not. Each question was given points with reference to IOC's index (The Item-Objective Congruence). The IOC calculation formula is as follows (Turner & Carlson, 2003).

$$\textbf{IOC} = \boldsymbol{\Sigma R/N}$$

R = Congruence value of each question

N = The number of professors

Since the score range of the IOC is between -1 to 1, the acceptable question must be close to 1. The item that had scored lower than 0.5 should be revised; whereas the items that gained scored higher than 0.5 can be reserved. The explanation of the score range is as follows.

+1 = When the professor perceived that the question was fully consistent with the content.

0 = When the professor found that the question was doubtful whether it was consistent with the content or not.

-1 = When the professor did not understand the question and perceived that it was inconsistent with the content.

To assure the consistency and validity of the instrument, the questionnaire was assessed by two professors and one expert who has an abundance of knowledge and experience in terms of Information system and technology to consider and review whether all details were simple to comprehend and meet the points or not.

Confidence Reliability: Reliability refers to the degree to which an instrument yields consistent results (Li Y. , 2016). For this research, the questionnaires were created, updated, and tested on a population of 30 persons in the research to see if they were clear and capable of being answered without problem. The questionnaires were then used to assess the confidence using the SPSS program to calculate the confidence of the percentage.

The Cronbach's Alpha coefficient method was conducted as the reliability procedure for checking the quality of the equipment. Items that have a Cronbach's alpha coefficient should have a value of 0.70 or higher. Values above 0.70 are considered highly reliable and the items that have a Cronbach's alpha coefficient should have a level of 0.5 to 0.65 or moderate (Cronbach, 1951).

$$\alpha = \frac{K\bar{r}}{1 + \bar{r}(K-1)}$$

α: Reliability Coefficient

K: Number of Items

$\bar{r}$: Average Item Correlation

$\alpha \geq 0.7$: High reliability

$0.5 \leq \alpha \leq 0.65$: Moderate reliability

To check the accuracy and internal consistency, the researcher examined the accuracy of both the experimental data (n=30) and the actual data (n=352) collected by individuals that have experience with Thailand's mass rapid transit system's self-service technology.

After obtaining the data from 30 both operation level and management level employees who are in the pilot group, the researcher used the SPSS version 26 to analyze the data. Cronbach's alpha of this questionnaire was 0.888, which was above 0.7. Thus, the questionnaire was highly reliable

The results of reliability analysis for factors influencing COVID-19 prevention effectiveness: a case study of semiconductor company in Wellgrow industrial estate are the basic data for testing initial agreement for multivariate statistical analysis, confirmatory element analysis and finally structural equation model analysis. Finally, the Index of Congruence (IOC) and Cronbach's Alpha were used to demonstrate the questionnaire's validity and reliability. Therefore, The questionnaire is appropriate and acceptable for distribution to the intended respondents and the result score range from 0.67-1. The final questionnaire version is shown in the Appendix B.

3.3 Data Collection

Due to the situation of the ongoing pandemic in the study semicondutor company, to protect respondents from the infection, the author provides the Covid-19 procedure for the respondent before and after completing the survey as follows.

a) Make sure your facial mask covers your chin, mouth, and nose when you put it on. Do not use masks with valves; instead, use the medical face mask.
b) Clean your hands with water and soap or alcoholic cleaning gel before you pick up the questionnaire sheet to answer, as well as after finishing the survey.
c) When respondents want to return their survey answers, they will put the answer down in the questionnaire collection box, prepared by the researcher.

And to collect research data from sample group, the following steps were used to obtain data for this survey-based descriptive study.

3.3.1 Provide 352 questionnaires to the chosen sample group of employees from each position levels, including with operation level, supervisor level and management level employees.

3.3.2 Take the questionnaire to the staff or area suprvisor and request cooperation, review the research objectives, and notify how to the return the survey answer.

3.3.3 Bring the collected questionnaires to consider the completeness of the questionnaires for further statistical analysis.

3.4 Data analysis

The data collected from the survey and encoded in code are finished, processed with the SPSS for Windows application, and evaluated logically, similar to the pertinent theoretical ideas. Statistics must be utilized for data analysis as follows to make the analysis process and results clearer:

3.4.1. Descriptive statistics

- Find the frequency and percentage of personal factors i.e. gender, age, position level, work experience, transportation to work, educational level, and monthly income.

- Find the mean and standard deviation in relation to the level of the company's COVID-19 preventive measures and the effectiveness of COVID-19 prevention of the semiconductor company at the Wellgrow Industrial Estate.

- Determination of the frequency, the percentage, the mean, and the finding of standard deviation in the company's COVID-19 preventive measures and the effectiveness of COVID-19 prevention of the semiconductor company at the Wellgrow Industrial Estate.

Arithmetic Mean It is used for a test on factors affecting measures effectiveness and parts 2 and part 3 using formulas for groups of data (Medhi, 1992).

$$\bar{x}=\sum x/n$$

$\bar{x}$ = Average means of the sample

x = Each person's score value

n = Total number of people

Standard Deviation is used to analyze and interpret different data, which is used together with the mean, to characterize the distribution of each score, calculated by a formula (Khan, 2011).

S $S.D = \sqrt{\frac{n\sum x^2-(\sum x)^2}{n(n-1)}}$ = Sample standard deviation

X = Each person's score value

n = Total number of people

3.4.2. Inferential Static Statistics

Factors influencing effectiveness of COVID-19 prevention were analyzed using simple linear regression, at a significant level of 0.05. and 0.001

Hypothesis 1: Company's COVID-19 preventive measures could influence the effectiveness of COVID-19 prevention in the semiconductor firm at Wellgrow industrial estate.

Hypothesis 2: Company's requirement and prohibition could influence the effectiveness of COVID-19 prevention in the semiconductor firm at Wellgrow industrial estate.

Hypothesis 3: Company's employee welfare support measures could influence the effectiveness of COVID-19 prevention in the semiconductor firm at Wellgrow industrial estate.

3.5 Ethical Consideration

Throughout the data collecting and analysis phases of the study endeavor, the researcher took all ethical factors into account. The researcher ensured that the information was solely used for this particular purpose. The respondents weren't asked a lot of introspective questions, and no one else had access to their private data. All participant information was protected from public view during the research process. There were efforts taken to ensure that participants' dignity and safety were upheld at all times. Obtain the unanimous approval of all survey participants before posing a question.

According to Bell and Bryman (2007) the following ten points represent the most important principles related to ethical considerations in dissertations (Bell & Bryman, 2007):

1. Research participants should not be subjected to harm in any ways whatsoever.
2. Respect for the dignity of research participants should be prioritized.
3. Full consent should be obtained from the participants prior to the study.
4. The protection of the privacy of research participants has to be ensured.
5. Adequate level of confidentiality of the research data should be ensured.
6. Anonymity of individuals and organizations participating in the research has to be ensured.
7. Any deception or exaggeration about the aims and objectives of the research must be avoided.
8. Affiliations in any forms, sources of funding, as well as any possible conflicts of interests have to be declared.
9. Any type of communication in relation to the research should be done with honesty and transparency.

10. Any type of misleading information, as well as representation of primary data findings in a biased way must be avoided.

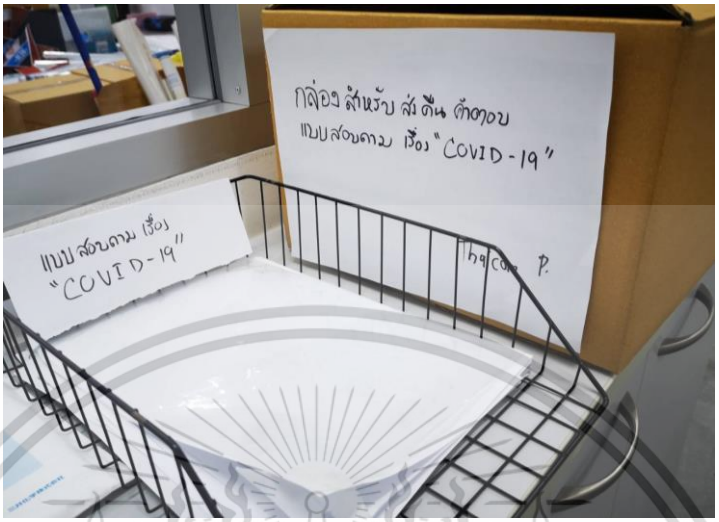

Figure 3.1: Data collection

CHAPTER 4
ANALYTICAL RESULTS

By examining the numerous dimensions of factors impacting COVID-19 preventive effectiveness, this chapter aims to meet the study's objectives: a case of a semiconductor firm in wellgrow industrial estate. Therefore, this chapter displayed the findings from the analytical procedures discussed in chapter three.

There are seven sections in this chapter. The first section starts with the respondents' details, which are supported by demographic data. The second section describes the Company's COVID-19 preventive measures (CPM) about factors influencing the COVID-19 prevention effectiveness (CPE). The descriptive analyses were executed for each item. The third section will describe the result of the Company's requirement and prohibition (CRP) about factors that influence the COVID-19 prevention effectiveness (CPE). The fourth section will demonstrate results of the Company's employee welfare support measures (EWM) influence the effectiveness of COVID-19 prevention.The fifth section will indicate the results of the The descriptive analysis, mean and standard deviation of Covid-19 prevention effectiveness (CPE). The sixth section will demonstrate results of the opinion level of employees about Company's COVID-19 measures and COVID-19 prevention effectiveness (CPE). The results of this study will be compiled in the last part, which will demonstrate hypothesis testing.

Employees at the studied semiconductor company, mentioned in chapter three, were given a total of 352 questionnaires to complete this research. Due to the different proportions of the employees in each working shift, the questionnaires are allocated unequally.

After four weeks of data collection period, 352 questionnaires had been gathered completely. The researcher has screens the answers collected from chosen respondents, there were no respondents who did not meet the research criteria. Finally, a total of 352 completed questionnaires were received and analyses the results of this research topic using the simple linear regression analysis method to test the research hypothysis which has mentioned early in the third chapter: research methodology

4.1 Demographic Information

Based on the sample collected through the distribution of questionnaires, the respondents' socio-demographic data in this section. The descriptive analysis of the demographic information is presented in Table 4.1, and the descriptive analysis of the opinion level of employees who had experienced the factors influencing COVID-19 prevention effectiveness: a case of a semiconductor firm in wellgrow industrial estate also shown in table.

Table 4.1 Frequencies and Percentages of Sample Demographics (n=352)

Demographic	n	%
Gender		
Male	138	39.2
Female	214	60.8
Age		
Less than 30 years	147	41.8
30-40 years old	136	38.6
41-50 years old	52	14.8
More than 50 years	17	4.8
Education Level		
Below bachelor's degree (High school/ Vocational)	110	31.3
Certificate, High Vocational Certificate	170	48.3
Bachelor's degree	62	17.6
Master degree or higher level	10	2.8

Table 4.1 (Cont.)

Demographic	n	%
Work Experience		
Less than 5 years	146	41.5
5-10 years	90	25.6
11-15 years	52	14.8
More than 15 years	64	18.2
Position level		
Operation level	308	87.5
Supervisor level	29	8.2
Management level	15	4.3
Transportation to work		
Personal vehicle	137	38.9
Company's shuttle bus	210	60.0
Public Transportation	4	1.1
Monthly income		
Less than or equal to - 10,000 Bath	6	1.7
10,001 - 20,000 Bath	119	33.8
20,001 - 30,000 Bath	152	43.2
30,001 – 40,000 Bath	38	10.8
Above 40,000 Baths	37	10.5

The sample consisted of 138 (39.2%) male respondents and 214 (60.8%) female respondents. the vast majority of those respondents are from the age group of Less than 30 years old for 147 (41.8%) respondents and 31-40 years old for 136 (38.6%) respondents, 41-50 years old for 52 (14.8%) respondents and above 50 years for 17 (4.8%) respectively.

From the education level, the greater number of respondents is achieved below Bachelor Degree (High School, Vocational) for 110 (31.3%) respondents followed by Certificate, High Vocational Certificate for 170 (48.3%) respondents, Bachelor Degree for 62

(17.6%) and Master degree or higher level for 10 (2.8%) respondents. The years' Experience for the response of less than 5 years for 146 (41.5%), 5-10 years for 90 (25.6%) respondents, 10-15 years for 52 (14.8%) respondents and more than 15 years for 64 (18.2%). In terms of position level, most of the respondents were operation level 308 (87.5%), supervisor level 29 (8.2%) respondents, and management level 15 (4.3%) respondents. %).

For transportation work of employees, most of the respondents take on the company's shuttle bus 210 (60.0%), personal vehicle for 137 (38.9%) respondents, and public transportation for 4 (1.1%) respondents. In term of income per month, most of the respondents earned 20,001 - 30,000 bath for 152 (43.2%), followed by 10,001 – 20000 baths for 119 (33.8%) respondents, 30,001 - 40,000 baths for 38 (12.5%) and more than 40,000 Baths for 37 (10.5%) respondents.

4.2 Opinion level of company's COVID-19 measures and prevention effectiveness

The seven study variables in the research framework are described in the section that follows. The four independent variables are as follows: (1) Requirement and prohibition for COVID-19, (2) Company's COVID-19 preventive measures, (3) Employee's welfare support measures and (4) COVID-19 prevention effectiveness.

All variables are measured by using 5 point-Likert-scale with the remark of Mean value as follows:

The mean value between 1.00-1.80 is "Lowest"

The mean value between 1.81-2.60 is "Low"

The mean value between 2.61-3.40 is "Moderate"

The mean value between 3.41-4.20 is "High"

The mean value between 4.21-5.00 is "Highest"

Then, the descriptive analysis of these variables is presented as bellows:

4.2.1 Requirement and prohibition for COVID-19 (CRP)

The descriptive analysis, mean and standard deviation of Requirement and prohibition for COVID-19, is shown in Table 4.2.

Table 4.2 The Mean and Standard Deviation of Requirement and prohibition for COVID-19

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
Requirement and prohibition						4.567	0.473	Highest
Employees must wear a Medical facial mask in the company's area.	2 (0.6)	1 (0.3)	5 (1.4)	34 (9.7)	310 (88.1)	4.84	0.497	Highest
Employees must follow a proper Social-distancing procedure, at least 1-2 m.	1 (0.3)	3 (0.9)	13 (3.7)	54 (15.3)	281 (79.8)	4.73	0.595	Highest
Regular hand washing with soap and water or alcohol gel should be practiced by employees.	1 (0.3)	1 (0.3)	7 (2.0)	37 (10.5)	306 (86.9)	4.83	0.487	Highest
Employees must check their body temperature before enter the company.	1 (0.3)	2 (0.6)	10 (2.8)	23 (6.5)	316 (89.8)	4.85	0.487	Highest
Employees must not dine in the restaurant outside the company.	5 (1.4)	12 (3.4)	54 (15.3)	76 (21.6)	205 (58.2)	4.32	0.947	Highest
Employees must do a COVID-19 testing with COVID-19 antigen test kit twice a week.	1 (0.3)	0 (0.0)	17 (4.8)	45 (12.8)	289 (82.1)	4.76	0.558	Highest

Table 4.2 (Cont.)

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
Employees must not brush their teeth and wash their face in the company's toilet	30 (8.5)	15 (4.3)	73 (20.7)	60 (17.0)	174 (48.4)	3.95	1.277	High
Employees must wear a Face mask and gloves in the production area.	1 (0.3)	4 (1.1)	23 (6.5)	59 (16.8)	265 (75.3)	4.65	0.677	Highest
Employees must do a self-quarantine, when contact COVID-19 patients.	2 (0.6)	0 (0.0)	5 (1.4)	27 (7.7)	318 (90.3)	4.87	0.458	Highest

In terms of requirement and prohibition for COVID-19, it indicated that the first ranked of respondents' requirement and prohibition for COVID-19 was the items of "Employees must do a self-quarantine immediately, when contact with COVID-19 patients." (mean of 4.87) followed by the item of "Employees must be checked body temperature before entering the company." (mean of 4.85). The item of "Employees must wear a Medical facial mask in the company's area." (mean of 4.84). The item of "Regular hand washing with soap and water or alcohol gel should be practiced by employees." (mean of 4.83). The item of "Employees must do a COVID-19 testing with COVID-19 antigen test kit twice a week." (mean of 4.76). The item of "Employees must follow a proper Social-distancing procedure, at least 1-2 m." (mean of 4.73). The item of "Employees must wear a Face mask and gloves in the production area." (mean of 4.65). The item of "Employees must not dine in the restaurant outside the company." (mean of 4.32). The item of "Employees must not brush their teeth and wash their face in the company's toilet." (mean of 3.95). Overall, the respondents' group of requirements and prohibition for COVID-19 is at Highest level (mean of 4.567).

4.2.2 COVID-19 preventive measures (CPM)

The descriptive analysis, mean and standard deviation of COVID-19 preventive measures, is shown in Table 4.3.

Table 4.3 The Mean and Standard Deviation of COVID-19 preventive measures.

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
COVID-19 preventive measure						4.643	0.423	Highest
Company installed the Virus killer (air purifier machine) in a risky area.	1 (0.3)	3 (0.9)	19 (5.4)	72 (20.5)	257 (73.0)	4.65	0.648	Highest
Company allows employees to enter the production area without scanning their fingers on the gate.	1 (0.3)	2 (0.6)	22 (6.3)	41 (11.6)	286 (81.3)	4.73	0.624	Highest
Company increases the frequency of washing working suits schedule.	2 (0.6)	2 (0.6)	25 (7.1)	65 (18.5)	258 (73.3)	4.63	0.690	Highest
Company manages the schedule for employees working from home.	6 (1.7)	2 (0.6)	30 (8.5)	82 (23.3)	232 (65.9)	4.51	0.811	Highest

Table 4.3 (Cont.)

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
Company installed plastic partitions in the high risk of infection.	1 (0.3)	0 (0.0)	19 (5.4)	53 (15.1)	279 (79.3)	4.73	0.582	Highest
Company installed the copper coating plastic plate on the high risk of an infected surface.	3 (0.9)	8 (2.3)	42 (11.9)	69 (19.6)	230 (65.3)	4.46	0.851	Highest
Company provides a new shift schedule for employees to reduce crowded areas and lower risk of infection.	7 (2.0)	5 (1.4)	22 (6.3)	58 (16.5)	260 (73.9)	4.59	0.830	Highest
The company has installed spots for placing alcohol spray in risk areas	0 (0.0)	1 (0.3)	7 (2.0)	40 (11.4)	304 (86.4)	4.84	0.438	Highest

In terms of COVID-19 preventive measure, it indicated that the first ranked of respondents' COVID-19 preventive measure was in the items of "The company has installed spots for placing alcohol spray in risk areas such as bathrooms, dining tables, benches." (mean 4.87). The second ranked item is "Company allows employees to enter the production area without scanning their fingers on the gate." And "Company installed plastic partitions in the high risk of infection." (mean 4.73). The item of "Company installed the Virus killer (air purifier machine) in a risky area." (mean 4.65). The item of "Company increases the frequency of washing working suits schedule." (mean 4.63). The item of "Company provides the new shift

schedule for employees to reduce crowded areas and lower risk of infection." (mean 4.59). The item of "Company manages the schedule for employees working from home." (mean 4.51). The item of "Company installed the copper coating plastic plate on the high risk of infected surface." (mean 4.46). Overall, the respondents' group of COVID-19 preventive measures is at the highest level (mean 4.643).

4.2.3 Employee's welfare support measures (EWM)

The descriptive analysis, mean and standard deviation of Employee's welfare support measures (EWM), is shown in Table 4.4

Table 4.4 The Mean and Standard Deviation of Employee's welfare supporting measures.

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
Employee's welfare support measures						4.68	0.334	Highest
Company providing the Covid-19 vaccine to the 100% of employees.	0 (0.0)	0 (0.0)	4 (1.1)	21 (6)	327 (92.9)	4.92	0.313	Highest
Companies give away free meals to employees before they go back home.	3 (0.9)	6 (1.7)	40 (11.4)	64 (18.2)	239 (67.9)	4.50	0.825	Highest
Company gives away weekly COVID-19 antigen test kit checks for employees.	0 (0.0)	0 (0.0)	1 (0.3)	22 (6.3)	329 (93.5)	4.93	0.267	Highest

Table 4.4 (Cont.)

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
Company added a special ambulance for transporting high-risk patients.	1 (0.3)	0 (0.0)	7 (2.0)	35 (9.9)	309 (87.8)	4.85	0.449	Highest
Company distributed double-layer masks and latex gloves in the working area to employees every day.	1 (0.3)	1 (0.3)	5 (1.4)	21 (6.0)	324 (92.0)	4.89	0.421	Highest
Company booking hotel for employees to stay for quarantine.	2 (0.6)	13 (3.7)	50 (14.2)	59 (16.8)	228 (64.8)	4.41	0.903	Highest
Company installed alcohol sprayers in working areas.	0 (0.0)	0 (0.0)	7 (2.0)	37 (10.5)	308 (87.5)	4.86	0.404	Highest
COVID-19 pandemic affects decreasing the employee's welfare from the company.	20 (5.7)	13.3 (3.7)	61 (17.3)	87 (24.7)	171 (48.6)	4.07	1.144	High

In terms of employee's welfare support measures, it indicated that the first ranked of respondents' employee's welfare support measures were in the item of "Company gives away

a weekly COVID-19 antigen test kit checks for employees." (mean 4.93). The item of "Company providing the Covid-19 vaccine to the 100% of employees." (mean 4.92). The item of "Company distributed double-layer masks and latex gloves in the working area to employees every day." (mean 4.89). The item of "Company installed alcohol sprayers in working areas." (mean 4.86). The item". Company added a special ambulance for transporting high-risk patients." (mean 4.85). The item "Company gives away free meals to employees before going back home." (mean 4.50). The item "Company booking hotel for employees to stay for quarantine." (mean 4.41). The item "The COVID-19 pandemic affects decreasing the employee's welfare from the company." (mean 4.07). Overall, the respondents' group of employee's welfare support measures is at its highest level (mean 4.678).

4.2.4 COVID-19 prevention effectiveness (CPE)

The descriptive analysis, mean and standard deviation of Covid-19 prevention effectiveness (CPE), is shown in Table 4.5

Table 4.5 The Mean and Standard Deviation of Covid-19 prevention effectiveness.

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
COVID-19 prevention effectiveness						4.30	0.577	Highest
Before the company's COVID-19 measures were set up, do you think the company can control the risk of COVID-19 spreading in the company?	1 (0.3)	5 (1.4)	55 (15.6)	111 (31.5)	180 (51.1)	4.32	0.804	Highest

Table 4.5 (Cont.)

Variable	Level of opinion					Mean	S.D.	Level
	Lowest	Low	Moderate	High	Highest			
	Frequency/ Percentage							
After the company's COVID-19 measures are set up, do you think the company can control the risk of COVID-19 spreading in the company?	0 (0.0)	1 (0.3)	20 (5.7)	102 (29.0)	229 (65.1)	4.59	0.610	Highest
Do you think the present company's COVID-19 measures have an impact to decrease the company's operation performance?	20 (5.7)	21 (6.0)	75 (21,3)	113 (32.1)	123 (34.9)	3.85	1.134	High
The present company's COVID-19 measures are enough to control the COVID-19 situation in the future?	0 (0.0)	6 (1.7)	30 (8.5)	124 (35.2)	192 (54.5)	4.43	0.719	Highest

In terms of Covid-19 prevention effectiveness, it indicated that the first ranked of respondents' working stress were in the items of "After company's COVID-19 measures set up, do you think the company can control risk of COVID-19 spreading in the company?" (mean 4.59) followed by the item of "The present company's COVID-19 measures are enough to control the COVID-19 situation in the future?" (mean 4.43). The item of "Before the company's

COVID-19 measures were set up, do you think the company can control the risk of COVID-19 spreading in the company?" (mean 4.32). The item of "Before the company's COVID-19 measures were set up, do you think the company can control the risk of COVID-19 spreading in the company?" (mean 4.32). And overall, the respondents' opinion of Covid-19 prevention effectiveness is at highest level (mean 4.296).

4.3 Level of Company's COVID-19 measures and COVID-19 prevention effectiveness

From this study, there are four variables including COVID-19 prevention effectiveness, requirement and prohibition, COVID-19 preventive measure and employee's welfare support measures. The following table has provided the summary results of the Company's COVID-19 measures and COVID-19 prevention effectiveness.

Table 4.6 Summary results of the Company's measures and COVID-19 prevention effectiveness (n = 352)

Variable	Mean	Standard Deviation	Interpretation
COVID-19 prevention effectiveness	4.296	0.577	Highest
Company's COVID-19 measures:			
Requirements and prohibitions	4.567	0.473	Highest
COVID-19 preventive measures	4.643	0.423	Highest
Employee's welfare support measures	4.678	0.334	Highest

Table 4.6 shows that the level of COVID-19 prevention effectiveness is the highest, with a mean score of 4.296 and summary standard deviation of 0.423. When the four sources of COVID-19 measures are considered, the following results can be provided and interpreted. The summary mean of the company's requirements and prohibitions is 4.643, with a summary

standard deviation of 0.423, indicating the highest level. The company's COVID-19 preventive measures summary mean is 4.643, and standard deviation is 0.423, indicating the highest level. And the company's level of employee welfare support measures has a summary mean of 4.678 and a summary standard deviation of 0.334, which can also be interpreted as the highest level.

According to the summary results shown in the table above, the sample group of employees in the semiconductor company in Wellgrow industrial estate have the highest opinion level with the current company's COVID-19 measures, as well as the highest opinion level with the company's COVID-19 prevention effectiveness.

4.4 Hypothesis Testing

From this result, it was shown that the proposed model is consistent with empirical data.

Table 4.7 Regression correlation coefficient of Factors Influencing COVID-19 Prevention Effectiveness.

Factors Influencing COVID-19 Prevention Effectiveness	**b**	**S. E. b**	**Beta**	**t**	**Sig.**
Requirement and prohibition	0.406	0.066	0.333	6.137	0.000
COVID-19 preventive measures	-0.028	0.078	-0.016	-0.356	0.722
Employee's welfare support measures	0.564	0.096	0.327	5.889	0.000
Constant 0.858					

***P<0.05**

From Table 4.7 it is shown that model multiple regression correlation coefficient. The process of forecasting factors influencing COVID-19 prevention effectiveness. It was found that the Requirement and prohibition has a regression correlation coefficient of 0.406, meaning that if one unit of COVID-19 preventive measures is given priority, the COVID-19 prevention effectiveness will be increased by 0.406 units.

COVID-19 preventive measures has a regression correlation coefficient of -0.028. It means that if Requirement and prohibition of company is given priority, one unit of COVID-19 prevention effectiveness will decrease by 0.028 units.

Employee's welfare support measures has a regression correlation coefficient of 0.564. It means that if employee's welfare support measures of company is given priority, one unit of COVID-19 prevention effectiveness will increase by 0.564 units.

Table 4.8 Regression Analysis of Factor Influencing COVID-19 Prevention Effectiveness.

Hypothesis	Beta	P-value	Results
COVID-19 preventive measures could influence the COVID-19 prevention effectiveness.	-0.020	0.722	Reject
Requirement and prohibition could influence the COVID-19 prevention effectiveness.	0.333	0.000**	Accept
Employee's welfare support measures could influence the COVID-19 prevention effectiveness.	0.327	0.000**	Accept

***P<0.05 **P<0.001**

According to table 4.7, Hypothesis 1: Company's COVID-19 preventive measures could influence the effectiveness of COVID-19 prevention in the semiconductor company at Wellgrow industrial estate has a negative beta value of -0.020 and a P-value of 0.722, which is greater than the significant levels of 0.05 and 0.001. This means that the semiconductor company's COVID-19 preventive measures had no effect on COVID-19 prevention effectiveness in the Wellgrow industrial estate at statistically significant levels of 0.05 and 0.001.

In contrast, Hypothesis 2: the company's requirements and prohibitions could influence the COVID-19 prevention effectiveness in the semiconductor company at Wellgrow industrial estate. the hypothesis beta value is positive value at 0.333 and and the P-value is less than the

significant levels of 0.05 and 0.001. This means that the company's requirements and prohibitions have had a positive effect or influence on the COVID-19 prevention effectiveness in the semiconductor company at Wellgrow industrial estate, at statistically significant levels of 0.05 and 0.001.

Furthermore, the Hypothesis 3: the employee's welfare support measures could influence the COVID-19 prevention effectiveness in the semiconductor firm at Wellgrow industrial estate. The hypothesis beta value is 0.327, and the P-value is less than the significant levels of 0.05 and 0.001.This means that employee welfare support measures have a positive effect or influence on COVID-19 prevention efficacy at the semiconductor firm at Wellgrow industrial estate at statistically significant levels of 0.05 and 0.001.

CHAPTER 5
CONCLUSION AND DISCUSSION

This aim of the study is the Factors influencing COVID-19 prevention effectiveness in semiconductor firms in the Wellgrow Industrial Estate as follows. 1) To investigate the concern effects and 2) the direct effects of social influence on the factors influencing COVID-19 prevention effectiveness in semiconductor firms in the Wellgrow Industrial Estate.

This chapter summarizes the main findings from the research and discussion and proposes theoretical and practical implications and recommendations of the study.

5.1 Conclusion

From this study, in terms of characteristics of target respondents, it was found that the majority of respondents were of 60.8% female respondents and 39.2% male respondents. The majority of the respondents are from the age group of Less than 30 years old for 41.8% respondents and 30-40 years old for 38.6% respondents, 41-50 years for 14.8% and more than 50 years for 4.8% respectively. From the education level, the greater number of respondents is achieved Certificate, High Vocational Certificate for 48.3% followed by below Bachelor's degree (High school/ Vocational) for 31.3%, Bachelor's degree for 17.6% respondents, and Master degree or higher level for 2.8% respondents. The years' experience for respondents less than 5 years 41.5%, respondents 5-10 years for 25.6%, 11-15 years or more 14.8% and more than 15 years respondents for 18.2%. In terms of position level most of the respondents are operation level employees for 87.5%, supervisor level respondents for 8.2% responds, and management level respondents for 4.3%. %. In terms of transportation to work, most of the respondents use personal vehicles for 59.7%, respondents transport with the company's shuttle bus for 38.9%, respondents use public transportation for 1.1%. In term of income per month, most of the respondents earned 20,001 - 30,000 bath for 43.2%, followed by 10,001 – 20,000 baths for 33.8%, respondents earn 30,001 - 40,000 baths for10.8%, more than 40,000 Baths for 10.5%, and less than or equal to - 10,000 Bath respondents for 10.5%.

The result on the level of COVID-19 prevention effectiveness mean score is 4.295 and standard deviation is 0.817 which interpretation is highest. Company's Requirement and prohibition for COVID-19 mean score is 4.644 and standard deviation is 0.725 which interpretation

is highest. Company's COVID-19 preventive measure has a mean score is 4.643 and standard deviation is 0.684 which interpretation is highest. And Company's Employees welfare support measure mean score is 4.678 and standard deviation is 0.591which interpretation is highest.

The results of the survey conducted with employees in the semiconductor industry at the Wellgrow industrial estate show that employees are extremely adept in preventing COVID-19. This study demonstrates the prediction of COVID-19 prevention effectiveness which is the Requirement and prohibition for COVID-19 Employee's welfare support measures. In addition, the company's COVID-19 Preventive measures have no effect on the COVID-19 prevention effectiveness in the semiconductor firm. The survey findings may be utilized by managers and supervisors to enhance a number of areas in order to increase productivity and the efficacy of COVID-19 prevention.

5.2 Discussion

The conceptual framework of this research has been proposed based on the theories, articles and reports. It is compiled and presented in Chapter 2 Literature Review. There are three hypotheses proposed in the research framework. The causal relationship between the variables of the study has been presented in Table 4.7. The hypothesis tests were conducted, and the results are presented in Chapter 4. In this section, the hypotheses proposed in this study are discussed in more detail.

Influence of Requirement and Prohibition

The result of hypothesis testing shown that influence of requirement and prohibition, it indicated that the result hypothesis testing the requirement and prohibition to COVID-19 prevention effectiveness is Beta .331, p-value .000** results are accepted.

Every employer may take the simple precautions listed in OSHA's Guidance (2020) on Preparing Workplaces for COVID-19 to lower the risk of employee exposure to the SARS-CoV-2 virus. Employers should create rules and procedures for quickly identifying and isolating ill persons. One such policy is to encourage regular and thorough hand washing, which includes giving employees, customers, and site visitors a space to do so. Give them alcohol-based hand massages with at least 60% alcohol if soap and running water aren't right away accessible. Urge respiratory etiquette among employees, such as concealing coughs and sneezes, and encourage sick employees to stay at home.

Influencing of COVID-19 Preventive Measures

The result of hypothesis testing showed influence of COVID-19 preventive measures at the company, negatively affecting COVID-19 prevention effectiveness at statistically significant level 0.005, results are rejected.

According to Ağalar & Engin (Ağalar & Engin, 2020) came to the conclusion that in order to assure the patient's triage, the contact distance should be set up to be at least 2 m, and the patient should be asked to wear a surgical mask if they are suspected of having COVID-19. Healthcare providers (HCP) should adhere to protocol and use personal protection equipment (PPE) while caring for these patients. They should also practice good hand hygiene. The personal protection equipment needs to be worn in accordance with the task at hand. Only by following infection control and safety procedures is it feasible to safeguard the HCP who make the sacrifice at the risk of their lives.

Influencing of Employee's Welfare Support Measures

The result of hypothesis testing shown that influence of employee's welfare support measure, it indicated that the result hypothesis testing the employee's welfare support measure to COVID-19 prevention effectiveness is Beta .324, p-value .000** results are accepted.

Mohanraj D. (Mohanraj, Sara, & Ramesh, 2021) studies the labor welfare measures on employee Job Satisfaction of Lab technician during coronavirus pandemic (COVID-19), which has led the world toward severe socio economic crisis and psychological distress. It has a negative impact on the employees' mental health since it makes them feel more insecure and makes them believe they are unemployed. The majority of organizations choose to emphasize worker satisfaction. Employees that are content and fulfilled are not only more enjoyable to work with, but they also feel more driven and productive than those who are disgruntled, marginalized, or unhappy. Having great workers who stay for a long time, decreasing turnover, and eventually supporting the firm in developing, is the main objective of enhancing employee happiness. This study's objective is to determine whether welfare policies and employee job satisfaction in a firm are related. Little study has been done on organizational effectiveness among employees, according to a review of the literature. The results of this study showed a substantial connection between welfare policies and workers' job satisfaction in a firm.

5.3 Implication

This study examined the influence of the Company's COVID-19 measures with COVID-19 prevention effectiveness and external factors on satisfaction to compliance of these

measures. The results of a joint survey with employees in the semiconductor firm at Wellgrow Industrial Estate. Demonstrated show a highest level of COVID-19 prevention effectiveness.

There are also external factors such as COVID -19 situations outside the company. Practice both at work and outside the factory has a different influence on COVID-19 prevention effectiveness. Company's requirement and prohibition, company's COVID-19 preventive measure and employee's welfare support measure; It can affect the COVID-19 prevention effectiveness of the company. The data obtained from the survey can provide information on which areas need to be optimized Supervisors or Human Resources, managers and management level officer the results of the survey can be used to improve the COVID-19 measure on various issues, to reduce COVID-19 infection risk in company and increase employee's work efficiency.

Theoretical Implications

Altogether, the model and results of this study make an important contribution to the theoretical understanding of the determinants that influence users' continuation intentions towards the models and results of this study make an important contribution to the theoretical understanding of the determinants that influence users' continuation intentions. This time may not be new, but they have been brought together in a way that has never been done before, the inclusion of the COVID-19 prevention effectiveness model as the main conceptual framework of this research.

The proposed model is a unique structure that examines factors in multidimensional studies with COVID-19 prevention effectiveness surveys to explore individual prevention effectiveness levels. And when the data has been collected, it is possible to know the prevention effectiveness in the body surveyed and where it comes from. Those who were involved in the data were analyzed. And adapt the company's measures to manage COVID-19 prevention effectiveness.

5.4 Limitation of This Research

This study has the following limitations. Firstly, this study measured employee satisfaction and continuance intention regarding the company's COVID-19 measure based on a single industry context by assessing some positive aspects. However, employees' perceptions are different in different industry contexts because the company's COVID-19 measures may be different for the user in different industry contexts. Therefore, It would be preferable to get feedback from participants who have taken additional COVID-19 steps in other businesses. Secondly, only a quantitative research method was used in this study to find out the opinions

of a company's COVID-19 measures. However, this method provides less perspective from the employees in the current situation.

5.5 Recomendation for the Future Research

In order to undertake additional study on this issue, the future research should further study on conducting research with a focus on organizations outside of the semiconductor or electronics industries. To identify the trends of COVID-19 measures or managements and prevention effectiveness from the other business perspective. It would also be more exact for research results and data analysis if you choose to collect data from more than one source company in the relevant business industry.

In the future research, qualitative methodologies should be employed to acquire a deeper understanding of employees perspectives. The researcher has the opportunity to chat with people in order to better understanding the issue or situation and back up the current findings.

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APPENDIX

APPENDIX A

Researcher's Ethical Testing Result

Appendix A

Researcher's Ethical Testing Result

Appendix B

Instrument's Reliability and Validity Assesment

Appendix B

Instrument's Reliability and Validity Assesment

THE INDEX OF CONGRUENCE (IOC)

Index of Item-Objective Congruence (IOC) is considered as tool to assess the content validity in the questionnaire. Therefore, item that gained scored higher than 0.5 can be used as question in questionnaire (Turner & Carlson, 2003).

$$\mathbf{IOC} = \boldsymbol{\Sigma RN}$$

R = Congruence value of each question

N = the number of professors/experts

The score range of IOC is between -1 to 1, the acceptable question must be close to 1, the item that had scores lower than 0.6 should be revised; whereas the items that gained scored higher than 0.5 can be reserved. The explanation of the score range is as follow.

+1 = When the professor perceived that the question was fully consistent with the content

0 = When the professor found that the question was doubtful whether it was consistent with the content or not\

-1 = When the professor did not understand the question and perceive that it was inconsistent with the content

No.	Item to consider	Summary IOC			Total Score	The IOC index
	Information of respondents	Expert 1	Expert 2	Expert 3		
1	Gender: ( ) Male ( ) Female	1	1	1	3	1
2	Age: ( ) Less than 30 years ( ) 30-40 years old ( ) 41-50 years old ( ) Over 50 years old	1	1	1	3	1
3	Position level: ( ) Operation level ( ) Management level ( ) Supervisor level	1	1	1	3	1
4	Education level: ( ) Secondary school or lower level ( ) Vocational Certificate ( ) Bachelor degree ( ) Master degree or higher level	1	1	1	3	1
5	Years' experience: ( ) Less than 5 years ( ) 5-10 years ( ) 10-15 years ( ) 15 years or above	1	1	1	3	1
6	Transportation to work ( ) Personal vehicle ( ) Company's shuttle bus ( ) Public Transportation	1	1	1	3	1
7	Income per month ( ) 0 - 9,000 Bath ( ) 9,001 -15,000 Bath ( ) 15,001 - 25,000 Bath ( ) 25,001 – 35000 Bath ( ) Over 35,000 bath	1	0	1	2	0.67

No.	Variables	Summary IOC			Total score	The IOC index
	Company's COVID-19 measures	Expert 1	Expert 2	Expert 3		
	Requirement and prohibition					
1	Employees must wear a Medical facial mask in the company's area.	1	1	1	3	1
2	Employees must follow a proper Social-distancing procedure.	1	1	1	3	1
3	Employees should frequently wash hands with soap or alcohol gel.	1	1	1	3	1
4	Employees must be checked body temperature before entering the company every day.	1	1	1	3	1
5	Employees must not dine in the restaurant outside company.	1	0	1	2	0.67
6	Employees must wearing a face shield while ride on the company's shuttle bus.	1	0	0	1	0.33
7	Employees must do a COVID-19 testing with COVID-19 antigen test kit twice a week.	1	0	1	2	0.67
8	Employees must not tooth brushing and wash their face in the company's toilet	1	0	1	2	0.67
9	Employees must wear a Face mask and gloves in the production area.	1	1	1	3	1
10	Employees must do a self-quarantine immediately, when contact with patients.	1	1	1	3	1
	Requirement and prohibition					
11	Company allows employees to entrance the production area without scanning finger on the ESD gate.	1	0	1	2	0.67

No.	Variables	Summary IOC			Total score	The IOC index
	Company's COVID-19 measures	Expert 1	Expert 2	Expert 3		
	Requirement and prohibition					
12	Company increases the frequency of washing working suits schedule.	1	1	1	3	1
13	Company manages the schedule for employees working from home.	1	1	1	3	1
14	Company installed plastic partition in the high risk of infected area.	1	1	1	3	1
15	Company installed the copper coating plastic plate on the high risk of infected surface.	1	1	1	3	1
16	Company provides the new shift schedule for employees to reduce crowded area and lower risk of infection.	1	1	1	3	1
17	The company has installed spots for placing alcohol spray in risk areas such as bathrooms, dining tables, benches.	1	1	1	3	1
	Employee's welfare support measures					
18	Company providing the Covid-19 vaccine to the 100% of employees.	1	1	1	3	1
19	Company give away free meals to employees before go back to home.	1	0	1	2	0.67
20	Company gives away weekly COVID-19 antigen test kit checks for employees.	1	1	1	3	1
21	Company added a special ambulance for transporting high-risk patients.	1	1	1	3	1

No.	Variables	Summary IOC			Total score	The IOC index
	Company's COVID-19 measures	Expert 1	Expert 2	Expert 3		
	Requirement and prohibition					
22	Company distributed double-layer masks and latex gloves in the working area to employees every day.	1	0	1	2	0.67
23	Company booking hotel for employees to stay for quarantine.	1	1	1	3	1
24	Company installed alcohol sprayers in working areas.	1	1	1	3	1
25	COVID-19 pandemic has an impact to decreasing of the employee's welfare from the company.	1	1	1	3	1
	COVID-19 Prevention Effectiveness					
26	Before the company's COVID-19 measures were set up, do you think the company can control risk of COVID-19 spreading in the company?	1	1	1	3	1
27	After the company's COVID-19 measures set up, do you think the company can control risk of COVID-19 spreading in the company?	1	1	1	3	1
28	The present company's COVID-19 measures have an impact to decrease the company's operation performance?	1	1	1	3	1
29	The present company's COVID-19 measures are enough to control the COVID-19 situation in the future?	1	1	1	3	1

The Reliability of The Instrument

The Cronbach's Alpha coefficient method was conducted as the reliability procedure for checking the quality the equipment. The items which have Cronbach's alpha coefficient should have a level of 0.70 or higher. The value above than 0.70 is considered to be highly reliable (Cronbach, 1951)

$$\alpha = \frac{K\bar{r}}{1 + \bar{r}(K-1)}$$

α: Reliability Coefficient

K: Number of Items

$\bar{r}$: Average Item Correlation

$\alpha \geq 0.7$: High reliability

$0.5 \leq \alpha \leq 0.65$: Moderate reliability

Cronbach's Alpha from 30 Respondents (Pilot Group) Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded	0	.0
	Total	30	100.0

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

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.82	0.82	30

Appendix C

Research Questionnaire

Appendix C

Research Questionnaire

Topic: Factors Influencing COVID-19 Prevention Effectiveness: A Case Study Of Semiconductor Firm in Wellgrow Industrial Estate.

Objective: This questionnaire is intended to collect data about Covid-19 prevention effectiveness of the semiconductor firms' measures. Typically, the ideal respondents will be in the semiconductor firms from the wellgrow industrial estate. The questionnaire was divided into two parts, part 1 general Information of respondents for 7 questions, part 2 questions about COVID-19 preventive measures and COVID-19 prevention effectiveness in semiconductor firms for 29 questions.

Part 1: General Information of respondents

Instruction: Please put the X mark in front of the item that best describes your reality.

1. Gender

( ) Male ( ) Female

2. Age

( ) Less than 30 years ( ) 30-40 years old

( ) 41-50 years old ( ) 50 years or above

3. Position level

( ) Operation level ( ) Management level

( ) Supervisor level

4. Education level

( ) Secondary school or lower level ( ) Vocational Certificate

( ) Bachelor degree ( ) Master degree or higher level

5. Years' experience

( ) Less than 5 years ( ) 5-10 years

( ) 11-15 years ( ) 15 years or above

6. Transportation to work

( ) Personal vehicle ( ) Company's shuttle bus

( ) Public Transportation

7. Income per month

( ) Less than 10,000 Bath ( ) 10,001 -20,000 Bath

( ) 20,001 - 30,000 Bath ( ) 30,001 – 40,000 Bath

( ) More than 40,000 bath

Part 2: Questions about COVID-19 preventive measures and COVID-19 prevention effectiveness in semiconductor firms.

Information and Instruction:

1.The purpose of this questionnaire is to study your opinions on the COVID-19 measures of the company you currently work for. Each item has a 5 level of opinion.

2. Put the mark in the box that best describes your situation or opinion with only one answer.

3. There are 29 questions in total, please fill the X to answer them all.

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree 5 = Strongly agree)

No.	Variable	Opinion Level				
	Company's COVID-19 measures					
	Requirment and prohibition	**5**	**4**	**3**	**2**	**1**
1	Employees must wear a Medical facial mask in the company's area.					
2	Employees must follow a proper Social-distancing procedure.					
3	Employees should frequently wash hands with soap and water or alcohol gel.					
4	Employees must be checked body temperature before entering the company every day.					
5	Employees must not dine in the restaurant outside company.					
6	Employees must do a COVID-19 testing with COVID-19 antigen test kit once a week.					
7	Employees must not brush their teeth and wash their face in the company's toilet					
8	Employees must wear a Face mask and gloves in the production area.					
9	Employees must fix their car seat on the company's shuttle bus.					
10	Employees must do a self-quarantine immediately, when contact with COVID-19 patients.					
	COVID-19 preventive measures	**5**	**4**	**3**	**2**	**1**

No.	Variable	Opinion Level				
	Company's COVID-19 measures					
	Requirment and prohibition	**5**	**4**	**3**	**2**	**1**
11	Company installed the Virus killer (air purifier machine) in risky area.					
12	Company allows employees to entrance the production area without scanning finger on the ESD gate.					
13	Company increases the frequency of washing working suits schedule.					
14	Company manages the schedules for employees working from home.					
15	Company installed plastic partition in the high risk of infected area.					
16	Company installed the copper coating plastic plate on the high risk of infected surface.					
17	Company provides the new shift schedule for employees to reduce crowded area and lower risk of infection.					
	Employee's welfare support measures	**5**	**4**	**3**	**2**	**1**
18	Company providing the Covid-19 vaccine to the 100% of employees.					
19	Company give away free meals to employees before go back to home.					
20	Company gives away weekly COVID-19 antigen test kit checks for employees.					
21	Company added a special ambulance for transporting high-risk patients.					

No.	Variable Company's COVID-19 measures	Opinion Level				
	Requirment and prohibition	**5**	**4**	**3**	**2**	**1**
22	Company distributed facial masks and latex gloves in the working area to employees every day.					
23	Company booking hotel for employees to stay.					
24	Company installed alcohol sprayers in working areas.					
25	COVID-19 pandemic has an impact to decreasing of the employee's welfare from the company.					
	COVID-19 Prevention Effectiveness	**5**	**4**	**3**	**2**	**1**
26	Before the company's COVID-19 measures were set up, do you think the company can control risk of COVID-19 spreading in the company?					
27	After the company's COVID-19 measures set up, do you think the company can control risk of COVID-19 spreading in the company?					
28	Do you think the present company's COVID-19 measures have an impact to the company's operation performance?					
29	Do you think the present company's COVID-19 measures enough to control the COVID-19 situation in the future?					

Additional Comment

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แบบสอบถามสำหรับงานวิจัย

หัวข้อวิจัย: ปัจจัยที่มีผลต่อประสิทธิภาพการป้องกัน COVID-19 ในบริษัทเซมิคอนดักเตอร์ : กรณีศึกษาของบริษัทเซมิคอนดักเตอร์ในนิคมอุตสาหกรรมเวลโกรว์

จุดประสงค์: แบบสอบถามนี้จัดทำขึ้นเพื่อรวบรวมข้อมูลเกี่ยวกับประสิทธิภาพของมาตรการการป้องกัน Covid-19 ของบริษัทเซมิคอนดักเตอร์ โดยผู้ตอบแบบสำรวจจะเป็นผู้ที่ทำงานอยู่ในบริษัทเซมิคอนดักเตอร์จากนิคมอุตสาหกรรมเวลโกรว์ แบบสอบถามแบ่งออกเป็น 2 ส่วน ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถามทั้งหมด 7 ข้อคำถาม ส่วนที่ 2 คำถามเกี่ยวกับมาตรการป้องกัน COVID-19 และประสิทธิภาพการป้องกัน COVID-19 ในบริษัทเซมิคอนดักเตอร์ทั้งหมด 29 ข้อคำถาม

ส่วนที่ 1: ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

คำแนะนำ: โปรดทำเครื่องหมาย X ด้านหน้ารายการที่ตรงกับความเป็นจริงของคุณที่สุด

1. เพศ

( ) ชาย ( ) หญิง

2. อายุ

( ) น้อยกว่า 30 ปี ( ) 30-40 ปี

( ) 41-50 ปี ( ) มากกว่า 50 ปีขึ้นไป

3. ระดับตำแหน่งงาน

( ) ระดับปฏิบัติการ ( ) ระดับบริหารจัดการ

( ) ระดับหัวหน้างาน

4. ระดับวุฒิการศึกษา

( ) มัธยมศึกษาตอนต้น หรือต่ำกว่า ( ) ปวช. หรือ ปวส.

( ) ปริญญาตรี ( ) ปริญญาโท หรือสูงกว่า

5. อายุการทำงาน

( ) น้อยกว่า 5 ปี ( ) 5-10 ปี

( ) 11-15 ปี ( ) 15 ปีขึ้นไป

6. การเดินทางมาทำงาน

( ) รถส่วนบุคคล ( ) รถรับส่งของบริษัท

( ) รถโดยสารสาธารณะ

7. เงินเดือนที่ได้รับ

( ) น้อยกว่า 10,000 บาท ( ) 10,001 -20,000 บาท

( ) 20,001 - 30,000 บาท ( ) 30,001 – 40,000 บาท

( ) มากกว่า 40,000 บาท

ส่วนที่ 2: คำถามเกี่ยวกับมาตรการป้องกัน COVID-19 และประสิทธิภาพในการป้องกัน COVID-19 ของบริษัทเซมิคอนดักเตอร์

<u>ข้อมูลและคำแนะนำ:</u>

1. แบบสอบถามนี้มีจุดประสงค์เพื่อศึกษาความคิดเห็นของคุณเกี่ยวกับมาตรการป้องกันโรค

โควิด-19 ของบริษัทที่คุณทำงานอยู่ในปัจจุบัน แต่ละรายการมีระดับความคิดเห็น 5 ระดับ

2. ทำเครื่องหมาย X ในช่องที่สามารถอธิบายสถานการณ์หรือความคิดเห็นของคุณได้ดีที่สุดในแต่ละข้อ เพียงคำตอบเดียว.

3. มีคำถามทั้งหมด 29 ข้อ โปรดทำเครื่องหมาย X เพื่อตอบคำถามทั้งหมด

(1 = ไม่เห็นด้วยอย่างยิ่ง, 2 = ไม่เห็นด้วย, 3 = ไม่แน่ใจ, 4 = เห็นด้วย 5 = เห็นด้วยอย่างยิ่ง)

ข้อที่	ตัวแปรที่เกี่ยวข้อง มาตรการเกี่ยวกับโรคโควิด-19 ของบริษัท ข้อควรปฏิบัติและข้อห้าม	ระดับความคิดเห็น 5	4	3	2	1
1	พนักงานต้องสวมหน้ากากอนามัยทุกครั้งที่อยู่ในพื้นที่บริษัท					
2	พนักงานต้องทำการเว้นระยะห่างทางสังคมในบริษัท (อย่างน้อย 1-2 เมตร)					
3	พนักงานควรหมั่นล้างมือด้วยสบู่และเจล ล้างมือแอลกอฮอล์					
4	พนักงานทุกคนต้องถูกตรวจวัดอุณหภูมิร่างกายก่อนเข้าบริษัททุกครั้ง					
5	ห้ามพนักงานทุกคนนั่งรับประทานอาหารที่ร้านอาหารภายนอกบริษัท					
6	พนักงานต้องทำการตรวจ COVID-19 ด้วยชุดตรวจ ATK สัปดาห์ละสองครั้ง					
7	ห้ามพนักงานล้างหน้าและแปรงฟันที่ห้องน้ำภายในบริษัท					
8	พนักงานต้องสวมถุงมือทุกครั้งที่อยู่ในพื้นที่การผลิต					
9	ขณะอยู่บนรถรับส่ง พนักงานต้องนั่งที่นั่งประจำตามที่บริษัทได้กำหนดไว้ให้					
10	พนักงานต้องกักตัวทันที เมื่อพบว่าสัมผัสใกล้ชิดผู้ติดเชื้อ.					

ข้อที่	ตัวแปรที่เกี่ยวข้อง มาตรการเกี่ยวกับโรคโควิด-19 ของบริษัท	ระดับความคิดเห็น				
	ข้อควรปฏิบัติและข้อห้าม	5	4	3	2	1
	มาตรการการป้องกัน COVID-19 ของบริษัท	5	4	3	2	1
11	บริษัททำการติดตั้ง Virus killer (เครื่องฟอกอากาศ) ในพื้นที่เสี่ยงต่างๆ					
12	บริษัททำการยกเลิกการใช้นิ้วสัมผัส ESD gate ก่อนเข้าสายการผลิต					
13	บริษัททำการเพิ่มความถี่ของตารางในการซักชุดทำงานในสายการผลิต (smock)					
14	บริษัทมีการจัดการให้พนักงานบางส่วนทำงานที่บ้าน (Work from home)					
15	บริษัททำการติดตั้งแผ่นพลาสติกกั้น(Partition)ในพื้นที่เสี่ยงต่างๆ					
16	การติดตั้งแผ่นพลาสติกเคลือบทองแดงเพื่อฆ่าเชื้อตามผิวสัมผัสที่เป็นจุดเสี่ยง					
17	บริษัททำการปรับเปลี่ยนเวลาเข้า-ออกกะ ของพนักงานเพื่อลดความแออัดในพื้นที่ลงเวลา					
	Employee's welfare support measures	**5**	**4**	**3**	**2**	**1**
18	บริษัททำการจัดหาวัคซีนป้องกันโรค Covid-19 ให้พนักงานทุกคน 100%					

ข้อที่	ตัวแปรที่เกี่ยวข้อง มาตรการเกี่ยวกับโรคโควิด-19 ของบริษัท ข้อควรปฏิบัติและข้อห้าม	ระดับความคิดเห็น 5	4	3	2	1
19	บริษัททำการแจกอาหารฟรีให้พนักงานในสายการผลิตตอนเลิกงาน เพื่อลดการเดินทางไปพื้นที่เสี่ยง เช่น ห้างสรรพสินค้า, ตลาด เป็นต้น					
20	บริษัททำการแจกชุดตรวจ ATK ฟรีสำหรับให้พนักงานทำการตรวจทุกสัปดาห์					
21	บริษัททำการเพิ่มรถพยาบาลแบบพิเศษสำหรับรับส่งผู้ป่วยกลุ่มเสี่ยงไปโรงพยาบาล					
22	บริษัททำการแจกหน้ากากอนามัยแบบ 2 ชั้นและถุงมือให้พนักงานในสายการผลิตทุกสัปดาห์					
23	บริษัททำการจองโรงแรมไว้เพื่อให้พนักงานบางส่วนเพื่อพักอาศัยในช่วงโควิด					
24	บริษัททำการแจกสเปรย์แอลกอฮอล์ เพื่อให้พนักงานติดตัวไว้ใช้ในพื้นที่ทำงาน					
25	โรค Covid-19 ส่งผลกระทบทำให้นโยบายด้านสวัสดิการของพนักงานลดลง					
	COVID-19 Prevention Effectiveness	**5**	**4**	**3**	**2**	**1**
26	ก่อนที่บริษัทจะมีการกำหนดมาตรการเกี่ยวกับ COVID-19 บริษัทสามารถควบคุมความเสี่ยงและป้องกันการแพร่ระบาดของโรค COVID-19 ได้เป็นอย่างดี					

ข้อที่	ตัวแปรที่เกี่ยวข้อง มาตรการเกี่ยวกับโรคโควิด-19 ของบริษัท ข้อควรปฏิบัติและข้อห้าม	ระดับความคิดเห็น 5	4	3	2	1
27	หลังจากมีการกำหนดมาตรการเกี่ยวกับ COVID-19 ในบริษัท บริษัทสามารถควบคุมความเสี่ยงและป้องกันการแพร่ระบาดของโรค COVID-19 ได้เป็นอย่างดี					
28	มาตรการเกี่ยวกับ COVID-19 ของบริษัทที่กล่าวมา ส่งผลทำให้ประสิทธิภาพและกำลังการผลิตของบริษัทลดลง					
29	มาตรการเกี่ยวกับ COVID-19 ของบริษัทที่กล่าวมา เพียงพอต่อการควบคุมสถานการณ์การระบาดของ COVID-19 ของบริษัทในอนาคตข้างหน้า					

ข้อเสนอแนะเพิ่มเติม

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Appendix D

Descriptive Statistics Analysis and Results Using SPSS program

Descriptive Statistics

	Mean	Std. Deviation	N
Prevention effectiveness	4.296	0.577	352
Req and Prohibit	4.567	0.473	352
Preventive measures	4.643	0.423	352
Employee support	4.678	0.334	352

Correlations

		Prevention effectiveness	Req and Prohibit	Preventive measures	Employee support measures
Person Correlation	**Prevention effectiveness**	1.000	0.476	0.333	0.472
	Req and Prohibit	0.476	1.000	0.517	0.471
	Preventive measures	0.333	0.517	1.000	0.554
	Employee support	0.472	0.471	0.554	1.000
Sig. (1-tailed)	**Prevention effectiveness**	.	0.000	0.000	0.000
	Req and Prohibit	0.000	.	0.000	0.000
	Preventive measures	0.000	0.000	.	0.000
	Employee support	0.000	0.000	0.000	.
N	**Prevention effectiveness**	352	352	352	352
	Req and Prohibit	352	352	352	352
	Preventive measures	352	352	352	352
	Employee support	352	352	352	352

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		Durbin-Watson
					R Square Change	F Change	
1	0.554[a]	0.306	0.300	0.4825	0.306	51.235	3

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Employee support, Req and Prohibit, Prevent measures[b]	.	Enter

a. Dependent Variable: Prevent effectiveness

b. All requested variables entered.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.787	3	11.929	51.235	0.000[b]
	Residual	81.025	348	0.233		
	Total	116.812	351			

a. Dependent Variable: Prevent effectiveness

b. Predictors: (Constant), Employee support, Req and Prohibit, Prevent measure

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.068	0.379		-0.180	0.858
	Req and Prohibit	0.404	0.066	0.333	6.170	0.000
	Prevent measure	-0.028	0.078	-0.020	-0.356	0.722
	Employee support	0.564	0.096	0.327	5.889	0.000

a. Dependent Variable: Prevent effectiveness

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.8831	4.6578	4.2962	0.31931	352
Residual	-1.64391	1.47288	0.00000	0.48046	352
Std. Predicted Value	-4.425	1.133	0.000	1.000	352
Std. Residual	-3.407	3.052	0.000	0.996	352

a. Dependent Variable: Prevent effectiveness

AUTHOR BIOGRAPHY

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Publications	