



DECISION-MAKING PROCESS OF STOCK INVESTMENT BEHAVIOR DURING THE
COVID-19 PANDEMIC: SYSTEMATIC LITERATURE REVIEW AND MULTIPLE-CASE
STUDY OF THAI INVESTORS

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THE THESIS TITLED

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BY

JARADPAN INTARAWANICH

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The COVID-19 pandemic had a social and economic impact on stock market investors and the consequences were that investors changed their ways of making decisions and their stock investment behavior. This study aimed to study the factors affecting the decision-making of investors under pandemic circumstances through a multi-method design that included a systematic literature review and a multiple-case study of Thai investors. The systematic review was conducted according to PRISMA 2020 checklist. The five included studies were retrieved from academic databases, namely Scopus and ScienceDirect, and analyzed through narrative synthesis. The results of the systematic review revealed that decisions of multinational group of investors were affected by both environmental factors, namely COVID-19 cases and the time spent on the stock market, and psychological factors, namely expectations of pandemic risk and biases. From the results of the systematic review, factors affecting investment decisions were identified, and subsequently, they were used to create semi-structured interview questions for the second phase, the multiple-case study of Thai investors. The qualitative data was collected from nine experienced Thai investors, and analyzed by pattern matching. The results of the multiple-case study verified that decisions of Thai investors were affected by environmental factors, namely rising COVID-19 cases, and the psychological factors. Moreover, Thai investors perceived they had more time to search for information about stock investment, including the economic impact and news about effective vaccines. Thai investors also had emotions, such as fear of the unknown and anxiety about investment decisions. The results of this study would be appropriate for experienced Thai investors to acknowledge that their investment decisions were sometimes suboptimal because of their psychological states. The results also would be shared with the Securities and Exchange Commission of Thailand so that they might consider guidelines on investing in stocks under high uncertainties. The future research could compare and study the factors affecting stock investment decisions in post-pandemic circumstances.

Keyword : Decision-making, Investor behavior, Stock market, Systematic review, Multiple-case study

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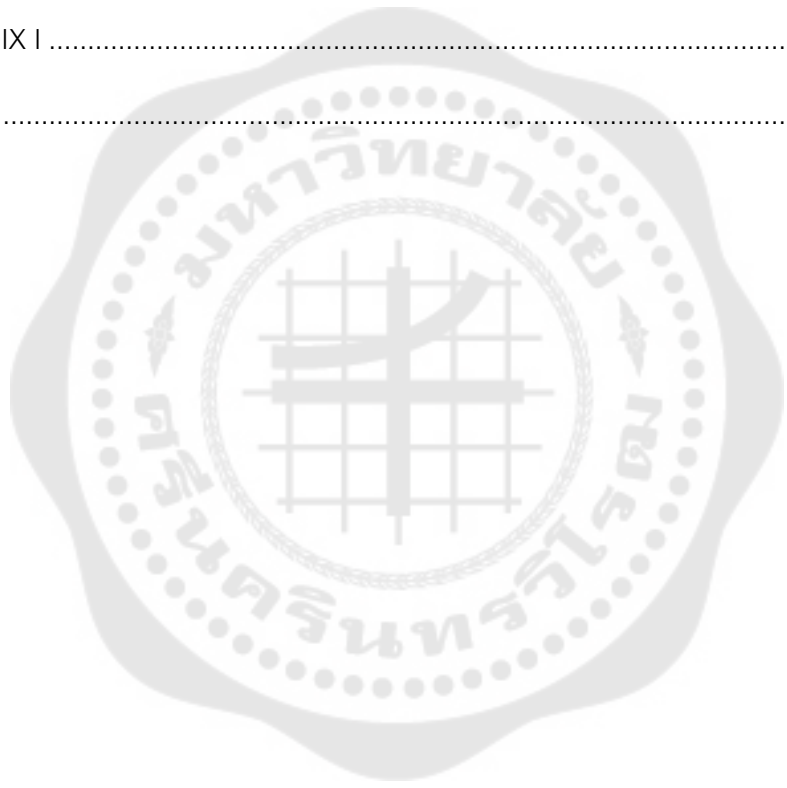
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CHAPTER 1

INTRODUCTION

Rationale for the research

Around the very end of 2019, a novel infectious disease started to spread across the world. It was called the coronavirus disease or COVID-19 later on in 2020 (World Health Organization, 2021). The disease easily and rapidly infected human respiratory system (Chigada & Madzinga, 2021; World Health Organization, 2021; Xu et al., 2020). As this disease was highly infectious, social distancing measures including wearing masks and lockdowns were implemented in many countries across the world (Billore & Anisimova, 2021). This resulted in immediate closures of a majority of businesses, and blue-collar workers were suddenly unemployed while white-collar workers were recommended to work from home (Wielen & Barrios, 2021). Adverse economic impacts due to business being out of operation and the expected high rate of unemployment put pressure on stock prices listed in stock markets (Xu et al., 2020). Investors in the stock markets perceived these impacts of the pandemic as they altered their stock investment decisions differently due to their demographics, cognition, and available information (Ortmann et al., 2020). These factors, such as age (Zheng et al., 2022), attention (Smales, 2021), and online information (Su et al., 2022) were studied by using stock market indices. In actuality, the stock market performances were consequences of the decision-making of investors. Therefore, the first research question was, apart from the factors studied by secondary data, what factors affected stock investment decision-making under the circumstances while the coronavirus was still spreading all around the world.

Aiming to identify factors that had an influence on stock investment decision-making during the COVID-19 pandemic, a systematic literature review was conducted according to PRISMA 2020 item checklist (Page et al., 2021). The included studies were retrieved from academic research studies related to this research objective, and, screened by inclusion and exclusion criteria. All the included studies were organized through primary data collected on investors in stock markets (not on stock market

indices). The details of the included studies were extracted and tabulated into research context, design, and results (Petticrew & Roberts, 2006, p. 165). Due to the fact that all the included studies had different research hypotheses, the extracted data could not be analyzed through meta-analysis but through narrative synthesis (Popay et al., 2006, p. 5). The identified factors resulted from this review were examined through risk of bias assessment, which was adapted from Cochrane risk of bias tool (RoB 2) (Higgins et al., 2022; Higgins et al., 2011) . The report of the risk of bias was a visualization of a traffic light plot and a summary (McGuinness & Higgins, 2020).

Nevertheless, the identified factors were not expected to be found in Thai investors, who were actually facing the COVID-19 pandemic situations and anxious about their personal finance (Pan-Ngum et al., 2020) as well as about their chances of them getting infected with the COVID-19 (Goodwin et al., 2021). According to The National Economic and Social Development Council (October, 2020), Thailand was considered to be the second country (beside China) recording the COVID-19 cases. The Thai government did endeavor to control the outbreak of COVID-19 through the implementation of non-pharmaceutical interventions; including state emergencies, social distancing, and school closures. Despite the success of restricting the spreading, real adverse economic impacts were revealed by a higher number of the unemployment and a great loss to business activities. Furthermore, the stock market of Thailand had decreasing returns but increasing price volatility (Panyagometh, 2020). Thailand, therefore, had the suitability for verification of the identified factors. Since the performances of the stock market resulted from the decision-making of Thai investors, the second research question was, with no use of Thailand stock market indices, what factors had effects on their decision-making under the circumstances that the COVID-19 pandemic was existent but there had not been sufficient pharmaceutical interventions.

Aiming to examine the identified factors in Thai investors, multiple-case study with pattern matching for rival explanation was organized based on case study protocol of Yin (2017). The cases of the study were Thai investors who were born in different generations including baby boomer and postwar, generation X, and generation Y.

Applying snowball sampling technique, the samples contained nine key informants. Since this multiple-case study respected the constructivist worldview, the key informants were interviewed through open-ended questions. The results of systematic literature review were the underlying fundament of the interview questions. The interview questions were also approved by three educated and sophisticated experts in stock investment decision-making. The qualitative data was analyzed through thematic analysis (Howitt, 2019, pp. 148-158), including deductive and inductive coding. Thereafter, the results of the analysis were reported through comparing with the hypothetical pattern drawn from the review. The results of this multiple-case study were assessed the quality of the case study, consisting of construct validity, internal validity, external validity, and reliability (Yin, 2017, pp. 42-47).

To conclude, the main purpose of this research was the exploration of specific factors influencing stock investment decision-making process during the COVID-19 pandemic. The factors were categorized and comprehended through several behavioral science theories.

Research Questions

1. What were the factors that affected the decision-making process of stock investment behavior during the COVID-19 pandemic that can be identified from a systematic literature review?
2. Do the factors identified have an impact on the decision-making process of stock investment behavior in Thai investors during the COVID-19 pandemic?"

Objectives of the Study

- 1.To identify the factors affecting the decision-making process of stock investment behavior during the COVID-19 pandemic using systematic literature review
- 2.To explore how the identified factors affect the decision-making process of stock investment behavior among Thai investors during the COVID-19 pandemic using a multi-case study approach

Significance of Research

In academia, this study was conducted through a multimethod design consisting of a systematic literature review and a multiple-case study of Thai investors. The integrated results of the multimethod were explained through behavioral science theory comprised of a modern decision theory (decision theory with a human face), psychological theory (cognitive psychology), behavioral economic theory (nudge theory), and anthropological theory (national culture). Therefore, the results provided multiple aspects of comprehending the decision-making process of stock investment behavior.

For policy makers, this study attempted to discover primary factors that originally operated the decision-making process of investors in stock markets with a high level of uncertainty. A stock investment policy with a comprehension of investor decision-making was significant for managing stock investment situations under uncertain circumstances.

In practice, this study conveyed some parts of true stories of experienced investors about their investment decisions during the outbreak of COVID-19. Other individual investors could learn from these real-life lessons in order to be aware of their stock investment behavior in a state of chaos because these could enhance their investment performances.

Scope of Research

This study was conducted by a multimethod approach. In the first phase, factors of the decision-making process of stock investment behavior were examined through a systematic literature review. The included studies were retrieved from academic databases, that were published in English language between 2020 and 2022. In the second phase, the stock investment decision-making process of Thai investors were explored by multiple-case study. The key informants were Thai investors aging between 25 and above 57 years old. The key informants were interviewed retrospectively, and were questioned about their stock investment decisions around April 2020.

Terms and Operational Definitions

Stock Investment

Stock investment was the way that individuals have excess money after spending on consumption and some saving, and paid the money for trading securities in order to gain profits (Brown & Reilly, 2009, pp. 3-5). Hence, the stock investment would be measured in terms of trading stocks in financial markets.

Stock Investment Behavior

Stock investment behavior were actions of investors based on their psychological states (their cognition and affection), their social circumstances (people around them and social situations), situations in stock markets (news in the markets and financial information), and their decisions. The behavior would be measured through cognitive procedure including perception, attention, memory, and problem-solving.

Decision-making

Decision-making was a human cognitive activity based on their natural reasoning in a specific situation. The decision-making was, therefore, measured through the current condition and the psychological state of each investor.

CHAPTER 2

LITERATURE REVIEW

This chapter provides a literature review of the research on the decision-making process of stock investment behavior during the COVID-19 pandemic. This chapter contains:

Section 1 Global effects of the COVID-19 pandemic on stock markets

Section 2 Stock market of Thailand under the COVID-19 pandemic

Section 3 Impacts of the COVID-19 pandemic on Thai people

Section 4 Decision-making process of stock investment behavior

4.1 Stock investment behavior

4.1.1 From behavioral finance view

4.1.1.1 Sentiments

4.1.1.2 Emotions: panic

4.1.1.3 Biases: anchoring and herding

4.1.2 From psychological view

4.1.2.1 Attitude

4.1.2.2 Attention

4.1.2.3 Adaptation

4.1.3 From social view

4.1.3.1 Online trading platform

4.1.3.2 Roles of social media

4.2 Stock investment decision-making process

4.2.1 From contextual view

4.2.2 From emotional view

4.2.3 From cultural view

Section 5 Factors affecting stock investment behavior being studied during the COVID-19 pandemic

Section 6 Theories

6.1 Decision theory with a human face

6.2 Cognitive psychology

6.3 Nudge theory

6.4 National culture

Section 7 Systematic literature review

Section 8 Case study research

Section 9 Conceptual framework

Section 1 Global effects of the COVID-19 pandemic on stock markets and investors

The main question when coronavirus was first introduced was 'what effects of the COVID-19 pandemic on stock investment behavior were'. So as to know those effects in a wide frame, the main keywords in search were 'COVID-19' 'stock', and 'investment behavior'. The keyword 'stock' was generated to 'stock market', 'equity' and 'equity market'. Also, the keyword 'investment behavior' was generated to 'investor behavior' and 'investor'. Three sets of keywords were combined by 'AND' function, so there were twelve sets of searching. Four databases namely ProQuest Dissertations and Theses Global (as of the 6th of September,2021); ScienceDirect eJournal (as of the 7th of September,2021); Scopus (as of the 9th of September, 2021); and Web of Science (as of the 13th of September, 2021) were used to search for related literatures. Limitations were defined as English language plus years 2020 and 2021.

Regarding asset allocation, there are four main financial markets that are stock market, bonds market, commodity market, and currency market. However, since stock market was of interest, only literatures about stock market were included. After forty-eight times of searching, there were 104 related literatures; nonetheless 45 related literatures found in more than one database were selected to review. Results of reviewing were categorized into three parts, including population, interest, and context.

Since the coronavirus began to cover most of countries in the globe, the numbers of infected and death cases had been surging. This led humans to live a life in such a new and unique health crisis. The crisis has impacted on individuals' real economies and participants in financial world (Chundakkadan & Nedumparambil, 2022; Hasan et al., 2021; Huynh et al., 2021; Khan et al., 2020; Li et al., 2021; M. Talwar et al.,

2021; Uddin et al., 2021). As public announcements of the COVID-19 situation reflected the severity of the crisis, participants in stock markets, so-called investors, overwhelmingly reacted to the announcements through clearing their portfolios and withdrawing their deposits from trading accounts, accounting for plunges in stock prices. Nonetheless, the sharp drops in stock prices occurred in just a moment (Ashraf, 2021; Harjoto et al., 2021; Kamaludin et al., 2021; Khan et al., 2020; Liu et al., 2021; Mishra & Mishra, 2021; Subramaniam & Chakraborty, 2021; Sun et al., 2021; Uddin et al., 2021; Wu et al., 2020). When the announcements became prevalent, investors also became familiarized with the pandemic situation but cautious. Investors activated their trading again and paid more attention to not just financial information but also health information. The more attention, the more trading activities, resulting in higher stock market volatilities (Bakry et al., 2022; Chiah & Zhong, 2020; Dhall & Singh, 2020; Duan et al., 2021) (Huber et al., 2021; Li et al., 2021; M. Talwar et al., 2021; Wang et al., 2021).

Due to the fact that the pandemic situation had not recovered yet, lockdown restrictions were implemented. The restrictions sparked economic recession through shutdowns, and disappearance of travel and business activities, which deteriorated household income and economic outlooks of investors (Aggarwal et al., 2021; Aslam et al., 2020; Chundakkadan & Nedumparambil, 2022; Fernandez-Perez et al., 2021; Gurbaxani & Gupte, 2021). Hence, the lives of individuals and investors were full of uncertainties. So as to find solutions to unknown situations, people had been searching for information about the pandemic via online platforms as well as sharing it to social media platforms namely Twitter and Sina Weibo. Having ample time because of work-from-home and having communicating devices at hand; clusters of facts, fake news and negative emotions were absorbed and diffused into people with ease (Abuzayed et al., 2021; Chiah & Zhong, 2020; Huynh et al., 2021; Li et al., 2021; Liu et al., 2021; Smales, 2021; M. Talwar et al., 2021). In particular, investors, using online information to make investment decisions, were swayed by their own sentiments produced from that information. Such sentiments along with uncertainties brought about stock return swings, which caused extreme stock market volatilities and unpredictable stock returns.

Despite the unpredictability, stock market movements were upward with higher trading volumes and higher stock market volatilities (Aslam et al., 2020; Baek et al., 2020; Baig et al., 2021; Chundakkadan & Nedumparambil, 2022; Duan et al., 2021; Fernandez-Perez et al., 2021; Liu et al., 2021; Maia et al., 2021; Mishra & Mishra, 2021; Pagano et al., 2021; Subramaniam & Chakraborty, 2021; Uddin et al., 2021).



Figure 1 MSCI world index movement from January 2019 to September 2020

Source: <https://www.investing.com/indices/msci-world-historical-data>

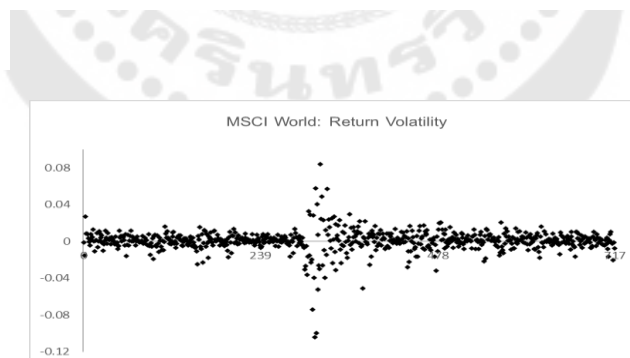


Figure 2 Return volatility of MSCI world index from January 2019 to September 2020

Source: <https://www.investing.com/indices/msci-world-historical-data>

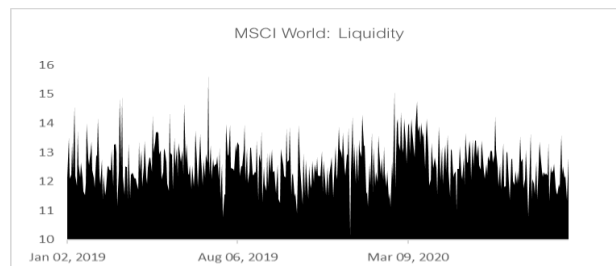


Figure 3 Liquidity of MSCI World
from January 2019 to September 2020

Source: <https://www.investing.com/indices/msci-world-historical-data>

Section 2 Stock market of Thailand under the COVID-19 pandemic

Thai stock market in the time of the coronavirus spreading, SET Source (2020) reported that Pakorn Peetathawatchai, President of Stock Exchange of Thailand, had an interview for “Navigating the Thai capital market through the world’s emerging new normal” in November 2021, stated that investors and financial advisors could not meet in person so the operational service standards has been improving, especially e-account opening. Pattamasukhon (2020) wrote articles for The Securities and Exchange Commission (Thailand) – SEC – that the SEC has been improving “digital infrastructure” in order to enhance “end-to-end process” service for opening trading accounts, reserving IPO, trading, altering clients’ personal information, and eKYC (Know Your Client). Additionally, the SEC has been promoting National Digital ID (NDID), which is available on mobile application and enable to connect with mobile banking application, to clients. Despite an excellent encouragement of the SEC, Pinsai and Maseang (2020) explained that Thai stock index drastically dropped and fluctuated in February and March 2020 due to the COVID-19 pandemic. On the other hand, the COVID-19 pandemic created room for entering Thai stock market. Chalermpong and Subboonrueng (2021) suggested that the plummet in Thai stock market was advantageous to investors in terms of collecting more stocks. Moreover, the impact of

the COVID-19 pandemic contributed a chance to individuals to consider stock investment as a new path of earning money and maintaining their wealth. As a result, there was an increase in the number of new individual investors. It was interesting that the number of young investors – generation Z (born between 1997 and 2009) investors – had been increasing. This implied that young generation were more interested in stock investment. Moreover, generation Y (born between 1980 and 1996) investors were the most active investors.



Figure 4 Thailand stock index movement from January 2019 to September 2020

Source: <https://www.investing.com/indices/thailand-set-historical-data>



Figure 5 Return volatility of Thailand stock index from January 2019 to September 2020

Source: <https://www.investing.com/indices/thailand-set-historical-data>

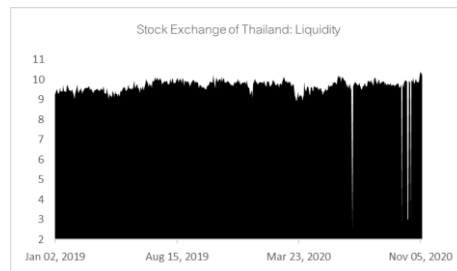


Figure 6 Liquidity of Thailand stock index
from January 2019 to September 2020

Source: <https://www.investing.com/indices/thailand-set-historical-data>

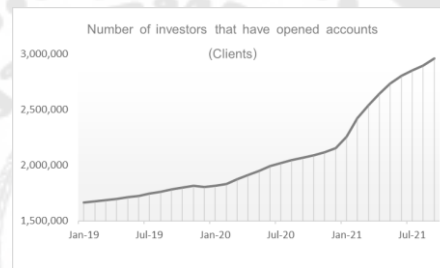


Figure 7 The numbers of new opened accounts
in stock exchange of Thailand
from January 2019 to September 2020

Source: https://www.set.or.th/en/market/market_statistics.html

Section 3 Impacts of the COVID-19 pandemic

The COVID-19 outbreak in Thailand was controlled by the health policies and measures of the Thai government such as lockdowns. Regular updates on the COVID-19 situations in Thailand and other countries via social media platforms were given (Pan-Ngum et al., 2020). Due to the lockdowns, people spent longer time on social media, and as research reports, this may have led to more people getting anxious and depressed (Mongkhon et al., 2021). Moreover, the length of the lockdowns meant that some Thai people had a shorter working time so they were encountering financial difficulties, decreasing incomes and increasing expenses for the COVID-19 prevention;

hence giving rise to the anxiety of Thai people about their welfare (Pan-Ngum et al., 2020). Many pieces of information on social media platforms additionally caused Thai people to be anxious about possibilities of getting infected with COVID-19 from others and spreading the virus to others (Goodwin et al., 2020; Goodwin et al., 2021)

Thai investors were also impacted by the Thai government policies; and may have had additional anxiety about their wealth.

Section 4 Decision-making process of stock investment behavior

This section will begin with describing stock investment behavior from behavioral finance, psychological, and social views. Afterwards, the stock investment decision-making process will be described through contextual, emotional, and cultural views.

4.1 Stock investment behavior

According to the related literatures cited works, stock investment behavior was indicated through behavioral finance, psychology, and sociology. Also, decision-making was found to be a part of the behavior.

4.1.1 Stock investment behavior from behavioral finance view

4.1.1.1 Sentiments of investors were a set of feelings and expectation about future cashflow and ordinary investment risks, which investors apply them to evaluate stock prices (Ashraf, 2021; Chiah and Zhong, 2020; Wang et al., 2021). Feelings were defined as mental qualities of investors which could basically either be positive or negative (American Psychological Association, 2023). Moreover, expectations were defined as opinions of investors about future events based on social interaction (Johnson, 2018). During the COVID-19 pandemic, news about the virus affected expectations of the investors on what would alter their ways to wealth and how long they would hold their stocks in the portfolios (Huynh et al., 2021; Kamaludin et al., 2021).

4.1.1.2 Emotions: panic sell. Whenever humans encountered disaster or catastrophic events such as terrorist attacks, panic occurs; likewise, this also occurred in investors participating in stock markets when there was a great shock. Consequently,

investors became hopeless and overreacted to the shock temporarily (Aggarwal et al., 2021; Al-Qudah and Houcine, 2021; Liu et al., 2021). In a nerve-racking time of living with the virus, the lockdown was a way of controlling impacts of the contagion. The measures, however, took a toll on expected returns in stock markets. As a result, investors wanted to avoid risks as much as they could so they sold stocks in their portfolios or held them in a very short time to make short-term profits (Aggarwal et al., 2021; Pagano et al., 2021).

4.1.1.3 Biases were beliefs of each investor that pieces of information were true (Kelly, 2022). There were two biases found in the literature review, namely anchoring and herding biases. These biases gave rise in anchor and herding behavior.

Anchor behavior. At the time as investors were going to sell or buy stocks, they usually considered historical stock prices and their past experience. Investors who used to gain high rate of profits were more likely to be willing to trade in high volatility stock markets than those who experienced low rate of profits, or perhaps, gained losses (Harjoto et al., 2021; Huber et al., 2021; Naseem et al., 2021).

Herding behavior. In a time when stock markets were full of ambiguous and unreliable information, investors seemed to trust what others said and what others did, so their investment decisions depended upon others' decisions as well (Dhall and Singh, 2020; Fang et al., 2021; Wu et al., 2020). In the age of vague information about the COVID-19 disseminating around and round, investors in the east part of the world – China – had different knowledge about the virus. This led to infinite decisions on stock investments, resulting in disappearance of herding behavior in bear stock markets in China. It was dissimilar to the west part of the world – Eastern Europe – investors had a rise in fears due to the COVID-19 information. So as to make investment decisions, they relied on other investors who looked knowledgeable. As a result, herding behavior was able to be seen clearly in eastern European bear stock markets (Fang et al., 2021; Wu et al., 2020).

4.1.2 Stock investment behavior from psychological view

4.1.2.1 Financial attitude was a set of opinion based on each information and experience of each individual. This attitude had an influence on how investors decide to invest in financial markets such as stock markets (Gurbaxani and Gupte, 2021; M. Talwar et al., 2021). Thanks to information technology, individuals and investors had been receiving financial and coronavirus information via communication tools more often since the lockdown restrictions was announced. Some of individuals, who saw a chance to earn another income from stock markets, decided to start trading by opening new trading accounts. Some investors, who saw a chance to collect potential stocks, increased their trading activities by observing financial news more frequently in order to know the time to sell stocks on hold and buy further sexy stocks. Other investors, conversely, who were aroused by public fear, expect the bear markets which the values of stocks were deteriorated by information about damaging impacts of the COVID-19 pandemic on economies around the world, and thus, they were likely to require other financial products having lower and lovely risks. In addition, health news about the coronavirus outbreak in the media ruined perspectives of investors. As coronavirus was novel and no-one never ever has experience and knowledge about it, various opinions about the effects of the virus on economies and human existence were dispersed (Giglio et al., 2021; Gurbaxani and Gupte, 2021; lyke and Ho, 2021; Li et al., 2021; Naseem et al., 2021; Ortmann et al., 2020; M. Talwar et al., 2021).

4.1.2.2 Attention of investors. In reality, the attention of each investor was limited, so investors were not able to receive all information in stock markets but just information that they felt interested in or some that could attract their attention such as new incidents. Investors normally paid a great attention to very new information and process it in a very short time. In stock markets, any stocks that looked attractive would be overpriced by investors' buying but a rise in prices would last in the blink of an eye. In essence, attention of investors could explain just only buy-decision (Shear et al., 2020; Smales, 2021). In the COVID-19 era, investors have been increasing their attention to many types of information. Google Search Volume was employed to notice

investors' attention. It was found that investors had been searching for information about coronavirus – health information, while they were making decisions about stock investment – wealth decision. Additionally, investors had interpreted stock returns as uncertainty. In one sense, investors' attention also affected sell-decision (Iyke and Ho, 2021; Sherif, 2020).

4.1.2.3 Adaptation to normalization. The first wave of the COVID-19 pandemic was from December 2020 to February 2021. Investors perceived that the pandemic would wreck business activities and lead to a recession so they became pessimistic for a while, then they sold shares in hands and withdrew their capital from stock markets. Nevertheless, in the second wave of the pandemic began from March 2021, investors felt familiar with the pandemic situation and high stock market volatilities, and thus, they saw the stock markets as less risky (Giglio et al., 2021; Harjoto et al., 2021; Huber et al., 2021; Uddin et al., 2021).

4.1.3 Stock investment behaviors from sociological view, online communities.

4.1.3.1 Online Stock trading. The advantages of online stock trading were the low cost of trading and the ease of entering (M. Talwar et al., 2021). Due to the lockdown restrictions, investors had plenty of leisure time to do trading activities. Apart from established investors, new stock market participants had been coming in and playing their roles in the markets. An increase in the number of stock markets was a reason for a remarkable rise in trading volumes in the markets (Chiah and Zhong, 2020; M. Talwar et al., 2021).

4.1.3.2 Roles of social media. Fears in stock markets were disseminated and more intense owing to financial information from famous and reliable media sources; especially social media that was stated to be a place of sharing feelings and opinions of investors. Such pessimistic sentiments were diffusing to investors and influencing investment decisions, then investors' behavior. For instance, a study in China showed that shared emotions and thoughts on SinaWeibo (a popular social media platform in China) had a strong effect on behavior of investors in China stock markets

(Abuzayed et al., 2021; Aslam et al., 2020; Baig et al., 2021; Duan et al., 2021; Huynh et al., 2021; Maia et al., 2021; Naseem et al., 2021; Smales, 2021).

4.2 Stock investment decision-making process

Decision-making Process

Best (1999) implied that deciding was a product of individuals' natural reasoning, which was used for solving everyday problems when individuals were deficient in knowledge and for enhancing a good judgement of reasoning of individuals in a particular state. The natural reasoning had several components including inferences about causality, world knowledge, representativeness and availability. First, inferences about causality were an ability to infer (guess) about cause and effect with reliability. One said that the more causes of one effect the more inaccurate inferences will be. Second, world knowledge that individuals applied for making inferences were alternative causes (various causes that individuals knew and think that they accounted for an effect) and disabling conditions (something that happened to obstruct an effect observation). Third, representativeness was the way in which individuals had a firm idea about a particular thing. For instance, a man who likes sailing and home carpentry, as well as, being good at mathematics. He was thus inferred to be an engineer, where in actuality he might not. Forth, availability was the way in which individuals were familiar with something being similar to what they had already memorized. But above and beyond the components of natural reasoning, real-life situations, which individuals engaged in and seem sensitive to, contribute a small number of options. These situations put a pressure on individuals to select one of those options – individuals must make a decision (Heck et al., 2017; Patalano et al., 2020). All in all, decision-making was an activity of individuals who were in a specific situation have an obligation to take an action through their own reasoning ability.

Within the specific situation or environment, there was a basket of information. Individuals being in the environment visualized the information (Holmes et al., 2016; Miletic and van Maanen, 2019; Patalano et al., 2020) and memorized it (Heck et al., 2017; Holmes et al., 2016; Patalano et al., 2020). The information could be past experiences of individuals, their conversations with their peers, some experts'

knowledge, or even online and offline advertisement (Schwartz, 2016, pp. 54-55) gathering the information, individuals evaluated the information they paid attention to, then, formed opinions about what they could do, choices, as well as what effects of each choice, consequence (Bhatia and Mullett, 2016; Heck et al., 2017; Miletic and van Maanen, 2019). Individuals would probabilistically choose an option when there was a time-limit, that was, the longer time the higher degree of deferral was. Individuals tended to spend more of their time to find more information about options and consequences of the options unhurriedly, so a cut off for selecting an option was delayed. Such that individuals basically were forced to select an option when there was a time pressure (Bhatia and Mullett, 2016; Heck et al., 2017; Miletic and van Maanen, 2019; Ratcliff and McKoon, 2020). In conclusion, a process of decision-making began with individuals who were aware of information in an environment and used the stored information to identify their options. So as to consider each option, individuals searched for more knowledge about each option and evaluated its consequences. When the time was putting a pressure, individuals decide to take an action.

Stock Investment Decision-making

Regarding stock investment decision-making, this world had become a digital world where a communication technology namely social media has a role in disseminating not only information but also emotions. Social media was said to a new space of interaction where people shared their opinions as well as emotions. Emotions were absorbed by investors through consuming information. In other words, investors received information and perceived emotions while using social media at the same time. Furthermore, emotions were produced while investors are making decisions, and likewise, emotions had a control over decision-making of investors. Emotions also influenced reasoning and attention of investors; particularly, attention had a role in memorizing data. Such that, investors probably made a wrong investment decision or even had a financial bias (irrational behavior) (Ge et al., 2020; Löfgren and Nordblom, 2020; Maqsood et al., 2020; Ritika and Kishor, 2020).

4.2.1 Stock investment decision-making from contextual view.

Confirmed and death cases had influence on investment decision-making. Harjoto et al. (2021) found that both confirmed and death cases affected decisions of investors in both emerging and developed countries. However, Bakry et al. (2022) stated that only confirmed cases had an effect on decisions of investors in developed countries, and only death cases influenced decisions of investors in emerging countries. Regards to studies in China and the United State, Naseem et al. (2021) found that both confirmed and death cases had an influence on the decision, while Li et al. (2021) argued that just confirmed cases affected the decision. Almost similarly, Xue et al. (2021) did research in China and found that only confirmed cases were influential to decision-making on stock investment. Moreover, Lee et al. (2020) did a study in Malaysia and went to the conclusion that just only confirmed cases influenced decision-making of investors.

4.2.2 Stock investment decision-making from emotional view.

Investors, basically, decided to invest in stocks through considering risks and being subject to their emotions. In other words, emotions were influential in decision-making on investing in stocks. In particular, negative emotions were potential to cause investors to be pessimistic, consequently they made decisions on stock investment irrationally (Chundakkadan and Nedumparambil, 2022; Huynh et al., 2021). In the time of the COVID-19 pandemic, emotions of investors were indicated that they had an effect on confidence of investors in their choices and decision-making, as well as, gave a rise in stock market volatilities. Emotions such as fear form effects of the pandemic on wealth and health uncertainties. Investors felt uncertain about their regular careers and how to survive from the virus. Hence, fear rendered investors behaving with vague ideas and no reason (Baek et al., 2020; Chundakkadan and Nedumparambil, 2022; Huynh et al., 2021; Liu et al., 2021; Subramaniam and Chakraborty, 2021).

4.2.3 Stock investment decision-making from cultural view.

Geert Hofstede (2014) categorized national cultures into six dimensions; including individualism, power distance, masculinity, uncertainty avoidance, long-term

orientation and, indulgence. However, individualism and uncertainty avoidance were considered to have influences on deciding in stock investment. Individualism was that people in a society prefer to take care of just their family and themselves, and did not rely on opinions of others. As a result, individualistic investors tended to overreact to any events that had a great effect on them. Uncertainty avoidance was that people in a society take efforts to relieve their insecurity caused by unstable situations. So as to avoid possible harmful outcomes, investors who had a higher degree of uncertainty avoidance tended to pay greater attention to those situations and search more and more information (Fernandez-Perez et al., 2021; Shear et al., 2020). During the COVID-19 pandemic, on the one hand, investors who were in higher level of individualism countries – developed countries – seem to rely much on their private information; and still, are trading stocks actively. In contrast, investors who were in lower level of individualism countries, emerging countries, were more dependent on public opinions, consequently participated in trading activities in a similar way. Herding behavior, therefore, could be seen in emerging stock markets. On the other hand, investors who were in higher uncertainty avoidance countries were likely to overvalue uncertainty and devalue stock prices. This, thus, accounted for investors' withdrawals from stock markets and portfolio minimization. By comparison, investors who were in lower degree of uncertainty avoidance countries did not respond profoundly to the uncertainty due to the pandemic (Ashraf, 2021; Bakry et al., 2022; Chiah and Zhong, 2020; Fernandez-Perez et al., 2021; Shear et al., 2020)

Section 5 Factors affecting stock investment behavior being studied during the COVID-19 pandemic

According to the 45 related literatures cited works, there was one experimental research having a research question that how risk-taking behavior of European investors changed during the COVID-19 pandemic. Huber et al. (2021), therefore, examined the subjects in two periods, including bullish stock markets in December 2019 and bearish stock markets in March 2020 through controlling beliefs about asset risk and beliefs about future asset prices. There were three surveys researching on financial attitude,

opinions, and expectations. A couple of them conducted the research in Indian investors about to what extent financial attitude (M. Talwar et al., 2021) and financial opinions (Gurbaxani and Gupte, 2021) and how they had relationship with stock investment behavior; also, another one did the research in American investors about to what extent financial expectations had relationship with the behavior (Giglio et al., 2021).

Moreover, there were six correlational research on fear sentiment, information in media, and decision. A half of them studied about connectedness between fear sentiment and stock investment behavior from January to May 2020 by using equity indices and confirmed and death cases then analyzing the data with wavelet analysis family, including continuous wavelet transform and several wavelet analyses (Hasan et al., 2021; Kamaludin et al., 2021; Sherif, 2020). A couple of the research did research about a connectedness between information in media and stock investment behavior from January to July 2020 by using equity indices and numbers of new stock market participants then analyzing the data with correlation coefficient, auto correlation and variance-covariance matrix (Aslam et al., 2020; Pagano et al., 2021). Lastly, another one did a study about an association between stock investment decision and stock investment behavior from January to April 2020 by using equity indices and COVID-19 confirmed and death cases then analyzing the data with auto-correlation (Dubin Watson) (Lee et al., 2020).

The majority of related literatures cited works was causal comparative research studying about relationship between stock investment behavior and ten variables including; 1) the COVID-19 pandemic; 2) effects of the COVID-19 pandemic; 3) risks of the COVID-19 pandemic; 4) COVID-19 confirmed and death cases; 5) fear sentiment and moods; 6) panic and lockdowns; 7) attention; 8) herding; 9) national culture; and 10) social media. The study periods, data in use, and the data analysis techniques were shown in Table 1.

To conclude, factors affecting stock investment behaviors during the health crisis are behavioral finance factors (fear sentiment and financial bias) psychological factors (financial attitude, financial opinion, financial expectation, investors' attention,

and stock investment decision), social factors (the numbers of infected and death cases, panic and lockdowns, the COVID-19 pandemic, effects of the COVID-19 pandemic, information in regular media and social media), as well as anthropological factor (national culture).

Table 1 Studied factors affecting stock investment behavior during the pandemic

Studied factors	Authors	Study period	Data	Data Analysis
The COVID-19 pandemic	1. Al-Qudah and Houcine (2021) 2. Baek et al. (2020) 3. Dhall and Singh (2020) 4. Mishra and Mishra (2021) 5. Ortmann et al. (2020) 6. Rahman et al. (2021) 7. Xue et al. (2021).	March to June 2020	1. equity indices 2. trading data 3. COVID-19 confirmed and death cases	1. regression family 2. generalized autoregressive conditional heteroskedasticity (GARCH) 3. Granger causality test.
Effects of the pandemic	1. Chiah and Zhong (2020) 2. Fang et al. (2021) 3. Khan et al. (2020) 4. Liu et al. (2021) 5. Shaikh (2020) 6. Sun et al. (2021) 7. Uddin et al. (2021)	December 2019 to March 2020	1. equity indices 2. COVID-19 confirmed and death cases 3. trading volumes 4. volatility index 5. sentiment index	1. regression family 2. GARCH with skewness 3. exponential GARCH
Risks of the pandemic	1. Abuzayed et al. (2021) 2. Li et al. (2021)	July 2019 to July 2020	1. equity indices 2. COVID-19 confirmed and death cases	1. regression family 2. exponential GARCH 3. Value at Risk
Cases and deaths	1. Harjoto et al. (2021) 2. O'Donnell et al. (2021)	January to June 2020	1. equity indices 2. COVID-19 confirmed and death cases	1. multivariate regression 2. GARCH

Table 1 (Continued)

Studied factors	Authors	Study period	Data	Data Analysis
Fear sentiment and moods	1. Duan et al. (2021) 2. Naseem et al. (2021) 3. Shaikh (2020) 4. Subramaniam and Chakraborty (2021)	January to April 2020	1. equity indices 2. COVID-19 confirmed and death cases 3. fear index 4. sentiment index 5. big data from Sina Weibo	1. support vector machine algorithms 2. OLS regression with bootstrapped standard error 3. augmented regression.
Panic and lockdowns	1. Aggarwal et al. (2021) 2. Baig et al. (2021)	January to April 2020	1. equity indices 2. trading volumes 3. Google search index	1. regression
Attention	1. Smales (2021)	January to June 2020	1. equity indices 2. Google Search Volume	1. regression 2. exponential GARCH
Herding	1. Wu et al. (2020)	June 2019 to October 2020	1. equity indices	1. regression
National culture	1. Ashraf (2021) 2. Fernandez-Perez et al. (2021)	January to March 2020	1. equity indices 2. COVID-19 confirmed and death cases 3. culture index	1. regression
Social media	1. Huynh et al. (2021) 2. Maia et al. (2021)	January to February 2020	1. equity indices, 2. COVID-19 confirmed and death cases 3. sentiment index 4. big data extracted from Twitter	1. regression 2. time-varying parameter-vector

Section 6 Theories

This study mainly used behavioral science theories to analyze and explain the results of this studies. The main theories comprised decision theory with a human face, cognitive psychology (information processing), nudge theory, and national culture.

6.1 Decision Theory with a Human Face

This decision theory was developed by Bradley (2016), who was a professor and a project leader at The London School of Economics and Political Science. He had an interest in decision-making in uncertain and unknown situations. He also argued an explanation of decision-making that decision-making varied from state to state, and, differed in each individual trait. The state could be described as risky (slightly uncertain), uncertain, and ambiguous (severely uncertain).

First, the risky state was conditions that there were no significant pieces of information about available options, however, probabilities of selecting these options could be evaluated fairly accurately. According to von Neumann and Morgenstern theory, individuals were expected to select the options that they desired. Desirability of selecting the options was consequences of the options; in addition, according to the Choice Principle, the consequences were entities having importance to individuals such as wealth and well-being.

Second, the uncertain state was conditions that there were no accurate pieces of information about options being accessible to individuals, and thus, probabilities of selecting the options in this state were likely to be evaluated inaccurately. According to Desirability of Actions theorem, individuals were expected to select the options that provided consequences maximizing their subjective expected utility. Additionally, according to Savage Acts, the consequences were various as each consequence was dependent upon each sub-state. Hence, the options would be judged and selected because of usefulness of their consequences at a particular sub-state.

Third, the ambiguous state was conditions that there were not both important and precise pieces of information about given options. Moreover, there were no known outcomes of the similar state. Consequences of the options were unknown,

and thus, probabilities of selecting the options could not be evaluated. According to Imprecise Bayesian, individuals had their own grounds for deciding what to do, and, used the grounds to form their personal opinions about the options. This was called pragmatic dogmatism. Hence, individuals would select the options that were believed to be the best for their purposes, or, that were acceptable to a group of others.

Due to the fact that this study was conducted in the time of the COVID-19 pandemic which had never occurred, and no one had ever encountered this health crisis; the context of this study was the ambiguous state which investors in stock markets could not anticipate consequences of their investment options. Decisions of the investors were expected to be dependent upon their personal opinion or beliefs.

6.2 Cognitive psychology

Cognitive psychology in terms of information processing was a development of cognitive psychology that explained mental processes through receiving and responding to information (American Psychological Association, 2023). Information processing consisted of perception, memory, and problem-solving. Perception was a mental activity that individuals were conscious of things and events surrounding them (American Psychological Association, 2023). According to Gregory's theory of perception, after perceiving the things and events, individuals inferred the environment from their knowledge and experience (Fulcher, 2003, p. 29). Memory was "the ability to retain information" (American Psychological Association, 2023). According to Atkinson and Shiffrin's model, the memory comprised short-term store (STS) and long-term store (LTS). The perceived pieces of information were encoded into short-term store; and some of the information that were rehearsed would be encoded into long-term store (Fulcher, 2003, pp. 64-65). Problem-solving was a mental process that individuals used their reasoning in order to achieve their goals (American Psychological Association, 2023). Moreover, Fulcher (2003, pp. 96-97) argued that individuals made the effort to understand a problem in a particular situation although they sometimes could not make a complete understanding of the problem because of failure to apply their basic world knowledge.

The information processing was illustrated with a model diagram, Figure 8, showing that perceived pieces of information in an environment (input process) flew into memory (storage process) and problem-solving (output process) (Mcleod, 2024).

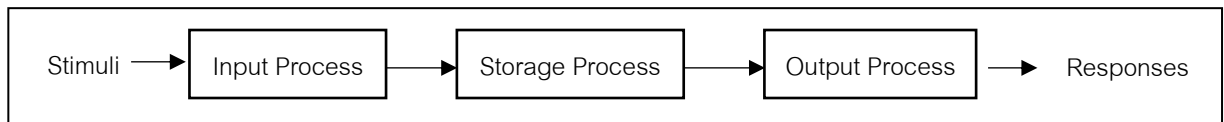


Figure 8 Information Processing Model

Source: <https://www.simplypsychology.org/information-processing.html>

This study had an interest in stock investment decision-making process. The cognitive psychology provided a body of knowledge about human mental processes, which could be used to explain the decision-making process of investors in stock markets under the COVID-19 circumstances.

6.3 Nudge theory

Thaler and Sunstein (2021) argued that nudge theory was a perspective on influencing decision makers by means of designing the environment for the decision makers. According to Libertarian and Paternalism concept, policies implemented by institutions had a role in manipulating the environment and the decision makers. In other words, Libertarian and Paternalism was a public choice architecture. The choice architecture was an idea that the decision makers were offered standard choices by either intentional or unintentional environment, without the feeling of being controlled. In addition, the decision makers were considered as real humans who had limited capacities of memorization and calculation; and thus, they usually made imperfect decisions due to biases such as heuristics (anchoring, availability, and representativeness), status quo bias, and herding.

The context of this study was the COVID-19 pandemic which millions of people were infected with the coronavirus, and thus governments of many countries implemented non-pharmaceutical interventions such as lockdowns. The non-pharmaceutical intervention impacted stock investment environment. Positively, the

investors had more time spending on considering their portfolios, and negatively, the investors had a concern about business activities. Hence, stock investment decisions were influenced through an unintentional environment shaped by the government policies.

6.4 National culture

National culture included six dimensions: power distance, individualism, motivation towards achievement and success, uncertainty avoidance, long-term orientation, and indulgence.

Large versus small power distances

Power distance was used to describe features of relationship between persons in societies where there were unequal distributions of power. An acceptance of power distance was transferred from the elders to the youngers, from parents to their children, or from superiors to subordinates. Large power distance societies accepted inequality and hierarchy. Their children were shaped to be respectful. The subordinates had a role in obeying the official orders. Policies are adopted through central authorities. In contrast, small power distance societies had an opinion that inequality was unacceptable while hierarchy was fairly acceptable in some specific situations. Their children were shaped to be autonomous. The subordinates had a role in giving and taking advice. Policies were adopted through each local authority (Geert Hofstede, 2014).

Thailand scored 64 on power distance index, while the average of Asian countries scored 71 (The Culture Factor Group, 2024a).

Individualism versus collectivism

Individualism was used to indicate societies where the persons loosely connect and explicitly communicate with others. Individualist societies valued tasks rather than relations; also, accepted human rights and disagreements. In contrast, Collectivism was used to indicate tight connecting and implicit communicating societies. Collectivist societies valued relations and “in-group harmony”; but somewhat respected human rights (Geert Hofstede, 2014).

Thailand scored 19 on individualism index, which was considered to be a collectivist country, explicitly (The Culture Factor Group, 2024a).

Decisive versus consensus-oriented societies

Previously, decisive and consensus-oriented societies were named masculine and feminine ones. With the concern over sex discrimination, the names were changed in 2023 (The Culture Factor Group, 2024b). Decisive society was motivated by competition. People in this society valued the status of being the best so they were interested in the use of social media to collect facts. In contrast, consensus-oriented society was motivated by quality of life. People in this society valued happiness and health so they were compassionate and used social media in order to know facts and communicate with others (Geert Hofstede, 2014; The Culture Factor Group, 2024b).

Thailand scored 34 on motivation towards achievement and success index, which was the lowest score among Asian countries as the average of Asian countries scored 53, and the average of the world scored 50 (The Culture Factor Group, 2024a).

Uncertainty avoidance versus uncertainty acceptance

Uncertainty avoidance was used describe feelings of groups of people when they encounter some ambiguities or “unknown situations.” It was suggested that uncertainty avoidance was not risk avoidance. Persons in uncertainty avoiding societies participated in risky activities in the case that they had already known those activities and surroundings. In unfamiliar situations, they felt anxious and perhaps are emotionally aggressive as they believed that the unknown is insecure. They thus took a lot of effort to clarify the unknown. In contrast, persons in uncertainty accepting societies felt less anxious and could control their emotions as they believed that the unknown was exciting. Therefore, they agreed to learn the unknown, satisfactorily (Geert Hofstede, 2015).

Thailand scored 64 on uncertainty avoidance index (The Culture Factor Group, 2024a).

Long-term Orientation versus Short-term Orientation

Long-term orientation represented societies internalizing a pragmatic characteristic. Persons in long-term orientation societies were perseverant and well-prepared for alterable events. They believed that norms and traditions are dynamic and dependent upon each specific situation. In contrast, short-term orientation represented societies internalizing a normative characteristic. Persons in short-term orientation societies were traditional and proud of their national prides. They believed that norms were immutable, and traditions were inviolable. They thus behaved as usual, in spite of the fact that environments had been changed (Geert Hofstede, 2015).

Thailand scored 67 on long-term orientation index (The Culture Factor Group, 2024a).

Indulgence versus Restraint

Indulgence was an attitude that an enjoyable life is a human basic need, so persons in indulgent societies committed themselves to have leisure and be optimistic. They preferred social contact and social activities such as sports (and festivals). They also valued “freedom of speech” and accepted foreign audio and visual arts. In contrast, Restraint was a belief that social norms were basic rules of living. Persons in restrained societies were obligated to work interested in (just) themselves, so they preferred independent activities (Geert Hofstede, 2015).

Thailand scored 45 on indulgence index, however this score could indicate that Thailand had a preference on either indulgence or restraint (The Culture Factor Group, 2024a).

Since the second objective of this study was conducted in Thailand, national culture was used to explain the findings of multiple-case study in Thai investors.

Section 7 Systematic literature review

Definition

In the 17th century, a Scottish surgeon named James Lind had been documenting how sailors prevented themselves from having scurvy. This way of collecting experiential data on patients was beneficial in showing whether or not each

remedy was proper for all patients, and afterwards it was called randomized controlled trials (RCTs). In the 19th century, after World War II, new research papers were produced too massively, resulting in the “information mountain” (Petticrew and Roberts, 2006) phenomenon. In the UK, a tuberculosis specialist named Archie Cochrane suggested that new research about health care should be evaluated and organized before implementing. Meanwhile, in the US, social scientists started to organize and evaluate new research in their fields. In the 20th century, the “information explosion” (Booth et al., 2012) phenomenon was sprung into academia via the internet expansion. The large increase in information resulted in web-based studies in bulk in several and different methodologies; thus, it was suspicious whether or not the consistency in research findings still existed. So as to avoid personal biases and find an agreement on all available studies, related studies to a particular purpose needed to be examined how appropriate they were for and be arranged in each specific area. The findings of those studies, then, needed to be analyzed and summarized in a single summary showing what was effective as well as what was ineffective. This summary was extracted from doing systematic literature review; it was said to be “the best evidence” of all available information.

Types

According to Xiao and Watson (2017), systematic literature reviews have been categorized by purposes of reviewing into describing, testing, extending and critiquing. Since descriptive review is basically employed in order to reveal what the relevant research contains and the types of literatures that will be reviewed are able to be quantitative, qualitative and mixed methods studies; this review is of interest. Types of descriptive reviews include narrative review, textual narrative synthesis, scoping review, meta-narrative and meta-summary. First, narrative review is a basic descriptive review that reviewers have no need to concern about the quality and the types of related studies, but need to collect plenty of information to draw and describe a whole picture of a study topic. This type of review, thus, is quite the most expensive and time-consuming. Next, textual narrative review is used to make comparisons among many

different studies through organizing them into each category such as by population, by intervention and by context. Similarly, but not exactly, scoping review is used to create aggregations of each study aspect such as sample, exposure and outcome. This kind of review is feasible to visualize the principle of a research question. Fourth, meta-narrative is employed when the same and single research problem is investigated by many researchers implementing multimethod of study. This type of review has a potential to indicate various measurements of the problem and some errors of research designs. The last one is meta-summary in which reviewers have to extract findings of all gathered studies and compute the effect sizes by “the frequency of each finding”, then the main topic will be discovered.

Frameworks

The frameworks have been employed to scope the review and make a concentration on a research question. Major forms of frameworks were designed by many academic institutions and resources. In this part, the main forms have been compiled from online library resources of two universities in Perth, Australia and two universities in Reading and London, the United Kingdom namely Murdoch University Library (2021), Central Queensland University Library (2021) University of Reading Library (2021), and City University of London Library (2021). The first and most common framework is PICO (Population or Problem, Intervention, Comparison, Outcomes). The aim of this framework is to compare the outcomes of related studies to find the effectiveness of interventions. Sometimes, some studies intend to study the effects of some exposure or environment, so I (intervention) is replaced by E (environment or exposure). PICO, thus, becomes PECO. Some studies have research questions about how interventions work and produce outcomes in the essential settings; consequently, C (comparison) is changed to C (context) and M (mechanism) replaces P (Population or Problem). Hence, this framework is so-called CIMO. Furthermore, there is a homophone of PICO. That is PICo (Population or Problem, Interests, Context). This form of framework is claimed to be appropriate for qualitative questions because I (interests) is definable as a specific situation, process, experience or even activity; which it ought to be

explained in detail. More specific forms of frameworks derived from PICO are PICOC and SPICE. PICOC (Population, Intervention, Comparison, Outcomes, Context) is used to compare outcomes resulted from interventions in a particular situation so that effectiveness of interventions in the context is obviously clarified. While SPICE (Setting, Population or Problem, Intervention, Comparison, Evaluation) is used to answer research questions that emphasize people's cognition in a particular setting, so P (perspective) substitutes for P (Population or Problem) and E (evaluation) is augmented in order to evaluate what outcomes are and how effective interventions are as well.

Protocol

The review protocol is a guidance in reviewing literatures. According to PRISMA 2020 statement (Page et al., 2021), the protocol consists of: background describing events or situations which lead to a review question; review targets that answer the review question; search strategy specifying keywords (search terms), resources (databases), language in search, and time span; inclusion and exclusion criteria including types of research (qualitative or/and quantitative research), types populations or samples, types of interventions or exposure, and types of contexts or setting where the research has been done; as well as data extraction and synthesis strategies that are used to create a new piece of writing.

To conclude, this study employed a descriptive systematic literature review with narrative synthesis. The framework for scoping the search was PECO; which P was populations, E was exposure, C was comparison, and O was outcomes. The population of the search was investors in stock markets. Exposure was the COVID-19 pandemic. Comparison was consideration for independent variables. Outcomes were stock investment decision.

Section 8 Multiple-case study research

Yin (2017) defines the case study research as the approach is answering research questions about a current and real-life situation which contains a variety of variables and multiple results. And especially, there is no "control over behavioral events". The approach consists of documentary data, an event observation and

interviews of the key informants. The purposes of a case study can be exploratory, descriptive, or explanatory. An exploratory case study is used to examine what the difference between cases is, while a descriptive case study is used to find what the origin of effect(s) of a situation is happening now. Apart from those case studies, an explanatory case study is used to explain how or why the behavior occurs. Moreover, case study research could be categorized into a single-case study and a multiple-case study (Yin, 2017). This study, however, concentrated only on the multiple-case study design.

Stake (2006) argued that the multiple-case study was a research design that examined variables being able to be found in many cases, and had a purpose in exhibiting similarities and dissimilarities in a special context. The design of the multiple-case study consisted of study question(s), cases to be studied, analytic technique, and criteria for interpreting findings (Yin, 2017). The study question(s) could be derived from related literatures about a key topic being of interest (Yin, 2017), and it should be the question(s) about a studied context and the cases to be studied (Stake, 2006). The cases to be studied should be related to the study question (s), diverse in the studies context, and informative (Stake, 2006). According to (Yin, 2017), a set of qualitative data could be analyzed through a variety of analytic techniques described in Appendix A. As one of objectives of this study was to verify factors affecting decision-making of Thai investors through comparing the factors discovered by a multiple-case study the factors identified by a systematic literature review, pattern matching analysis was implemented. Completing analyzing the data, findings of the analysis could be interpreted through several criteria described in Appendix B. Due to a prediction that there were perhaps some remaining factors not being identified (Yin, 2017), plausible rival explanations were used in this study.

Section 9 Conceptual framework

This study aimed to study the decision-making process of investors in stock markets under the COVID-19 circumstances through conducting a multimethod study design which composed of a systematic literature review and a multiple-case study of

Thai investors. The systematic literature review aimed to identify factors affecting the stock investment decision-making process of multinational investors. The decision theory with a human face (Bradley, 2016) stated that human decisions were influenced by environmental and psychological factors. Based on this decision theory, in phase one, the current research focused on environmental factors as the COVID-19, and the psychological factors as biases of each investor.

In the second phase, the identified factors affecting the multinational investors were verified whether or not they had a role in influencing the decision-making process of Thai investors through the multiple-case study with a retrospective interview. The key informants were asked to recall what they perceived and what they applied to stock investment decision-making at the beginning of the COVID-19 pandemic. Consequently, cognitive psychology in terms of information processing, including perception, memory, and problem-solving (American Psychological Association, 2023; Fulcher, 2003) were used to understand the verified factors. However, this study did not examine the factors relating to investor memories. A box of memory was painted in black color, accordingly.

Since the decision-making of Thai investors were explored under the COVID-19 circumstances, in this study, their behavior was examined within the framework of the nudge theory stating that a government had interventions used to lead people to a desirable behavior (Thaler & Sunstein, 2021). The interventions used during the COVID-19 pandemic included social distancing measures and official announcements via social media platforms (Correa et al., 2022; Ivanov et al., 2023). In addition, the nudge theory stated that investors were having limitations in calculating and memorizing, and thus they sometimes use biases to make decisions (Thaler & Sunstein, 2021). Therefore, it was hypothesized that the impacts of the government interventions such as the extra time spent on consuming information (Mongkhon et al., 2021) as well as biases (Bakry et al., 2022) could affect the decision-making of Thai investors.

Moreover, Thai investors were characterized through national culture (Goodwin et al., 2021) that they have a quality of uncertainty avoidance so they seem emotional while facing uncertain situations (The Culture Factor Group, 2024). Thai investors were

hypothesized that the decision-making during the COVID-19 pandemic was affected by their emotions (Chundakkadan & Nedumparambil, 2022; Fernandez-Perez et al., 2021; Huynh et al., 2021; Shear et al., 2020).

To conclude, in the first phase, the identified factors were separated into environmental and psychological factors. In the second phase, there was a hypothesis that the number of COVID-19 cases, the extra time spent on consuming information, biases, and emotions can influence the decision-making of Thai investors being in the COVID-19 situations. Therefore, a conceptual framework of this study was illustrated in Figure 9.



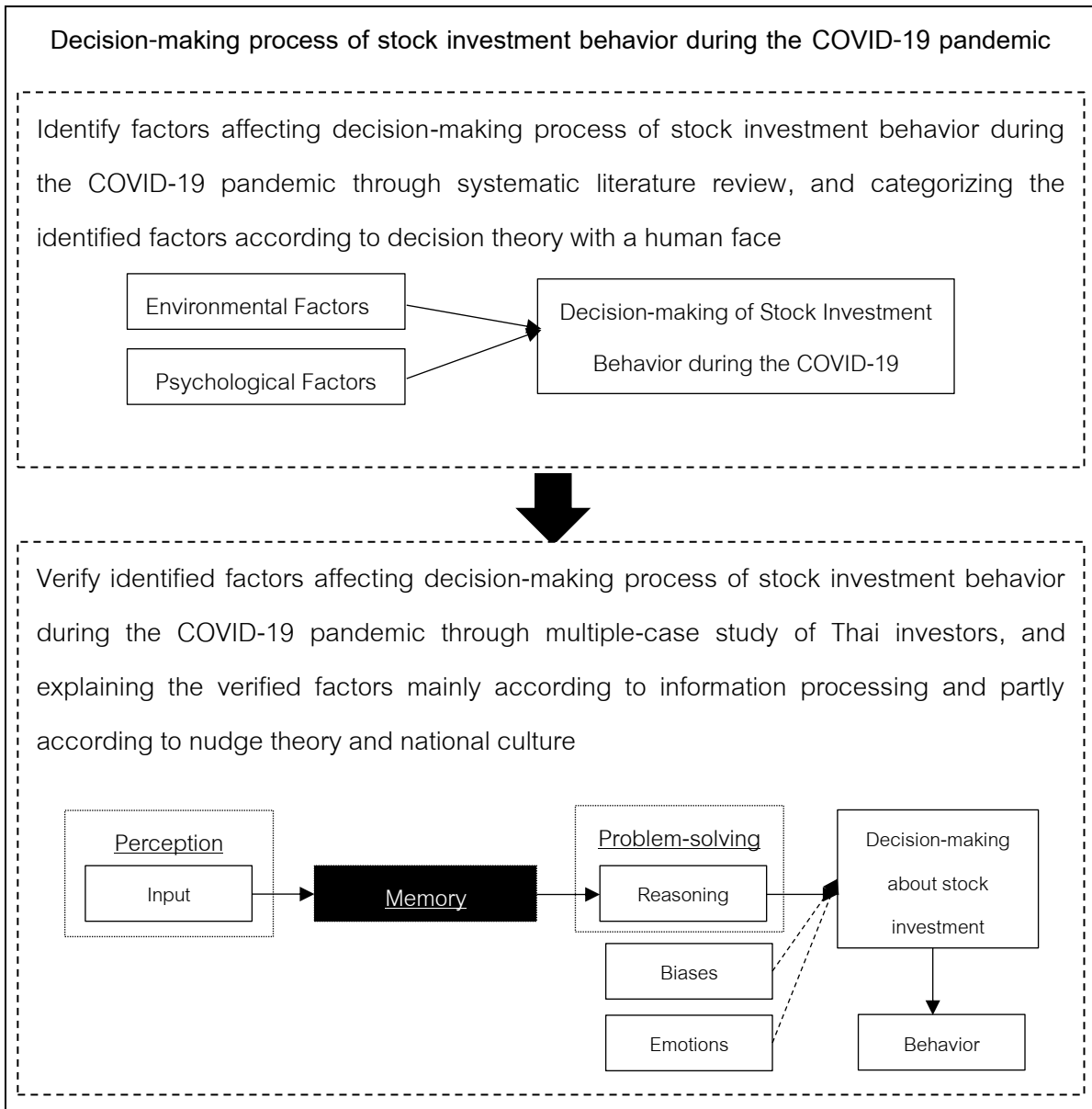


Figure 9 Conceptual framework

CHAPTER 3

METHODOLOGY

Since this research aims to explore the decision-making process of stock investment behavior during the COVID-19 pandemic, the first phase of this research has an objective of identifying factors affecting the decision-making process of investors in stock markets through systematic literature review; thereafter, the results of the first phase is verified through a multiple-case study of Thai investors in the second phase. The protocols of both methods are explained in the sub-sections.

Phase 1: Identifying factors influencing the decision-making process of stock investment behavior during the COVID-19 pandemic through a systematic literature review

According to the first research question requesting to identify factors that affected the decision-making process of stock investment behavior during the COVID-19 pandemic, the method of systematic literature review in this study was scoped through PECO framework; P stood for stock investors who were observed their stock investment behavior, E stood for exposure that was the COVID-19 pandemic, C stood for comparison between independent variables, and O stood for outcomes of the independent variables which were stock investment decisions. Moreover, this systematic literature review was organized mainly according to PRISMA 2020 item checklist (Page et al., 2021). Additionally, the risk of bias assessment was adapted from The Cochrane Collaboration: Cochrane risk of bias tool for randomized trials (RoB 2).

1.1 Systematic Literature Review Methods (PRISMA 2020)

Eligibility

The interest of this study was the factors influencing the decision-making and behavior of investors in stock markets during the COVID-19 outbreak. The included studies should be eligible for the inclusion and exclusion criteria.

Inclusion Criteria

1. The retrieved literature works must be related to the COVID-19 pandemic context. Hence, the titles and abstracts can be composed of synonym of COVID-19.

2. The retrieved literature works must be related to components of stock investment decision-making at least one aspect of economics and finance, psychology, anthropology or sociology. Hence, the titles and abstracts can be composed of the words and content related to economic and financial, psychological, anthropological and sociological activities.

3. The titles and abstracts of the retrieved literature works do not necessarily use the word, 'decision-making process', directly.

4. The retrieved literature works must be related to stock investment behavior and conducted through primary data, which is collected from stock investors' behavior, not from stock market activities namely stock returns, volatilities, and liquidities.

Exclusion Criteria

1. The titles and abstracts of the retrieved literature works consist of the COVID-19 pandemic setting and stock market activities; except that the economic and financial, psychological, anthropological and sociological components do not appear. This kind of literature works are excluded and labelled as 'no components.'

2. The titles and abstracts of the retrieved literature works consist of the COVID-19 pandemic setting, stock market activities and other financial markets activities. This kind of literatures are excluded and labelled as 'stocks and others.'

3. The titles and abstracts of the retrieved literature works consist of the COVID-19 pandemic setting, stock market activities and macroeconomic ones. This kind of literatures are excluded and labelled as 'macroeconomics.'

4. The titles and abstracts of the retrieved literature works consist of the COVID-19 pandemic setting and stock market activities; however, they have the interest of a single sector. This kind of literatures are excluded and labelled as 'single sector.'

5. The titles and abstracts of the retrieved literature works consist of the COVID-19 pandemic setting and other financial markets activities, except stock market ones. This kind of literatures are excluded and labelled as 'other financial markets.'

6. The titles and abstracts of the retrieved literature works consist of the COVID-19 pandemic setting and business management. This kind of literatures are excluded and labelled as 'management'.

7. The titles and abstracts of the retrieved literature works consist of the COVID-19 pandemic setting but do not contain any types of investment; or they are do not consist of the COVID-19 pandemic setting. This kind of literatures are excluded and labelled as 'not related'.

8. Full-articles of the included literature works are not accessed. These literature works are excluded and labelled as 'inaccessible'.

Information sources

As an increasing number of related studies was a matter of concern (Petticrew and Roberts, 2006, pp. 7-8), this study relied only on a couple of accessible academic databases namely Scopus and ScienceDirect. Both databases have similar search techniques but not exactly the same ones. Their advanced search tips are shown in the Table 2.

Table 2 Scopus and ScienceDirect Search Tips

Specification	Scopus	ScienceDirect
Document type	Article	Research article
Boolean Operators	<p>OR operates as finding literatures containing at least one of the search terms.</p> <p>AND operates as finding literatures containing both search terms.</p> <p>AND NOT operates as finding literatures not containing the one search term</p>	<p>OR operates as finding literatures containing at least one of the search terms.</p> <p>AND operates as finding literatures containing both search terms.</p> <p>NOT operates as finding literatures not containing the one search term</p>

Table 2 (Continued)

Specification	Scopus	ScienceDirect
Document type	Article	Research article
Find exact or approximate phrases and words	Quotation mark (“”) operates as finding literature works containing almost exact search terms. Braces operates as finding literature works containing exact search terms.	Quotation mark (“”) operates as finding literature works containing those specific search terms.
Hyphen (-)	Hyphen is excluded while searching, however, it is included if it is in the braces. For example, searching for decision-making, the result will show literature works containing decision and making both separately and together.	Hyphen operates as NOT operator. For example, searching for decision-making, the result will show literature works containing just the decision. However, it becomes an ignored punctuation if it is in the quotation mark.

1.2 Search Strategy

To select the eligible studies, search strategy including search terms, language, and time span are specified.

Search Terms

The search terms are determined through keyword reduction and resemblance. According to the first research question, the main search terms are comprised of “decision-making process,” “stock investment behavior” and, “COVID-19 pandemic”. The generation of the search terms are shown in the figure below. Thus, sets of search terms are generated to 27 sets for each database. Both databases have similar Boolean operators, so AND operator is employed to connect the search terms. However, the means of finding specific search terms are dissimilar. Scopus has braces that function word specification while ScienceDirect has quotation mark (“ ”) doing so. In order to settle the same sets of search terms and reduce some errors, hyphen (-) in the middle of the words decision and making is removed. Hence, the search term ‘decision making’ is used instead of ‘decision-making.’

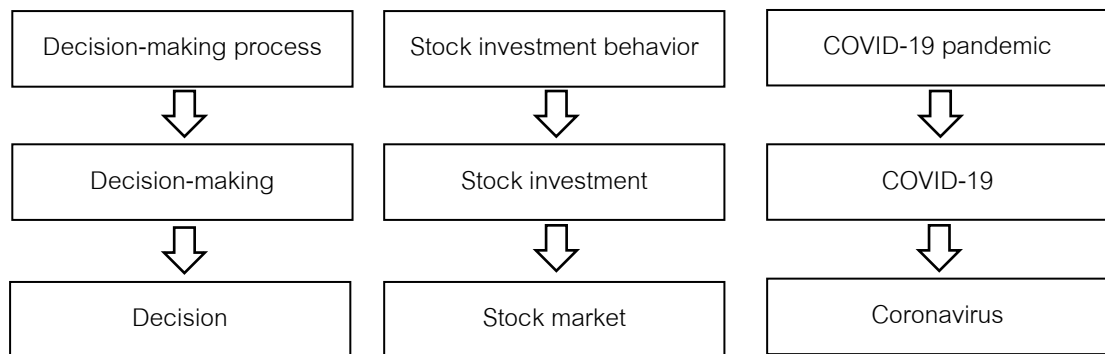


Figure 10 Generation of search terms

Language and Time Span

The language in search was determined as English, and the time span of search was between 2020 and 2022.

1.3 Selection process

So as to select the most practicable sets of the strings, relative frequency or empirical probability (Salvatore and Reagle, 2011, p. 37) of the relevance was computed by the fraction of the number of relevant studies divided by the number of total searches. Finding the studies as per the search terms, the reached studies were screened through relevant subject areas namely Economics, Econometrics and Finance; Psychology, and Social Sciences. The sets of search terms, having the highest empirical probabilities, of Scopus and ScienceDirect would be selected.

Data collection process

The data of the included studies would be collected manually. Thereafter, three reviewers would have a group discussion on data extraction, then, the reviewers worked independently. After extracting the data individually, three sets of extractions would be compared.

Data items

In applying “Tabulating the included studies” (Petticrew and Roberts, 2006, p. 165), all the included studies will be considered rigorously in order to indicate their research context, design, and results. The research context consists of the COVID-19 situations – including real-life and stock market situations, and research population

(Denyer and Tranfield, 2009, pp. 671-686). The research design is composed of sampling technique, the numbers of samples, research instrument, and data analysis. The research results are divided into independent and dependent variables. These details of each included study will be tabulated. The potential tabulation of data is displayed below.

Table 3 Tabulation of the data

Author	Year	Research Context		Research Design				Research Results		
		The COVID-19 Situations		Population	Sampling Technique	Number of Samples	Research Instrument	Data Analysis	Independent Variable	Dependent Variable
		Real-life	Stock Market							

1.4 Synthesis methods

Narrative synthesis was applied in this study. The narrative synthesis is a synthesizing method using written words of the included studies to finalize a conclusion (Popay et al., 2006, p. 5). Since the variety of research objective is expected, narrative synthesis is applied to create the review results. The narrative synthesis comprises of organization of the included studies, writing the study analysis, and cross-included study synthesis (Petticrew and Roberts, 2006, pp. 170-181). Hence, firstly, the included studies will be arranged in types of factors and in alphabetical order of authors, Secondly, the findings of each included study will be described in terms of research context, design, and results. Finally, the heterogeneity of the context, design, and results (Petticrew and Roberts, 2006, p. 216) will be compared.

1.5 Reporting risk of bias assessment

The risk of bias assessment of this study originated from Cochrane risk of bias tool (RoB 2); which has five domains of bias including selection bias, performance bias, detection bias, attrition bias, and reporting bias (Higgins et al., 2022; Higgins and Green, 2011). Although RoB 2 criteria of the domains are relevant to experimental studies, the included studies are expected to be nonexperimental studies ones – no

manipulation of an independent variable and no randomizing participants to an assignment (University of Minnesota Libraries, 2016). Hence, the criteria of the domains of bias are adjusted to nonexperimental studies ones. Higgins et al. (2022) suggested that Generic risk of bias assessment can be conducted through:

1. providing definitions of the five domains of bias
2. writing signaling questions exhibiting the qualities of the domains
3. writing criteria of overall risk of bias (low, unclear, and high)
4. making a judgement

The risk of bias will be reported through a traffic light plot and a summary which will be created via a generic assessment tool in robvis, which is an online application designed for visualizing risk of bias assessment (McGuinness and Higgins, 2020).

Phase 2: Verifying the identified factors influencing the decision-making process of stock investment behavior during the COVID-19 pandemic through multiple-case study of Thai investors

Regarding the systematic literature review, it was expected that the included studies were probably not conducted in Thailand. The results of the first phase, therefore, were hypotheses which ought to be proved through an exploration of Thai investors, who were grouped by age. So as to verify the factors discovered in the first phase, a multiple-case study with pattern matching was conducted.

2.1 Multiple-case Study of Thai Investors

According to eFinance Thai (2022), it was reported that Thai investors were categorized into four generations: baby boomer and postwar (57 years old and above), Gen X (42-56 years old), Gen Y (25-41 years old), and Gen Z (13-24 years old). The majority of Thai investors was Gen Y; however, the most trading value was of Gen X investors.

Table 4 Generations and trading values of Thai investors

Age	Numbers of Investors	Percentage of Investors	Trading Value (Million THB)	Percentage of Trading Value
Baby Boomer and Postwar (57 and above)	143,000	13	12,899	30
Gen X (42-56 years old)	307,000	27	16,866	39
Gen Y (25-41 years old)	585,000	51	10,678	25
Gen Z (13-24 years old)	94,000	8	945	2
No Information	10,000	1	1,385	3

2.2 Qualitative Data Collection

The key informants were expected to be the accurate representatives of the Thai investors; therefore, they should be eligible for the inclusion and exclusion criteria.

Inclusion Criteria

1. The key informants were Thais who were born in baby boomer, generation X, and generation Y. Their ages are above 24 years old.
2. The key informants were investors who make investment decision themselves.
3. The key informants were investors who have experienced the COVID-19 situations in real-life and stock markets.

Exclusion Criteria

1. The key informants were investors who use algorithmic trading.

The access to the key informants

In order to reach out to Thai investors in three generations, snowball sampling was used to be this research sampling technique because this sampling technique was suitable for a qualitative study that the key informants were difficult to contact (Simkus, 2023). Since Thailand had power distance score at 64 (Hofstede Insights, 2022) which indicated that age hierarchy was accepted, the initial key informant was aimed to be an elder. The first key informant was requested to introduce two potential key informants. As the number of key informants was expected to be at the maximum of ten, a feasible key-informant map was shown in the Figure 11.

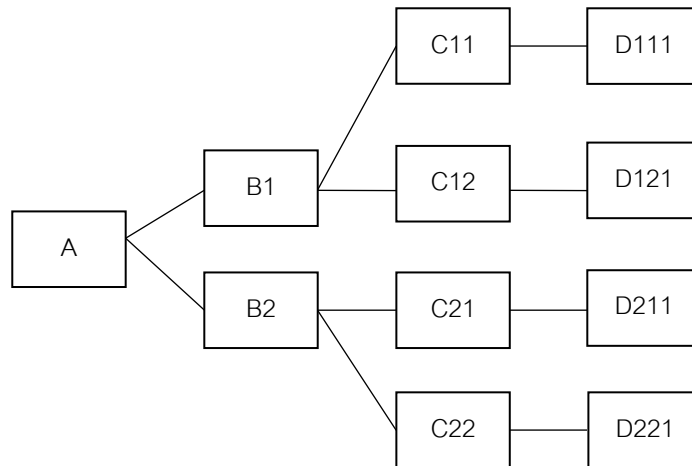


Figure 11 Snowball sampling

A was the first key informant who recruited another two key informants namely B1 and B2. Now, B1 and B2 were responsible for recruiting another two key informants namely C11, C12, C21, and C22. Then, they were suggested to recruit one key informant namely D111, D121, D211, and D221, respectively.

The procedures for protecting the key informants

This research was conducted under the Institutional Review Board of the Strategic Wisdom and Research Institute Srinakharinwirot University. The approve number was SWUEC/E/G-165-2565 as shown in Appendix A. With concerns over secrecy and privacy of the key informants, the preventive measures of secrecy and privacy were below.

1. The key informants were interviewed via mobile phone and asked for permission before recording the interview.
2. The records could be accessed by only one researcher.
3. The records were transcribed by only one researcher. The real names of the key informants were replaced by pseudonyms.
4. The personal information of the key informants was never revealed, and thus, the transcripts of the records were completely deleted after this research was fully finished.

5. The key informants were informed that please did not hesitate to refuse to answer any questions that caused uncomfortable feelings, and those questions were skipped.

Qualitative Research Instrument: Interview Questions

The qualitative data was collected through a retrospective in-depth interview, an interview form is semi-structured and constructed of the results of the systematic literature review. The initial interview form has been developed according to the advice of two persons in academia and one experienced investor. The validity and reliability of the interview questions are measured through the item objective congruence (IOC) index. Therefore, the questions having the IOC index below 0.67 are eliminated from the form. The form of the item objective congruence index was shown in Appendix E.

2.3 Qualitative Data Analysis: Thematic Analysis

Howitt (2019, pp. 148-158) states that thematic analysis is an analysis of content in qualitative data. The process of this analysis is outlined as the following.

1. Data familiarization. After the interview records are transcribed, the research should recognize the details of the transcriptions by considering occurrences in the interviews.

2. Initial coding generation. A coding is a definition of a piece of information in an interview, and, can both be line-by-line and a group of several lines. The coding should be an indication of significant information.

3. Search for themes. Themes are the categorization of the initial coding. Each theme can be expanded on sub-themes.

4. Review of themes. The themes are examined against the transcriptions to assure that there are proper supporting details for each particular theme.

5. Theme definition and labelling. The themes should be distinct from each other. Therefore, the researcher should describe each theme clearly.

Regarding the coding, Creswell and Creswell (2018, p. 195) suggest that there are three types of codes, including:

1. Expected codes are the codes that are expected to be discovered in the transcriptions as these codes have been introduced in a prior stage.

2. Surprising codes are the codes that are unexpected to be discovered in the transcriptions.

3. Codes of conceptual interest are the codes that are congruent with a study concept.

According to this study with the objective of identifying and verifying factors affecting the stock investment decision-making process, the codes will be discovered through deductive coding and inductive coding.

Deductive coding is the coding method that a codebook will be created through relying on the results of systematic literature review stage (Bingham, 2021).

Table 5 Deductive coding format

Codes	Definitions	Pieces of information	Case

Inductive coding is the coding method that the codes will be derived from the transcriptions of the interviews (Bingham, 2021).

Table 6 Inductive coding format

Case	Pieces of Information	Definition	Codes

2.4 Reporting Multiple Cases with Plausible Rival Explanations

Having expectations of discovering unexpected factors that perhaps affected stock investment decisions, pattern matching with plausible rival explanations was applied to report the multiple-case study results. According to Yin (2017, pp. 176-177), the procedure for conducting pattern matching for rival explanation was as the following.

1. Identifying factors affecting stock investment decisions that were found from the qualitative data analysis
2. Explaining how and why the investment behavior occurred
3. Comparing multiple-case study pattern of factors with the hypothetical pattern of factors found from systematic literature review
4. Explaining each factor that is different from the hypothetical pattern

2.5 Quality Assessment

According to Yin (2017, pp. 42-47), the quality of the multiple-case study can be assessed through:

1. Construct validity. Regarding data collection, the study should have the clarity in the case of study, specific criteria of the case of study, as well as, multiple sources or a chain of evidence. The description of Thai investors was retrieved from efinance Thai website, which was a reliable source of information. The inclusion and exclusion criteria of Thai investors who were the key informants were obviously declared next to the section of Thai investors description. Moreover, the qualitative data was collected through employing interview questions which were improved by two experts in behavioral science, and behavioral economics and finance; as well as, by one experienced Thai investor.

2. Internal validity. Regarding data analysis, the study should have an analytic technique in order to exhibit a relationship between the hypothetical pattern and multiple-case study one. The hypothetical pattern was constructed from the results of a systematic literature review of factors affecting stock investment decisions during the COVID-19 pandemic. As all the included studies of the review were not conducted in Thailand, the inductive inference was anticipated. As a result, the rival explanation was also considered. The results of this multiple case study exhibited the relationships between verified influential factors and stock investment decisions of Thai investors, while also exhibited the relationships between surprising influential factors and the decisions.

3. External validity. Regarding research design, the study should have a methodology that is logically or theoretically suitable for answering the research question. Hence, study results can be generalized. Concerning the sampling technique and the samples of the case of multiple-case study, snow ball sampling technique was conducted through beginning with approaching the first key informant who was a senior Thai investor due to concerning over Thai culture –respecting the elders. In addition, the number of the key informants was nine, including one Baby Boomer investor, one Generation X investor, and seven Generation Y investors. There was a resemblance between the proportions of the samples and this research population. Therefore, the results of this multiple-case study were general in Thai investors.

4. Reliability. Regarding the methodology and results, study methods should be repeatable and able to provide constant study results. Therefore, a case study protocol or documentation is necessary. Concernin the methodology and the results of this multiple-case study, the methodology clearly exhibited details of data collection which included the case description, eligibility of the key informants, snow ball sampling procedure, and the development of this research instrument. The details of data analysis – thematic analysis including coding generation and theme definition, were also exhibited with clarity. Hence, the methodology of this study could be repeated and could produce similar results.

This multiple-case study was conducted in order to verify the influential factors identified from systematic literature review. Although this multiple-case study was an exploratory study that the internal validity was not suggested to be an assessment of the quality of case study (Yin, 2017, pp. 44-45), this multiple-case study was organized according to a hypothetical pattern. Therefore, the internal validity remains eligible to be a test of the quality of case study.

CHAPTER 4

STUDY RESULTS

This study consisted of two phases: a systematic literature review and a multiple-case study. The results of this study are subsequently reported in two main sections.

Section 1. Results of objective 1 using systematic literature review including:

- 1.1 Search result
- 1.2 Data extraction
- 1.3 Narrative synthesis
- 1.4 Report of risk of bias
- 1.5 Identified pattern of factors affecting the stock investment decision-making

Section 2. Results of objective 2 using multiple-case study including:

- 2.1 Case of study description
- 2.2 Development of interview questions
- 2.3 Thematic analysis
- 2.4 Report of pattern matching for rival explanation
- 2.5 Quality of this multiple-case study

Section1 Results of objective 1 using systematic literature review

1.1 Search result

The included studies were searched through the search strings {decision} AND {stock investment} AND coronavirus, in Scopus; as well as, decision AND “stock market” AND “covid-19 pandemic, in ScienceDirect. There were 21 identified studies in Scopus and 919 studies in ScienceDirect, therefore, there were 940 identified studies in total. After scanning the identified studies through subject areas namely Economics, Econometrics and Finance, Psychology, and Social Science; there were 651 studies being screened through exclusion criteria. There were 7 eligible studies after screening. When exploring throughout the eligible studies, one study conducted an experiment on

finance professionals and students, and another study examined the differences in trading activities between before and during the COVID-19 pandemic due to age and gender. As a result, these two studies were not appropriate for this systematic literature review objective which aims to identify the factors affecting stock investment decision-making of investors. Finally, there were 5 included studies. The process of searching the included studies is shown in Figure 12.

1.2 Data extraction

The details of the included studies were collected and tabulated into research context including real-life, stock markets situations, and research population; research design including sampling technique, study duration, research instrument, and data analysis; and research results including independent and dependent variables (Petticrew & Roberts, 2006, p. 165). The details are shown in Table 7.

1.3 Narrative synthesis

The results of the narrative synthesis were the summary of the dependent variables as shown in table 6. The dependent variables were indicated to be identified factors having effects on stock investment decisions and behavior during the COVID-19 pandemic. The identified factors were examined under different research populations and methodologies. This section, therefore, exhibited heterogeneity of the study contexts and designs which led to the heterogeneity of the identified factors, and the effects of the identified factors.

1.3.1 Heterogeneity of study context

Every included study was conducted in the most ambiguous period of the pandemic as there was no COVID-19 vaccinations, so investors were encountering unfamiliarity with life and uncertainties in stock markets. However, research populations of the included studies were investors residing in single countries – India, Finland, and China (where the investors faced the first outbreak); and those residing in the grouped countries – Gulf Cooperation Council countries.

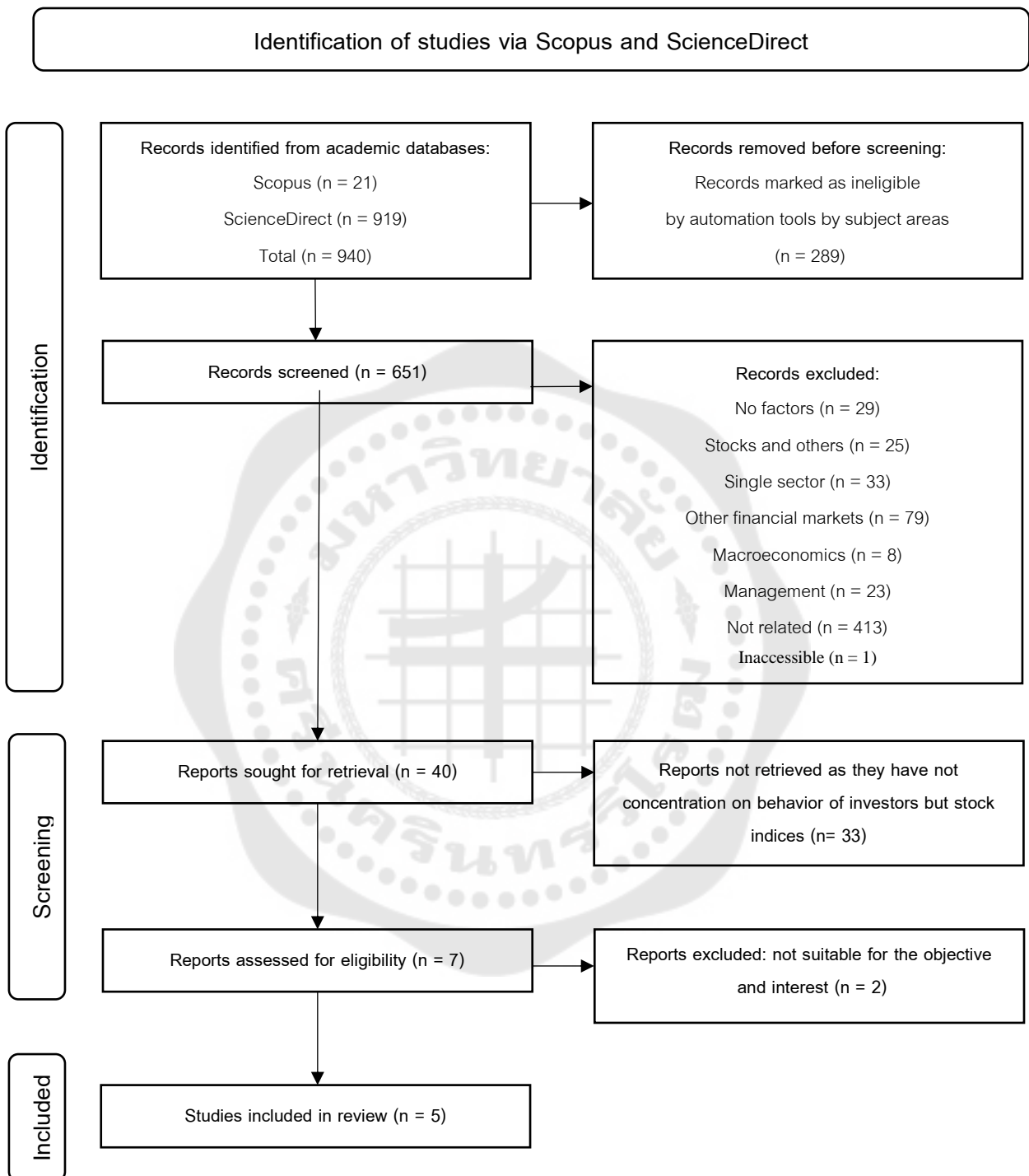


Figure 12 Flow of including studies for systematic review (PRISMA 2020)

1.3.2 Heterogeneity of study designs

All the included studies were correlational studies. The studies were categorized into one archival study and four survey studies. The archival data was recorded from January to December 2020, and analyzed via ordinary least square regression (Sha et al., 2022). The four sets of survey data were collected through questionnaires from January to November 2020; furthermore, a half of the studies were analyzed via structural equation model (SEM) (Abdeldayem & Al Dulaimi, 2020; S. Talwar et al., 2021), and another half of them were analyzed via artificial neural networks (ANN) (Kathpal et al., 2021) as well as analytic hierarchy process (AHP) (Himanshu et al., 2021).

1.3.3 Heterogeneity of identified factors

The Covid-19 cases, time spent on stock markets (Sha et al., 2022), expectations of pandemic risk (Abdeldayem & Al Dulaimi, 2020), and behavioral biases; anchoring, herding, hindsight, overconfidence and self-attribution, and representativeness (S. Talwar et al., 2021), were statistically proved to be independent variables having influence on decisions and behavior of investors. Dissimilarly, disposition effect, snake-bite effect, and status quo were not explicitly examined by statistical models; they were still indicated to be the reasons for investment decisions (Himanshu et al., 2021). Also, heuristic biases, anchoring, availability, and representativeness, were confirmed that they were dependent variables affected by the impacts of the COVID-19 which investors perceived, and thus, these biases in essence were suggested to be a cause of suboptimal investment decisions (Kathpal et al., 2021). At this stage, the identified factors affecting investor decisions during the COVID-19 outbreak were the COVID-19 cases, time spent on stock markets, expectations of pandemic risk, and nine types of investor biases.

Table 7 Descriptive table of the included study research context, design, and results.

Authors	Year	Research context			Research design			Research results		
		The COVID-19 situations		Research population	Sampling technique/ Duration	Number of samples	Research instrument	Data analysis	Independent variable	Dependent variable
		Real-life	Stock markets							
Sha et al. (2022)		Changes in commuting, a great number of news and discussion, and overwhelming panic	Intensified stock market volatilities	Chinese individual investors living in different cities having different infection rate (the number of infected cases per day)	Archival data/ from January to December 2020	29,687	2020 China individual investor behavior database including age, gender, marital status, education level, occupation, financial knowledge, investment year, and wealth level.	Regression	The COVID-19 cases and time spent on stock market	Diversifications of stock investment
Abdeldayem and Al Dulaimi (2020)	2020	A serious increasing rate of infection but no restrictions relieving monetary impact	Capital outflow and stock market crashes	Investors living in 5 GCC countries (Bahrain, Saudi Arabia, UAE, Kuwait, Oman)	Convenience sampling/ from January to March 2020	318	An online questionnaire survey consisting of 6 items measuring expectations of pandemic risk and 8 items measuring herding behavior	Structural Equation Model	Expectations of pandemic risk	Herd investment behavior
Himanshu et al. (2021)	2020	Lockdowns, adverse impacts on economic activities, and changes in lifestyle	High uncertainties	Indian investors residing in Delhi and Mumbai	Snowball sampling/ from May to July 2020	184	Questionnaire asking to compare preference for investment avenues before COVID-19 and during COVID-19	Analytic Hierarchy Process (AHP)	Disposition effect, snake-bite effect, and status quo bias	Decisions on portfolio holding

Table 7 (Continued)

Authors	Year	Research context		Research population	Research design			Research results		
		The COVID-19 situations			Sampling technique/ Duration	Numb er of sampl es	Research instrument	Data analysis	Independent variable	Dependent variable
		Real-life	Stock markets							
Kathpal et al. (2021)	2021	Collapse of business and investment activities	High uncertainties	Indian retail investor residing in Delhi region and invest in Bombay Stock Exchange	Convenience sampling by phone and personal visits/ from June to November 2020	290	A self-administered questionnaire containing demography, Covid-19 perception, and heuristic biases (five-point Likert scale)	Structural Equation Model	Anchoring, availability, and representativeness	Errors in investment judgement
(S. Talwar et al., 2021)	2021	Lockdowns, closure of commercial activities, but delayed economic supportive plans	Stock market crashes	Male Finnish investors being born between 1981 and 1996	Convenience sampling by sharing the survey link on What's app and Facebook / in May 2020	351	Online questionnaire surveying heuristic biases, self-deception biases, and social interaction	Artificial Neural Network (ANN) analysis	Anchoring, herding, hindsight, overconfidence and self-attribution, and representativeness	Trading activities during the pandemic



1.4 Report of Risk of Bias

Due to the fact the included studies were correlational studies that the research data was collected from respondents answering a self-report questionnaire themselves under a study context (University of Minnesota Libraries, 2016), a tool of assessing the risk of bias was adapted from generic risk of bias (Higgins et al., 2022) as shown in Appendix F. The thorough investigation of the risk of bias revealed that there were three low-risk-of-bias studies, and two unclear-risk-of-bias studies. The outcome of the investigation was reported via a traffic light plot and a summary plot as shown in Figure 13.

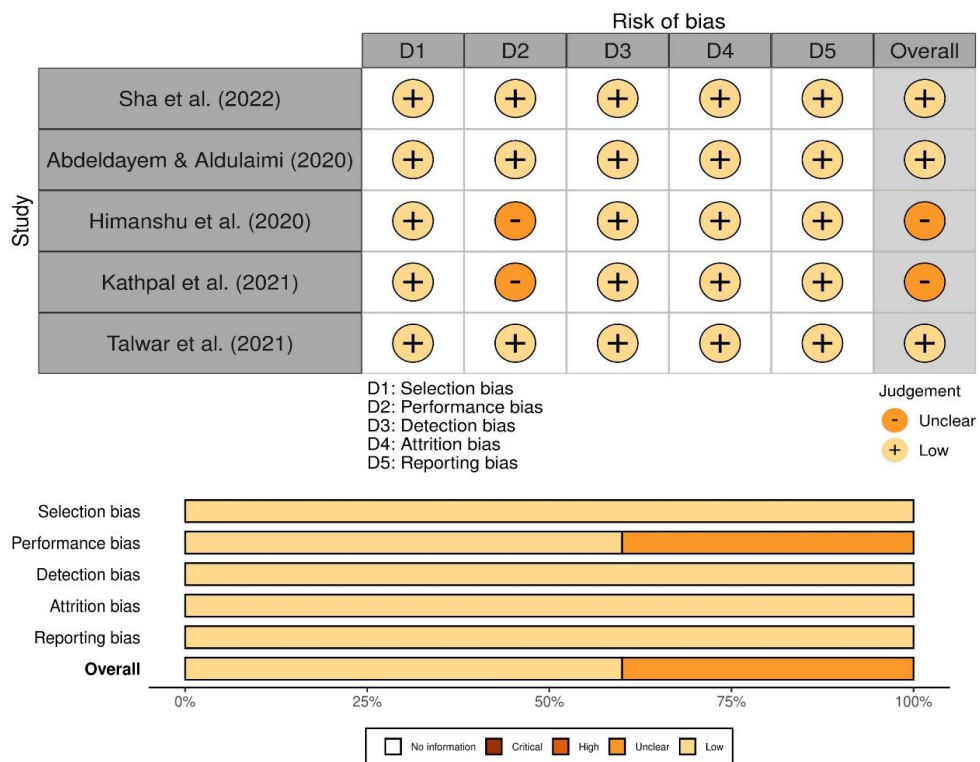


Figure 13 The report of risk of bias assessment.

Studies of Abdeldayem and Al Dulaimi (2020), Sha et al. (2022), and S. Talwar et al. (2021) had low risk of bias, while studies of Himanshu et al. (2021) and Kathpal et al. (2021) had unclear risk of bias.

1.5 Identified pattern of factors affecting stock investment decision

The pattern of the factors was identified through the systematic review. The factors were roughly categorized into environmental and psychological factors as shown in Figure 14. All environmental factors were proved that they had low risk of bias, however, a half of psychological factors were proved that they had unclear risk of bias.

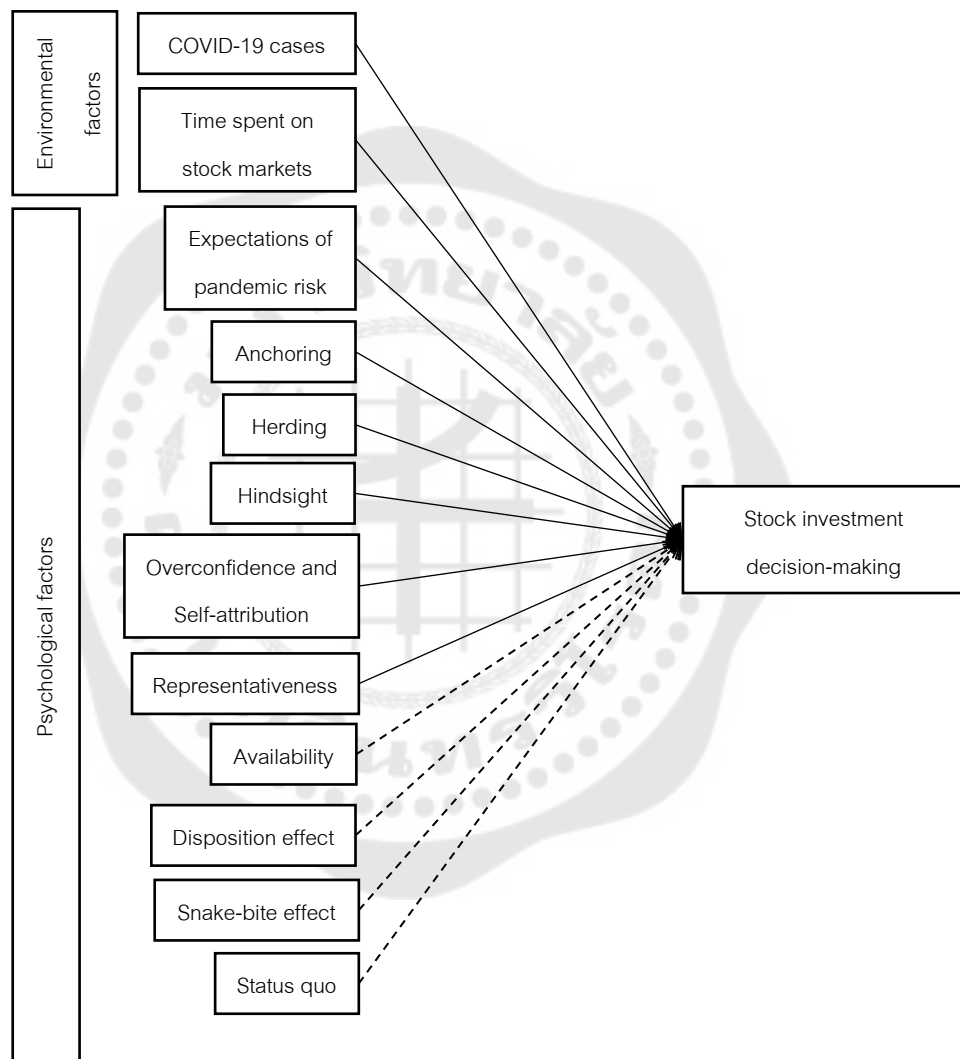


Figure 14 Identified pattern

The straight lines indicated that the identified factors had low risk of bias; and the dashed lines indicated that the identified factors had unclear risk of bias.

1.6 Explanations of each identified factor

1.6.1 COVID-19 cases were the number of the COVID-19 cases confirmed by the government, and this number related to frequencies of trading in stocks during the pandemic (Sha et al., 2022).

1.6.2 Time spent on stock markets, due to government travel restrictions, was the length of time that investors spent on observing performances of stocks listed in the stock markets; and this length of time gave investors a chance to diverse stocks in their portfolios (Sha et al., 2022).

1.6.3 Expectations of pandemic risk were the investor outlooks for revenues of firms listed in the stock market and for the time to invest in stocks; and this type of expectations related to herd investment behavior during the pandemic (Abdeldayem & Al Dulaimi, 2020).

1.6.4 Anchoring bias was the tendency of investors to rely on previous pieces of information while making investment decisions, therefore, their decision-making depended upon the former information (Kathpal et al., 2021; S. Talwar et al., 2021).

1.6.5 Herding bias was the tendency of investors to believe in the decisions of other investors and emulate others investment activities (S. Talwar et al., 2021).

1.6.6 Hindsight bias was the tendency of investors to believe in their ability to predict stock market events, therefore, their decisions depended upon their predictions (S. Talwar et al., 2021).

1.6.7 Overconfidence and self-attribution bias was the tendency of investors to overestimate their ability to predict stock market events, or/and, their investment knowledge because of their past success (S. Talwar et al., 2021)

1.6.8 Representativeness bias was the tendency of investors to make investment decisions due to a comparison between the past and current events (Kathpal et al., 2021; S. Talwar et al., 2021).

1.6.9 Availability bias was the tendency of investors to believe in available information that quickly comes in their mind (Kathpal et al., 2021).

1.6.10 Disposition effect was the tendency of investors to believe that stock prices would be recovered so they held the stocks having negative returns (Himanshu et al., 2021)

1.6.11 Snake-bite effect was the tendency of investors to remember their investment loss so they refrained from investing in stocks in situations having uncertainties (Himanshu et al., 2021)

1.6.12 Status quo bias was the tendency of investors to have no effort to adjust their portfolios because they intended to maintain their current state or goal (Himanshu et al., 2021).

These identified factors were discovered in multinational investors except Thai investors; therefore, the identified factors were verified through multiple-case study of Thai investors in the second phase.

Section 2 Results of objective 2 using multiple-case study in Thai investors

This section provided the results of multiple-case study in Thai investors. Key details of Thai key informants were in case study description section. The development interview questions and thematic analysis were described. Afterwards, the report of pattern matching for rival explanation were explained as valid factors and threats. Finally, the quality of the multiple-case study in Thai investors was reported.

2.1 Case Study Description

The key informants included one Baby Boomer generation, one Generation X, and seven Generation Y. The majority of them were experienced investors as they had been investing in stock market of Thailand more than ten years. The demographics of the key informants were shown in Table 8.

Table 8 Demographic information of key informants

Key informants	Age Generation	Gender	Occupation	Investment years	Investment objective
A	64 Baby Boomer	Male	Retiree	>10	Saving
B1	48 Generation X	Male	Management officer	>10	Saving
B2	37 Generation Y	Female	Management officer	>10	Secondary income
C11	36 Generation Y	Male	Management officer	>10	Secondary income
C12	36 Generation Y	LGBTQ	Marketing officer	>5	Secondary income
C21	32 Generation Y	Female	Business woman	>5	Secondary income
C22	36 Generation Y	Male	Human resource officer	>10	Secondary income
D121	37 Generation Y	Male	Business man	>10	Secondary income
E1211	37 Generation Y	Male	Management officer	>10	Saving

The interview began with investor A, who was a retiree being an experienced investor. He was born in the Baby Boomer generation. His purpose in investing in stocks was saving. He suggested one Generation X investor and one Generation Y investor namely investor B1 and investor B2. Investor B1 was a management officer. His purpose in investing in stocks was saving. Investor B2 was also a management officer, but her purpose of investing in stocks was secondary incomes.

Investor B1 suggested two Generation Y investors namely investor C11 and investor C12. Investor C11 was a management officer and his purpose in investing in stocks was secondary incomes. While, Investor C12 was a marketing officer and his

purpose in investing in stocks was secondary incomes. Investor C12 suggested one Generation Y investor namely investor D121 who was a business man having a purpose in investing in stocks for secondary incomes. Finally, investor D121 suggested one Generation Y investor namely investor E1211 who was in management have a purpose in investing in stocks for saving.

Investor B2 suggested two Generation Y investors namely investor C21 and investor C22. Investor C21 was a business woman and her purpose in investing in stocks was secondary incomes. Investor C22 was in human resource and his purpose in investing in stocks was secondary incomes. The map of interview shown in Figure 14.

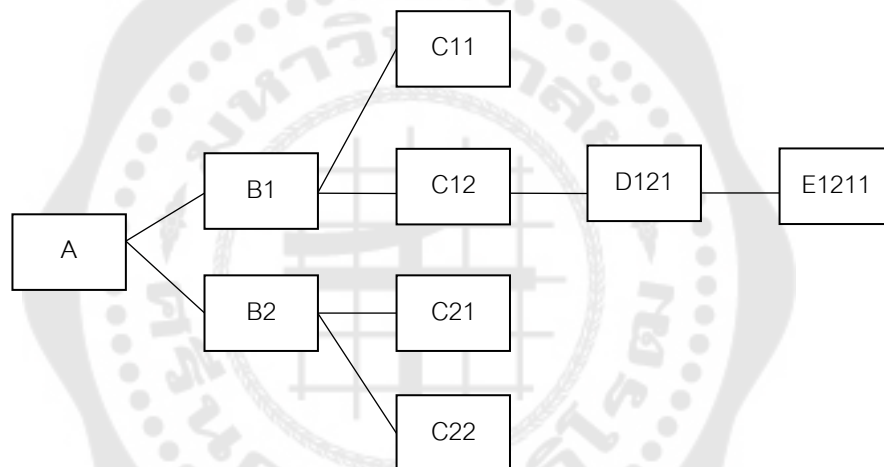


Figure 15 Map of the interview.

The interview began with investor A, who was the most senior one. Then, he referred investor B1 and investor B2. Investors C11 and investors C12 were referred by investor B1. Investor C21 and investor C22 were referred by investor B2. Investor D121 was referred by investor C12. Investor E1211 was referred by investor D121.

2.2 Development of Interview Questions

Interview questions were developed through 3 expert suggestions. The index of item objective congruence (IOC) was employed as a measurement of managing interview questions. All interview questions had values of IOC at 0.67 and 1. The final form of the interview questions consisted of 5 main parts: personal

demographics, perceived impacts of the COVID-19, expectations of pandemic risk, cognitive biases, and stock investment behavior. The interview questions are shown in Appendix G.

2.3 Thematic Analysis

The thematic analysis consisted of coding technique and theme definition.

2.3.1 Coding technique

There were two coding techniques including deductive coding and inductive coding. The deductive coding began with describing the factors identified through the systematic review, afterwards, transcriptions were separated into pieces of information and positioned into rows of matching codes. The deductive coding is shown in Appendix H. In contrast, the inductive coding began with separating and categorizing transcriptions, afterwards, the transcriptions were derived into codes. The inductive coding is shown in Appendix I.

2.3.2 Theme definition

After the coding process, the codes were categorized into environmental, psychosocial, and psychological factors. The environmental factors were social and economic conditions (Avison, 2016) that had effects on investors in stock markets. The psychosocial factors were a fact of having psychological and social influences (Thomas et al., 2020) on the investors. The psychological factors were characteristics of the investors such as their personal experience and beliefs (American Psychological Association, 2023).

2.4 Report of pattern matching for plausible rival explanation

This report included two main sections, verified and unexpected factors. The verified factors were the factors that matched with the identified pattern constructed in the systematic literature review phase. In addition, although unexpected factors were the factors that did not match with the pattern, they also affected stock investment decisions as they were discovered from the multiple-case study in Thai investors.

2.4.1 Verified Factors

1. A verified environmental factor affecting Generation Y Thai investor decision-making: COVID-19 cases

Generation Y Thai investors observed the number of cases to make predictions about the COVID-19 pandemic situations. First, they predicted how severe the pandemic would be: C12 said, *“At that time, as I remember, the spreading was from China. I saw the numbers of cases of neighbor countries. The numbers were increasing. And eventually, the virus spread out to Thailand. Oh! I felt that the virus had been already spreading all around the world.”*; also, C21 said, *“I thought it was the daily number of cases. Like, the domestic spreading.”* Secondly, they predicted how long lockdowns would be implemented: B2 said, *“But at the beginning, it was the number of cases. I had a look at that number for monitoring the spreading of the virus and for estimating how long the lockdowns would be.”*

Reasons why COVID-19 cases were considered

First, the number of COVID-19 cases was conveniently observable: C12 said, *“I focused mainly on the number of cases because it was easy to observe. There was a website feeding the numbers of cases of each country. So, I could see the situation of the spreading”*

Second, the number of COVID-19 cases was noticed to have a negative relationship with the stock market index. Hence, it was observed to make predictions about trends in the stock market: C21 said, *“Because, in the period when the number of cases was high, I felt the stock market was not alright.”*

Third, there had not been an effective COVID-19 vaccine: B2 said, *“The number of cases had not been decreasing yet. Also, the vaccine had not been completed yet. It had not been completely effective yet.”*

2. Three verified psychological factors affecting Generation Y Thai investor decision-making: herding, overconfidence and self-attribution, and hindsight biases

Herding: *“I did not dare. But if others did, I did.”*

“I knew that my friends got profits, I followed them.”

Investor B2 interacted with her friends and recognized that her friends successfully invested in stocks that she once did not dare to invest in. Hence, during the pandemic, she became brave to invest in those stocks. B2 said,

I talked with my friends so I knew what my friends invested. For example, I talked with my friends that real estate might be bearish at least 3 years so we should invest in technological stocks or new start-up stocks. Something like that. Especially when I knew that my friends got profits, I followed them. Previously, I did not dare to do so although I knew what they invested and how much they gained, but at that time I knew it then I thought that it was pretty good. (B2, line 40-44)

“I observed others, I found someone smart.”

Not just investor B2 emulating other investor behavior, but investor C11 also did. Investor C11, during the pandemic, he could not make investment decisions himself. However, he observed and noticed that people around him had potential investment strategies, and consequently, he emulated others. C11 said,

Till May, I started to buy some stocks because there were some research papers from overseas. So I quite dared to buy them. In March and April when the market crashed, ooh..... I did not dare to buy any stocks at all. ... Till I observed others, I found someone smart. I considered his idea and started to accept his idea as I thought that, yeah, it could be possible. So, in May, I started to accumulate stocks. (C11, line 21-26)

Overconfidence and self-attribution: “I thought I could ride it out.”

Investor D121 interpreted the stock market crash as an investment opportunity, in spite of some uncertainties about the business operation and stock

market situations: D121 said, *"Insecurity of the business direction. But at the same time, I thought that it might be a mis-correction, then, I assumed that everything would recover, it was a good opportunity for medium and long terms investments."* He also believed that he could cope with his stock investment during the pandemic because he did believe in his knowledge of risk management: D121 said, *"In the beginning, there were some uncertainties. But, at that time, I made worst case scenario assessment in order to estimate the situation. I thought I could ride it out. Assuming that the pandemic would end within 2 or 3 years. I believed it on that day."*

"Once I won."

Additionally, investor D121 had positive past experience in stock investment. He once invested in a single stock during the last financial crisis. He left the stock in his portfolio although its price tumbled. As the time passed by, he had a look at the stock again. He earned some profits from that stock. D121 said,

I got an amount of dividend. And I talked with my school friend that, hey, during the financial crisis, I used to buy CITI bank and held it. I got freaking losses. But I was still holding it. Then, I got back to have a look at it. Oh, its price was positive. So, I thought if I selected good companies and if they could go through this pandemic, they might be fine. (D121, line 71-74)

Hindsight: "I had already studied the market. I knew it."

Investor C12 noticed that the stock market plummeted, however, he thought that the plummet was temporary as he predicted that there was a possibility of the stock market recovery. C12 said,

And when the market dramatically dropped, I felt... umm... it might be in March or April. At that time, the market seemed to be crashed. I felt that the pandemic might not stay

long. I meant it did not impact the market so long. It might be because of panic that led the market crashed. The market plummeted very quickly as I remember. It plummeted to lower than 1000 points. At that time I felt... ahh... and there was a floor. The market plummeted to the floor one or two days. So, I felt that the market was too panic. So, I turned to buy some stocks being fundamentally strong. Whenever the pandemic disappeared, the prices might recover. (C12, line 17-23)

“It would definitely be like I thought.”

Regarding the interview, twice again, he still reiterated that he thought that there would be the recovery of stock prices so that he interpreted the time of the pandemic as an appropriate time to invest in stocks. C12 said,

And stock prices were too low to low valuation. I thought if the situation became normal, the prices would recover as the same. This actually was the main reason I invested in stocks again. (C12, line 36-37)

And during the pandemic, I thought it was a good time to invest because the market collapsed. After that, the market started to recover. So, if there was a chance or news about some stocks, I would invest. (C12, line 45-47)

“I did believe in what I had leant.”

In the final part of the interview, he confirmed that he thought that the pandemic was the investment opportunity because he believed in his knowledge of the stock market situations that he did study. As a result, he made a strong decision to invest in stocks. C12 said,

I withdrew money from money market fund, then hugely invested in stocks. I felt like... I had already studied about the market. Each crisis was rather the timing to buy stocks. It did not usually happen. The market did not usually collapse. So, I thought it was the chance. (C12, 77-79)

3. Two verified psychological factors affecting Generation X and Generation Y Thai investor decision-making: expectations of pandemic risk and availability bias

Expectations of pandemic risk: "I thought it would happen."

Regarding the interview, questioning Thai investors what the COVID-19 pandemic risk was, Generation X and Generation Y investors realized the lockdowns would be a cause of adverse economic impacts: B1 said, *"Well. I saw a lot of impacts. I did not expect that the lockdowns would be long. Yeah. I did not expect that the lockdowns would be implemented in many places. But when the lockdowns occurred, I did see a lot of impacts on economic activities."*; as a result, those impacts would take a toll on the firm operations: C22 said, *"The risk that I thought that it would happen. Well. It happened. It was that the country was closed. And, actually, it was not the worst case that I thought. It was that every single company must be shut down. Every single one could go out. Umm. Yeah. It happened in Malaysia and China, not in Thailand. I thought like that at first. But it was not the worst. Because if it was the worst, all business could not run and generated income."*; as for the stock prices of the firms: C12 said, *"I knew and expected that the rising number of cases in Thailand would lead to the same situations as others countries. That was lockdowns. The economy was impacted, then the stock prices dropped."*

X said yes. Y said no.

Generation X and Generation Y investors, however, had different opinions on the time to invest. Generation X investor (B1) thought that the period of

lockdowns was the time to invest in stocks gaining benefits from the lockdowns: B1 said, *“Umm. While locking down, there were some stocks getting benefits and their prices did not go down but up.”* In contrast, Generation Y investors (C12 and C22) thought that the period of lockdowns was not a suitable time to invest in stocks because the lockdowns had pressure on stock prices: C22 said, *“I thought that if the government implement the shut-down measure, stock prices would drop and drop. So it was not the time to buy”*; additionally, economies would not recover unless there was not a COVID-19 vaccine: C12 said, *“It might be economic slowdown as business closures. The economy might be shot for a while. But, what I did not expect was how long the impact was. But I did know just the economy must be shot, surely. Until the situation or ...it had not had the vaccine yet. So I thought that the economy might be slow down until there were the vaccines.”*

4. A verified psychological factor affecting Baby Boomer and Generation Y Thai investor decision-making: status quo bias

A Baby Boomer investor: “I have my own saving policy.”

Investor A had his personal intention of saving which stock investment was one of his parts of saving. A said,

I have my own saving policy that I divided it into 3 plies. The first pile is for investment. The second pile is cash for emergency. And the third pile is for daily expense. All of them are obviously separated. I have my investment frame. (A, line 67-69)

“I did not sell my stocks.”

In order to maintain his existing intention of saving, he decided to hold his stocks. His portfolio remained as normal although he realized that the prices of stocks which he had already invested were fluctuating. A said,

I adhered to my primary investment policy. I invested in fundamental stocks. I knew that their prices swung as usual. I might get more or less dividends and capital gains. But I did not realize gains. I realized losses because I did not sell my stocks. (A, line 61-63)

A Generation Y investor: “I have my own financial plan for retirement.”

Investor E1211 had his stock investment aim of saving for retirement: E1211 said, *“I invested in stocks as a saving for my retirement in the next 20 years, at least.”* This investor also expressed that he had his personal investment plan which he separated an amount of principal from his earnings and bought stocks at a suitable time. E1211 said,

My investment style was that I split an amount of money to invest when I thought that it was the time I should buy stocks. So, I did not receive information daily. I did not consume the information all the day then decided to buy stocks at the end of the day. No, I did not. So, I waited until I saw the trend. I did not need to wait until the situation recovered and ended. Even through there were lockdowns during the pandemic, some sectors in the stock market got better. (E1211, line 38-42)

“I did not sell stocks out. I left my portfolio the same.”

In order to maintain his stock investment goal, he did not adjust his portfolio. He did not sell stocks but bought some stocks at the end of the year as he always did. E1211 said,

I did not sell stocks out. I left my portfolio the same. Then, around the end of that year, I buy stocks as equal as the bonus I earned. So, actually, if asking me if I made the decision differently between the year having the COVID-19 and the year without it, it was not quite different. (E1211, line 70-72)

“I did like DCA (dollar-cost-average) but I did not DCA monthly.”

Investor E1211 had two main reasons that he continued buying some stocks at the same time of each year. First, he did not believe in the market timing so he decided to buy some stocks annually. E1211 said,

I thought that it was very difficult to point the market timing. If saying this time, I should buy or this time I should sell, I thought someone who could predict the right timing was rare. So, I avoided to use the market timing. I avoided to observe the price level for trading. No, I did not use that. I did like DCA but I did not DCA monthly. (E1211, line 74-76)

Second, he was cognizant of being a white-collar worker who earned monthly salaries and an annual bonus. E1211 said,

Well. My investment horizon was long. And I was a salary man. I earned salary and an annual amount of bonus. So, the time I bought a big lot of stocks was around the end of each year. (E1211, line 77-78)

To summarize, there was one verified environmental factor, COVID-19 cases was reported only from Generation Y investors. There were six psychological factors: expectations of pandemic risk, availability, herding, status quo, hindsight, and overconfidence and self-attribution; reported from three generation investors as shown in Table 9.

Table 9 Verified factors

Generation	Environmental Factor	Psychological Factors					
	COVID-19 cases	Expectations of pandemic risk	Availability	Herding	Status quo	Hindsight	Overconfidence and self-attribution
Baby Boomer					✓		
X		✓	✓				
Y	✓	✓	✓	✓	✓	✓	✓

Moreover, it was noticed that although hindsight, and overconfidence and self-attribution had low risk of bias of the systematic review; they were reported by one key informant – investor C12 and investor D121 respectively. In addition, availability bias had unclear risk of bias of the systematic review, nonetheless, it was reported by two key informants – investor B1 and investor C21. The verified factors was illustrated in Figure 16.

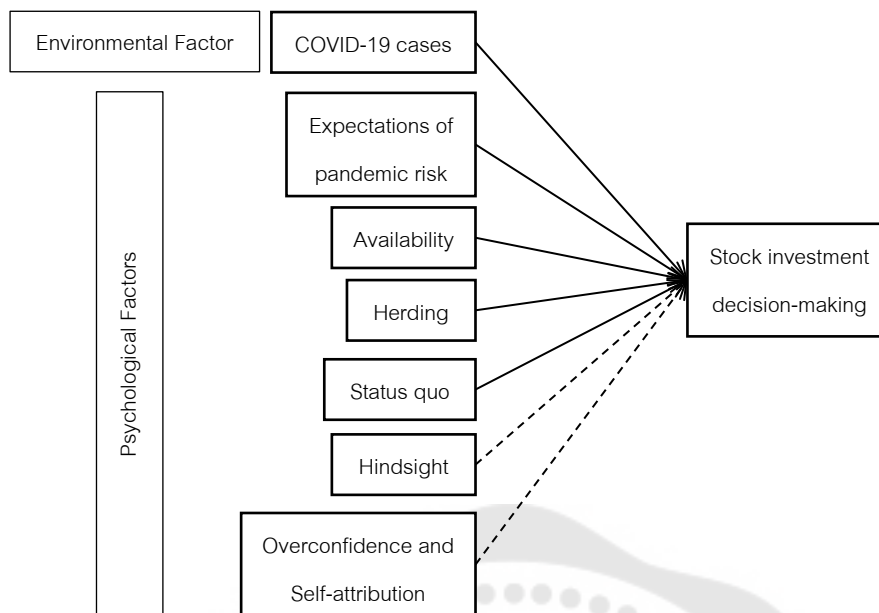


Figure 16 Verified factors through multiple-case study of Thai investors

The straight lines indicated that there were more than one investor reported the factors; and the dashed lines indicated that there was just one investor reported the factors.

2.4.2 Unexpected Factors

1. An unexpected environmental factor that was discovered to potentially affect Generation Y investor decision-making: time spent on consuming information

The more time, the more information received, the more trading

One of the impacts of the COVID-19 pandemic was that the investors perceived that they had more time to stay at their places. A rise in the time was interpreted as a chance of consuming a bulk of information, and consequently the abundant pieces of information stimulated the investors to buy and sell stocks more often. D121 said,

When I set the new portfolio, I tracked my portfolio every day. And, I did not travel so I had time to observe the market. I listened to news about stock markets every often, so... If I had not listened to news, I would not have thought that, should I buy

it?, should I sell it? When I had space and time to receive information all the time, I wanted to buy, I wanted to sell stocks all the time.” (D121, line 77-80)

The more time, the more information received, the more risks taken

Moreover, another consequence of the extravagant consumption of information was that investor investment style became risky temporarily. B2 said,

Actually, I was conservative to investment. I did not dare to invest riskily. But, during the pandemic, I could not go outside. I spent a lot of time at home so I had more time to consume more information. The information was really ample. I consumed a bundle of information. So, I changed from being conservative to being risky. I invested in cryptocurrencies and foreign stocks. (B2, line 35-38) Actually, at that time, it was the time I was very risky. I allocated my money from stocks and stocks mutual funds to cryptocurrencies and foreign stocks. (B2, line 70-71) I did have a lot of free time. And I had friends. We talked a lot about various platforms. Some of them were robot. So, I tried it. But now, I am investing in stocks. (B2, line 73-74)

2. An unexpected environmental factor that was discovered to potentially affect Generation X and Generation Y investor decision-making: an effective vaccine

Expectations of stock market recovery

An effective vaccine protecting against COVID-19 was perceived as a solution to the stock market difficulty and the pandemic. As a result, the effective vaccine had a role in growing expectations of the stock market recovery: D121 said, *“In the case of SET, I focused on the vaccine. At that time when the market went down, I*

expected that the market would well recover if there was the vaccine and if it was effective.”

“The vaccine meant the confidence in spending life outside.”

Investor C11 expected the stock market recovery because the effective vaccine would be the cause of positive investors sentiment due to people confidence in spending their lives out of doors. C11 said,

Well. The vaccine meant the confidence in spending life outside. Surely, we could get infected even though we got the jab. But the probability of death was truly decreasing. So, I thought the vaccine was essential because it led to the decrease in the death rate. Dropping in the death rate, the sentiment might recover. The market might fairly recover. ... Actually, the vaccine was poor, ... (C11, line 49-54)

“The US announced that they found the vaccine.”

Investor B1 reported that he expected that the stock market would recover after the United State could completely produce the vaccine protecting against the COVID-19 because the vaccine would result in improved economic figures due to people confidence in living their lives as normal. B1 said,

Umm... when the US announced that they found the vaccine. Because at that time, it was the critical point of the market that whether or not the market would recover. But when the vaccine was discovered, the economy immediately recovered. Economic figures such as economic growth recovered. People turned back to spend their life again. (B1, line 25-29)

Expectations of the end of the pandemic

Investor E1211 expected that the pandemic would end when the COVID-19 vaccine was completely effective: E1211 said, “I felt that whenever there was the effective vaccine, the pandemic would end. That was for a short term. Then, if the short-term situation ended, I fairly knew how long the impacts of the pandemic would exist.”

Predictions of stock prices

Investor C21 perceived information about a vaccine protecting against COVID-19 that it had a relationship with the stock market performance. As a result, she paid attention to news about the vaccine because she noticed that the news had an impact on the stock market movements – both increasing and decreasing ones. C21 said,

And actually, the vaccine was also influential. Like, when there was news about the vaccine, I felt the news had impacts in stock price movements, up and down. (C21, line 31-32)

3. An unexpected environmental factor that was discovered to potentially affect Baby Boomer, Generation X and Generation Y investor decision-making: economic impacts

The economic impacts were two-way effect as one of them led to a decrease in stock investment and another one led to an increase in the investment.

Business loss, decreasing stock investment of baby boomer investor

Business losses were caused by a recession during the pandemic: A said, “What I could perceive was that the economy was awful so companies listed in the stock markets did not have good business profits.”, and these business losses took a toll on dividend rates: A said, “I knew that the companies’ profit would drop surely. It definitely affected the dividends I would get.” So as to protect a part of his wealth, he decided to hold cash: A said, “I thought that it might be saver to hold cash because the principal was still constant.”

Interest rate cut, increasing stock investment of generation X and Y investors

The interest rate cut was having a role in deducting an amount of interest that investors would earn: B1 said, *“At that time, the interest rate was too low. I got too small amount of interest.”*; and in raising bond prices: C11 said, *“At that time, the interest rate was cut to nearly zero. So, it did not make sense to hold bonds. The next step was the rise in interest rate, then, the prices of bonds dropped.”* Consequently, they increased their stock investment: B1 said, *“I fully held stocks in my portfolio, and bought some more stocks.”*; and, C11 said, *“So, I should allocate my assets from bonds to cash, then buy more stocks.”*

4. Unexpected psychological factors that were discovered to potentially affect Generation Y investor decision-making: surprise and hope

Surprise: *“I did not think that the change would be that fast.”*

Investor B2 perceived pieces of reliable information about potentially profitable sectors, so she realized that she could invest in stocks in unfamiliar sectors despite being under the circumstances of the pandemic: B2 said,

Well. When I got some information from my company, brokers, and online; I started to know what I would do. So, I knew that there were other opportune alternatives during the pandemic. So, I changed a sector to invest. So, I used the information for considering sectors to invest. (B2, line 31-33)

Investor B2 had expectations of quick changes in stock prices. Surprisingly, the prices were changing faster than ever.

I expected that if everything recovered, the situation might change rapidly. What I invested might be sold suddenly when

the situation was normal. But I did not think that the change would be that fast, especially stock prices. They changed very quickly. (B2, line 54-56)

Becoming more careful

In response to the faster-than-ever change in stock prices, investor B2 was more careful in investing in stocks, and made an effort to change the sectors to invest. Unfortunately, her decision was not optimal.

Well. I slowed down my investment and changed the stocks I invested. I tried to change sector to invest but all of my expectations were wrong. I still got loss. (B2, line 58-59)

Hope of stock investment profits: "I thought I would get profits."

The COVID-19 outbreak did not affect the stock investment decision-making of every Thai investor. Investor C21 did consider information about the stock market: C21 said, *"Umm... actually, I mainly considered the whole market situation."*, and thus the outbreak was not impactful to her investment decision: C21 said, *"Actually, the COVID-19 situation did not influence my decision. I do not trade stocks as my career. I just find another way to increase my income."*

Having hope, kept holding, sold

Since the stock market at the beginning of the pandemic did crash, investor C21 perceived that the prices of stocks were exceptionally low: C21 said, *"Actually, at that time, I thought that stock prices were pretty low."* As a consequence, she was hopeful of stock investment profits: C21 said, *"Well. I thought I would get profits if I invested at that time."*; then, she bought some stocks and held them until their prices rose to her target prices: C21 said, *"So, I bought some stocks and held till the prices would go up. I just observed the prices. If the prices were at the point, I felt satisfied, I just sold them."*

5. Unexpected psychological factors that were discovered to potentially affect Baby Boomer and Generation Y investor decision-making: fear of the unknown and anxieties

Fear of the unknown: "I did not know what. I really did not know when."

Unpredictable situations during the COVID-19 pandemic contained basic unknowns such as unknown about what the pandemic was: A said, *"I really did not know about the COVID-19"*, and, C11 said, *"I asked myself if this event was the same as the past events or not. It never ever happened."*; in addition, unknown about when the pandemic would end: A and C11 said, *"I did not know how long the pandemic would exist."*, and, B2 said, *"I wondered how long the pandemic would exist."*

"I had never ever known what the pandemic was."

Unpredictability of the severity of the coronavirus disease was defined as the situation that the coronavirus symptoms possibly led to death, and its spread was too rapid to cause a deficiency in medical service. A said,

Because, for example, my friends told me that their parents got in the hospital and eventually they were at ICU unit longer than they expected. Someone got in the hospital and died. Some of my friends contacted me and ask me to find a place in hospital because I knew the doctors. Some cases got the 100th queue of the ambulance even if they were serious cases. (A, line 47-5)

"I did not know how much expenses I needed to pay."

Due to this unpredictable situation, besides having no clue about the COVID-19 pandemic: A said, *"I had never known what the pandemic was. No-one ever knew it."*, he did not know the accurate expense of medical service: a said, *"I did not know what would happen, how much expenses I needed to pay."* Although he had COVID-19 insurance, he still did not know whether or not the insurance limit would cover

him for all of the medical treatment: A said, *“Actually, I had the COVID-19 insurance. But I did not really know if it was enough or not.”*

“I decreased my investment. I focused on the certainty of my family.”

Since the threat of this situation was the unknown medical expenses – then the investor responded to this threat by immediately ignoring the investment in stocks and paying attention to his family: A said,

I managed the priority. The investment was arranged to be a lower priority. I decreased my investment. I concentrated on the certainty of my family (A, line 43-44) So, when I thought about the investment, I just had a look at my portfolio. If the portfolio got loss in an acceptable level, I was fine. Done! (A, line 51-52)

“No, it had never ever happened in the stock market.”

Unpredictability of the stock market performances was defined as the situation in the stock market was in chaos as stock prices plummeted: B2 said, *“At that moment when stock prices plummeted, it was a situation that everyone panicked. So did I. I knew it was because of the COVID-19, though.”*; in addition, the degree of uncertainty over the stock market was high because the pandemic was absolutely novel. C11 said,

About investment, there were high uncertainties because the COVID-19 crisis was the novel event. There had never been the event like this for the last many years or last 10 years. The last crises were financial and economic crises. The pandemic crisis had never ever happened for the last 10 years or even 50 years ago. No, it had never ever happened. So, there were uncertainties in the stock market.

“I really did not know what I should do.”

Due to the unpredictable situations of the stock market, investor B2 and investor C11 did not know what they should do with their portfolios: B2 said, *“I really did not know how to update my portfolio and I did know how low the prices would be.”*, and, C11 said, *“Like, eh, should I buy some stocks? The prices dropped a lot. Should I buy them?”*

“I reduced my investment.”

As the threat of this situation was the unknown about an appropriate portfolio adjustment, then investor B2 and investor C11 responded to this threat by decreasing their investments in stocks: B2 said, *“So, I slowed down the investment”*, and, C11 said, *“I was too late to cut losses.”*

“I needed to consider economic uncertainties for my future plan.”

The unpredictability of employment was defined as the situation that adverse economic impacts of the pandemic led to uncertainty over economic activities including employment. E1211 said,

Global economy got worse. Economic activities stopped. I could not do my usual activity. I needed to consider economic uncertainties for my future plan. (E1211, line 13-14)

“I did not know the employment situation.”

Due to the unpredictable situation about employment, investor E1211 perceived employment uncertainty: E1211 said, *“But, having the uncertainties, I did not know the employment situation.”*

“I needed to increase the percentage of saving.”

Since the threat of this situation was the unknown about career path, the investor deducted an amount of stock investment and accumulated more saving: E1211 said, *“I needed to increase the percentage of saving. The budget for investment decreased.”*

Table 10 Summary of causes of unpredictability, personal important stimuli, and responses

Case	Causes of unpredictability	Personal important stimuli	Responses
A	The pandemic and medical situations	Unknowns about the pandemic and medical expense	Decreasing stock investment
B2	Stock market situation	Unknowns about the pandemic and an appropriate portfolio adjustment	Decreasing stock investment
C11	Stock market situation	Unknowns about the pandemic and an appropriate portfolio adjustment	Slow decreasing stock investment
E1211	Employment situation	unemployment	Decreasing stock investment and increasing saving

Investment anxiety: "I was insecure. I was anxious."

A Generation Y investor: "I was insecure about stock prices."

The unpredictability of the stock market performances which was defined through high volatilities of stock prices: C21 said, *"The stock market during the pandemic was too volatile so that I needed to save myself more."* The volatile stock market stimulated an investor to feel uncertain about future trends of stock prices: C21 said, *"I also felt insecure that if stock prices would go up or down. It was not that certain."*

"I needed to study more and reduce the amount of investment."

In response to the volatile stock market, investor C21 had a greater careful consideration for stock investment by paying attention to more information about some stocks: C21 said, *"Well. I felt that I studied in more details while investing in stocks. Like, there were some stocks that were fluctuating. So, I needed to study more."*; and, reducing an amount of investment in stock that she was not familiar: C21 said, *"I reduced an amount of money invested in new stocks."*

Another Generation Y investor: “I was anxious about the impacts of the pandemic on the stock market.”

The unpredictability of the severity of the coronavirus disease which was exhibited through the spreading of the virus was noticed by the number of infected cases. C12 said,

At that time, as I remember, the spreading was from China. I saw the numbers of cases of neighbor countries. The numbers were increasing. And eventually, the virus spread out to Thailand. I.. Oh! I felt that the virus had been already spreading all around the world. (C12, line 14-16)

“I did not know the impacts on the economy.”

Under the circumstances that COVID-19 was spreading into Thailand, investor C12 thought about unpleasant events that were existing and seemed to continue: C12 said, *“I was anxious that .. like.. Well. I did not know what the impacts on the economy and the stock market. I did not know how severe the impacts were.”*

“I stepped back and observed the situation.”

In response to the continuous spreading, he decided to wait and see through selling some stocks and holding cash in order to observe the future situation: C12 said: *“I stepped back and observed the situation. I slowed down my investment in stocks. Then, I sold some assets and held cash.”*

Health anxiety: “I had a heart disease.”

A Baby Boomer investor: “I would have died if I got infected.”

Investor A, who had health anxiety, perceived that the symptoms of the coronavirus were too severe to cause numerous deaths, and, medical service was not sufficient: A said,

And, at the beginning of the pandemic, I would have died if I got infected. It was delta. There were so many deaths. And what I faced was that everyone tried to find a place in hospital because they could not get in hospital even if they had an amount of money. (A, line 24-26)

“I felt concerned about the number of deaths.”

Since investor A realized that he was categorized into group 608 as he was above 60 years old and still had heart disease, he was worried about the severity of the coronavirus and thus was sensitive to the coronavirus death toll. A said,

Both. But I felt concerned about the number of deaths more because I was a kind of 608. I was above 60-year-old. And if I got infected, I would have died as the doctor was advertising every single day! And more importantly, I had a heart disease. I was in that criteria so I must save myself. (A, line 32-34)

“I got back to concentrate on safety in life.”

In response to his personal health condition, investor A neglected stock investment and gave priority to the safety of his life: A said, “*So, the investment became unnecessary. So, I got back to concentrate on safety in life.*” Concentrating on safety, he was paying great attention to the daily government announcements and pieces of health information from his knowledgeable friends. A said,

The announcement of M.D. Taweessin. I needed to follow what was happening. And I happened to attend Certificate Course in Good Governance for Medical Executives, so I had friends who were doctors. I talked with my friends as well. (A, line 36-38)

To summarize, there were three unexpected environmental factors, economic impacts, an effective vaccine, and time spent on consuming information, reported from Baby Boomer, Generation X and Generation Y investors. There were four psychological factors: fear of the unknown, anxiety, surprise and hope; reported by Baby Boomer and Generation Y investors as shown in Table 11.

Table 11 Unexpected factors

Generation	Environmental Factors			Psychological Factors			
	Economic impacts	An effective vaccine	Time spent on consuming information	Fear of the unknown	Anxieties	Surprise	Hope
Baby Boomer	✓			✓	✓		
X	✓	✓					
Y	✓	✓	✓	✓	✓	✓	✓

To conclude, the verified factors that were identified by the systematic review and verified by multiple-case study in Thai investors included one environmental factor namely COVID-19 cases; and six psychological factors namely expectations of the pandemic risk, availability, herding, status quo bias, hindsight, and, overconfidence and self-attribution. Moreover, the unexpected factors that were discovered in Thai investors included three environmental factors namely an effective vaccine, economic impacts, and time spent on consuming information; and, four types of emotions namely, fear of the unknown, anxieties, surprise, and hope. However, an identified environmental factor namely time spent on stock market, as well as, four verified psychological factors namely anchoring, representativeness, disposition effect, and snake-bite effect were not discovered through conducting multiple-case study of Thai investors.

In addition, according to the point hypothesizing about potentially influential factors affecting decision-making of Thai investors during the COVID-19 pandemic, it was proved that COVID-19 cases and time spent on consuming information were environmental factors occurring in the pandemic situation in Thailand. Furthermore,

biases namely availability, herding, hindsight, overconfidence and self-attribution, and status quo; as well as, emotions namely fear of the unknown, health anxiety, investment anxiety, surprise, and hope were psychological factors reported by Thai investors.

The conclusion of the factors affecting decision-making of Thai investors was illustrated in Figure 17.

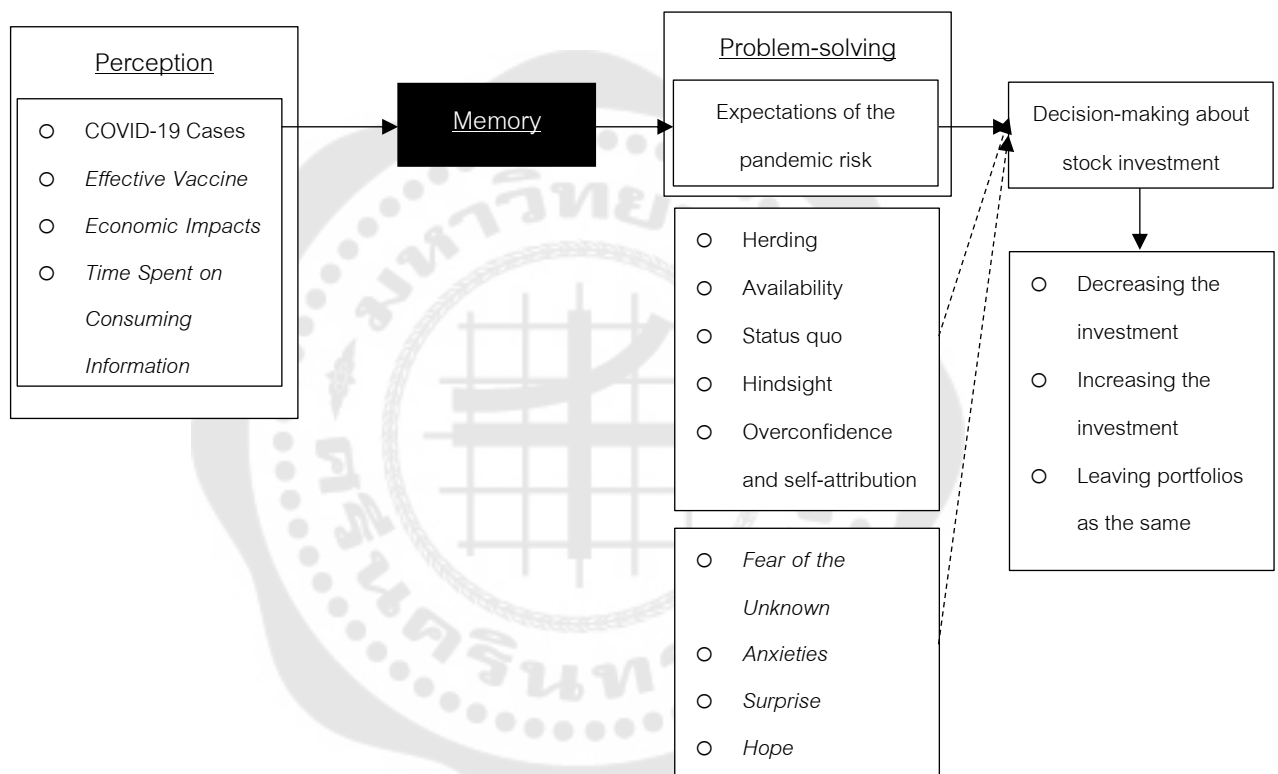


Figure 17 Factors affecting decision-making of Thai investors during the pandemic

The factors in straight letters were the verified ones. The factors in italic letters were the unexpected factors discovered in Thai investors.

CHAPTER 5

SUMMARY DISCUSSION LIMITATION AND IMPLICATION

Summary

This study had an overall aim of exploring the decision-making process of stock investment behavior during the COVID-19 pandemic. The first phase of the study had the purpose of identifying factors affecting the decision-making process through systematically reviewing a number of eligible academic research. The identified factors included 1) two environmental factors namely the COVID-19 cases and time spent on stock markets; 2) ten psychological factors namely expectations of pandemic risk and eight biases (anchoring, herding, hindsight, overconfidence and self-attribution, representativeness, availability, disposition effect, snake-bite effect, and status quo). The findings of the first phase agreed with some studies and academic books. First, the COVID-19 cases were perceived as a numerical stimulus activating the process of the decision-making (Holmes et al., 2016; Ratcliff & McKoon, 2020). Second, time spent on stock markets had a role in adapting stock investment options and decision-making. Third, herding bias basically occurred when the investors were encountering severe uncertainties (Pompain, 2021, pp. 286-287). Fourth, expectations of pandemic risk were forecasts for future pandemic situations but had an influence on the current decision-making (Hommes, 2013, p. 5). Lastly, the nine remaining biases were strong personal beliefs of the investors that were really used while the decisions were made under ambiguous circumstances (Bradley, 2016, pp. 234-238).

The second phase of this study had the purpose of verifying the identified factors through conducting the multiple-case study of Thai investors. The verified factors included one environmental factor namely the COVID-19 cases; as well as, six psychological factors namely expectations of pandemic risk and five biases (availability, herding, status quo, hindsight, and overconfidence and self-attribution). Moreover, there were unexpected factors discovered in Thai investors including three environmental factors namely an effective vaccine, economic impacts, and time spent on consuming

information; and, one psychological factor namely emotions (fear of the unknown, anxieties, surprise, and hope).

Discussion

The results of this study could be categorized into 1) identified factors verified by the multiple-case study of Thai investors; 2) identified factors disproved by the multiple-case study; and 3) specific factors discovered by the multiple-case study.

First, the identified factors verified by a multiple-case study of Thai investors included COVID-19 cases, expectations of pandemic risk, availability, herding, hindsight, overconfidence and self-attribution, and status quo bias. First, COVID-19 cases confirmed that this COVID-19 figure was impacting the decision-making and behavior of investors in stock markets in many countries such as Japan, the United States (Naseem et al., 2021) and emerging countries (Wu et al., 2020). Second, expectations of the pandemic risk were actually studied in a group country namely Gulf Cooperate Council (Abdeldayem & Al Dulaimi, 2020), this factor was still found in a single country namely Thailand. Last, the five biases (availability, herding, hindsight, overconfidence and self-attribution, and status quo) were studied in Asian countries such as India (Harjoto et al., 2021; Kathpal et al., 2021) and European ones such as Finland (Fang et al., 2021; S. Talwar et al., 2021), they were also impacting on Thai investors. Hence, the factors categorized into the first group appeared to be general in multinational investors.

Second, the identified factors disproved by a multiple-case study of Thai investors included anchoring, representativeness, disposition effect, and snake-bite effect biases. Since anchoring and representativeness biases were tendencies that investors made stock investment decisions due to historical data of stock prices and stock market history, respectively (Pompain, 2021); investors having some pieces of information about a pandemic impacting on stock markets, such as the Spanish flu (Onion et al., 2023), tended to search for past stock prices and old stories of the stock markets under the past pandemic circumstances, and make stock investment decisions due to those bits of information. Conversely, disposition effect and snake-bite effect

biases were tendencies that investors adhered to their past positive experience in stock price recovery (Baker & Ricciardi, 2014) and their past negative experiences in total failure at investing in stocks (Kartasova et al., 2014), respectively; and hence making stock investment decisions due to those experiences. Nonetheless, Thai investors had never ever experienced any pandemic except the COVID-19 one; therefore, they were not likely to make a comparison of stock market situations in order to make their investment decisions. The factors categorized into the second group appeared to be less feasible for affecting Thai investors, accordingly.

Third, the specific factors discovered by the multiple-case study included economic impacts, an effective vaccine, time spent on consuming information, and emotions. Empirically, economic impacts were considered to be pieces of information that Thai or even overseas investors received (Hunjra et al., 2021; Zaremba et al., 2021); also, an effective vaccine was perceived as a life-saving according to this study interview of Thai investors. Theoretically, a concise concept of the nudge theory was “putting fruit at eye level” (Ivanov et al., 2023; Thaler & Sunstein, 2021). The Thai government had to control the COVID-19 contagion so they implemented the lockdowns. This caused a change in Thai people lifestyle from spending life outside to spending life at home (Mongkhon et al., 2021). The Thai government also intended people to involve with the importance of the health measures, hence announcing the COVID-19 information regularly (Pan-Ngum et al., 2020). As a result, the decision-making of Thai investors was affected by time spent on consuming information (Mongkhon et al., 2021). Furthermore, uncertainty avoidance of national culture described that people in an uncertainty avoidance society, such as Thailand, interpreted an ambiguous situation as an insecure situation (Geert Hofstede, 2015; The Culture Factor Group, 2024). Consequently, Thai investors had signs of fear and anxiety during the pandemic (Goodwin et al., 2020). These types of emotions were accepted for being the factors influencing stock investment decision-making (Ghosh & Sanyal, 2021; Su et al., 2022).

Limitations

A systematic literature review was conducted at the beginning of the COVID-19 pandemic, and thus a number of included studies seemed so small. This matter possibly led to a deficiency of other influential factors such as locus of control. Actually, there were just a couple of stock investment options under ambiguous investment situations because of the COVID-19 pandemic: continuing trading and quitting trading. Investors with an internal locus of control believed that they could achieve their investment goals so they decided to invest in stocks despite the high level of financial risk (Kesavayuth et al., 2018). Importantly, due to the small number of included studies, this systematic review had a limitation in exhibiting the effect size of identified factors through meta-analysis.

A multiple-case study of Thai investors was conducted according to the results of the systematic review, hence a limitation of exploring a wide range of influential factors. Furthermore, the research sample of this multiple-case study were Thai investors who were born between the ages of 25 and above 57 years old; which were counted to be a majority of Thai investors (eFinance Thai, 2022). Additionally, the key informants of this multiple-case study had stock investment experiences. As a result, the results of this multiple-case study, perhaps, could not apply to generation Z Thai investors, having ages below 25 years old because of differences in stock investment span. With no manipulation of selecting research samples, the numbers of Baby Boomer and Generation X investors were not adequate to support the factors found in these investors.

Implication

Academic Implication

In academia, this study concentrates on exploring the factors affecting the decision-making process during the COVID-19 pandemic, the future research has room to confirm the factors. Furthermore, future research can compare the results of this study with factors affecting the decision-making process during post-pandemic situations.

Policy Implication

Since the COVID-19 situation in the beginning was severe and chaotic, governments of many countries implemented social distancing and other restriction measures. The impacts of these measures partly took a toll on the stock investment environment as a part of the nudge theory, Libertarian and Paternalism, had an implication that the governments were implicitly designing the investment environment and options for investors (Thaler & Sunstein, 2021). Similarly, the findings of this study revealed that environmental factors brought about by the government such as extra time and an effective vaccine had an impact on the decision-making process of the investors. Moreover, the stock market environment cooperated with cognitive function of each individual investor (Bradley, 2016). The cognitive function was sometimes interfered with biases (Kelly, 2022, pp. 171-172) and emotions especially fear (Liu et al., 2020). Therefore, a public organization is advised to prepare for other crises in the future by enhancing online public relations (Goodwin et al., 2020) as social media has been playing an important role in disseminating pieces of information and emotions since pre-COVID-19 pandemic (Phan et al., 2018). In Thailand, the Securities and Exchange Commission (SEC) is recommended to realize that Thai investors are emotionally sensitive to ambiguities as Thailand culture has uncertainty avoidance (The Culture Factor Group, 2024), and thus, confidence and clarity in the stock market environment should be firmed through providing right and reliable bits of information .

Practical Implication

This study had a serious intention to study the decision-making process of stock investment behavior at a time when both wealth and health were of concern. The methodology of this study, therefore, was designed to study the original factors that had influence on the decision-making process. Consequently, the results of this study were beneficial to individual experienced investors who intended to comprehend their investment decision-making to improve their investment performances. The results were also recommended to individual inexperienced investors who intended to invest in stocks to prepare themselves before facing severe uncertainties in stock markets that might occur in the future.

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APPENDIX



CASE STUDY ANALYTIC TECHNIQUE

According to Yin (2017), there are five analytic techniques describing below.

1 Pattern matching is one of logical techniques used to analyze the findings through comparing with a predicted outcome. Therefore, there must be some predictions before collecting the data.

1.1 Pattern matching for processes and outcomes is concentrating on the process and outcomes in a considered case study. A firm pattern of processes and outcomes must be determined through a theoretical proposition. In the case that the findings are comparable to the firm pattern, a conclusion can be written.

1.2 Pattern matching for rival explanations is an alternative to a case that findings do not suit to the firm pattern of processes and outcomes – so-called ‘threat(s).’ So as to manage such threats, another different patterns of processes and outcomes ought to be identified. Also, the reasonable actuality that the threats do not match the firm pattern should be declared.

2 Explanation building actually is another kind of pattern matching, but this technique targets for ‘building an explanation about the case.’ Hence, there must be an analogue of explaining the case.

2.1 Elements for explanations are a technique narrating what exactly an especial event is. The explanations ought to show a theoretical significance and a crystal-clear understanding of the event.

2.2 Iterative nature of explanation building is a technique providing an ‘eventual explanation.’ This kind of explanation is produced through examining evidence of a case repeatedly and revising explanations for the case recurrently.

3 Time-series analysis is a technique conducting certain conclusions of a case study though using recorded-particular-time data.

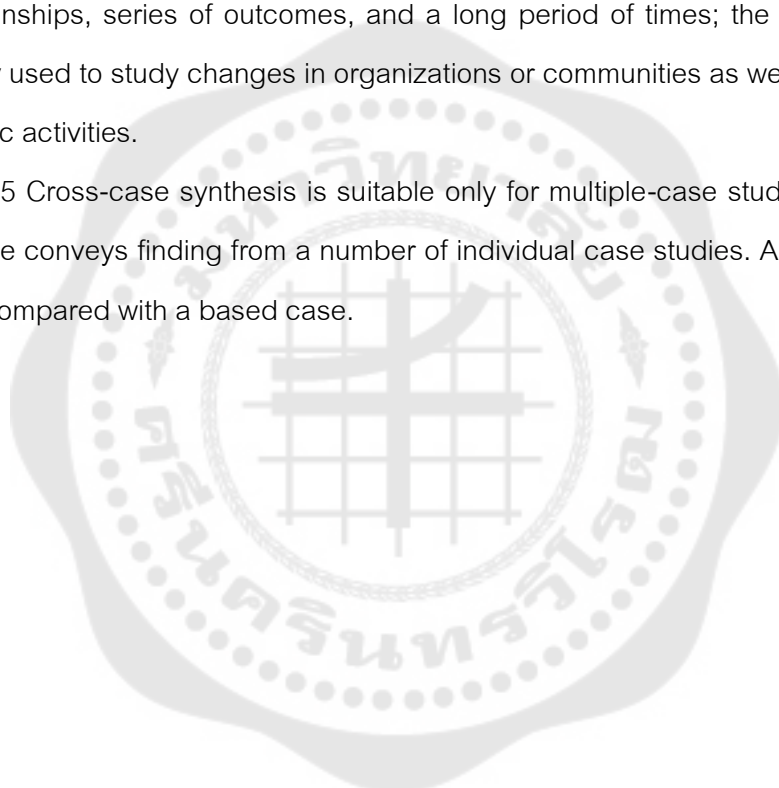
3.1 Simple time series is a technique tracing a time from the starting point to the ending one and matching the ‘observed trend’ with a theoretical trend or ‘rival trend’, so conclusions of a case are drawn by historical findings.

3.2 Complex time series is partly similar to simple time series, but the differences are that the observed trend is flat but also fluctuating, and that time series contains different patterns.

3.3 Chronological sequences are believed to be 'a special form of time-series analysis' due to dealing with various real events within a period of times. This technique aims to compare a sequence of events to a theoretical proposition.

4 Logic models are appropriate for complicated events consisting of a number of relationships, series of outcomes, and a long period of times; the logic models are basically used to study changes in organizations or communities as well as a process of economic activities.

5 Cross-case synthesis is suitable only for multiple-case studies, because this technique conveys finding from a number of individual case studies. A basket of finding is then compared with a based case.





APPENDIX B

CRITERIA FOR INTERPRETING THE FINDING

According to Yin (2017), there are four criteria of interpreting the finding as describing below.

1 Relying on theoretical proposition

Relying on theoretical proposition is a strategy which applies a theory or theories to how the findings should be analyzed. Such that the analysis depends upon the theoretical proposition.

2 Grounded-up

Grounded-up is an inductive strategy, which a researcher has to 'play with the data' by considering the data consciously in order to discover a pattern. This strategy contains a variety of codes transformed by the data, and each set of codes describes an idea of interest.

3 Developing a case description

Developing a case description is a strategy which employs a descriptive framework generated from researchers' initial idea or their literature reviews. The framework is beneficial to manage and analyze the data, and the findings of the data is an appropriate explanation for a situation being studied.

4 Examining plausible rival explanations

Examining plausible rival explanations is used to give rise in another possible explanations which have not done in the three previous strategies owing to the fact that there are some remaining facts not having been studied.



APPENDIX C

CASE STUDY RESEARCH DESIGN

Single-case study

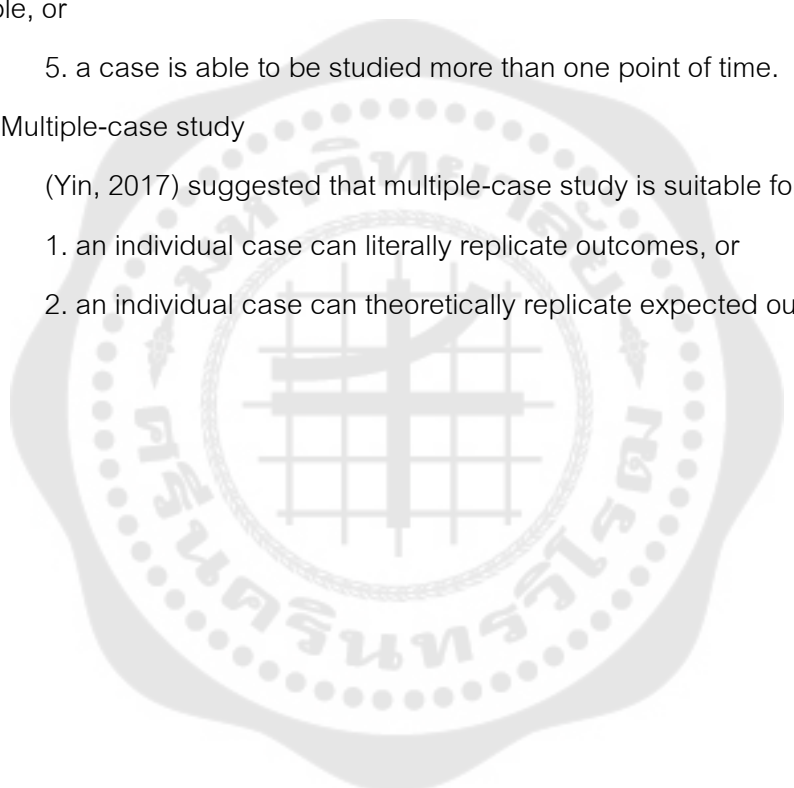
Yin (2017) suggested that single-case study is suitable for:

1. a case which is critical to the research theoretical proposition, or
2. a case is extreme, or
3. a case is able to represent the whole of particular states of an event, or
4. a case that researchers could not observe in the past, but now is accessible, or
5. a case is able to be studied more than one point of time.

Multiple-case study

(Yin, 2017) suggested that multiple-case study is suitable for:

1. an individual case can literally replicate outcomes, or
2. an individual case can theoretically replicate expected outcomes.





APPENDIX D

INSITUTIONAL REVIEW BOARD (IRB) CERTIFICATE

MF-04-version-2.0

วันที่ 18 ต.ค. 61



หนังสือรับรองจริยธรรมการวิจัยของข้อเสนอการวิจัย
เอกสารข้อมูลคำอธิบายสำหรับผู้เข้าร่วมการวิจัยและใบยินยอม

หมายเลขข้อเสนอการวิจัย SWUEC-G- 165/2565E

ข้อเสนอการวิจัยนี้และเอกสารประกอบของข้อเสนอการวิจัยตามรายการแสดงด้านล่าง ได้รับการพิจารณาจาก คณะกรรมการจริยธรรมสำหรับพิจารณาโครงการวิจัยที่ทำในมนุษย์ มหาวิทยาลัยศรีนครินทรวิโรฒแล้ว คณะกรรมการฯ มีความเห็นว่าข้อเสนอการวิจัยที่จะดำเนินการมีความสอดคล้องกับหลักจริยธรรมสากล ตลอดจนกฎหมาย ข้อบังคับและ ข้อกำหนดภายในประเทศ จึงเห็นสมควรให้ดำเนินการวิจัยตามข้อเสนอการวิจัยนี้ได้

ชื่อโครงการวิจัยเรื่อง: กระบวนการตัดสินใจลงทุนในหลักทรัพย์ในช่วงการแพร่ระบาดของโคโรนาไวรัส: การสังเคราะห์งานวิจัยและการศึกษาแบบพหุศึกษา

ชื่อผู้วิจัยหลัก: นางสาว จรัสพรรณ อินทรวนิษฐ

สังกัด: สถาบันวิจัยพฤติกรรมศาสตร์

เอกสารที่รับรอง:

1. แบบเสนอโครงการวิจัย
2. โครงการวิจัย
3. เอกสารชี้แจงผู้เข้าร่วมการวิจัย
4. หนังสือให้ความยินยอมเข้าร่วมโครงการวิจัย

เอกสารที่พิจารณาบทวน

1. แบบเสนอโครงการวิจัย	ฉบับที่ 1 วัน/เดือน/ปี 14 มีนาคม 2565
2. โครงร่างการวิจัย	ฉบับที่ 1 วัน/เดือน/ปี 14 มีนาคม 2565
3. เอกสารชี้แจงผู้เข้าร่วมการวิจัย	ฉบับที่ 1 วัน/เดือน/ปี 14 มีนาคม 2565
4. หนังสือให้ความยินยอมเข้าร่วมโครงการวิจัย	ฉบับที่ 1 วัน/เดือน/ปี 14 มีนาคม 2565

(ลงชื่อ).....

(ผู้ช่วยศาสตราจารย์ ดร.พันตแพทย์หญิงณปภา เอี่ยมจิตรกุล)

กรรมการและเลขานุการคณะกรรมการจริยธรรมสำหรับพิจารณาโครงการวิจัยที่ทำในมนุษย์

(ลงชื่อ).....

(แพทย์หญิงสุวิพร ภัทรสุวรรณ)

ประธานคณะกรรมการจริยธรรมสำหรับพิจารณาโครงการวิจัยที่ทำในมนุษย์

หมายเลขรับรอง : SWUEC/E/G-165/2565

วันที่ให้การรับรอง : 14/03/2565

วันหมดอายุใบรับรอง : 14/03/2566



APPENDIX E

ITEM OBJECTIVE CONGRUENCE INDEX FORM

Objectives	Articles	Main questions	Probing questions	Suggestions	IOC
Personal demographic					
To collect demographic	Sha et al., 2022 & Talwar et al., 2021	1. Age			1
		2. Gender		(Dr. Peera) There should be a diversity of gender.	1
		3. Occupation		(Dr. Polthep) There should be another question to show differences between multiple cases.	1
Perceived "impacts" of the COVID-19					
To know what the impacts investors perceived and how the impacts affected the informants	Kathpal et al., 2021 & Sha et al., 2022	1. How long have you been investing in stocks?	1.1 What are differences of decisions about stock investment before and during the COVID-19 pandemic?	(Dr. Peera) He would like to know if all the questions are opened or multiple choices questions. (Dr. Polthep) How to differentiate? Is there any measure?	0.67
			1.2 How did you invest in stocks?	Do not understand what decision about stock investment is.	0.67
			1.3 How did you decide to do so?	The question looks too broad. Is the situation still the pandemic?	0.33
			1.4 Why did you decide to do so?	(Dr. Peera) This question (1.2) is broad. This should be self-evaluation: are you risk lover, risk averse, or risk neutral.	0.33
		2. What were the impacts of the COVID-19 that you perceived?	2.1 How did the impacts affect your life?		1
			2.2 How did the impacts affect your decision on stock investment?		1
		3. What was the most impactful information about the COVID-19 that influenced your decision on stock investment?	3.1 Which channel did you receive the information?		1
			3.2 How did you interpret/consider the information as a fact of stock investment decision?		0.67
		Expectations of pandemic risks			
To explore what pandemic risks that the	Abdeldayem & Aldulaimi, 2020	1. What does the word "pandemic risk" mean for you?	1.1 What was the pandemic risk you expected to occur?	(Dr. Polthep) This question is quite broad. The answers of informants may not be related to the investment (Dr. Peera) 1.2 is similar to 1.1. There is a concern that informants will answer that it is	0.67

Objectives	Articles	Main questions	Probing questions	Suggestions	IOC
informants expected to happen			1.2 What led you to expect that it would happen? 1.3 How did you react to deal with the expected pandemic risk? 1.4 What else do you think you would have done? 1.5 Why did not you choose this way?	because of COVID-19 (1.1).	0.33 0.33 0 0
Cognitive biases					
To explore which source of information the informants relied on (type of biases)	Himanshu et al.,2020; Kathpal et al., 2021; & Talwar et al., 2021	1. During the COVID-19 pandemic, which source/kind of information did you search while considering stock investment conditions and options?	1.1 Before making a decision on stock investment, which information did you select? 1.2 How did you select the information? 1.3 Why did you trust/believe in the information and the source of it?	(Dr. Peera) Please consider the duplication of this part and part3, and if 3.1 and 3.2 are repeating or not.	1 0.67 0.33
Stock investment behaviour					
To confirm how/why the informants invested in stocks under the COVID-19 circumstances		1. Under the COVID-19 situation, what did you actually do with your portfolio?	1.1 How did you decide to about the portfolio? 1.2 Why did you decide to do so? OR What led you decide to do so?	(Dr. Polthep) This question (1.1) looks repeated. Please consider the duplication of the questions. This may be asked in question1.	1 0.67
		2. How do you think that your age, your saving, and your work stability affect your stock investment decision during the COVID-19 pandemic?	2.1 Imagine if you were older or younger than your current age, what would you decide to invest in stocks during the pandemic? And, why? 2.2 Imagine if you had more or less saving than your actuality, what would you decide to invest in stocks during the pandemic? And,	(Dr. Peera) 2.1,2.2,2.3 should be divided into if less and if more in order to prevent confusion. So there should be 6 questions. (Dr. Polthep) It may not need informants to imagine all about 3 factors, but allow them to rank which one is the most influential to their decision. After that let them to imagine how it affects their decision.	1 1

Objectives	Articles	Main questions	Probing questions	Suggestions	IOC
			<p>why?</p> <p>2.3 Imagine if you had more or less work stability than your actuality, what would you decide to invest in stocks during the pandemic? And, why?</p>		1





GENERIC RISK OF BIAS ASSESSMENT

Generic risk of bias in included studies assessment

This assessment tool is created based on The Cochrane Collaboration: Cochrane risk of bias tool for randomized trials (RoB 2). The procedure for assessing risk of bias is composed of defining domains of bias, producing “signaling questions” related to the domain qualities, stating eligibility for overall risk of bias, and forming a judgement (Higgins et al., 2022). Since the included studies of this study are correlational studies which are nonexperimental ones having no manipulation of an independent variable and no randomizing assignment of participants to conditions (University of Minnesota Libraries, 2016), criteria of the domains of bias are adjusted. Moreover, this tool is adapted for behavioral economic and finance studies conducted outside experimental settings, therefore, the word “respondents” are substituted for the word “participants” used in randomized controlled trials.

1. Domains of bias: definitions

According to the Cochrane RoB 2, risk of bias assessment tool consists of five domains of bias including selection bias, performance bias, detection bias, attrition bias, and reporting bias. The concise definitions of each domain are listed below:

1) Selection bias is considered into two aspects – sequence generation and allocation sequence. The sequence generation is a process that interventions are allocated randomly to participants while the allocation sequence is a process that the participants are assigned to study programs by chance (Higgins et al., 2022; Higgins and Green, 2011).

2) Performance bias is considered whether the participants have foreknowledge of an allocated intervention and the foreknowledge causes changes in outcomes (Higgins et al., 2022; Higgins and Green, 2011).

3) Detection bias (or measurement error) is considered whether a measurement of outcomes of the allocated intervention is suitable for the purpose of the study (Higgins et al., 2022; Higgins and Green, 2011).

4) Attrition bias is considered whether the outcomes of the allocated intervention are still complete after deducting numbers of withdrawals and exclusions (Higgins et al., 2022).

5) Reporting bias is considered whether the outcomes are selected to report based on a pre-specified plan (Higgins et al., 2022).

2. Signaling questions and judgement

2.1 Signaling question

Regarding correlational studies, interventions or independent variables cannot be manipulated and thus the independent variables are measured through a self-report questionnaire answered by respondents; additionally, the respondents are in a typical environment (University of Minnesota Libraries, 2016). Therefore, the validity of correlational studies accounts for their designs -- including sampling, data assessment instruments and data analyses -- leading to the study results. Criteria for assess risk of bias in correlational studies are tabulated below.

Table 1. Signaling questions of each domain of bias

Risk of bias	Signalling questions
Selection bias	Were the respondents selected by chance? Were the respondents in the study context?
Performance bias	Did not the respondents have any knowledge of topics located in the questionnaire?
Detection bias	Was the questionnaire suitable for a study objective?
Attrition bias	Did not the number of incomplete responses reduce the quality of statistical analysis?
Reporting bias	Did the selective reports depend upon the statistical analysis?

2.2 Judgement on signalling questions

According to Higgins et al. (2022), there are three main options for judging the signalling questions: 'Yes', 'No', and 'No information.' Regarding this assessment tool, 'Yes' means low risk of bias, 'No' means high risk of bias, and 'No information' means both there are no details of the domains of bias and the details of the domains of bias are not sufficient.

3. Overall risk of bias judgement

According to Higgins et al. (2022), the criteria of overall risk of bias are:

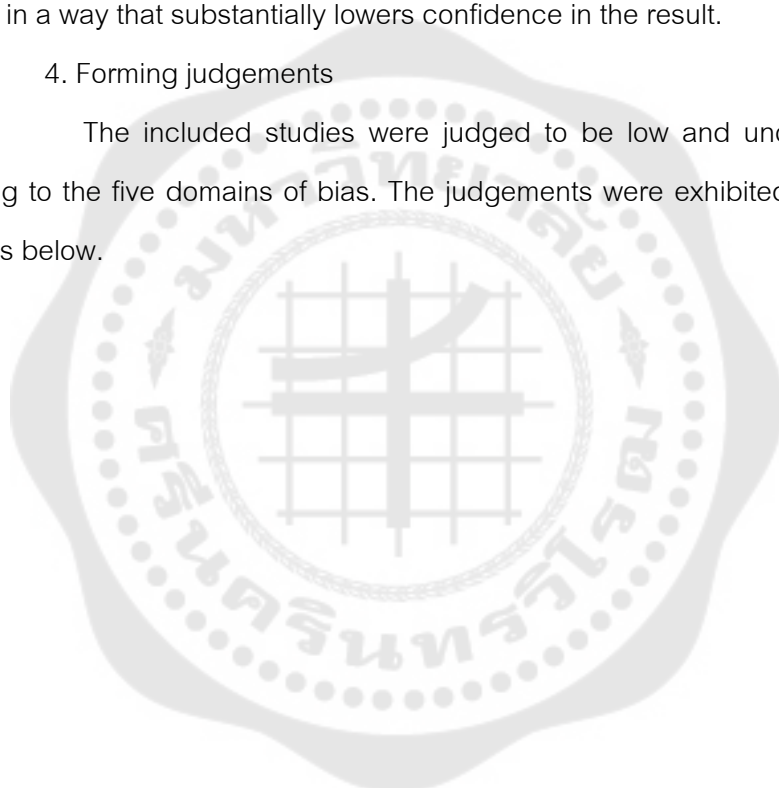
Low risk of bias if the study is judged to be at low risk of bias for all domains for this result.

Unclear if the study is judged to raise unclarity in at least one domain for this result, but not to be at high risk of bias for any domain.

High risk of bias if the study is judged to be at high risk of bias in at least one domain for this result; or, the study is judged to have some unclarities for multiple domains in a way that substantially lowers confidence in the result.

4. Forming judgements

The included studies were judged to be low and unclear risk of bias according to the five domains of bias. The judgements were exhibited by blue texts in the tables below.



Study 1. Sha, Y., Zhang, Y., and Lu, X. (2022). Household investment diversification amid Covid-19 pandemic: Evidence from Chinese investors. <i>Finance Research Letters</i> , 47(Part A). https://doi.org/10.1016/j.frl.2022.102820			
Risk of bias	Signaling question	Judgement	Support for judgement
Selection bias	Were the respondents selected by chance? Were the respondents in the study context?	Yes	“The data used in this paper are retrieved from the 2020 China individual investor behavior database, covering 30,209 individual investors who live in 315 different cities. 29,687 observations are obtained after processing the missing data.” (This study was an archival study, being a type of correlational studies.)
Performance bias	Did not the respondents have any knowledge of topics located in the questionnaire?	Yes	“The data used in this paper are retrieved from the 2020 China individual investor behavior database, ...” (Archival data)
Detection bias	Was the questionnaire suitable for a study objective?	Yes	“The data used in this paper are retrieved from the 2020 China individual investor behavior database ...” (Archival data)
Attrition bias	Did not the number of incomplete responses reduce the quality of statistical analysis?	Yes	“... covering 30,209 individual investors who live in 315 different cities. 29,687 observations are obtained after processing the missing data.”
Reporting bias	Did the selective reports depend upon the statistical analysis?	Yes	“Firstly, this study examines the impact of Covid-19 on individual investment diversification. Column 1 of Table 1 shows the results in which control variables are not added to the regression. Columns 2 demonstrates the results in which control variables are gradually added to the regression. It is found that in each column, the coefficients of the variables, Confirmed, are 0.0155 and 0.0135, respectively and they are statistically significant at the level of 1%.”
Overall judgement: Low risk of bias			

Study 2. Abdeldayem, M. M., and Al Dulaimi, S. H. (2020). Investors' herd behavior related to the pandemic-risk reflected on the GCC stock markets. <i>Zbornik radova Ekonomskog fakulteta u Rijeci</i> , 38(2), 563-584. https://doi.org/10.18045/zbfri.2020.2.563			
Risk of bias	Signaling question	Judgement	Support for judgement
Selection bias	Were the respondents selected by chance? Were the respondents in the study context?	Yes	“Since all individual investors in the GCC Stock markets have been remembered for the second phase of the study embraced through an online questionnaire survey, completed by utilizing the convenience sampling strategy, comprising of 420 respondents in the sample. The 6-points Likert scale was employed. The surveys were disseminated on the web, with explicit purposes, through directors of financier firms of five GCC Stock Exchanges being considered capable to send arbitrarily to investors (respondents).” “The surveys were disseminated on the web, with explicit purposes, through directors of financier firms of five GCC Stock Exchanges being considered capable to send arbitrarily to investors (respondents).”
Performance bias	Did not the respondents have any knowledge of topics located in the questionnaire?	Yes	Page 568. measuring herding behavior, paragraph 4.
Detection bias	Was the questionnaire suitable for a study objective?	Yes	Page 568. measuring herding behavior, paragraph 3.
Attrition bias	Did not the number of incomplete responses reduce the quality of statistical analysis?	Yes	Page 568. measuring herding behavior, paragraph 4.
Reporting bias	Did the selective reports depend upon the statistical analysis?	Yes	Page 572-573, empirical data and analysis. Page 577, result and discussion, paragraph 1.
Overall judgement: Low risk of bias			

Study 3. Himanshu, Ritika, Mushir, N., and Suryavanshi, R. (2021). Impact of COVID-19 on portfolio allocation decisions of individual investors. *Journal of Public Affairs, 21*(4). <https://doi.org/10.1002/pa.2649>

Risk of bias	Signaling question	Judgement	Support for judgement	Location of the details
Selection bias	Were the respondents selected by chance? Were the respondents in the study context?	Yes	“Questionnaire was mailed to the respondents. The data were collected from 184 individual investors residing in Delhi and Mumbai using the snowball sampling method. The data were collected between May 2020 and mid of July 2020.”	Page 3-4, case study, paragraph 2.
Performance bias	Did not the respondents have any knowledge of topics located in the questionnaire?	No information	N.A.	
Detection bias	Was the questionnaire suitable for a study objective?	Yes	“These respondents compared investment avenues according to their preference in a pairwise comparison matrix before COVID-19 and during COVID-19.”	Page 4, case study.
Attrition bias	Did not the number of incomplete responses reduce the quality of statistical analysis?	Yes	“Questionnaire was mailed to the respondents. The data were collected from 184 individual investors residing in Delhi and Mumbai using the snowball sampling method.”	Page 3-4, case study, paragraph 2.
Reporting bias	Did the selective reports depend upon the statistical analysis?	Yes	“The study uses AHP to rank the investment avenues in India. The ranks obtained before and during COVID-19 will help in knowing how investment preferences have been changed due to the COVID pandemic.” “Table 2 shows the preference of investment avenues (main criteria and sub-criteria) based on weights before COVID-19.” “Table 3 shows the preference of investment avenues (main criteria and sub-criteria) based on weights during COVID-19.”	Page 3, research methodology. Page 4, result and discussion, paragraph 1 and 2.
Overall judgement: Unclear				

Study 4. Kathpal, S., Akhtar, A., Zaheer, A., and Khan, M. N. (2021). Covid-19 and heuristic biases: evidence from India. *Journal of Financial Services Marketing*, 26(4), 305-316. <https://doi.org/10.1057/s41264-021-00116-x>

Risk of bias	Signaling question	Judgement	Support for judgement	Location of the details
Selection bias	Were the respondents selected by chance? Were the respondents in the study context?	Yes	“Investors were contacted via phone or personal visits from June 2020 to November 2020. A total of 500 investors were contacted to fill the questionnaire.”	Page 309, sampling technique.
Performance bias	Did not the respondents have any knowledge of topics located in the questionnaire?	No information	N.A.	
Detection bias	Was the questionnaire suitable for a study objective?	Yes	“A self-administered questionnaire was developed containing demography, Covid-19 perception, and heuristic biases concerning India’s individual investors.” “The questionnaire consists of two sections, where section A deals with respondents’ demographic profile and section B focuses on questions related to Covid-19 and heuristic biases using a five-point Likert scale.”	Page 308, questionnaire
Attrition bias	Did not the number of incomplete responses reduce the quality of statistical analysis?	Yes	“Out of the 500, 340 people filled the questionnaire, out of which 50 were found incomplete. Hence, 290 answers were considered for the investigation.” “To ensure sampling adequacy, this studied determined the sample size using four criteria: ...”	Page 309, area of sample and sample technique.
Reporting bias	Did the selective reports depend upon the statistical analysis?	Yes	“In order to analyze the coefficients of the proposed structure, a maximum likelihood procedure is employed. Table 8 represents the estimations of the proposed model. If the p value < 0.05 and C.R.> 1.96, the estimates are considered significant. Apart from estimating regression between Covid-19 and overconfidence, all other heuristic biases significantly correlate with Covid-19.”	Page 310, structural model
Overall judgement: Unclear				

Study 5. Talwar, S., Talwar, M., Tarjanne, V., and Dhir, A. (2021). Why retail investors traded equity during the pandemic? An application of artificial neural networks to examine behavioral biases. <i>Psychology and Marketing</i> , 38(11), 2142-2163. https://doi.org/10.1002/mar.21550			
Risk of bias	Signaling question	Judgement	Support for judgement
Selection bias	Were the respondents selected by chance? Were the respondents in the study context?	Yes	“The survey was conducted during May 2020 to capture the responses during the ongoing COVID-19 pandemic. Due to this, multiple touchpoints were used to solicit a response.”
Performance bias	Did not the respondents have any knowledge of topics located in the questionnaire?	Yes	“To control for self-response bias, we informed the participants that their anonymity would be maintained, and no personal information except basic demographic details would be collected. Furthermore, we did not disclose that the purpose of the study was to measure behavioral biases.”
Detection bias	Was the questionnaire suitable for a study objective?	Yes	“The questionnaire was developed by adapting pre-validated scales from prior studies in the area of behavioral finance. The following scales were derived from Baker et al. (2019). Overconfidence and self-attribution, hindsight bias, representativeness, anchoring, mental accounting, and herding. Over-optimism was operationalized by adapting the scale from Barrafre et al. (2020), while the loss aversion scale was adapted from Chun and Ming (2009). For trading activity, items were developed based on Milgrom and Stokey (1982) and Barber and Odean (2000), and recommendation intentions were captured through a scale adapted from Riquelme et al. (2016).”
Attrition bias	Did not the number of incomplete responses reduce the quality of statistical analysis?	Yes	“A total of 380 responses were received, of which 351 were taken forward for analysis after the removal of incomplete responses and outliers.”
Reporting bias	Did the selective reports depend upon the statistical analysis?	Yes	“The present study conducted a sensitivity analysis to assess the comparative influence of biases by computing their normalized importance. This was calculated by expressing each value as a percentage of the highest value. As presented in Table 5, in the case of trading activity, herding is the most important bias, followed by hindsight, overconfidence and self-attribution, representativeness, and anchoring.”
Overall judgement: Low risk of bias			



APPENXID G

Interview questions

Introduction

This interview contains 5 main sections asking for information about your investment experience during the COVID-19 pandemic in April 2020.

1. Personal demographics

1. Age: _____
2. Gender: _____
3. Occupation: _____
4. Investment experience (years): _____
5. Investment objective: saving earning another income daily expense

2. Perceived impacts of the COVID-19

1. What were the impacts of the COVID-19 you perceived?
 - 1.1 How did the impacts affect your life?
 - 1.2 How did the impacts affect your investment decision?
2. What was the most impactful information about the COVID-19 that influenced your investment decision?
 - 2.1 Which channel did you receive the information?
 - 2.2 How did you use the information for making investment decision?
3. How did the impacts change the way of making investment decision?

3. Expectations of pandemic risks

1. What was the pandemic risks you expected to occur regarding your investment?
 - 1.1 How did the expectations impact your investment decision?

4. Cognitive biases

1. During the COVID-19 pandemic, which source/kind of information did you search while considering stock investment conditions and options?
 - 1.1 Before making investment decision, which information did you select?
 - 1.2 Why did you trust/believe in the information and the source of it?

5. Stock investment behavior

1. During the COVID-19 situation, what did you actually do with your portfolio?

1.1 What led you decide to do so?

2. Please can you rank age, saving, and work stability? Which one is the most and the least impactful to your investment decision?

2.1 How did it affect your investment decision?





APPENDIX H

DEDUCTIVE CODING

Codes	Definitions	Pieces of information	Case
COVID-19 cases	The number of the COVID-19 cases, in the place where investors were residing, that was confirmed by the government (Sha et al., 2022).	<p>“But at the beginning, it was the number of cases. I had a look at that number for monitoring the spreading of the virus and for estimating how long the lockdowns would be.” [line 22-23]</p> <p>“Because of the COVID-19 information. I knew that it would not end in a near time, within one or two years. No. So, I knew that I could invest like this at least one year afterwards.” [line 46-47]</p> <p>“The number of cases had not been decreasing yet. Also, the vaccine had not been completed yet. It had not been completely effective yet. [line 49-50]</p>	B2
		<p>“At that time, as I remember, the spreading was from China. I saw the numbers of cases of neighbor countries. The numbers were increasing. And eventually, the virus spread out to Thailand. I.. Oh! I felt that the virus had been already spreading all around the world. There were lockdowns. The stock market plummeted. At that time, I tried to sell stocks that I could sell.” [line 14-17]</p> <p>“I focused mainly on the number of cases because it was easy to observe. There was a website feeding the numbers of cases of each country. So, I could see the situation of the spreading.” [line 30-31]</p>	C12
		<p>“I thought it was the daily number of cases. Like, the domestic spreading.” [line 28]</p> <p>“Because, in the period when the number of cases was high, I felt the stock market was not alright.” [line 30]</p>	C21
Time spent on stock markets	The length of time that investors were at their accommodations and spent the time on stock markets (Sha et al., 2022).	<p>“When I set the new portfolio, I tracked my portfolio every day. And, I did not travel so I had time to observe the market. I listened to news about stock markets every often, so... If I had not listened to news, I would not have thought that, should I buy it?, should I sell it? When I had space and time to receive information all the time, I wanted to buy, I wanted to sell stocks all the time.” [line 77-80]</p>	D121
Expectations of pandemic risk	Investor outlooks for the time to invest, future returns on stocks, and chances of investment loss (Abdeldayem and Aldulaimi, 2020).	<p>“At that time, I did not expect that there would be lockdowns. But I thought economic activities would dramatically drop.” [line 46-47]</p> <p>“Well. I saw a lot of impacts. I did not expect that the lockdowns would be long. Yeah. I did not expect that the lockdowns would be implemented in many places. But when the lockdowns</p>	B1

		<p>occurred, I did see a lot of impacts.” [line 49-51]</p> <p>“Umm. While locking down, there were some stocks getting benefits and their prices did not go down but up.” [line 53]</p>	
		<p>“I knew and expected that the rising number of cases in Thailand would lead to the same situations as others countries. That was lockdowns. The economy was impacted, then the stock prices dropped.” [line 53-54]</p> <p>“It might be economic slowdown as business closures. The economy might be shot for a while. But, what I did not expect was how long the impact was. But I did know just the economy must be shot, surely. Until the situation or ...it had not had the vaccine yet. So I thought that the economy might be slow down until there were the vaccines.” [line 56-59]</p>	C12
		<p>“The risk that I thought that it would happen. Well. It happened. It was that the country was closed. And, actually, it was not the worst case that I thought. It was that every single company must be shut down. Every single one could go out. Umm. Yeah. It happened in Malaysia and China, not in Thailand. I thought like that at first. But it was not the worst. Because if it was the worst, all business could not run and generated income. Everything stopped.” [line 81-85]</p> <p>“I thought that if the government implement the shut-down measure, stock prices would drop and drop. So it was not the time to buy.” [line 89-90]</p>	C22
Representativeness	Investors consider past events as representative of future event (Talwar et al., 2021).	<p>“I must fight against myself. I asked myself if this event was the same as the past events or not. It never ever happened. Yeah, it used to happen last hundred years ago, Spanish flu. So, I had to say that I did not know. Umm.... As I did not know which the past event was similar to this event, I did not have guide for investment at that time.” [line 30-33]</p>	C11
Herding	Investors believe in decisions of other investors and emulate others investment activities (Talwar et al., 2021).	<p>“I talked with my friends so I knew what my friends invested. For example, I talked with my friends that real estate might be bearish at least 3 years so we should invest in technological stocks or new start-up stocks. Something like that. Especially when I knew that my friends got profits, I followed them. Previously, I did not dare to do so although I knew what they invested and how much they gained, but at that time I knew it then I thought that it was pretty good.” [line 40-44]</p>	B2
		<p>“Till May, I started to buy some stocks because there were some</p>	C11

		<p>research papers from overseas. So I quite dared to buy them. In March and April when the market crashed, ooh..... I did dare to buy any stocks at all. Cos I did not know. Well. It was very new event. And there were lockdowns. I did not know. Other countries also had lockdowns. So, I did not know. Till I observed others, I found someone smart. I considered his idea and started to accept his idea as I thought that, yeah, it could be possible. So, in May, I started to accumulate stocks." [line 21-26]</p> <p>“: The mindset of people around me. They changed to invest in mutual funds more. I also invested in mutual funds because they also provided pretty high returns.” [line 42-43]</p>	
		<p>“The group that we were talking about stocks. And, Facebook pages.” [line 39]</p> <p>“Because, those pages were reliable. I also sought advice from my siblings.” [line 41]</p>	C21
Hindsight	Investors do believe in their ability to predict stock market events (Talwar et al., 2021).	<p>“And when the market dramatically dropped, I felt... umm... it might be in March or April. At that time, the market seemed to be crashed. I felt that the pandemic might stay long. I meant it did not impact the market so long. It might be because of panic that led the market crashed. The market plummeted very quickly as I remember. It plummeted to lower than 1000 points. At that time I felt... ahh... and there was a floor. The market plummeted to the floor one or two days. So, I felt that the market was too panic. So, I turned to buy some stocks being fundamentally strong. Whenever the pandemic disappeared, the prices might recover.” [line 17-23]</p> <p>“And stock prices were too low to low valuation. I thought if the situation became normal, the prices would recover as the same. This actually was the main reason I invested in stocks again.” [line 36-37]</p> <p>“Basically, I did not trade stocks frequently. If there was a good chance, I would invest. And during the pandemic, I thought it was a good time to invest because the market collapsed. After that, the market started to recover. So if there was a chance or news about some stocks, I would invest.” [line 44-47]</p> <p>“I withdrew money from money market fund, then hugely invested in stocks. I felt like.. I had already studied about the market. Each crisis was rather the timing to buy stocks. It did not</p>	C12

		usually happen. The market did not usually collapse. So, I thought it was the chance." [77-79]	
Overconfidence and self-attribution	Investors overestimate their ability to predict stock market events, or/and, their investment knowledge because of their past success (Talwar et al., 2021)	<p>"Insecurity of the business direction. But at the same time, I thought that it might be a mis-correction, then, I assumed that everything would recover, it was a good opportunity for medium and long terms investments." [line 14-15]</p> <p>"In the beginning, there were some uncertainties. But, at that time, I made worst case scenario assessment in order to estimate the situation. I thought I could ride it out. Assuming that the pandemic would end within 2-3 years. I believed it on that day." [line 19-21]</p> <p>"I got an amount of dividend. And I talked with my school friend that, hey, during the financial crisis, I used to buy CITI bank and held it. I got freaking losses. But I was still holding it. Then, I got back to have a look at it. Oh, its price was positive. So, I thought if I selected good companies and of they could go through this pandemic, they might be fine." [line 71-74]</p>	D121
Availability	Investors believe in available information that quickly comes in their mind (Kathpal et al., 2021).	<p>"News channels on Youtube." [line 33]</p> <p>"I searched the names of speakers who I knew. They were analysts who I knew where they were working." [line 35]</p> <p>"The information on Youtube is various. Some is a fundamental information. Some is economic figures. Some is an analytical information. It's various. Actually, I found the information myself by reading papers sent from brokers. But during the COVID-19, there were a lot of research on Youtube, really. It might be because people worked via Zoom, and it could record. Then, the record was uploaded on Youtube, like, they reused the data." [line37-41]</p>	B1
		"Facebook. Well. I read news from Thairath and Matchon pages. I thought they were pretty reliable. I read them for observing trends. I used the main media for observing trends." [line 69-70]	C21
		"Well. I screened stocks that were surely impacted by the pandemic out. As I was working in manufacturing line, I knew other firms that did manufacturing production. The costs of these firms were impacted a lot, so these firms might not have profits. So, stocks that I selected were the stocks benefiting from the COVID-19. Another stock I selected was not related to the COVID-19 at all, but it looked potential in the future. At that time,	C22

		<p>I got a lot of profits from STGT and STA. Another one was NEX. About NEX, at that time, it got losses pretty much as I had a look at its financial statement. But, after that, there was news that NEX decided to produce electric buses. So, I personally thought, hey, it was possible. And the executive's vision was good. There was no competitor, and, no-one wanted to compete. So I invested in it a lot." [line 30-37]</p> <p>"Actually, the received information was the official one. Did I use it for investment decision? No, I might not use it a lot because it might be too late. I searched the information for investment myself. I listened to news and rumors. I searched in the internet." [line 60-62]</p> <p>"I visited Settrade. It had everything about investment, in particular, consensus on stock prices that brokers provided. Basically, I visited Settrade in order to see the consensus. Like, the brokers recommended to buy or sell or the target prices." [line 95-98]</p> <p>"I did believe in it because they were professionals. They had more knowledge than me. I did not involve in the price analyses. But, they did it every day so they must be more skillful." [line 100-101]</p>	
Status quo bias	Investors have no effort to adjust their portfolios (Himanshu et al., 2020).	<p>"I adhered to my primary investment policy. I invested in fundamental stocks. I knew that their prices swung as usual. I might get more or less dividends and capital gains. But I did not realize gains. I realized losses because I did not sell my stocks." [line 61-63]</p> <p>"I have my own saving policy that I dived it into 3 plies. The first pile is for investment. The second pile is cash for emergency. And the third pile is for daily expense. All of them are obviously separated. I have my investment frame." [line 67-69]</p> <p>"My investment style was that I split an amount of money to invest when I thought that it was the time I should buy stocks. So, I did not receive information daily. <i>I did not consume the information all the day then decided to buy stocks at the end of the day. No, I did not. So, I waited until I saw the trend.</i> I did not need to wait until the situation recovered and ended. Because even during the pandemic, there were still lockdowns but some sectors in the stock market got better. So, I started to buy some stocks at that point." [line 38-42]</p>	<p>A</p> <p>E1211</p>

		<p>“I did not feel that it was the time to have quick expectations in order to get the returns. <i>I could wait until I could see the clear picture</i> that the COVID-19 ended in some countries. And there were not any risks of lockdowns again. So, <i>I did not need to hurry</i> to buy stocks as my investment horizon was very long. <i>I invested in stocks as a saving for my retirement in the next 20 years</i>, at least. So, comparing with my investment time horizon, it was not different to buy now, this month, or next month. <i>I could wait until the future outlook was clear</i> or even the end of that year. So, I did not need to consider that, yeah, if I should buy stocks or not. Especially, while comparing with the risks.” [line 53-59]</p> <p>“I did not sell stocks out. I left my portfolio the same. Then, around the end of that year, I buy stocks as equal as the bonus I earned. So, actually, if asking me if I made the decision differently between the year having the COVID-19 and the year without it, it was not quite different.” [line 70-72]</p> <p>“I thought that it was very difficult to point the market timing. If saying this time I should buy or this time I should sell, I thought someone who could predict the right timing was rare. So, <i>I avoided to use the market timing. I avoided to observe the price level for trading. No, I did not use that.</i> I did like DCA but I did not DCA monthly. Well. My investment horizon was long. And I was a salary man. I earned salary and an annual amount of bonus. So, the time I bought a big lot of stocks was around the end of each year.” [line 74-78]</p>	
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INDUCTIVE CODING

Case	Pieces of Information	Definition	Codes
A	<p>“And <i>I really did not know</i> about the COVID-19 so I felt I must save myself more. If relating it to the investment, I decreased my investment in stocks. Being in a very risky condition, <i>there were too many unknown factors</i>. So I slowed down my investment in stocks.” [line 19-21]</p> <p>“The factors that <i>I had never ever met</i>. I had never known what the pandemic was. No-one ever knew it.” [line 23]</p> <p>“I managed the priority. The investment was arranged to be a lower priority. I decreased my investment. I concentrated on the certainty of my family because <i>I did not know</i> what would happen, how much expenses I needed to pay. I did not have insurance so I had to have self-insurance. I must be responsible to myself.” [line 43-45]</p> <p>“Actually, I had the COVID-19 insurance. But <i>I did not really know</i> if it was enough or not. Because, for example, my friends told me that their parents got in the hospital and eventually they were at ICU unit longer than they expected. Someone got in the hospital and died. Some of my friends contacted me and ask me to find a place in hospital because I knew the doctors. Some cases got the 100th queue of the ambulance even if they were serious cases. So, when I thought about the investment, I just had a look at my portfolio. If the portfolio got loss in an acceptable level, I was fine. Done!” [line 47-52]</p> <p>“The risk was that <i>I did not know how long the pandemic would exist...</i>” [line 55]</p>		Fear of the Unknown or Intolerance of Uncertainty
	<p>“And, at the beginning of the pandemic, <i>I would have died if I got infected</i>. It was delta. There were so many deaths. And <i>what I faced was</i> that everyone tried to find a place in hospital because they could not get in hospital even if they had an amount of money. So, the investment became unnecessary. So, I got back to concentrate on safety in life.” [line 24-26]</p> <p>“Both. But I felt concerned about the number of deaths more because I was a kind of 608. I was above 60-year-old. And <i>if I got infected I would have died</i> as the doctor was advertising every single day! And more importantly, I had a heart disease. I was in that criteria so I must save myself. [line 32-34]</p> <p>“The announcement of M.D. Taweessin. I needed to follow what</p>		Health Anxiety

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	<p>was happening. And I happened to attend Certificate Course in Good Governance for Medical Executives, so I had friends who were doctors. I talked with my friends as well.” [line 36-38]</p>		
B1	<p>“Umm... <i>when the US announced that they found the vaccine.</i>” [line25]</p> <p>“Because at that time, it was the critical point of the market that whether or not the market would recover. But when the vaccine was discovered, the economy immediately recovered. Economic figures such as economic growth recovered. People turned back to spend their life again.” [line 27-29]</p>		Vaccine
	<p>“I fully held stocks in my portfolio, and bought some more stocks.” [line 64]</p> <p>“Because at that time, <i>the interest rate was too low.</i> I got too small amount of interest, so I bought stocks, fully and hugely.” [line 66-67]</p>		Interest Rate Cut
B2	<p>“<i>I did not know</i> what I should do about my job, how I could go to meet my clients. And the investment was impacted. At that moment when stock prices plummeted, it was a situation that everyone <i>panicked</i>. So did I. I knew it was because of the COVID-19, though. So, <i>I really did not know</i> how to update my portfolio. “I wondered <i>how long the pandemic would exist</i> and how low the prices would be. So, I slowed down the investment because <i>I did not know</i> how the pandemic would end.” [line 13-17]</p>		Fear of the unknown
	<p>“Actually, I was conservative to investment. I did not dare to invest riskily. But, during the pandemic, I could not go outside. <i>I spent a lot of time at home so I had more time to consume more information.</i> The information was really ample. <i>I consumed a bundle of information.</i> So, I changed from being conservative to being riskier. I invested in cryptocurrencies and foreign stocks.” [line 35-38]</p> <p>“Actually, at that time, it was the time I was very risky. I allocated my money from stocks and stocks mutual funds to cryptocurrencies and foreign stocks.” [line 70-71]</p> <p>“<i>I did have a lot of free time.</i> And I had friends. We talked a lot about various platforms. Some of them were robot. So I tried it. But now, I am investing in stocks.” [line 73-74]</p>		Time spent on consuming information
	<p>“I expected that if everything recovered, the situation might</p>		Surprise

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	<p>change rapidly. What I invested might be sold suddenly when the situation was normal. <i>But I did not think that</i> the change would be that fast, especially stock prices. They changed very quickly.” [line 54-56]</p> <p>“Well. I slowed down my investment and changed the stocks I invested. I tried to change sector to invest but all of my expectations were wrong. I still got loss.” [line 58-59]</p>		
C11	<p>“About investment, there were high uncertainties because the COVID-19 crisis was the novel event. <i>There had never been the event like this</i> for the last many years or last 10 years. The last crises were financial and economic crises. <i>The pandemic crisis had never ever happened</i> for the last 10 years or even 50 years ago. No, <i>it had never ever happened</i>. So, there were uncertainties in the stock market. Like, eh, should I buy some stocks? The prices dropped a lot. Should I buy them?” [line 14-18]</p> <p>“Because this event, <i>I did not know</i> if the world would collapse or if how long this situation would exist.” [line 18-19]</p> <p>“Well. <i>I did not know</i> what would happen. Well. I was too late to cut losses.” [line 78]</p>		Fear of the unknown
	<p>“At that time I thought that the vaccine was the endgame because the infected cases and the deaths might keep occurring. The key points were the vaccine and the number of deaths, actually.” [line 46-47]</p> <p>“Well. The vaccine meant the confidence in spending life outside. Surely, we could get infected even though we got the jab. But the probability of death was truly decreasing. So, I thought the vaccine was essential because it led to the decrease in the death rate. Dropping in the death rate, the sentiment might recover. The market might fairly recover.” [line 49-52]</p> <p>“<i>The effectiveness of it</i> was not as effective as mRNA produced from the US or the West. The effectiveness of anti-virus was different. But, it was each person’s condition.” [line 58-59]</p> <p>“Well. The risk was no-end. The coronavirus could keep mutating. Due to its mutation, the vaccine became ineffective.” [line 61-62]</p>		Vaccine
C12	<p>“Anxious. I was anxious that .. like.. I stepped back and</p>		Fear of the

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	<p>observed. Then, I sold some assets and held cash." [line 25]</p> <p>"Well. <i>I did not know</i> what the impacts on the economy and the stock market. <i>I did not know</i> how severe the impacts were. So, I stepped back and observed the situation. I slowed down my investment in stocks." [line 27-28]</p>		Unknown
	<p>"Mainly, I tried to observed what was going on. At that time when I decided to invest, I did not consider information of each stock. But I bought the stocks that I had already known such as MINT. I just thought that the hotel industry was dropped a lot but MINT had food delivery. The delivery was still fine during the pandemic. So, I decided to invest in MINT. Because if I invested in a business running only hotel, I feared as the hotel was closed too long to fail. it was a threat. So, I decided to invest in MINT hugely." [line 71-75]</p>		Availability
C21	<p>"Well. I felt that I studied in more details while investing in stocks. Like, there were some stocks that were temporary. So, I needed to study more." [line 22-23]</p> <p>"The stocks that were volatile" [line 25]</p> <p>"Well. I decreased my investment because the stock market during the pandemic was too volatile. I needed to save myself more. <i>I also felt insecure</i> that if stock prices would go up or down. It was not that certain. So, I had a break. I reduced an amount of money invested in new stocks." [line 45-47]</p>		Anxiety
	<p>"And actually, <i>the vaccine</i> was also influential. Like, when there was news about the vaccine, I felt the news had impacts in stock price movements, up and down." [line 31-32]</p>		Vaccine
	<p>"Actually, at that time, <i>I thought</i> that stock prices were pretty low. So, I bought some stocks and held till the prices would go up." [line 55-56]</p> <p>"<i>I just</i> observed the prices. If the prices were at the point <i>I felt satisfied, I just</i> sold them." [line 60-61]</p> <p>"<i>I just</i> find another way to increase my income. Well. I thought I would get profits if I invested at that time." [line 62-63]</p>		Hope
C22	<p>"Government measures." [line 39]</p> <p>"Well. The number of cases told just the current situation. If we notice that people panicked at the beginning of the pandemic, so the number of cases was impactful. It influenced stock prices to go up and down. So, in the first year of the pandemic, the</p>		Government Measures

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	<p>number of cases was impactful. I also feared and protected myself as good as I could do. But, after I got used to it, I ignored the number of cases and focused on the measures. I observed what the government would take actions. When would they open the country? Because if I could predict the government measures beforehand, I had opportunity to buy the stocks getting benefits from the measures." [line 41-46]</p>		
D121	<p>"In the case of SET, I focused on the vaccine. At that time when the market went down, I expected that the market would well recover <i>if there was the vaccine and if it was effective.</i>" [line 36-37]</p>		Vaccine
	<p>"Well. When the stock prices were a bit positive, I hastily sold them. I hurried to sell them. When the prices a bit dropped, actually, I should rational, like, my real logic was that I would hold the stocks in long-term as I intended initially. But, <i>the emotions took control.</i> I listened too much news, then I felt that the situation at that moment was bad. So, I sold stocks for cutting losses. But if I did not use any emotions for trading, used only reasons, the trading outcome might be better." [line 48-52]</p> <p>"If the time of selling, it might be fear. If the time of buying, it might be that I could see the light at the end. Well. I thought it was hope." [line 54-55]</p> <p>"But, practically, <i>there were emotions controlling me.</i> When the prices went up a bit, I should not sell them. Yeah, I sold them. I panicked then sold stocks." Line 68-69]</p>		Emotions
E1211	<p>"But, having the uncertainties, <i>I did not know</i> the employment situation so I needed to increase the percentage of saving. The budget for investment decreased." [line 17-18]</p>		Fear of the unknown
	<p>"I felt that whenever there was the <i>effective vaccine</i>, the pandemic would end. That was for a short term. Then, if the short-term situation end, I fairly knew how long the impacts of the pandemic would exist." [line 23-25]</p>		Vaccine

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