

## **CHAPTER 4**

### **RESEARCH METHODOLOGY**

#### **4.1 INTRODUCTION**

This research follows the quantitative method in which data was collected using the survey instruments distributed among the key informants in an organization. The key informant refers to the decision-maker of the firms that successfully secure funding via equity crowdfunding from the year 2016-2019. There are 77 MSMEs altogether. The key informants include the founder, co-founder, director, chief executive officer (CEO), chief financial officer (CFO), and chief operating officer (COO). Also, they include other designated posts which hold the responsibility as a decision-maker of the firm with the appropriate knowledge to respond to the survey questions.

This chapter aims to provide details of the methodology used in collecting the primary data for this study. The data answers the research questions and addresses the objectives to investigate the ECF-funded firms in Malaysia. Performance was examined using the financial and non-financial approaches. The study investigated the impact of financial management practices, the affiliation of social networks, and the ECF platform focused on this study on equity-crowdfunded SMEs' performance in Malaysia. Thus, this chapter will explain the study's research design, the population, and sampling techniques. Later, it will describe the research instrument used and the process for a pilot study. This is followed by a discussion on the validity and reliability of the instrument in the subsequent subsections.

Lastly, this chapter discusses the statistical techniques that this study employed and the steps for data analysis. The SPSS version 20.0 was used to clean the data before using the PLS-SEM version 3.0 to assess the measurement and structural models.

## 4.2 RESEARCH PARADIGM

The French philosopher, Comte (2015), inspires the positivism paradigm in exploring social reality. He highlights that understanding and analyzing the situation is vital, especially when understanding human behavior. He also emphasizes that true knowledge is based on sensational experience, observation, and experimentation. He also added that positive thinkers adapt their scientific methods as tools for knowledge generation. Thus, principles and assumptions of knowledge need to be understood (Dash, 2005). These assumptions are referred as determinism, empiricism, parsimony, and generality (Cohen *et al.*, 2000).

Positivism is described as traditionalist, objectivist, and experimentalist, using the quantitative approach to understand a phenomenon. On the other hand, interpretivism embraces interview and observation and employs a qualitative approach to understand a phenomenon (Collis & Hussey, 2013; Easter-Smith *et al.*, 2008). The research objectives determine whether to select the positivism or interpretivism approach. Positivism is concerned with proving or rejecting the hypothesis, testing the theory, and proposing complete and fact-based quantitative data to generalize the result. Meanwhile, interpretivism involves theory generation and producing subjective and qualitative data (Collis & Hussey, 2009; Saunders *et al.*, 2009).

Since the objective of this study is to examine the performance of ECF on the firm's performance, this study is involved in the testing of numerous hypotheses among the constructs developed based on existing theories that supported previous empirical

studies. Thus, this study chooses positivism as the philosophical paradigm as it matches the spirit of this research. Therefore, the deductive approach is more relevant to this study. In addition, this study also intends to demonstrate the theoretical relationship with previously-researched theories. As a matter of fact, in the hypotheses development, this study employs the resource-based view (RBV) as an underpinning theory and signaling theory to explain the phenomena involving crowdfunding and the performance of the ECF-funded firms. However, the overall perspective of this study is bounded by Islamic teaching. This study uses the Partial Least Squares – Structural Equation Modeling (PLS-SEM) technique to analyze the attribute of the hypotheses and extract the decision of this research using quantitative data collected from the sample of firms that successfully raised money via equity crowdfunding platforms.

This research employs the structured survey questionnaire instrument to obtain the quantitative measurements as this is the one of the best methods to collect data (Sekaran & Bougie, 2009; Zikmund, 2003). The survey method is a sampling technique that interacts with the purposive sample of the decision-makers of the firms (Zikmund, 2003). The targeted subjects were firms which successfully raised ECF from 2016 to 2019. Due to Covid-19, the instruments were distributed using Google form after further discussion with the cooperative ECF platforms. To note, the Covid-19 has emotionally impacted the firms.

Even though purposive sampling has some drawbacks because of its subjective nature in selecting the sample (i.e., it is unsuitable in representing the whole population), it has its own advantageous, especially when dealing with limited resources, time, and personnel. Another reason for its justification is when the population is too big that randomization is impossible, particularly in studies in which the number of successful ECF-funded firms is still low (see Etikan *et al.*, 2016).

Furthermore, quantitative methods enable the investigation of the research problems scientifically, systematically, and objectively. This method allows the researcher to carry out his/her analysis using multiple variables in a single study as it provides high generalization and external sound reliability (Nikbin *et al.*, 2012).

The survey questionnaire perfectly extracts data from hidden patterns, builds concrete relationships, and concludes sound facts compared to others strategies (Saunders *et al.*, 2009). In addition, the survey technique enables reaching the targeted population faster than any other method when the data collection period is short or data is cross-sectional (Forza, 2002; Wong *et al.*, 2009). Finally, the survey is an appropriate and effective tool to obtain meaningful responses from the population (Nikbin *et al.*, 2015). Therefore, the above deliberation serves to justify the position of this study which embraces the positivistic research paradigm and, thus, quantitative research approach using the survey as the research method (see Dash, 2005).

#### **4.3 QUANTITATIVE (DEDUCTIVE) ABOVE QUALITATIVE (INDUCTIVE) RESEARCH APPROACH**

This study examines the performance of the firm that received funding via ECF. Performance measures the survival or death of the firm. Scientific research is needed to study the performance of the firm. Most researchers frequently use scientific approaches to derive solutions to solve particular problems either in applied research or basic research. According to Sekaran and Bougie (2016), qualitative research is unable to provide generalizability. Thus, it is impossible to conduct the same study on other firms with different settings. Table 4.1 provides the eight characteristics of

scientific research that assist the researchers in obtaining accurate and assured findings, as explained by Uma Sekaran and Roger Bougie.

**Table 4.1:** Scientific Research Criteria

No.	Characteristics	Descriptions
1	Purposive	Has goal to achieve.
2	Rigor	Follow thorough investigation
3	Testability	The hypothesis created for the research must be testable
4	Replicability	The hypothesis created can be repeated in the same type of research elsewhere.
5	Precision and confidence	Nearness to the reality and high probability of findings correctness.
6	Objectivity	The results derived from the actual data not based on researcher emotional interpretation or subjective view.
7	Generalizability	The validity of the research findings to other organizational situations or surroundings. The higher generalizable of one research increases its usefulness and value.
8	Parsimony	Easy and simple in explaining the phenomenon that occur.

Source: Sekaran & Bougie (2016)

Therefore, in line with this research, where ECF is a new phenomenon in Malaysia, this study intends to know in-depth the post crowdfunding reality. At this stage, the researcher investigates further than the surface of the ECF-funded firms in Malaysia. In most crowdfunding cases, the entrepreneurs are motivated to approach the platform for some reasons. For example, the cost of raising ECF capital is lower, easy to apply, and able to attract faster market recognition and future funding from the investors than traditional banking institutions (Baumgardner *et al.*, 2017; Ljumovic & Pejovic, 2020; Strausz, 2017).

Specifically, the qualitative research approach focuses on exploring, investigating and categorizing the new emergent outcomes. A qualitative researcher is unable to predict the consequences of the research. Thus, he/she may conduct interview sessions or collect answers from open-ended questions to know the results. However,

when the researcher can expect the outcomes, quantitative and descriptive or causal research is the best option (Sekaran & Bougie, 2016). Therefore, this serves to justify the purpose of the researcher in selecting the quantitative approach over the qualitative. Table 4.2 portrays the differences between quantitative research and qualitative research based on nine features below;

**Table 4.2:** Comparison between Quantitative and Qualitative Research

No.	Features	Quantitative Research	Qualitative Research
1	Focus of research	Quantity (how much, how many)	Quality (nature, essence)
2	Philosophical roots	Positivism, logical empiricism, realism	Phenomenology, symbolic interactionism, constructivism
3	Associated phrases	Experimental, empirical, statistical	Fieldwork, ethnographic, naturalistic, grounded, constructivist
4	Goal of investigation	Prediction, control, description, confirmation, hypothesis testing	Understanding, description, discovery, meaning, hypothesis generating
5	Design characteristics	Predetermined, structured	Flexible, evolving, emergent
6	Sample	Large random, representative	Small, non-random, purposeful, theoretical
7	Data collection	Inanimate instruments (scales, tests, surveys, questionnaires, computers)	Researcher as primary instrument, interviews, observations, documents
8	Primary mode of analysis	Deductive, statistical	Inductive, constant comparative method
9	Findings	Precise, numerical	Comprehensive, holistic, expansive, richly descriptive

Adapted from Merriam & Tisdell (2015)

A deductive method was adopted in this study to investigate the FMP, SN, PP and the influence of mediator (BI) specifically on FAR and FPC towards the performance of the ECF-funded firms by applying the RBV. Correspondingly, several hypotheses were formulated to test this theory and these hypotheses were either confirmed or rejected based on the data collected and analyzed in the respective

industry. Notwithstanding, the ultimate finding will confirm or possibly suggest modifications to the theory. Thus, by adopting the deductive research method, all of the suggested research questions would have been answered.

#### 4.4 RESEARCH DESIGN

A study's research design is "a blueprint of data collection, measurement, and analysis designed to answer specific research questions" (Sekaran & Bougie, 2016, p.95). Formulating the research problem and determining its characteristics would lead to deciding which of the research design to be selected to answer the research problem (Herek, 2012; Megan, 2013). Research design is used as a guide for researchers when conducting a research project. The study's research design represents the overall research structure from the beginning to the final output in this study. Typically, there are three main types of research design: quantitative, qualitative, and mixed-method.

Emory and Cooper (1991) argued that a research design depicts a structure for achieving the research objectives and answering the research questions. Further, Sarantakos (1998) affirmed that a research design is central to the research. Sekaran (2006) and Churchill and Iacobuchi (2006) also outlined the research design as undertaking the research process. They suggested research design as a guide for scholars to use in completing their research.

Notwithstanding, Yin (2017) recommends that research design is connected to the data collection process. In general, the selection of research design should signify the decisions concerning the significance given to a series of aspects related to the research process (Bryman & Bell, 2014; Bryman *et al.*, 2018). Conclusions are also drawn upon achieving and answering the research objectives and questions. Based on the earlier review, it can be deduced that a research design establishes a basic research

plan for collecting data, which helps in answering the questions and objectives underpinning a study. Accordingly, this section examines the proposed research design to meet the research objectives and answer the research questions addressed in this study.

A researcher uses the research design to plan how the data can be collected and analyzed (Hair *et al.*, 2010). Thus, it is essential to derive meaningful information to answer the research questions (Bhattacharyya, 2006). In quantitative research, the researcher assumes social realism external to the informed person, whereas knowledge is considered factual and quantifiable. Thus, the researcher assumes his/her role as an observer and attempts to identify the common principles regarding the relations and consistencies of the chosen research variables. On the contrary, a qualitative researcher assumes that social realism prevails independent of the informed person, while knowledge is personal and subjective.

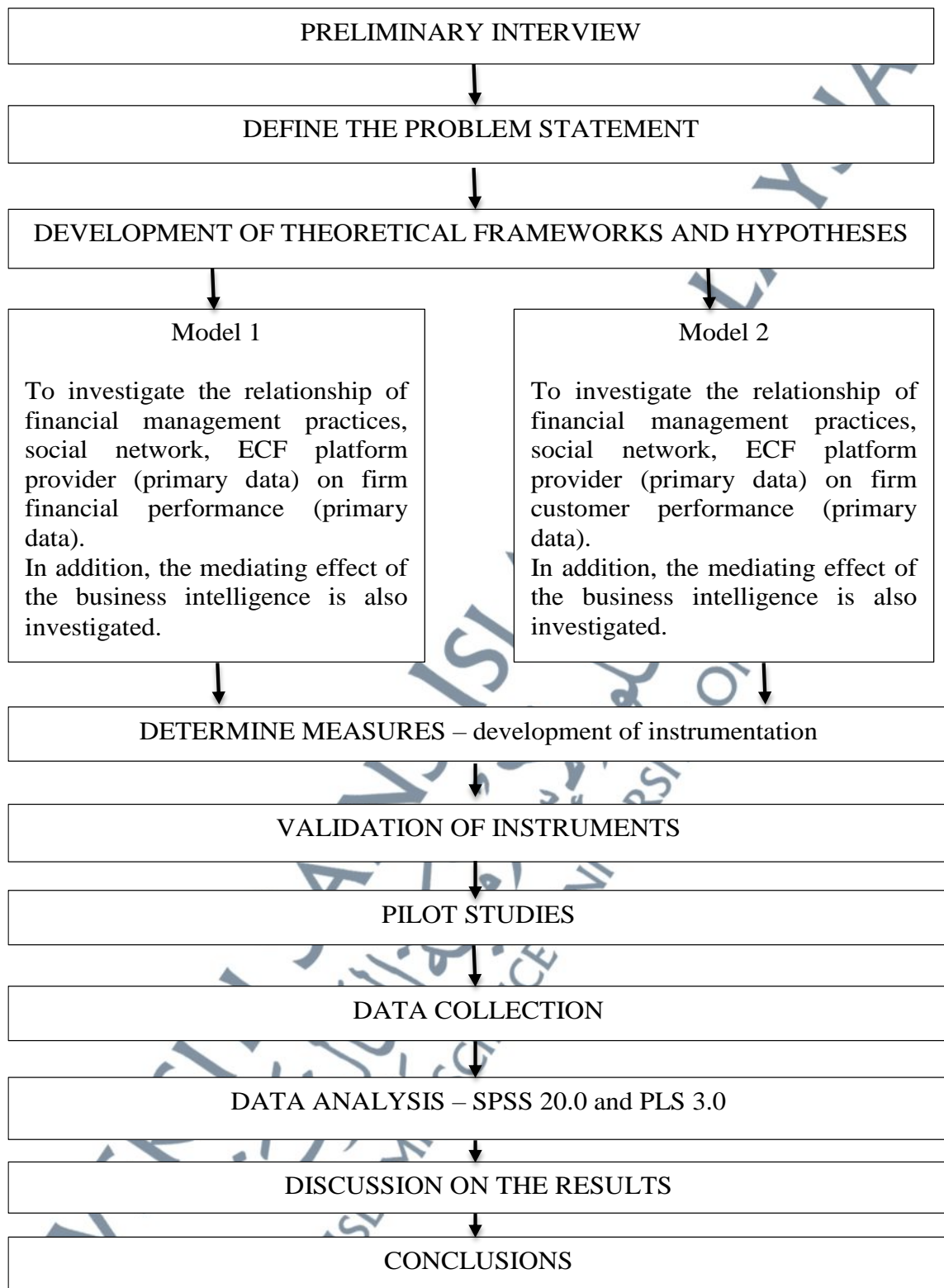
A cross-sectional survey was adopted as the data collection method representing a single point in time in this study. According to Olsen and George (2004), a cross-sectional survey encapsulates the whole population or a representative sample among X and Y at a certain period. Thus, the survey method was employed in this study to collect data from the samples. Prior to conducting the survey, the researcher prepares a formal list of questions beforehand. Later, the self-completed questionnaires were distributed to the respondents, and they were required to answer and return the completed questionnaires to the researcher.

The objectives of this study were established to investigate the FMP, SN, PP and the mediating of BI specifically on FAR and FPC towards the ECF-funded firms' performance. In this study, a quantitative approach was adopted. It includes descriptive, explanatory, and confirmatory characteristics with three justifications used for

delineating the research flow and outcome. Firstly, this study focuses on the influential elements relative to the ECF-funded firms in Malaysia; thus, it entertains descriptive values from previous studies. Secondly, this study describes the relationship between the measurable variables via extensive analysis; hence, it also has a significant explanatory character. Finally, the study develops a conceptual framework that accommodates the confirmatory elements on the factors that influence the performance of the ECF-funded firms. In conclusion, the deductive method of a quantitative approach was adopted to generate the anticipated outcome that meets the objectives of this study.

#### **4.5 RESEARCH PROCESS**

The research process explains how the researcher conducted the research, collected, measured, and analyzed it (Boeije, 2009). The research process illustrated in Figure 4.1 outlines the steps undertaken in this study. The related literature was reviewed extensively, then followed by identifying research problems to describe the purpose of the study. Next, the theoretical frameworks and hypotheses of this study were developed to solve the research problem. In order to strengthen the results of this study, two models were developed. Furthermore, the researcher determined the appropriate measures to test the hypotheses under study. Next, the instruments were tested by conducting pilot studies for Model 1 and Model 2. After doing minor modifications on the initial instruments, the fieldwork or correction of the actual data were conducted.



**Figure 4.1:** Research Process

The construction of the theoretical framework was followed by establishing the study's hypotheses. Two models were developed to support the result of this study. Model 1 analyzed the influence of financial management practices, social networks, ECF platform, and the firm's financial performance. Further, it investigated the mediating effect of business intelligence. Model 2 analyzed the influence of financial management practices, social networks, ECF platform, and the firm's non-financial performance. Further, it investigated the mediating effect of business intelligence on the financial analysis and reporting, and financial planning and control practices.

Later, suitable measures were established to test the hypotheses developed in this study. The following two steps concern the validation and testing of the instrument before collecting the actual data. Finally, the last step was to analyze the data. At this stage, the study's data was processed, interpreted, discussed, and concluded.

#### **4.6 SAMPLING PROCEDURE**

A quantitative study aims to measure variables and find generalizations in which the findings are revealed from the targeted population. A research's targeted population must be defined clearly to answer the problem the researcher wishes to investigate (Hardon *et al.*, 2004). Thus, this study's sampling procedure initially begun with selecting the research's target population, followed by choosing the sampling method, selecting the sample size and finally, the execution of the entire process.

##### **4.6.1 Target Population**

The targeted population is also known as the theoretical population. It refers to the whole set of entities (individuals or objects) with similar characteristics that the researcher defines in his/her study to generalize the findings (Banerjee & Chaudhury,

2010; Lavrakas, 2008). The target sample refers to a subdivision that represents the entire targeted population. The researcher uses the sample for information gathering, processing, and generalizing the findings to represent that targeted population (Gratton & Jones, 2010).

This study's targeted population are based on the annual reports of the Securities Commission of Malaysia to obtain the number of successful ECF funded firms (issuers). The report showed that 77 successful issuers in total from 2016 to 2019 (Securities Commission of Malaysia, SC, 2019).

#### **4.6.2 Unit of Analysis**

Sekaran and Bougie (2016) suggest that the unit of analysis or the sampling unit should be the extent of accumulated data stemming from successive steps in performing data analysis. Hence, the researcher decided to opt for a firm-level analysis since the primary research objectives are to investigate the effect of the financial management practices, social networks, and the ECF platform on the ECF-funded issuers and business intelligence as mediator. These firms are represented by their founder-manager as their views often represent the views of the entire firms (Bakar *et al.*, 2015). Thus, the unit of analysis consisted of the founder, CEO, CFO and COO. Therefore, to have better sample sizes, each of the firms was approached to answer the survey by a maximum of three respondents in the role of a decision-maker, specifically in terms of financial decision. The respondents must either be the founder, director, or top management teams. Thus, this study's population (N) is the total amount of successful issuers, which are 77 multiplied by three respondents ( $77 \times 3$ ), hence equal to 231 respondents (N=231).

This study assumes that the firms' decision-makers, such as the founder, co-founder, and top management teams such as director, CEO, CFO, and COO, will positively participate in this survey. They are selected based on the assumption that they are the most competent individual in the organization in terms of knowledge, participation in decision making, and well-versed about the organization's policies and strategic planning (Brazeal, 1993; Inkinen, 2016).

After this approach, the sampling unit must first be determined by which the selection for the unit of analysis is based on three characteristics. Firstly, the firms are registered under Suruhanjaya Syarikat Malaysia (SSM). Secondly, the firms must successfully fundraise the ECF campaign from 2016-2019 and last but not least, only firms aged three years and above were selected. In view of this, the ECF-funded firms are those represented by their founder-manager as their proxy that plays an on-going role in the daily functioning of the firm operation and have influence in decision making; hence, the unit of analysis in this study is specifically represented by the successful ECF-funded firms.

#### **4.6.3 Method of Sampling**

In general, quantitative research involves two main sampling methods that have been grouped into probability and non-probability. The probability sampling or random sampling method explains that every component in the population has a chance to be chosen (Hair *et al.*, 2010; Sekaran, 2003). There are various sampling methods under the group of probability sampling, such as simple random sampling, systematic sampling, multistage sampling, stratified sampling, cluster sampling, and lot quality assurance sampling (Banerjee & Chaudhury, 2010).

The non-probability or non-random sampling method explains that not every component in the population has a chance to be chosen. In other words, the samples are not randomly chosen. They are selected based on the preference of the researcher (Sekaran, 2003). The purposive sampling technique is one of the non-random samplings. However, non-probability sampling has certain limitations. For example, when the targeted population is too huge to be recognized. However, this is not considered a limitation when the generalization of findings for the whole population is not required. Other than this, from the statistical point of view, due to its nature of being non-random, the non-probability sampling cannot be used to estimate tests of significance and confidence intervals (Banerjee & Chaudhury, 2010).

Even so, the choice to choose which sampling method is to be used depends on the availability of resources and time consumptions. Sometimes, genuinely random sampling is impossible. Consequently, the samples are prone to be biased. To overcome this, the researcher should possess certain information about the population to reduce the degree of bias that will probably affect the validity of data collection (Banerjee & Chaudhury, 2010). Based on the above information, this study's targeted population is small. As such, the researcher intends to reach every successful firm which secured funding via ECF. Thus, it justifies the adoption of non-probability or non-random sampling or technique.

#### **4.6.4 Justification for Non-Probability Sampling**

Non-probability, also known as the purposive sampling method, enables the researcher to disseminate the questionnaires directly to individuals who possess the required information. In this study, they refer to the successful issuers. They are perhaps the only source of needed information or meet the researcher's predetermined

standard (Fraenkel *et al.*, 2011; Hair *et al.*, 2010; Sekaran, 2003). The objective of this research is to investigate the ECF-funded firms' performance. Therefore, in the context of this study, the required information can only be provided by the founders/directors or the executive level employees in the organization. Generally, ECF is new in Malaysia. It is a new emerging funding technique. Due to that, the participation rate of businesses involving crowdfunding is considered relatively low. In fact, most of the ECF-funded firms are young. Therefore, to obtain the required information and ensure its richness, it is necessary to adopt purposive sampling to reach the targeted population.

#### **4.6.5 Sampling Size**

Initially, this study aimed to distribute questionnaires by hand and through online applications such as Gmail, WhatsApp, and Facebook. The assumption was these methods can reach the targeted population better and faster. The methodological approach which the researcher embraces will determine the sample size (Hill, 1998).

Furthermore, to obtain accurate data, the sample size has to be representative because every single sample has a chance to be selected (Banerjee & Chaudhury, 2010). The researcher must make the critical consideration to ensure that the data collected is enough to generalize the whole population (Sekaran, 2003). Roscoe's (1975) rules of thumb reveal that the appropriate sample size for most experimental (quantitative) research is the recommended 30 or more samples (as cited in Hill, 1998; Sekaran, 2003).

In addition, other factors to be considered before the decision on sample size can be made, such as; resources constraint, the objective of the study, the confidence interval, the confidence level in accepting the risk, the level of inconsistency in the

population itself, and under certain circumstances, the size of the population itself (Sekaran & Bougie, 2016). However, aside from the above method to find the sample size, Krejcie and Morgan's (1970) guideline seems to be more convenient and reliable for almost any study. Again, this study refers to the annual reports of the Securities Commission of Malaysia to identify and obtain the number of successful recipients of equity crowdfunding. Therefore, using Krejcie and Morgan's, the suggested sample size would be 140 (Krejcie & Morgan, 1970). Otherwise, this study applied Sekaran's (2003) minimum of 30 sample size option. This study assumes that the firms' decision-maker, such as the founder, co-founder, and top management teams such as director, CEO, CFO, and COO, will positively participate in this survey. They are selected based on the assumption that they are the most competent individual in the organization in terms of knowledge, participation in decision making, and well-versed about the organization's policies and strategic planning (Brazeal, 1993; Inkinen, 2016).

Since this study's objective is to analyze ECF performance, it is essential to expand the study through a data collection methodology to represent its population. Thus, it is justified to use the purposive sampling method to obtain the required data. The researcher intends to gather the data face to face. Unfortunately, the Covid-19 restricted the researcher to conduct the face-to-face approach. As a result, it has taken the consideration and advice from the ECF platform to use the electronic mail surveys to increase the number of respondents, thus increasing participation in the survey (Dillman *et al.*, 2009). Utilising the electronic surveys during the pandemic has been proven by a study conducted by Alharahsheh, Harahsheh, Ehyeh and Alrawashdeh (2021) during pandemic Covid-19. The study population included Jordanian private universities in the northern region, with a total of five universities, and the analytic unit

included university deans and their deputies. The authors revealed the respondents' higher participation, 93.5%, from the original samples of 108 participants.

#### **4.7 RESEARCH INSTRUMENT DEVELOPMENT**

This section discusses in detail the development of the study's research instrument.

##### **4.7.1 Questionnaire Design**

The questionnaire development began with reviewing the relevant literature that provides necessary information for this study. Resultantly, a questionnaire survey approach was adopted in this study based on several structures.

The structure of the questionnaire employed in this study is divided according to various aspects, such as; firm demographics (age and size), founder-managers demographics (age, education, industrial and management experiences), financial management practices employed, the social networks, ECF platform, the business intelligence (mediator), performance, and ECF activities.

The respondents are requested to answer all of the questions enquired on a five-point Likert rating scale. According to Awang, Afthanorhan and Mamat (2016), the Likert scale is usually applied in a research survey, either primary or secondary. The purpose is to study the attitude of the respondents on a specific question in which they agree or disagree. The descriptors vary between '1' to '5'. '1' signifies 'strongly disagree,' '2' indicates to 'disagree,' '3' signifies 'neutral,' '4' indicates to 'agree,' and '5' signifies 'strongly agree.' The questionnaire consists of eight different sections. Each of the sections contains questions related to the identified variables in the study. However, Section 1 and Section 2 are excluded as they focus on the demographic criteria of the

firm and founder-managers as respondents for the study. Additionally, Section 8 is excluded as well. Section 8 is geared to obtain the respondents' ECF background and general opinion on the effect of the ECF on their performances.

**Cover Letter:** A cover letter was attached to each questionnaire. It explains the objective of the proposed study and ethical deliberations of this study.

**Section 1: Founder and Top Management Team Demography**

This section consists of questions that associate with the top management team of the firm. These include the founder-managers and the rest of the members' characteristics.

**Section 2: Firm Demography**

This section consists of questions associate with the firm's characteristics.

**Section 3: Financial Management Practices**

This section comprises questions related to financial management practices employed by the firm. The questions are assigned to each of the financial management components or variables that have been determined in the literature review and from previous researchers investigating similar constructs (see Hailu & Venkateswarlu, 2016). They include working capital management, financial planning and control, financial reporting and analysis, and accounting information system.

**Section 4: Social Capital Networks**

This section consists of questions that associate with the social capital networks as a strategy that may affect the firm's performance.

#### **Section 5: Equity Crowdfunding Platform**

This section consists of questions that associate with the equity crowdfunding platform strengths as a strategy that might affect the firm's performance.

#### **Section 6: Business Intelligence as Mediator**

This section consists of questions that associate with business intelligence as the mediator that might affect the independent variables, in specific, the financial analysis and financial planning towards the firm's performance.

#### **Section 7: The Performance of Firms Funded via Equity Crowdfunding**

This section consists of questions related to the performance of successful equity-crowdfunded firms in this study. The performance of the firms is measured using the financial and non-financial indicators, which have been explained in Chapter 3.

#### **Section 8: Equity crowdfunding Information**

This section consists of questions associated with the equity crowdfunding activities and information of the respondents.

Due to the pandemic, the questionnaire has been modified to suit the online survey format. The questions needed to be as simple as possible but still capture the real intention of the survey. The Google form has been used for this purpose (Wulandari *et al.*, 2020). Table 4.3 depicts all sections and the number of questions in the questionnaires.

**Table 4.3:** Summary for Sections in Questionnaires

Section	Content	Total Questions
1	Demographic Information	8
2	Firm Demographic	5
3	Financial Management Practices	17
4	Social Networks	4
5	ECF Platform Strengths	4
6	Business Intelligence	4
7	Firm Performance	6
8	ECF Information	10

Initially, this study intended to use secondary data of ECF-funded firms. The researcher planned to purchase the data from Suruhanjaya Syarikat Malaysia (SSM) or MyData. However, due to the pandemic, financial data used in the study was derived from the questionnaire. The consideration to purchase data depends on the availability of the audited financial statements, time, and costs. Otherwise, the respondents' willingness to fill in this section would be an advantage.

The questionnaire was developed in English and realigned to suit the online survey via Google form to get as many respondents as possible (Wulandari *et al.*, 2020), and some modification to the pdf version due to Covid-19 and movement order control (MCO) (kindly refer to Appendix A).

#### **4.7.2 Instrument Development**

This study uses primary data. Hence, one of the vital steps that have to be prioritized is developing the questionnaire's instrument. The questionnaire is defined as an official framework consisting of questions and scales to acquire primary data (Hair *et al.*, 2010). In the overall survey process, the data is collected from the distribution of the questionnaire. Only then can the research objective be accomplished (Brace, 2008). Before developing the questionnaire, the related literature was

extensively reviewed. The literature review acts as a source of information to formulate the research questionnaire used to determine the variables and information related to the primary data instrument. Besides that, questions adopted and adapted from previous research related to financial management practices, social networks, ECF platforms, business intelligence and performance measures in this study, such as those posed by earlier researchers as shown in Table 4.4 and Table 4.5.

The questionnaire has three approaches; open-ended, closed-ended, or a mixture of both (Dawson, 2002). The open-ended questionnaires are exercised in qualitative research. The closed-ended questionnaires are used in quantitative research. Therefore, this study mainly uses closed-ended questions in order to measure the variables of interest. Furthermore, the assumption behind the closed-ended questionnaire is that it is easy to complete and will generate a greater response rate while allowing the data to be analyzed efficiently and effectively (Zhou *et al.*, 2017).

An advantage of the questionnaire is that it is cost-effective as it saves the researcher's time, money, and effort. However, it is disadvantageous as unmotivated respondents may attempt to answer the questions. Such respondents may answer the questions without thinking, and there can also be respondents experiencing fatigue in answering long questionnaires (Dörnyei & Taguchi, 2009).

At the initial level, a cover letter stating the objective of the research was attached together with the research questionnaire. The letter and the questionnaire were distributed to the respondents as an invitation and request for their consent to participate in the study. The covering note is essential to get the respondents' acknowledgement and support (Zikmund, 2003).

### 4.7.3 Measurement Items

When research involves the survey to collect data, a researcher needs to develop an instrument for measurement (Forza, 2002; Zikmund, 2003). The survey instrument includes items used to measure the model's constructs, the informant, and firm demographic information. The literature review and the components of variables in this study adopt measurement of the variables from other researchers who have conducted similar studies using similar variables. The items should ideally represent the variables, match the definition of each construct, and pass the validity and reliability tests.

#### 4.7.3.1 Financial management practices measurements

1. Accounting Information Systems	Computerized accounting system has helped my company in managing our accounting matters.
	The reporting of the financial information in my firm is efficient.
	My firm knows that AIS is capable of enhancing top management understanding on the financial outcomes.
	My firm ensures timely reports for better decision, controlling and monitoring.
2. Financial Analysis & Reporting	My firm prepares all reports and analysis based on the Financial Reporting Standard.
	My firm ensures good governance during collecting, calculating, and presenting the financial data.
	My firm prepares forecasted income statement.
	My firm prepares break-even analysis.
3. Financial Planning and Control	My firm exercises budgetary control.
	My firm exercises periodical comparison to determine budget variances.
	My firm exercises real time forecasting to reduce the variances.
	My firm created a financial trail to improve the decision process.
4. Working Capital Management	My firm has a working capital management system.
	My firm maintains optimal cash balances.
	My firm maintains proper records for all payables.
	My firm monitors its cash conversion cycle.

#### 4.7.3.2 Social networks affiliation measurements

My social networks' contacts supported my firm's ECF campaign.
My family and friends supported my firm's ECF campaign.
The mutual acts of members in the crowdfunding ecosystem helps generate new opportunities for my firm.
The social network is capable of promoting creator-backers relationship that provides future competitive advantage for my firm.

#### 4.7.3.3 ECF platform measurements

ECF platform provides alternative funding for my firm.
Platform providers potentially attract the investor's willingness to participate on the project launched on the platform rather than word of mouth attraction.
The ECF platform's popularity possibly attract more client and funder to reach my company – act as a marketing platform for my firm.
Government intervention towards the ECF platform increases the herding effect of the investors.

#### 4.7.3.4 Business intelligence as mediator measurements

It helps my firm retrieve emergent information immediately.
It enhances my firm's customer relationship management and makes it more meaningful.
Business intelligence creates more value to my firm.
With business intelligence, my firm able to identify and seize opportunities better and faster.

#### 4.7.3.5 Firm performance measurements

1. Financial Performance	Please assess, to the best of your knowledge, your firm's performance over the last three years in term of Sales Growth.
	Please assess, to the best of your knowledge, your firm's performance over the last three years in term of Return on Assets (ROA).
	Please assess, to the best of your knowledge, your firm's performance over the last three years in term of Return on Equity (ROE).
2. Non-financial Performance (Customer Management)	My firm experiences customer growth after the ECF campaign.
	My firm's loyal customer database has increased for the past 3 years.
	My firm's customer satisfaction have increased for the last 3 years.

Table 4.4 and Table 4.5 below list the summary of variables and measurements for the study.

**Table 4.4: Independent Variables Measurement**

No.	Independent Variables	Measures	Adapt & Adopt
1	Financial Management		
1.1	Accounting Information System	Computerized system, Reporting efficiency, Founder's knowledge, Timely reports	(Chung & Chuang, 2016) (Widyaningdyah, 2019)
1.2	Financial Reporting and Analysis	Follow standard, Governance, Prepare forecasted income statement, Prepare breakeven analysis	(Randoy & Goel, 2003) (Wolmarans & Meintjes, 2015)
1.3	Financial Planning and Control	Budgetary control, Variance analysis, Real time forecasting, Create trail	(Paramasivan & Subramaniam, 2009; Wolmaran & Meintjes, 2015). (Eniola & Ektebang, 2014)
1.4	Working Capital Management	Working capital management system, Maintain optimal cash balances, Proper records for payables, Cash conversion cycle	(Kitonga, 2013)  (Gracia-Teruel & Martinez-Solano, 2007)
2	Social Networks	Third party social network contact Families & Friends Number of words during campaign Support other campaign	(Giudici <i>et al.</i> , 2013; Vismara, 2016; Nitani & Riding, 2017) (Kuppuswamy & Bayus, 2018) (Aprilia & Wibowo, 2016)  (Liao <i>et al.</i> , 2015)
3	Platform Providers	Alternative Funding Attraction to participate Platform popularity Government intervention	(Mollick, 2014) (Lacan & Desmet, 2017) (Moine & Papiasse, 2020) (Jiang <i>et al.</i> , 2018)

**Table 4.4 cont**

4	Mediator: Business Intelligence	Emergent Information Source of attain and maintain competitive advantage Create Value Identify and Seize Capability	(Al-ma, 2013) (Phan & Vogel, 2010)  (Ramakrishnan <i>et al.</i> , 2018) (Torres, Sidorova & Jones (2018)
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**Table 4.5: Dependent Variables Measurement**

	Dependent Variables	Measurement	Adapt & Adopt
1	Financial Performance	Sales Growth	Delmar (2006), Musah <i>et al.</i> (2018)
		Return on Assets	Ramadan & Ahmad (2018), Musah <i>et al.</i> (2018), Kiiru <i>et al.</i> (2019), Kamande (2015)
		Return on Equity	Alvi & Ikram (2015), Swarnapali & Rathnayaka (2016)
2	Non-Financial Performance	Customer Performance	(Kasim & Minai, 2009)
		- Customer growth	
		- Loyal customer growth - Customer satisfaction	

#### 4.7.4 Validity and Reliability

Given the nature of this study, the measurement items were adapted from previous studies. Hence, it is vital to validate the measurement components used and improve the questionnaire designed to deal with the framework of the study.

##### 4.7.4.1 Validity test

A validity test is a test used to measure specific components or qualities that are not defined operationally. It requires the construct validity (Heale & Twycross, 2015). The purpose of construct validation is to avoid wrong judgement or conclusion (Bamberger, 2017; Kang *et al.*, 2016; O'Leary-Kelly & Vokurka, 1998). The construct

validation is valid when the components realistically represent the theoretical construct measured (Forza, 2002).

Validity tests involve pre- and post-expert validation. First, when a panel of experts is engaged to validate the measurement components and improve the developed questionnaire, and when the experts' make modifications to the questionnaire or measurement components, the researcher needs to amend accordingly. After such amendments, the instrument will be pre-tested to detect any possible problems or enquiries related to the questionnaire that may affect the respondents' mood to answer (Malhotra & Peterson, 2006; Saunders *et al.*, 2009). Four experts validated this study's questionnaire and framework. The experts' details are presented in Appendix C2.

After the necessary amendments were made according to experts' feedback, the pre-test procedures were conducted. The questionnaires were distributed to academicians and doctoral students to identify the potential problem and the time taken to complete the questionnaire. The pre-test results showed that most of the respondents took about 20 – 30 minutes to complete the questionnaire. This procedure also caused some changes to be made to some items in the instrument.

In addition, Nunnally and Bernstein (1994) have confirmed that "validation is an unending process...most psychological measures need to be constantly evaluated and re-evaluated to see if they are behaving as they should..." (p.84).

#### **4.7.4.2 Reliability**

While validity is concerned with how well the concept is defined by the measure(s), reliability relates to the consistency of the measures (Hair *et al.*, 2010).

Reliability concerns how the concept is measured. It differs from validity that concerns what concept should be measured (Hair *et al.*, 2010). According to Sekaran and Bougie

(2010), the reliability of a measure indicates the extent to which it is without bias (error-free). Hence, it ensures consistent measurement across time and the various items in the instrument. It also helps assess the "goodness" of a measure. Hair *et al.* (2010) added that reliable measures would be consistent in their values if multiple measurements are taken.

Meanwhile, as Malhotra and Birks (2008) reported, reliability is assessed by determining the proportion of systematic variation in a scale, which can be determined by the association between scores obtained from different scale administrations. If the association is high, the scale yields consistent results and is therefore reliable. Approaches for assessing reliability include retest, alternative forms, and internal consistency methods.

One form of reliability is test-retest, by which consistency is measured between the responses for an individual at two points in time (Hair *et al.*, 2010; Malhotra & Birks, 2008). The objective is to ensure that responses are not too varied across periods so that a measurement taken at any point in time is reliable.

Hair *et al.* (2006, 2010) have provided guidelines for coefficient alpha values, referred to as Cronbach's alpha, ranging from 0 to 1. Table 4.6 shows the rule of thumb to interpret alpha values as suggested by D. George and Mallery (2002) and Hair *et al.* (2006). The value of the coefficient alpha of 0.7 is considered as minimal, even though lower values may also be acceptable depending on the research objectives (Hair *et al.*, 2006; 2010). However, for precaution, Hair *et al.* (2006, 2010) advise further inspecting the value of coefficient alpha if it records more than 0.95. It is to ensure that they measure the different aspects of the concept.

**Table 4.6:** Rules of Thumb about Cronbach's Alpha Coefficient Size

Alpha Coefficient Range	Strength of Association
< 0.50	Unacceptable
< 0.60	Poor
0.60 to < 0.70	Moderate
0.70 to < 0.80	Good
0.80 to < 0.90	Very Good
0.90	Excellent

Source: George & Mallery (2002), Hair *et al.* (2006)

#### 4.7.5 Pilot Testing

The pilot testing purpose is to ensure the instrument's reliability by identifying Cronbach's alpha to determine internal consistency (Peterson, 1994). This method assumes that each item is considered an equivalent test and all correlations between the items measured are the same. If the value of R shows a high value, then the instrument used is high in its reliability value (Ary *et al.*, 2018).

At the pilot testing stage as a reliability test, the questionnaire will be distributed to a group of respondents who share the same characteristics as the real respondents. Here, the researcher will assess the data to test the reliability and validity of the measurement used. Cronbach's alpha is believed to provide enough reliability test for all types of research (Sekaran & Bougie, 2009). Its credibility cannot be denied because it has been widely accepted (Malhotra *et al.*, 2012). However, to prove the internal consistency of the measurements, the value of the Cronbach's coefficient should not be less than 0.7 (Hair *et al.*, 2010). In terms of the pilot testing of the respondent's size, it is recommended that the minimum sample size should be ten respondents (Saunders *et al.*, 2009).

However, depending on the pilot testing goals, the number of respondents can be more or less than ten as long as the sample of respondents can evaluate the wording

or instructions, formatting, and administration of the measurement instruments used. Unless the pilot test goals are to assess the internal consistency, modify the instruments, estimate items' performance, test and retest reliability, then a small sample size of respondents is not enough. Nevertheless, the rule of thumb in deciding the size of the pilot testing is 10% of the final study's sample size (Hertzog, 2008). In addition, to conduct the exploratory factor analysis, a larger sample of respondents is compulsory (Hair *et al.*, 2010).

The pilot study was conducted on 30 respondents. All of the latent constructs had Cronbach's alpha coefficient of more than 0.7 (Hair *et al.*, 2010; Nunnally, 1978). Precisely, the Cronbach's alpha values for the Accounting Information Systems (0.907), Financial Analysis and Reporting (0.863), Financial Planning and Control (0.882), Working Capital Management (0.857), Social Networks (0.888), Platform Providers (0.861), Business Intelligence (0.837), Financial Performance (0.892), and Non-financial Performance (0.886) had very good to excellent strength of associations. Table 4.7 presents the measures of the reliability scores. From the table, it is clear that the Cronbach's alpha for all the instruments valued above 0.65, which is considered acceptable in line with Hair *et al.* (2010) in that the Cronbach's alpha value may decrease to 0.60 in exploratory research.

**Table 4.7:** Cronbach's Alpha ( $\alpha$ ) of the Research Variables

Variables	Original Items	Cronbach's alpha ( $\alpha$ )
<b>Financial Management Practices</b>		
Accounting Information Systems	4	.907
Financial Analysis and Reporting	4	.863
Financial Planning and Control	4	.882
Working Capital Management	4	.857
<b>Social Networks</b>	4	.888
<b>Platform Providers Strengths</b>	4	.861

**Table 4.7 cont**

<b>Business Intelligence</b>	4	.837
<b>Financial Performance</b>	3	.892
<b>Non-financial Performance</b>	3	.886

N=30

#### **4.8 DATA COLLECTION METHOD**

The data was collected after the experts validated the questionnaire. A pilot test was then conducted to measure its reliability (Cronbach's alpha  $\alpha$  analysis). This study completed the data collection survey within a six months' timeframe.

Primary data refers to first-time data gathered by the researcher who purposely studies specific research to address the research problem (Malhotra & Birks, 2007). According to Hair *et al.* (2010), primary data can be gathered via the application of a survey approach. The benefits of the survey method are many. Firstly, surveys allow the gaining of an extensive volume of data. The reason is due to the credibility of surveys to cover larger sample sizes at reasonable costs. Secondly, the data collected via this medium can be studied, analyzed, and interpreted using advanced statistical methods. Last but not least, surveys also allow the researcher to understand better the consumers' behaviors that are not easily observed.

Therefore, to proceed, this study utilized the survey method. Respondents' feedback garnered the data. The ECF platforms assisted in distributing the questionnaire using their database due to the difficulty to access the ECF-funded firms during Covid-19. The researcher sent the survey to the founders, co-founders, and top management teams such as director, CEO, CFO, COO, and other designations representing the firms.

## 4.9 DATA ANALYSIS TECHNIQUES

This study employed two statistical techniques to analyze the survey data. In the beginning, the researcher used the Statistical Package for Social Sciences (SPSS) version 20.0. The SPSS is helpful in data screening, generating descriptive analysis, and plots. Therefore, it is used to determine the missing values and to conduct the descriptive analysis related to the demographic information. Also, it helps to find the standard deviations, frequencies, and means. The following statistical technique employed was the Partial Least Squares Structural Equation Modeling (PLS-SEM) 3.0. It enables the researcher to assess or test the reliability and the validity of the instrument used for the study. Previous studies conducted by Muneer, Ahmad and Ali (2017) have also used these techniques in analyzing the impact of AIS, WCM and FAR and the agency costs as the moderator on Pakistan's SMEs profitability.

### 4.9.1 Descriptive Analysis

The descriptive analysis provides a summary of the selected sample and the applied measurements. It describes the data's main features and basic behavior. Such summary could be visual like simple-to-understand graphs or quantitative-like summary statistics. The descriptive analysis presents the basis of the initial description of the data as part of a more precise statistical analysis. Occasionally, it can be sufficient for a specific investigation (Saunders *et al.*, 2009). Descriptive analysis is used to analyze the profile and demography information. This study uses descriptive analysis to analyze the respondents (founder or top management team characteristics), including their age, gender, educational background, experiences, and entrepreneurship program participation. In addition, this current study analyzes the ECF-funded firms' profile

such as types of industry, age, and size. Besides that, the descriptive analysis is also used to analyze the information related to the firms' equity crowdfunding activities.

Apart from that, the researcher also analyzed the mean and standard deviations of the dimensions. These included a means and standard deviations for six dimensions of independent variables; four dimensions of financial management practices; working capital management, financial planning and control, financial analysis and reporting, and accounting information systems, a dimension of social networks and a dimension of ECF platform providers. In addition, business intelligence as a mediating variable and firm business performances (financial and non-financial) as the dependent variables.

Mean is the arithmetic average (Hair *et al.*, 2006, 2010). It is used to measure an interval or a ratio scale data (also called metric) (Hair *et al.*, 2006, 2010). Meanwhile, the standard deviation is a squared of the unit of measurement (Hair *et al.*, 2006, 2010). It describes the spread or variability of the sample distribution values from a mean and is perhaps the most valuable dispersion index (Hair *et al.*, 2006, 2010). The estimated standard deviation is large (for a 7-point Likert scale, the value of  $>3.0$  is considered as large), the responses in a sample distribution of numbers do not fall very close to a mean of the distribution, or it means that there is a lot of variability in the respondents' opinions. On the other hand, the estimated standard deviation is small (value of  $<1.0$ ), then the distribution values are close to a mean, or it means that the respondents are very consistent in their opinions about the variable (Hair *et al.*, 2006, 2010). Finally, the standard deviation of the sampling distribution of a mean is also referred to as the standard error of a mean (Hair *et al.*, 2006, 2010).

#### 4.9.2 Partial Least Squares Structural Equation Modeling (PLS-SEM)

In order to understand the partial least squares (PLS) modeling, there is a need to look at its root cause, which is the structural equation modeling (SEM). It is a generic statistical modeling technique that is concerned with the latent factors as they represent the theoretical constructs. SEM is commonly used in behavioral social science research (Hox & Bechger, 1998). It has been widely used in academic research and doctoral thesis as well (Civelek, 2018). It enables the academic and scientist to confirm the factor analysis model, regression model, and complex path model (Hox & Bechger, 1998).

Popular SEM approaches include the Covariance Based Structural Equation Modeling (CB-SEM) and Partial Least Squares Structural Equation Modeling (PLS-SEM). SEM is known as CB-SEM as it proposes a structure for the covariance between the observed variables. The main goal of CB-SEM is to reproduce the theoretical covariance matrix by avoiding to concentrate on the explained variance. Most researchers believe that SEM is the same as CB-SEM analysis using software like Amos, LISREL, Mplus, EQS and others (Hair *et al.*, 2011).

The PLS-SEM aspiration is to exploit the dependent latent constructs' explained variance. It has also been extensively used in marketing and other business researches (Henseler *et al.*, 2009). However, the application of the PLS-SEM approach has mixed results from researchers. Those that are already familiar and attached to CB-SEM regard PLS-SEM as less robust (Hair *et al.*, 2011). Nonetheless, the ability of PLS-SEM to accommodate a smaller sample size has given it an extra mile (Marcoulides & Saunders, 2006; Sosik *et al.*, 2009). In fact, according to Cassel, Hackl and Westland (1999), PLS-SEM performs effectively with small samples volume and complicated

models. According to Hair *et al.* (2011), the negative presumption regarding the PLS-SEM over CB-SEM is thoughtless.

PLS-SEM is such a complementary as it provides more features unfilled by CB-SEM. Also, this technique does not require normal data distribution (Chin & Newsted, 1999), and can conduct both reflective and formative variables that conjointly emerge in one structural model (Falk & Miller, 1992). In this study, the PLS-SEM is selected to assess the measurement model and the structural model. This tool generates loadings and weights amongst items, creates paths between constructs and thus, creates standardized regression coefficient estimates, the  $\beta$  coefficient (Claver-Cortés *et al.*, 2012; Croteau & Bergeron, 2001).

This study's constructs are all reflective measurements. Even though there are studies that modelled firm performance as a formative construct, in reality it depends on how they define the indicators used and the performance. Table 4.8 lists the rules of thumb in selecting either PLS-SEM or CB-SEM as suggested by Hair *et al.* (2011).

**Table 4.8:** The Rules of Thumb in Selecting PLS-SEM or CB-SEM

Item	PLS-SEM	CB-SEM
Research Goals	If the goal is predicting the key target constructs or identifying key “driver” construct. If the research is exploratory or an extension of an existing structural theory.	If the goal is theory testing, theory confirmation or comparison of alternative theories.
Measurement Model Specification	If formative constructs are part of the structural model. Note that formative measures can also be used with CB-SEM but to do so requires accounting for relatively complex and limiting specification rules.	If error terms require additional specification, such as covariation.
Structural Model	If the structural model is complex (many constructs and many indicators).	If the model is non-recursive.

**Table 4.8 cont**

Data Characteristic and Algorithm	<p>Sample size considerations – If the sample size is relatively low. PLS-SEM minimum sample size should be equal to the larger of following: Ten times the largest number of formative indicators used to measure one construct</p>	<p>If the data meet the CB-SEM assumptions exactly with respect to the minimum size and distributional assumption, otherwise, PLS-SEM is a good approximation of CB-SME results. Sample size considerations – With large data sets, CB-SEM and PLS.</p>
	<p>Ten times the largest number of structural path directed at a particular latent construct in the structural model. If the data are to some extent non-normal. Under normal data condition, PLS-SEM and CB-SEM are highly similar, with CB-SEM providing slightly more precise model estimates.</p>	<p>SEM are the same. Provided that a large number of indicator variables are used to measure the latent constructs (consistency at large). If CB-SEM requirement cannot be met (e.g., model specification, identification, nonconvergence, data distributional assumptions), used PLS-SEM as a good...</p>
	<p>PLS-SEM and CB-SEM results should be similar. If not check the model specification to ensure that CB-SEM was appropriately applied. If not, PLS-SEM results are a good approximation of CB-SEM results.</p>	<p>Approximation of CB-SEM results.</p>
Model Evaluation	<p>If you need to use latent variable score in subsequent analyzes.</p>	<p>If your research requires a global goodness-of-fit criterion. If you need to test for measurement model invariance.</p>

Source: Hair *et al.* (2011)

Therefore, based on the above rules of thumb, justifications for the adoption of PLS-SEM for the current study are as follow:

ECF in Malaysia is an emerging phenomenon. The number of entrepreneurs approaching ECF platforms for financing assistance is also small. This study will focus on firms that have successfully secured financing via the ECF platform. As their number is relatively limited (see Hair *et al.*, 2011), this justifies PLS-SEM selection.

This study investigates the determinants of financial management practices, social networks and ECF platform that influence the ECF-funded firms' performance.

Therefore, when the goal is to identify the key ‘driver’ construct (see Hair *et al.*, 2011), the PLS-SEM will be used.

This study also investigates the mediating impact of business intelligence on the relationship between financial analyzing and reporting and financial planning and control. Thus, it is suitable to use the PLS-SEM (Hair *et al.*, 2011). Table 4.9 explains the rules of thumb in evaluating the model.

**Table 4.9:** The Rules of Thumb for Model Evaluation

Item	PLS-SEM
Reflective Measurement Models	<p>Internal consistency reliability: Composite reliability should be higher than 0.70 (in exploratory research, 0.60 to 0.70 is considered acceptable).</p> <p>Indicator reliability: Indicator loadings should be higher than 0.70.</p> <p>Convergent validity: The average variance extracted (AVE) should be higher than 0.50.</p> <p>Discriminant validity: The AVE of each latent construct should higher than the construct’s highest squared correlation with any other latent construct (Fornell–Larcker criterion).</p> <p>An indicator’s loadings should be higher than all of its cross loadings.</p>
Formative Measurement Models	<p>Examine each indicator’s weight (relative importance) and loading (absolute importance) and use bootstrapping to assess their significance. The minimum number of bootstrap samples is 5,000, and the number of cases should be equal to the number of observations in the original sample. Critical t-values for a two-tailed test are 1.65 (significance level = 10 per cent), 1.96 (significance level = 5 per cent), and 2.58 (significance level = 1 per cent). When all the indicator weights are significant, there is empirical support to keep all the indicators.</p> <p>If both the weight and loading are nonsignificant, there is no empirical support to retain the indicator and its theoretical relevance should be questioned.</p> <p>Multicollinearity: Each indicator’s variance inflation factor (VIF) value should be less than 5.</p> <p>Indicator weights should be examined to determine if they are affected by (observed or unobserved) heterogeneity, which results in significantly different group-specific coefficients. If theory supports the existence of alternative groups of data, carry out PLS-SEM multigroup or moderator analyzes. If no theory or information is available about the underlying groups of data, an assessment of unobserved heterogeneity’s existence must be conducted by means of the finite mixture PLS (FIMIX-PLS) method.</p> <p>When many indicators are used to measure a formative construct, with some being nonsignificant, establish two or more distinct constructs, provided there is theoretical support for this step.</p>

**Table 4.9 cont**

Structural Model	<p><math>R^2</math> values of 0.75, 0.50, or 0.25 for endogenous latent variables in the structural model can be described as substantial, moderate, or weak, respectively.</p> <p>Use bootstrapping to assess the path coefficients' significance. The minimum number of bootstrap samples is 5,000, and the number of cases should be equal to the number of observations in the original sample. Critical t-values for a two-tailed test are 1.65 (significance level = 10 per cent), 1.96 (significance level = 5 per cent), and 2.58 (significance level = 1 per cent).</p> <p>Predictive relevance: Use blindfolding to obtain cross-validated redundancy measures for each construct. Make sure the number of valid observations is not a multiple integer number of the omission distance <math>d</math>. Choose values of <math>d</math> between 5 and 10.</p> <p>Resulting <math>Q^2</math> values of larger than zero indicate that the exogenous constructs have predictive relevance for the endogenous construct under consideration.</p> <p>Heterogeneity: If theory supports the existence of alternative groups of data, carry out PLS-SEM multigroup or moderator analyzes. If no theory or information about the underlying groups of data is available, an assessment of unobserved heterogeneity's existence must be conducted by means of the FIMIX-PLS method, which is available in the SmartPLS software package.</p>
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Source: Hair *et al.* (2011)

#### **4.10 STAGES AND PROCESSES IN PARTIAL LEAST SQUARES (PLS)**

According to Barclay, Higgins and Thompson (1995), there are two main steps required to analyze and explain the PLS model. The measurement model and the structural model. The former requires the measurement of its reliability and validity. The measurement model displays the relationship between the items and constructs. It explains the constructs and sends items to them (Bollen, 1989; Gefen *et al.*, 2000). The latter tests the relationships between the constructs (Fornell-Larcker, 1981). The following subsections describe further the two processes.

##### **4.10.1 First Stage: Assessment of the Measurement Model**

This assessment measures the outer model. Thus, it will be assessed by validity and reliability, as exhibited in Table 4.10. According to Sekaran and Bougie (2010), the reliability test is performed to determine how reliably the measuring instrument measures the concept used in the study. To analyze the reliability, the internal

consistency reliability is performed. For the individual item reliabilities, the researcher looked at their loadings on the particular constructs.

In the case of the validity test, this test examines how well the researcher has developed the instrument, that is, whether the instrument measure what it is supposed to measure (Sekaran & Bougie, 2010). Item reliability and validity are the main focus of Stage 1. According to Hair *et al.* (2017), researchers may proceed with structural model testing after all the required criteria are met by the measurement models. Measurement items are deemed reliable if they consistently measure the concepts they are intended to measure. On the other hand, measurement items are deemed to be valid if they measure their intended concept well. Convergent validity and discriminant validity were performed to test whether or not the measurement model in this study is reliable and valid. Table 4.10 explains the measurement model's assessment tests, the threshold value, and some explanation. Importantly, these tests must be done and confirmed before testing the hypotheses in the second stage assessment.

#### **4.10.1.1 Indicator reliability (outer reliability)**

According to Urbach and Ahlemann (2010), if an indicator truly measures what it is intended to measure, then the indicator is reliable. Indicator reliability is conducted to test the extent to which the indicators are consistent with what they intend to measure. This study applies the cut-off value of 0.5 to determine the significance value of each indicator (Hair *et al.* 2010). Loading values equal to and greater than 0.5 are acceptable, if the summation of loadings in high loading scores, contributing to AVE scores of greater than 0.5 (Byrne, 2016).

#### 4.10.1.2 Convergent validity

Convergent validity can normally be determined using the Average Variance Extracted (AVE). Fornell and Larcker (1981) underlined the condition that the AVE of a construct should be at least 0.5 in PLS for convergent validity to be achieved. Urbach and Ahlemann (2010) state that convergent validity takes two measures that are supposed to be measuring the same construct and show that they are related.

#### 4.10.1.3 Discriminant validity

The Fornell-Larcker's criterion (Fornell & Larcker, 1981) and cross-loading (Chin, 1998b) are the two measures of discriminant validity commonly used in PLS. Discriminant validity shows that two measures that are not supposed to be related are in fact, unrelated (Urbach & Ahlemann, 2010). Once the component score of each latent variable (LV) correlates with that of all other items, cross-loading is present (Chin, 1998b). There is no interchangeability between indicators of different constructs, if, compared to any other construct, the loading of each indicator for its designated construct is higher. As per the Fornell-Larcker criterion, the AVE of each LV should be greater than the LV's highest squared correlation with any other LV. Therefore, an LV must share more variance with its assigned indicators than with any other LV. Besides the above-given guidelines, Henseler *et al.* (2015) recommend testing the HTMT value, whether it is significantly different from 1.00 via bootstrapping. HTMT could also be tested at a lower threshold value such as 0.85 or 0.90, depending on the study context (Franke & Sarstedt, 2019). A summary of the guidelines for assessing measurement model validity is provided in Table 4.10.

**Table 4.10:** Assessment of Measurement Model

Reliability and Validity	Measure	Threshold Value	Explanation
Internal consistency reliability	Composite reliability (CR)	CR > 0.70 (Fornell & Larcker, 1981)	Similar to a Cronbach's alpha for internal consistency reliability (CR) assessment, a CR of 0.70 or higher is counted acceptable (Fornell & Larcker, 1981). The different is that, CR focused on individual item's loading whereas, the Cronbach's alpha presumes that each item contributes in the same way to its construct (Barclay <i>et al.</i> , 1995).
Indicator reliability	Items loading	Loadings > 0.50 (Hair <i>et al.</i> , 2010)	The indicator reliability can be assessed by inspecting the items loading. Hence, it is vital to have a satisfactory indicator reliability for a measurement model, where, each item's loading is no less than 0.50.
Convergent validity	Average variance extracted (AVE)	AVE > 0.50 (Fornell & Larcker, 1981)	AVE measures the variance captured by the indicators relative to measurement error, thus, it should be higher than 0.50 to validate using the construct (Barclay <i>et al.</i> , 1995).
Discriminant validity	Cross loadings	Not applicable	The discriminant validity shows the degree to which one construct varies from others. It can be assessed by using two measures: 1) Fornell and Larcker's (1981) criterion, and 2) Cross loading. The loadings of the indicators must be higher on their respective construct compared to other constructs.
Discriminant validity	Fornell-Larcker Criterion	Not applicable	There are two aspects of measuring the Fornell-Larcker criterion (Chin, 2010): 1) Compare the square root of AVE to construct correlations 2) Compare the AVE with the squared correlations among the construct correlations. The purpose is to ensure the AVE/square root of AVE should be greater than each of the construct correlations. Then only can be said that the measurement model has demonstrated adequate discriminant validity (Fornell & Larcker, 1981).
Discriminant validity	Heterotrait-monorait (HTMT) ratio of	HTMT < than 1.00 (Henseler <i>et al.</i> , 2015),	HTMT values close to 1 shows a lack of discriminant validity. Using the HTMT as a criterion involves comparing it to a predefined threshold. If the value of the

correlation criterion	HTMT <sub>0.85</sub> (Kline, 2011), HTMT <sub>0.90</sub> (Gold <i>et al.</i> , 2001)	HTMT is higher than this threshold, one can conclude that there is a lack of discriminant validity. Kline (2011) proposed a threshold of 0.85, whereas, Gold <i>et al.</i> (2001) proposed a value of 0.90.
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#### 4.10.2 Second Stage: Assessment of the Structural Model

The second main step is assessing the structural equation model. After the measurement model is validated, a representation of the structural model can be made by specifying the relationships among the constructs. The structural model provides details on the links between the variable (Hair *et al.*, 2010; Ho, 2006).

As proposed by Hair, Babin and Krey (2017), the structural model can be assessed by observing the beta ( $\beta$ ), R squared ( $R^2$ ), and the corresponding t-values through a bootstrapping technique with a subsample of 5,000. Also, they suggest reporting the effect sizes ( $f^2$ ) and the predictive relevance ( $Q^2$ ) as well since Sullivan and Fenin (2012) claim that the p-value determines whether the effect exists but does not disclose the size of the effect.

The structural model includes the relationships among the hypothetical constructs. In PLS, bootstrapping is used to measure the structural model. It thus differs from the covariance-based approaches. The PLS path modeling does not count the goodness-of-fit. It is due to the assumption of a distribution-free variance. Instead, in PLS, the non-parametrical tests can be employed to assess the quality of the structural model (Henseler *et al.*, 2009). In the PLS approach, to evaluate the model's quality, the researcher should focus on the path coefficients' directions and significance level, similar to the multiple regression's coefficients (Chin, 1998b).

According to Kock and Lynn (2012), though the discriminant validity criteria has been fulfilled (no issue on the vertical collinearity), but in the same cases, the lateral collinearity (predictor – criterion collinearity) may distort the findings.

Thus, before measuring the structural model, it is vital to ensure that there is no issue with the collinearity in the structural model. This would occur when the two hypothesized variables causally relate in assessing the same construct. According to Diamantopoulos and Sigua (2006), the threshold is 3.3. Meanwhile, Hair *et al.* (2011) propose that the variance inflation factor (VIF) value should be less than 5 (Hair *et al.*, 2011).

#### **4.10.2.1 Assessment on collinearity issues**

To ensure that the data introduces no bias to the regression results, the structural relationships were assessed and collinearity issues determined. Studies have stated that predictor constructs could have a high probability of collinearity issues if they have a VIF value of above 5; whereas others say that lower VIF values (3 to 5) could also indicate collinearity problems (Becker *et al.* 2015; Mason & Perreault 1991). Therefore, the researcher should aim for a VIF value of 3 and lower. One method to address collinearity is to create models that are theory-supported and with a higher order (Hair *et al.*, 2017).

#### **4.10.2.2 Estimate for path coefficients**

As part of the hypothesis testing in this study, the results of each path relationship in the model were generated using a bootstrapping procedure (a nonparametric test in PLS). In bootstrapping, the original sample is replaced with repeated random sampling to obtain the standard errors for hypothesis testing and to

create a bootstrapped sample (Hair *et al.* 2011). Chin (2010) suggests performing bootstrapping with 1000 re-samples. To test significance level, the bootstrapping function in SmartPLS 3.0 software was used to generate the t-statistics for all paths. The bootstrapping method with 5000 bootstrap re-sampling and bias-corrected confidence intervals was utilized (Hair *et al.*, 2016; Hsu *et al.*, 2020). Bootstrap samples are derived by repeatedly estimating the coefficients with a minimum of 5,000 bootstrap samples, each of which comprises N cases randomly sampled with replacement from the original sample N. The bootstrapping was set to 0.05 significance level, with a one-tailed test and 5,000 subsamples.

Ramayah *et al.* (2018) provide a guideline that the critical values for the one-tailed test are 2.33 at the 1 per cent significance level ( $\alpha = 0.01$ ), 1.645 at the 5 per cent significance level ( $\alpha = 0.05$ ), and 1.28 at the 10 per cent significance level ( $\alpha = 0.1$ ). Moreover, weaker relationships correlate with close to 0 values of estimated path coefficients, while strong positive relationships correlate with values close to +1 (Hair *et al.*, 2017).

The significant paths revealing the hypothesized direction and empirically support the proposed causal relationship, whilst the insignificant paths or contrary relationship indicate that the prior hypothesis was not supported (Gotz *et al.*, 2010).

#### **4.10.2.3 The coefficient of determination $R^2$ of endogenous latent variables**

Next, the model's predictive accuracy was evaluated using the coefficient of determination ( $R^2$ ). A model's explanatory power can be determined from its  $R^2$  value. This coefficient measures the variance that can be explained by each of the endogenous constructs (Shmueli & Koppius, 2011). Rigdon (2012) also indicates that in-sample predictive power could also be determined from the  $R^2$  value. In other words, the

coefficient of determination ( $R^2$ ), ranging from 0 to 1, shows the model's predictive power. Hair, Hult, Ringle, and Sarstedt (2017) state that the model has a better predictive accuracy if it has a higher  $R^2$  value. Falk and Miller (1992) suggested that  $R^2$  values should be the same or more than 0.10 so that the explained variance of a specific endogenous construct can be considered adequate. Meanwhile, Cohen (1988) explained that  $R^2$  values for endogenous variables are valued as follows; 0.26 (substantial), 0.13 (moderate), and 0.02 (weak). On the other hand, Chin (1998b) measured  $R^2$  as 0.67 (substantial), 0.33 (moderate), and 0.19 (weak). However, Hair *et al.* (2016) acclaim that  $R^2$  values for endogenous latent variables are assessed as 0.75 (substantial), 0.50 (moderate), and 0.25 (weak).

Next, after examining the  $R^2$  of all endogenous variables and the result of the hypotheses, the effect size of the mediating effect will be assessed. The change in the  $R^2$  shows whether the mediating variable has a significant contribution in the model.

#### **4.10.2.4 The effect size ( $f^2$ )**

This study also assessed the effect size ( $f^2$ ). It determines whether exogenous latent constructs have a substantial, moderate, or weak impact on the endogenous latent construct (Gefen *et al.*, 2011). Hair *et al.* (2017) propose for researchers to test the change in the  $R^2$  value. Meanwhile, Cohen (1988) recommended a guideline to measure the magnitude of the  $f^2$ , which is 0.35 (large effects), 0.15 (medium effects), and 0.02 (small effects).

#### **4.10.2.5 Predictive relevance (blindfolding) $Q^2$**

Predictive relevance or the  $Q^2$  test was developed by Stone (1974) and Geisser (1975). It examines the model's predictive validity using the non-parametric Stone-

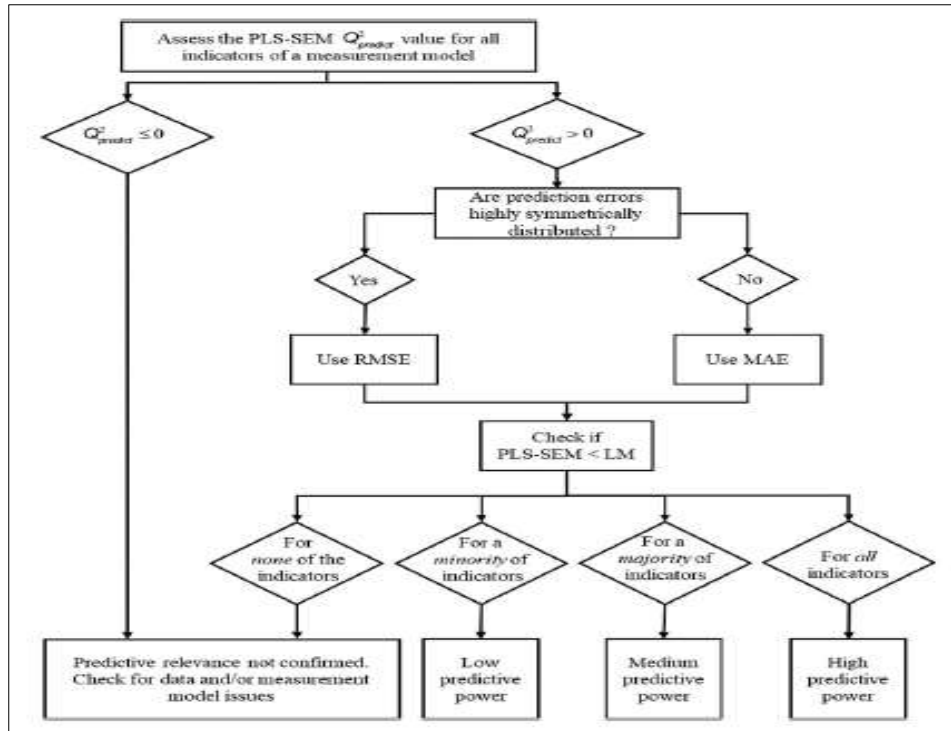
Geisser test (Chi, 1998a; Fornell *et al.*, 1994; Geisser, 1975; Stone, 1975). This test uses the "blindfolding" technique. According to Henseler, Ringle and Sinkovics (2009), the blindfolding process is merely applied to endogenous latent variables that have reflective measurement model function. The test is an indicator of how well the model and its parameter estimates reproduces the observed values. Fornell *et al.* (1994) explained that depending on the form of prediction, the cross-validated commonality and cross-validated redundancy may occur. However, Chin (1998b) proposes the use of cross-validated redundancy to assess the predictive relevance of the theoretical or structural model. If the  $Q^2$  value is greater than zero, the model is regarded as having predictive relevance. In other words, the model lacks predictive relevance when the  $Q^2$  value is zero or lesser (Barroso *et al.*, 2010). This study uses the blindfolding procedure to analyze the power of the research's proposed model in terms of predictive relevance. Hair *et al.* (2017) recommend that the blindfolding procedure use only endogenous constructs with a reflective measurement. If the value of  $Q^2$  is greater than 0, then the predictive relevance of the proposed model exists for a particular endogenous construct (Chin, 1994; Fornell *et al.*, 1994; Hair *et al.*, 2017).

#### **4.10.2.6 PLS predict ( $Q^2_{\text{predict}}$ )**

Hair, Ringle and Sarstedt (2011) explained the lack of a statistical tool that allows the researcher to undergo the holdout sampling approach to evaluate out-of-sample predictive ability as an alternative with a multivariate procedure. Thus, to expedite this type of analysis in PLS-SEM, Shmueli *et al.* (2016) propose the PLSpredict technique. PLSpredict applies a holdout sample approach to generate observation-level predictions on an item level (Shmueli *et al.*, 2019). Evaluation metrics such as  $R^2$  and  $Q^2$  reported for PLS-SEM results provide in-sample predictions,

but PLSpredict uses multiple randomly selected holdout samples to calculate out-of-sample predictive power. Information systems researchers using PLS-SEM should routinely report the results for the PLSpredict procedure (Chin, 1998; Nitzl & Chin, 2017).

Further to that, as suggested by Shmueli, Sarstedt, Hair, Cheah, Ting, Vaithilingam and Ringle (2019), explain the holdout sample-based procedure which generates case-level predictions on an item or a construct level using the PLS-Predict with a k=10-fold procedure to check for predictive relevance. Shmueli *et al.* (2019) suggest measuring the root mean squared error (RMSE) and a mean absolute error (MAE) of linear model (LM) value with the RMSE and MAE of the PLS. The difference between the two is known as  $Q^2_{predict}$ . The rule of thumb in PLS predicts that when the exogenous and endogenous indicators in PLS-SEM show values lower than RMSE or MAE of naïve LM benchmark, the model shows high prediction power. If all show a positive sign of the  $Q^2_{predict}$ , then the predictive relevance is not confirmed. The negative majority sign of  $Q^2_{predict}$  shows moderate predictive power, whereas minority means there is low predictive power. Figure 4.2 shows the procedures to translate the PLS predict outcomes.



Source: Shmueli *et al.* (2019)

**Figure 4.2:** Interpreting PLS Predict Results Guidelines

#### 4.10.2.7 Assessment for mediating variable (business intelligence)

This research employed the bootstrapping approach (Arbuckle & Wothke, 1999) to assess business intelligence's mediating or indirect effect on the relationship between the antecedents and the outcomes. Many researchers favorably use this method in evaluating indirect effects (Bollen & Stine, 1990; Hayes, 2009; MacKinnon, et al., 2004; Mackinnon & Luecken, 2011; Mackinnon, 2011; Preacher & Hayes, 2004; Shrout & Bolger, 2002). Bootstrap results are claimed to have more accurate probability estimates as this method can help with mediation problems in which the mediator and outcome variables are not normally distributed (Hayes 2009; Shrout & Bolger, 2002). The reasons to apply the bootstrapping method are: (i) this method provides a general way to test significance and confidence intervals in a wide

variety of situations; and (ii) this method does not require many assumptions, and as such, make the result more accurate (MacKinnon, Fairchild, & Fritz, 2007).

To evaluate the mediator, the researcher needs to consider each hypothesized path, the total effect, indirect effect, and direct effect. The total effect is the degree to which a change in the predictor (independent) variable is related to the criterion (dependent) variable. The indirect effect is the degree to which a change in the predictor variable produces a change in the criterion variable through the mediator variable. The direct effect is the degree to which a change in the predictor variable is directly related to the criterion variable without going through the mediator variable. The sum of direct and indirect effects equals total effects. Convention suggests the effect is significant if the 95% confidence interval (CI) denoted by lower and upper bounds exclude the value of 0.

The researcher needs to determine whether the degree of the mediation is partial or full mediation (Mathieu & Taylor, 2006). If both the indirect effect and direct effect are significant, this indicates a partial mediation. If the indirect effect and total effect are significant, but the direct effect is not significant, this reveals a full mediation.

#### **4.11 CHAPTER SUMMARY**

This chapter has discussed the research methodology employed in this study. This study employed a survey method to collect the data, which then used a quantitative approach to observe and measure the collected numeric information. The unit of analysis in this study were firms that successfully obtained funding from equity crowdfunding and represented by the owner-manager. The survey questionnaire was prepared in English. Unfortunately, due to Covid-19 and the movement control order (MCO), the questionnaire has to be adopted into Google form as a medium in

distribution to the respondents. The Google form questionnaire link was sent to the ECF platform providers via mail, and to reach the expected outcome, follow-up procedures were conducted.

The questionnaire consisted of 58 items. The measurement scales were tested for validity and reliability to ensure appropriateness. The study examined the direct effect involving exogenous and endogenous variables. Further, it also analyzed the impact of a mediator on the relationships between the selected exogenous variable and endogenous variables. The data was compiled and then analyzed using the Statistical Package of Social Science (SPSS) 20.0 and PLS-SEM version 3.0. The next chapter discusses the results of the main data analysis for this study.

