

The Mediating Effect of Representativeness Heuristic on Neurofinance and SME's Financial Decision Making

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Abstract: Financial decision-making is a crucial part of business survival, especially among SMEs. About 95% of the business are facing failures within five-year time. The financial decision making failure happened due to psychology and behavioural. This research aims to determine the mediating effect of representativeness heuristic on emotions and financial decision making. A pre-test and post-test experiment analyzes emotions, financial decision-making, and representativeness heuristic behaviour. In pre-testing, emotions and financial decision-making questionnaires are measured using questionnaires distributed to forty-two SMEs. Then, the video clips with 12 to 16 minutes duration are used in manipulating the emotions from neutral emotion to positive and negative emotions. Lastly, in post-testing, the data are gathered by repeating answered emotion and financial decision-making questionnaires, followed by the representativeness heuristic questionnaire. The data were analysed using General Linear Regression. The results showed that representativeness heuristic is partially effect on negative emotion towards financial decision making. From the analysis, neuro-behavioural of financial decision-making model has been proposed. The proposed models are incorporating with the brain components and working memory. It shows that System 1 and System 2 of the dual-process theory are activated for negative and positive emotions.

Keywords: Neurofinance, financial decision-making, heuristic, emotion, Small-Medium Enterprises (SMEs).

1. INTRODUCTION

There is a search modern methods for effective management in finance since late 20th century until to present time in the world practice and science (Kapustina, Rjachovskaya, Rjachovskij & Gantseva, 2018). The process is needed to change management conditions, self-transformation and self-adjustment constantly. The changes can improve companies' financial stability and rapid adaptation to modern situation. Mostly, the companies are facing with a negative on the financial results and cash flows of the current period in relation to current expenses and investments (Efimova, 2018). Thus, financial decision making is highly important for life-shaping decisions that individual and business makes for herself / himself or organization (Frydman & Camerer, 2016). This is because many financial decisions are immensely affected on people's lives and business survival where the decisions are made at different levels of economy. The standard decision-making model is based on belief of human beings as rational agents (Tisdell, 2014). In reality, "rational" actors are not show instable and inconsistent changes in preferences to predict the

future choices based on their past behaviour. Therefore, the revolution in finance called behavioural finance applies insight from all the social sciences to finance (Friedman, 2017). Friedman (2017) added a new decision-making model incorporate psychology and sociology among other disciplines of finance. Importantly, the explanation in value function in economic and financial phenomenon; and psychological patterns such as overconfidence and perceived kinks that impact financial decision-making. However, psychologists argue that people are susceptible to behavioral bias. Many financial experts suggest that these biases have asserted that markets are subject to these collective decisions' effects and impact an individual's economic decisions (Knoll, 2010; Sewwandi, 2015; Duxbury, 2015; Friedman, 2017). This argument is contradictory to the classical theories of Rational Behavior (Tisdell, 2014; Sen, 2008; Johnson, 1972; Simon, 1957) and Expected Utility Theory (Levy, 2016; Karni & Schmeidler, 2016).

The behavioral biases can either be emotional biases or cognitive errors (Sahi, 2012). Emotional biases originate from feelings, intuition, or impulsive thinking, while cognitive errors stem from a misunderstanding of data, faulty reasoning, statistical miscalculations, or memory errors. Both biases can lead to poor investment and financial decisions (Rocha

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et al., 2013). Furthermore, the prospect theory was introduced by Kahneman & Tversky (1973) that focused on behavioral biases by look at the heuristic effect. The heuristic and biases as heart of behavioral model concerning mood and emotions on financial behavior research (Duxbury, 2015). Additionally, Artinger *et al.* (2014) and Nigam *et al.* (2018) proposed heuristic to be tested as mediator and moderator in behavioral finance research. Emotional is the root of financial decision making (Sjobreg & Engelberg, 2006). Therefore, in order to achieve a greater understanding of individual financial decisions, neurofinance was introduced as a bridge between brain and financial sciences. Neurofinance explores the neurological basis of mental state on a financial decision (Miendlarzewska *et al.*, 2019), especially in emotion. Schwarz (1990) and Schwarz and Bless (1991) started the investigation of the positive and negative implication in their study. They found that the negative emotion uphold a difficult chance situation while positive emotion defend the reward situation with proper planning. The recent research found that negative emotion appeared the danger conditions from the bad information received (Tartidi *et al.*, 2018). At the same time, the positive emotion produced secured condition. Hence, the aim of this research is to determine the representativeness heuristic as mediating effect of emotion on financial decision making. This research is theoretically contributing to the literature of neurofinance and financial decision making. This research used pre-test and post-test experiments to analyse the effect of different emotions (positive or negative) on financial decision-making (investment, spending and borrowing) through representativeness heuristic. The finding shows that representativeness heuristic gives partial effect on negative emotion and financial decision making among SMEs on investing, spending and borrowing. In the next section, this research reviews the literature on financial decision making, neurofinance, representativeness heuristic and SMEs. Then, the hypotheses are developed. Section four discusses the underpinning theories which are prospect theory and dual-system theory. Then, the research methodology explains about experiment procedure and data analysis in section five. In section six, data interpretations and discussions are explained. Lastly, this research is concluded in section seven.

2. LITERATURE REVIEW

Previously, the financial decision making studies are more related to household (Frydman, 2016) and investors (Dar & Hakeem, 2015; Nyamute, 2016;

Karanja, 2017; Shah *et al.*, 2018). However, a lack of studies are focused on business owners, especially Small and Medium Entrepreneurs (SMEs). SMEs are not an alien organization in making financial decisions. The entrepreneurs should gain knowledge on how to plan and manage the capital/fund. This is because SMEs are the backbone of the Malaysian economy, where 98.5% business establishment in Malaysia is micro, small, and medium-sized enterprises across all sizes and sectors (SME Corporation, 2017). These include inclusive manufacturing sectors and services and other sectors. In other words, SMEs play a significant role in the creation of new jobs, rise in the gross domestic product (GDP), reduce regional development gaps, and develop innovation capabilities. SMEs employed almost 3.7 million workers in Malaysia (Kannan, 2016). Indeed, SMEs are recognized as the drivers of socio-economic growth, both in developed and developing economies (Karadag, 2015). Even though the SMEs are the majority business entity, modern corporate finance theory is not in line with small business in mind. Karadag (2015) found that business failures in SMEs come from poor financial decision-making due to lack of knowledge in financial management. In this research, good financial decision making is when people make their decision related to the rewards in their business. At the same time, poor financial decision-making is when people make their decision related to the risk that can lead to losses in their business. Indeed, Wong *et al.* (2018) found that the entrepreneurs intentionally choose to manage their firm's finance director to meet the personal goals for owning a business. It is sometimes the decision on financial that they made are not in line with the business objectives. This is because the entrepreneurs are more irrational on making the financial decision. However, the studies of irrational behaviour of entrepreneur's financial decision making are still alarming.

A study of the human brain as a processor of information that forms the basis of all decision making in finance called neurofinance. Understanding deeply in the human brain will lead to the field in human, financial decision-making behaviours. Emotion is the most important factor in neurofinance. Winter (2015) stressed that the impediment for making financial decisions is not cognitive but emotional. This is because when comes to money matters and financial decision making, people are very emotional under the condition of risk and/or uncertainty. This is in line with Winter (2014) discover emotions frequently lead us to

better, safer and more optimal outcomes. But, it lacks literature in studying neuro function, namely, emotion and cognitive ability, in making financial decisions, particularly among SMEs. Thus, emotion is considered in this research on positive emotion and negative emotion in relation to the financial decision making. Thompson (2007) found that the positive emotion gives a signal the expertise, attractiveness and agreeability of the good information. At the same time, the negative emotion signals to the generalization of the bad information received.

Frequently, the participants of previous laboratory experiment (Dorow *et al.*, 2018; Bothma, 2018; Efremidze *et al.*, 2017; Egidi & Sillari, 2017; Nadler *et al.*, 2017; Frydman & Camerer, 2016; Frydman, 2015; Jiao, 2014) are involved students who are unlikely to be representative of the general population that lead their responses to the experimental treatment may be distinctive (Bryman & Bell, 2015). The evidence of Pelaelo & Swami (2014) study on the tertiary level students in financial decision making that give low impact to the economy as a whole. Therefore, this research was used the natural setting of an experiment which is field experiment. The field experiment still infancy in neurofinance research due to less attention by the practitioners and academicians. In a field experiment, Seshan & Yang (2014), Bursztyn *et al.* (2014) and Stinjak & Ghazali (2012) conducted the research related to financial decision making and behavioural finance but exclude neuroscience. Due to that reason, this research is triggered to use the field experiment to investigate on how emotion state explain the reasons why people are not rational in making financial decision. This research was explored insights from the field of neuroscience by means of dual process theory (Kahneman, 2003) and working memory model (Baddeley, 2000). It also discussed on human working memory as a system to identify the brain components in financial decision making. The behaviour factor of SMEs which is representativeness heuristic was considered to examine the mediation effect on financial decision making and emotion. Findings from this research would assist the business owners making effective and efficient financial decision.

Financial decision making has important roots in emotional and motivational processes in neuroscience research that cannot be understood fully as the expression of cognitive limitations (Sjoberg & Engelberg, 2006). Peterson (2010) highlighted that the brain operates on two types of goal-directed behaviours, namely reward pursuit and loss avoidance

which can be activated or deactivated independently. These systems entail complex processes that involve emotions, cognition and actual behaviour. The literature shows that two main parts of the brain are involved in making financial decisions, namely nucleus accumbens (NAcc) and anterior insula (Sahi, 2012). The anterior insula is associated with emotional experience and conscious feelings which included feelings of pain, anger, happiness, disgust and fear (Peterson, 2007). Additionally, the rewards system pertains to the objectives that the individual wants to achieve through the evaluation of alternatives. This reward system communicates through neurotransmitter dopamine and when something valuable is envisioned, this system is activated, and great feelings of well-being are generated. The loss avoidance system gets activated in the light of fear and anxiety that an individual perceives in the environment. This system (refer to Figure 1) consists of anterior insula (pain and disgust), amyglada (emotional processing), the hippocampus (memory center) and the hypothalamus (hormone secreting). Both the loss avoidance and reward system lie in the limbic system and they direct individual's risk behavior through "subtle emotional influences on judgment, thinking and behavior" (Peterson, 2007).

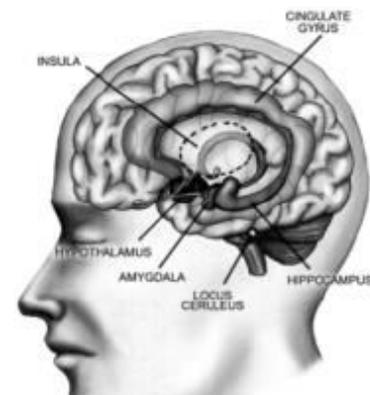


Figure 1: Brain Components.

With the inception of working memory, scholars are extremely interested in working memory since 1960's (Baddeley & Hitch, 1974; Baddeley, 2010; D'Esposito & Postle, 2015). The term "working memory" was first introduced by Miller *et al.* (1960). Working memory concept was described by the multicomponent working memory model that proposed by Baddeley & Hitch (1974). The working memory model was changed radically the rigid and dichotomous view of memory as being short or long-term memory. Short-term memory as working memory is multi-component system that provides short-term storage of information that

manipulates information storage for greater and more complex cognitive utility (Baddeley, 2000). The three subcomponents as shown Figure 2 involved are a phonological loop (or the verbal working memory), visuospatial sketchpad (the visual-spatial working memory) and the central executive which involves the attentional control system (Baddeley & Hitch, 1974). Central executive function as “control center” that oversees manipulation, recall and processing of information (non-verbal or verbal) for meaning full functions such as decision-making, problem-solving or even manuscript writing (Chai *et al.*, 2018). In the year 2000, another component term was “episodic buffer” in Figure 2 was introduced into the working memory model as a temporary storage system that modulates and integrates different sensory information (Baddeley, 2000a).

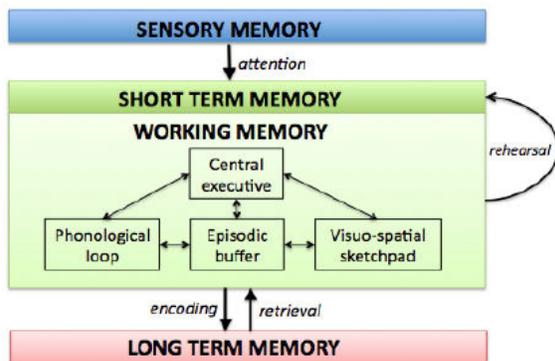


Figure 2: Working Memory Model (Baddeley, 2000).

In terms of emotion states, Garrison and Schmeichel (2018) stressed that the vital starring role in memory is emotional events. Emotional events captured attention, increased stimulus processing and elaboration; and strengthened during consolidation to develop memory representations (Garrison & Schmeichel, 2018). They assumed that emotional words receive very fast in memory processing as compared to neutral words in short-term memory tasks. The emotional words are presumably gotten initially prioritised processing, however not after encoding. Nevertheless, in a working memory task, the elaboration and practice are disturbed by the prerequisite to perform simultaneous cognitive activities. Accordingly avoiding the reinforcing of memory portrayals after introductory encoding. Evidently, people recalled more negative words than positive words on the emotional task (Garrison & Schmeichel, 2018). The impacts of emotion on working memory and executive control are frequently considered in disengagement. Positive mind-set improves verbal and impairs spatial working memory,

while negative emotion upgrades spatial and weakens verbal working memory (Storbeck & Maswood, 2015). Additionally, positive emotion upgrades executive control, though a negative mindset has little impact.

3. HYPOTHESIS DEVELOPMENT

Heuristics behaviour will lead to investors to evaluate the information objectively. However, the emotional and cognitive errors are difficult to ignore. According to Baker & Nofsinger (2010), scholars are continuing to identify, reconcile and understand heuristics behaviour affect in financial decision making. The most versatile and useful heuristics is the representativeness heuristic (Kahneman & Tversky, 1984). Representativeness heuristic is defined as a cognitive action in which an individual categorises a situation based on a pattern of previous experiences or beliefs about the scenario (Venkatapathy & Sultana, 2016). In other words, it can say that representativeness is the degree to which an event is similar in essential characteristics to its parent population and sample that reflects the salient features of the process by which it is generated. But how similarity was defined is left open (Gigerenzer & Brighton, 2011). They added that a label of representativeness can be a starting point in four decades and many experiments later due to representativeness have still not been instantiated as a model. Recently, Vives *et al.* (2018) had tested the foreign language context to modify biases and the use of representativeness heuristics without considered the emotional reactions took a look at the effect on decision making. The findings show that they failed to prove the impact of foreign language context shapes decision making. The scope of its effect might be limited to decision-making tendencies in which emotion plays a causal role. According to Gál *et al.* (2013), insensitivity to the sample size as one of the types of representativeness heuristics. These heuristics are considered a small sample for making conclusions, even though the small samples are not representative enough. There will be more variations in the average (mean) of the small sample as compared the average (mean) of the whole population, and not possible to generalise the conclusions made from this sample. Thus, from the reviewed, we outlined the hypothesis as:

Hypothesis 1

The mediating effect of representativeness heuristic significantly influence the emotion on financial decision making.

Hypothesis 1a

The mediating effect of representativeness heuristic significantly influence the positive emotion on financial decision making.

Hypothesis 1b

The mediating effect of representativeness heuristic significantly influence the negative emotion on financial decision making.

4. THE THEORIES

Two important theories are related to this research which are Prospect Theory and Dual Process Theory. In Prospect Theory, McDermott (2001) defined as a theory of decision making under conditions of risk. The challenging of decision making under conditions of uncertainty is difficult to foresee the consequences of the events with clarity. Furthermore, the internal conflict over value trade-offs in decision making made difficult when choices promote contradictory values and goals. Kahneman & Tversky (1974) demonstrated most of the time; people systematically violate all the basic axioms of subjective expected utility theory in actual decision making. It is contrary to the normative implications inherent within classical subjective expected utility theories. The prospect theory was introduced to provide the alternative of choice that accurately describes how people practice making their decisions. The theory also designed to explain in descriptive and empirical in nature about the common pattern of choice. This theory predicts that individuals tend to be risk-averse in a domain of gain and relatively risk-seeking in a domain of losses as shown in Figure 3.

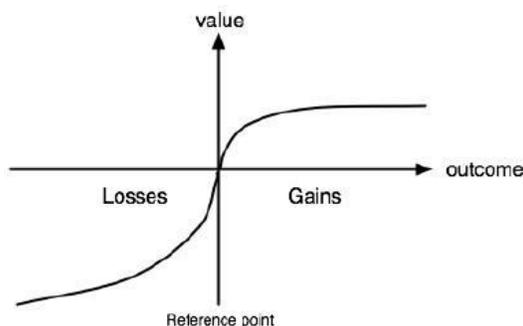


Figure 3: Value Function.

In Figure 3, it shows that the value function of prospect theory shows S-type, which means the investors tend to gain profit by selling securities first rather than taking certain risks (Wan, 2018). They also tend to hold securities and bear uncertain risks. It is

related to Kahneman & Tversky (1974) that described two-stage of decision processes, the editing phase and evaluation phase. The editing phase is the initial phase where outcomes of a decision are ordered according to a certain heuristic. People decide which outcomes they consider equivalent, set a reference point and then consider lesser outcomes as losses and greater ones as gains. This phase aims to alleviate any framing effects and resolve isolation effects stemming from individuals' propensity. Instead of treating them together. The editing process can be viewed as composed of coding, combination, segregation, cancellation, simplification and detection of dominance. Subsequently, in evaluation phase, people behave as if they would compute a value (utility), based on the potential outcomes and their respective probabilities, and then choose the alternative having a higher utility. Kahneman & Tversky (1974) had started the evolution of cognitive psychology in financial decision making. They found several personal factors affecting the decision of the individual such as knowledge, education, personality and behaviour (Kahneman & Tversky, 1984). The effect of internal and external variables are not directly connected to the decision itself. That is why, now, mental process takes place into the brain (Kahneman & Tversky, 1979) and by their own individual's cognitive limitations (Kahneman, 2003). Therefore, it discussed the Dual Process Theory that described two brain systems.

There are two brain system which are System 1 and System 2 as shown in Figure 4. According to James (2017), Dual Process Theory explained why many people make a mistake while making a decision. This theory was introduced by Kahneman (2003). The theory suggests that “we have two different thought patterns—System 1 (“fast” thinking) and System 2 (“slow” thinking)”.

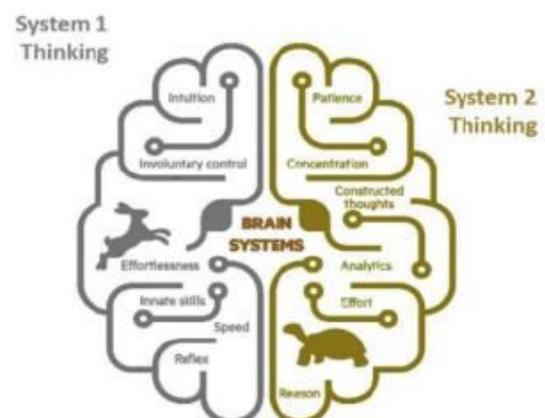


Figure 4: System 1 and System 2 (Hayes, & Rockwood, 2017).

As illustrated in Figure 4, System 1 thinking is fast, effortless and relies on intuition and mental shortcuts (heuristics). However, we do not want to regularly engage System 2 thinking for each of decisions. This is because System 2, as the more deliberate thinking mode, is slower and more taxing in terms of effort than System 1. Surprisingly, System 1 thinking is our default mode of thinking. Therefore, understanding this theory is an important step in improving your decision making process.

5. EXPERIMENT PROCEDURE

An actual experimental design involved pre-test and posttest experiment measures that conducted with both experimental groups and control group. Before conducting the experiment, the researchers had applied the human ethics from Universiti Malaysia Kelantan Human Ethics Committee (UMKHEC). The approval of human ethics is received from UMKHEC with the reference number UMK.PCA/A01/600-5/1 JLD 7 (4). The experiment was conducted in Pusat Usahawan MARA (PUSMA) that involved in three separate venue, Entrepreneur Incubator and two training rooms. Before conducting the experiment, researchers have distributed an online profiling questionnaire to 150 active entrepreneurs in PUSMA. Only 76 entrepreneurs responded to the questionnaire. After evaluating the feedback from entrepreneurs, 26 entrepreneurs are excluded from experiment due to criterion fulfilment not being met. To start the experiment, the homogeneity of the subjects is needed and had been controlled with academic qualification of STPM or Diploma and above, business age between 1 to 5 years, a high level of financial knowledge and neutral emotion. Homogeneity participants are important to eliminate possible distortions of the treatment effects on financial decision making. Upon arriving at PUSMA, the subjects were welcomed by the researchers and joined some refreshment that have been provided. In the initial stage, the researcher started the session with welcoming speech and short briefing to the subjects. Then, the researcher had given the instruction about the experiment procedure to the subjects. The researcher has informed the subjects that the experiment will be conducted in three different rooms and approximately lasted in 60 minutes. The pre-test and posttest experiment was conducted to the three groups. Two experimental groups were involved in the treatments where they have to watch the video clips that can change their emotion from neutral emotion to either positive emotion or negative emotion. Whereas, the control group was given the session of

emotion control by the researcher. Next, the consent forms were distributed to the subjects. The subjects must read and understand the content in the consent form. They can asked the researcher if they do not understand about the content. The subject has to sign the agreement form on the last page of the consent form if he / she agrees to involve in the experiment. After signing the agreement form, emotion questionnaire were distributed to the subjects. The subjects ranked their current emotion based on the excitement, happy, fear and sad items with a seven-point Likert scale from 1 = Never to 7 = Always. According to Krabbe (2017), the low category (negative emotion) is below the mid-point, high category (positive emotion) is above the mid-point and at mid-point is considered as neutral category (neutral emotion). The subjects were took approximately five minutes to response to the questionnaires. 8 subjects are excluded in the experiment because they are fall in negative and positive emotion. Only 42 subjects are selected who are in neutral emotion category.

Then, the subjects were answered the financial decision-making questionnaire. To answer this questionnaire, it took approximately 10 minutes. While waiting the subjects answered the questionnaire, the subject's group is identified using randomisation. Randomisation in the experiment means the participants are randomly assigned to the different groups either with or without treatment (Nazarova & Laurila, 2015). The randomisation was used to ensure the subjects are randomly assigned the treatments in an experiment. Thus, this research was decided to use lottery method as one of the popular method in experimental design. An alphabet lottery procedure is used to assign treatment to each subject (Ho & Imai, 2008). Three groups involved in this research is consisting of two experimental groups (positive emotion and negative emotion) and one control group. Then, the financial decision making questionnaires are collected. Next, after assigning the group to each subject, the treatment had been given to the experimental group. The control group has listened to ten minutes sharing session of emotion management. The subjects in the experimental group were received the emotion treatment (Dunn & Hoegg, 2014) either the treatment of positive emotion and negative emotion. For positive emotion treatments, each subject was watching four video clips consisting of excitement (Iklan Raya 2017 and How Diverse Is Malaysia?!, 2017) and happy (Mael Totey 5, 2019 and Maharajalawak Mega 2014 (Sepahtu)) in genres of drama, comedies and

documentary. For negative emotion treatments, each subject was watching four video clips of fear (Gamology Trailers Korea, 2018 and Tsunami in Japan, 2013) and sad (Lafazkan Kalimah Cintamu, 2018 and Buli, 2018) from horror, dramas and trackjacker genres. All video clips were pre-tested and validated using sentiment analysis to ensure that they are effectively generated the target emotion. After watching the video clip, the subjects immediately ask to fill in the same emotion questionnaires. The subjects were ranked their current emotions at that time to identify the changes of the subjects' emotion from the video clips. Then, the subjects were repeated assessed themselves on financial decision making through same financial decision-making questionnaire. Finally, they have to rate themselves on the given scenarios of representativeness heuristic questionnaire. The repeated measure of questionnaires such as emotion questionnaire and financial decision making questionnaire had been rearranged the order of the questions to avoid memorization of the questions (Yang, 2017; Eagle & Barnes, 2009). The process involved in this experiment was ended within 60 minutes for each subject including with pre-test process, treatment process and posttest process.

Mediation analysis is used to better understand the question of how the mediator effect of X on Y (Hayes & Rockwood, 2017). In this research, it explained as emotion (X) might affect the financial decision making (Y) because of the mediating of representativeness

heuristic (M). This research used a simple mediation model in which emotion is modelled to influence financial decision making directly or indirectly through a single mediator variable which is representativeness heuristic causally located between emotion and financial decision making (Hayes, 2012). Since emotion has three levels (control, positive and negative); it called multi-categorical variable. Many coding strategies can be used to represent the groups. The analysis using indicator coding also known as dummy coding (Hayes & Preacher, 2014). In order to dummy code of three groups, 2 dummy variables ($D_i, i = 1,2$) will be constructed with D_i set to 1 if a case is in group i and 0 otherwise.

6. RESULTS AND DISCUSSIONS

The data gathered from the experiment were analysed using Statistical Package of Social Science (SPSS) 25.0 PROCESS Macro Version 3.3 (PROCESS V3.3) developed by Hayes in 2019. The mediation effect is analysed using general linear model of multi-categorical of emotion (control group, positive group and negative group). A general linear modelling approach was articulated by the researcher in estimating the direct and indirect effects when the independent variable is multicategorical (Hayes & Preacher, 2014). Researcher rely on the fact that mean differences can be estimated with a linear model by representing groups with a set of $k-1$ variables, where k is the number of groups.

Table 1: The Effect of Emotion on Financial Decision Making through Representativeness Heuristic

Models	Coeff	MSE	t-value	p-value	LLCI	ULCI
Representativeness						
F-value = 0.7616, p-value = 0.4737, R ² = 0.0382						
Constant	5.2714	0.1904	27.6817	<0.0001	4.8862	5.6566
D1 (a ₁)	-0.0571	0.2895	-0.1974	0.8446	-0.6428	0.5285
D2 (a ₂)	0.2571	0.2631	0.9774	0.3344	-0.2750	0.7893
Post-test FDM						
F-value = 11.7159, p-value = <0.0001, R ² = 0.4229						
Constant	5.3536	0.1163	46.0175	<0.0001	5.1183	5.5889
D1 (Direct Effect) (c' ₁)	0.9480	0.1416	-2.8753	0.0066	-0.6938	-0.1205
D2 (Direct Effect) (c' ₂)	-0.7278	0.1266	-2.4695	0.0181	-0.5688	-0.0563
Representativeness (b)	0.3128	0.0787	3.9723	0.0003	0.1534	0.4722
Mediation (through Representativeness)	ab	BootSE	Bootstrapped	CI		
D1 (Indirect Effect) (a ₁ ,b)	-0.0179	0.1338	-0.6815	-0.1509		
D2 (Indirect Effect) (a ₂ ,b)	-0.0804	0.1194	-0.5371	-0.0708		

The effect of emotion on financial decision making mediated by representativeness heuristic as presented in Table 1. The mediation effect of representativeness heuristic exist on the emotion and financial decision making with F-value= 11.7159 and p-value = <0.0001. Thus, hypothesis 1 is supported. Table 1 shows the analysis of two different level of emotion as compared to control group were conducted. It showed that the effect both of emotions which are negative emotion (D1) and positive emotion (D2) directly affect the financial decision making with the coefficient of $c'_1 = -0.9480$, p-value = 0.0066 and $c'_2 = -0.7278$, p-value = 0.0181 respectively. Moreover, the representativeness heuristic mediates the effect of negative emotion and positive emotion on financial decision making indirectly with the coefficient $a_{1,b} = -0.0179$; CI: -0.6815, -0.1509 and $a_{2,b} = -0.0804$; CI: -0.5371, -0.0708 respectively as compared to control group. It indicates that the direct effect of negative emotion reduced the financial decision making by 0.95%. Likewise, the mediating effect of representativeness heuristic significantly influence the negative emotion on financial decision making as it slightly reduced by 0.02%. Therefore, hypothesis 1b is supported. As for positive emotion, the mediating effect of representativeness heuristic significantly affect the positive emotion on financial decision making as it slightly reduced by 0.08%. Thus, hypothesis 1a is supported. We can conclude that the partial mediation exist and it showed in Figure 5.

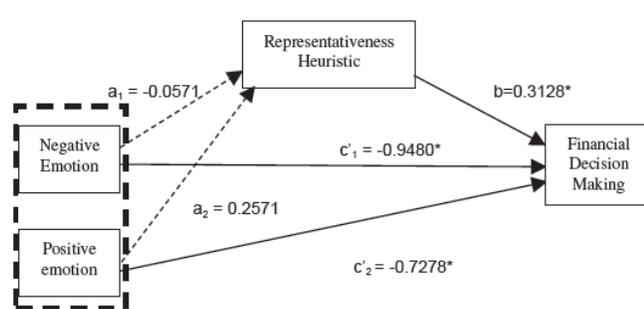


Figure 5: Representativeness Heuristic: Partial Mediation of Emotion on Financial Decision Making.

From the results, hypothesis 1 is supported. It indicates that the mediation of representativeness heuristic exists and affects the emotion on financial decision making. As we know, the heuristic has not yet been researched as a mediator. Thus, this experimental research tested the heuristic as a mediator as suggested by Artinger *et al.* (2014) and Nigam *et al.* (2018). However, this research only tested the representativeness heuristic. It shows that the representativeness heuristic has partially mediated between emotion and financial decision making among

SMEs. It implies that the emotion has direct and indirect effects on financial decision making. However, emotion does not influence the representativeness heuristic where a -path is not significant. The result is in line with experimental research by Duxbury (2015) when he found that the manipulation of cognitive biases influences the heuristic behaviour not emotion. According to Hayes & Rockwood (2017), the significant or insignificant of a -path and b -path (refer to Figure 5) are not important because it indicative of ab is significant. That's why, in this research, even a -path is not significant (refer to Table 1), the mediation effect is still occurred. However, in financial decision making (decision on investment, spending and borrowing) among SMEs, only negative emotion gives mediating effect of heuristic as compared with the control group. The results are consistent with Schwarz & Bless (1991) and Thompson (2007), the negative emotion felt in risk situation and increase improper decision because they generalized the kind of information that they received. It is also supported by Vives *et al.* (2018) and Venkatapathy & Sultana (2016) where the research showed that SMEs are easily to recall the negative information that they received and lead to overestimate of the probability on financial decision making. Venkatapathy & Sultana (2016) and Gál *et al.* (2013) revealed that the representativeness heuristic give tendency to bias on financial decision making as the actions are readily available in memory that evokes negative emotion. In a representativeness heuristic, it is significantly mediated to positive emotion but in poor financial decision making. It is inconsistent with Thompson (2007) where people in positive emotion are more expert and attractive when making a decision that generally lead to a good decision.

In relation to the working memory, the financial decision making that manages manipulation, recall and information processing is central executive function as "control centre" (Chai *et al.* 2018). The network distribution interacts working memory and financial decision making with common brain component which is prefrontal cortex (Murray *et al.*, 2017). Concerning to the emotion and working memory, the short-term memory task received fast emotional words in memory processing (Garrison & Schmeichel, 2018). On the other hand, the emotion on working memory and executive control are regularly disconnection. This is because the positive emotion upgrades spatial and negative emotion improve verbal working memory (Storbeck & Maswood, 2015). It indicates that the positive emotion upgrades the executive control though

negative emotion has small impact. However, the negative emotion enhances visual working memory as compared to neutral and positive emotions (Xie & Zhang, 2016). That's why the negative emotion has direct effect on financial decision making. It is also significantly affect with the mediation of representativeness heuristic. This is because the manipulation of emotion using video clips visualized and effect the negative emotion of entrepreneurs through the fear and sad video clips from the drama and tearjerkers genres. Furthermore, the brain components that involved in emotion are middle temporal, insula, medial prefrontal cortex, frontal and cingulate brain components (Farrell *et al.*, 2018). However, left amygdala and left anterior insula brain component activated when the people in negative emotion ((Lindquist *et al.*, 2016). Whereas, nucleus accumbens (NAcc) originates the activation of the brain component when people in positive emotion (Mateu *et al.*, 2017). Thus, in this research, we can suggest that when the entrepreneurs are in negative emotion, the left brain which System 1 is activated. The System 1 thinking is when people think fast, easy and trusts on instinct and mental shortcuts (heuristics) as the entrepreneurs are more related to risk. Whereas, the positive emotion among entrepreneurs lead to right brain activated which is System 2. They are more thoughtful, rational manner, slower and tougher in terms of effort in System 2 thinking. This is because they are more related to reward system.

7. CONCLUSION

As a conclusion, the positive and negative emotion among entrepreneurs (SMEs) give an affect either good or poor in financial decision making. The mediating variable, which is representativeness heuristic, examines its mediation effect on emotion and financial decision making. An experimental analysis was used to emphasize the effect of those variables. The theoretical implication implies that positive emotion does not influence good financial decision-making. This because the decision that the entrepreneurs made are unchanged as it related to the reward system. In contrast, negative emotion leads to poor financial decision making. This is because negative emotion is related to risk or uncertainty. It is interrelated with the prospect theory where people's behaviour leads to their risks and rewards on the financial decision making that can be applied in psychological conditions. Additionally, with the mediation of representativeness heuristic, the result is the same for financial decision making. For the practical implications, it looks at the entrepreneurs,

financial advisors, and policymakers. For the entrepreneurs, to avoid mistakes in financial decision-making, the entrepreneurs may leave a little bit of their negative emotion and take into account the information that represents their financial decisions. As a decision-maker, when it comes to money matters, the business owner has to consider just a little emotion. He / She needs to be more professionally think not emotionally and mentally short cut in financial decision making to ensure business success. It is important for those in five years of business age survived their businesses and avoid business discontinued. As the statistically showed that they are among the highest rate of business failures. Apart from that these research findings also provide insight to the financial advisors to use the tested video clips and emotion questionnaire to know the clients' (entrepreneurs) emotion and characteristics before advising them with any new financial products or services. This is because the results showed that negative emotion leads to poor financial decision-making. It can say that the SMEs are more believed in their relatives or friends when it comes to financial decisions rather than professional advisors. It is sometimes lead them involved with the illegal investment. Finally, the policymaker involved with the entrepreneurship activities needs to alert the existing policy, especially in financial support. For the business start-up, entrepreneurs are regularly getting the capital from personal savings and family support. Yet, to ensure business growth and survival, financial support from the government and other agencies is essential. The policymakers have to disseminate the information about the various financial assistance they provided to the entrepreneurs, especially those operating the business in rural areas. Besides financial support, non-financial support such as business training and development also important to ensure the entrepreneurs more creative and innovative in business that can expand their business internationally. At the university level, this research provides information regarding the psychological and behavioural finance in entrepreneurship that can be used as a core or elective course for undergraduate and postgraduate students.

Future researchers can enhance this research using emotion manipulation from the video clips in laboratory experiments to detect the brain activation of subjects involved in the future. From that, it can identify truly emotions of the potential subjects without having any biases. Apart from that, since the heuristic just provides partial mediation on emotion and financial decision making, we suggest that to test the heuristic as a

moderator in future research as proposed by Nigam et al. (2018). Finally, we recommend to use the structural equation model (SEM) for analysis in future research. It may be the results are different from this research.

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