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THE ROLE OF COGNITIVE BIASES, EMOTION AND PSYCHOLOGICAL MANAGEMENT DETERMINANTS ON INNOVATION DEVELOPMENT AND ENTERPRENEURIAL ORIENTATION: AN EVIDENCE OF SMALL AND MEDIUM MANUFACTURING ENTERPRISES

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Abstract:

The importance of innovation is well acknowledged in the literature of management. Innovation not only brings competitive advantages to organizations but also, along with science and technology, is the essential assets of nations seeking to secure economic competitiveness with the entrepreneurship sphere. The purposes of this study were to examine and investigate the relationships between cognitive biases, emotions on innovation, share-practiced, trust-based relations, and norms in venture creation with innovation development and entrepreneurial orientation. Survey research was conducted. The study found that such variables as cognitive biases, emotions on innovation, share-practiced, trust-based relations, norms, and innovation development correlated positively with innovation development and entrepreneurial orientation. Results suggested cognitive biases and emotions on innovation as a mechanism that triggers innovation development and that this effect is stronger when they engage in opportunity-based entrepreneurship. Finally, pragmatic implications were discussed on how to utilize these factors to gain competitiveness and sustainability.

Keywords:

Cognitive biases, Emotions on innovation, Innovation Development, Entrepreneurial Orientation, Small and Medium Enterprises

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Introduction

The importance of innovation is well acknowledged in the literature of management. Innovation not only brings competitive advantages to organizations (Porter, 1990), but also, along with science and technology, is the essential assets of nations seeking to secure economic competitiveness (Lindkvist, 2005). Innovation is different from invention. It can be defined as "a process of running opportunity into new ideas or knowledge and of putting these into widely used practice" (Tidd and Bessant, 2018).

It is obvious that innovation and knowledge creation in small and medium enterprises (SMEs) attract more and more research attention, because of the increasing number of SMEs with the globalization. SMEs' innovation is related not only to organizational performance, but to the development of global economy as well. On the one hand, these knowledge-based approaches through innovative creation are employed for understanding SMEs (Foss, 2006) such as how organization control and knowledge flow are interrelated, sometimes create risk. On the other hand, studying SMEs helps the understanding of boundary-spanning knowledge flow and innovation. Consequently, SMEs' operation and innovation requires knowledge sharing across different boundaries: departmental, organizational, and national boundaries so called cognitive knowledge.

Cognitive knowledge flow is closely related to cognitive bias and emotions innovation and reflects to innovation and performance. A cognitive bias is the human tendency to make systematic errors in certain circumstances based on cognitive factors rather than evidence. Such biases can result from information-processing shortcuts called heuristics. They include errors in judgment, social attribution, and memory. Cognitive biases are generally a common outcome of human thought, and often drastically skew the reliability of anecdotal and legal evidence. Emotional on Innovation (EI) is an ability, skill or, in the case of the trait EI model, a self-perceived ability to identify, assess, and control the emotions on innovation of oneself, of others, and of groups through certain creativity processes (Kilenthong, Hultman and Hills, 2016). Various models and definitions have been proposed of which the cognitive bias and trait EI models that so called in these research emotional on innovation topics are the most widely accepted in the scientific and managerial literature. However, cognitive bias is always existing in SMEs. In the previous literature, most research focuses on how SMEs can obtain innovation resources through internal sharing and external connections. In fact, there are many factors affecting internal knowledge sharing in SMEs such as share-practice, trust-based relations as well as norms. These factors, in the aspect of the innovative sphere can be simply categorized as cognitive and relational barriers that are called psychological innovation factors (Kilenthong et al., 2016; King and Slovic, 2014)

This study will focus on SMEs in a specific industry, herbal product manufacturers and distributors. In Thailand, small and medium enterprises that are located in tropical areas are well suited for growing and harvesting a variety of herbs. This has allowed the herbal product market to become one of the highest growth industries in Thailand. A comparison of the local market size in the years 2019 and 2020 shows that the size of the market has substantially increased by more than 60 percent of $270 million or $160 million annually (Department of International Trade Promotion, 2020) The herbal product market has also becoming a major exporter that has continuously generated 10 percent in the world market share accounted for $3 billion annual income with increases annually of 35 percent to 45 percent in Thailand (Department of International Trade Promotion, 2020). Thailand is one of the major locations for herbal product manufacturers in Southeast Asia with approximately 30 percent of overall

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total market share of the total nation which accounts for $100 million annually. This has led to an increase in the number of herbal product manufacturing enterprises, which has led to an increase in the quality and innovation of this market.

According to Nouri, Imanipour, Talebi and Zali (2017) which mentions that cognitive biases and other psychological innovation factors have important implications in entrepreneurial decisions. These decisions influence the results of entrepreneurial decisions which ultimately can have an effect on the businesses profits, as well as customer satisfaction. The entrepreneurial-related consequences of the bias are so called entrepreneurial orientation. The main causes of biases as well as their effects have been previously studied, especially in some phases like new business creation (Kilenthong et al., 2016).

Though the body of research in this regard seems to be satisfactory; there are some certain gaps that remain. In conclusion, the main purposes of this study are to examine cognitive biases, emotions on innovation, share-practiced, trust-based relations, and norms in SMEs venture creation, particularly when involving innovation, and investigate the effects of these independent variables and innovation development on entrepreneurial orientation. The most important of which are the nature of biases and related determinants such as shared practice, trust-based relations, norms, and organizational structure through innovative development, the ability to draw a definite line between positive and negative impacts of these variables, the relationship between these determinants and innovation development and the resulting biases and the essential measures to increase their positive effects and to decrease their negative entrepreneurial impacts in SMEs. Furthermore, the influence of heuristics or cognitive biases and essential related determinants in some nascent areas like entrepreneurial orientation that SMEs owners or entrepreneurs play substantial and major roles, seems to be understudied. Analyzing some of the most important cognitive biases, other related bias measures and their impact on entrepreneurial management decisions were essential. Therefore, there was lack of systematic discussion about how those factors are related in influencing cognitive bias and emotion lead to knowledge flow innovation and entrepreneurial intention and orientation of SMEs from both theoretical and empirical aspects. Whether organization structures, entrepreneurial orientation, and cultures that among most SMEs owners were related to the cognitive, relational determinants, innovation development was still not clear. This inquire was based on recognition of the need to explore those issues further by undertaking an empirical study in SMEs. The purposes of this study were to examine and investigate the relationships between cognitive biases, emotions on innovation, share-practiced, trust-based relations, and norms in venture creation with innovation development and entrepreneurial orientation.

Literature Review

The study encompasses literature review on various theories of cognitive bias and related determinants, innovation development, and entrepreneurship. It highlights that though there are many studies on the stages of enterprise development, there is a dearth of literature on finding patterns of growth through innovation development followed by the small and medium enterprises. Also, there is lack of literature on the effect of cognitive factors in determining growth path through the opportunity-based firm behaviour entrepreneur orientation. There is a need of a framework which can help the industry to empirically test enterprise potential growth patterns under different conditions.

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Cognitive Bias, Other Determinants, And Innovation Development

According to Prendergast, MaKanem, Dodd and Godown (2017), there were 3 types of cognitive bias;- Empathy gap, Anchoring bias, and confirmation bias. Empathy gap is generally one of the bias types that occurs when people underestimate the influence of their emotional states on their behaviour or preference, while they overestimate the intellectual influence on their decision-making. Anchoring bias on the other hand refers to the tendency to place too much importance on the initial pieces of information or knowledge presented when making decisions. And confirmation bias contributes to overconfidence in pre-existing beliefs that can result in negative effects on decision making. It was therefore the tendency to search for, interpret, focus on and remember information and knowledge that reflected their own preconceptions (Prendergast et al., 2017). Additionally, emotion on innovation was an ability, skill or a self-perceived ability to identify, assess, and control the emotions of oneself, of others, and of groups (Kilenthong et al., 2016; King and Slovic, 2014). However, cognitive bias was always existed with emotions on innovation in SMEs (Kilenthong et al., 2016).

Share-practice view of knowledge argues that knowledge was developed in people's everyday interaction – in the process of knowing how to get things done in the context of established routines and procedures in organizational work (Orlikowski, 2002). In mutually engaged practice, people developed a set of shared meaning and shared language (Boland and Tenkasi, 1995; Brown and Duguid, 1991), by which people can effectively communicate with each other and understand shared knowledge and information. The most effective way of sharing knowledge was to participate in the practice and interact with people on the pragmatically innovative development.

Additionally, trust-based relations were crucial for knowledge sharing (Davenport and Prusak, 1998). Trust-based relations unlocked access to other people for the exchange of knowledge and increase anticipation of value of such exchange (Nahapiet and Ghoshal, 1998; Nouri, Imanipour and Ahmadikafeshani, 2019). Without trust, people within different functions and units in SMEs might not be able to notice the value of others' knowledge, and, as a result, inter-departmental and inter-unit knowledge and information flow might be impeded.

Furthermore, norms were also essential factors influencing internal knowledge flow in SMEs. For instance, norms of cooperation help people cooperate in their joint work. Several research studies found that norms of cooperation produce positive effects on organization knowledge flow and innovation (Starbuck, 1992; Nahapiet and Ghoshal, 1998), and norms of professionalism can cause problems to acceptance of different ideas from the type of collectivism and external groups (Katz & Allen, 1982). Breaking with the common presumption that individual creativity was constrained by collective mechanisms such as social conformity, consequently there was a need to rethink the collective action as leverage on the ability of individuals to generate creative ideas and innovation (Agogué, Le Masson and Robinson, 2012).

Finally, but not least importantly, organizational structures and cultures have strong connections with organization innovation and knowledge flow. For instance, organizational structures and processes can restrain practice-based knowledge flow - "In most SMEs structures, practice-based knowledge will not flow easily at a distance unless structures and processes explicitly foster and support such flows" (Doz, 2006). Hofstede (1998) found that organization might have different subcultures in its different units. Especially in SMEs, because different business units were often located in different management style of owners

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and operated differently, different practice can develop separate subcultures. Different subcultures could influence innovation development significantly. For instance, study by Bate (1994) evinced that different subcultures led to conflict between units regarding innovation and caused the failure of the innovation development. These evidences lead to the following hypotheses.

Hypothesis 1 (H1). There is positive relationship between cognitive biases and innovation development.
Hypothesis 2 (H2). There is positive relationship between emotions on innovation and innovation development.
Hypothesis 3 (H3). There is positive relationship between share practices and innovation development.
Hypothesis 4 (H4). There is positive relationship between trust-based relations and innovation development.
Hypothesis 5 (H5). There is the positive relationship between norms and innovation development.

Innovation and Entrepreneurship

Stevenson (1983) conceptualizes entrepreneurship as a management approach that has at its heart an all-consuming passion for the pursuit and exploitation of opportunity without regard to resources currently controlled, named the opportunity-based firm behaviour entrepreneurship (Stevenson, 1983). He contrasted entrepreneurial with administrative behaviour. Along the spectrum of behaviours between these extremes, promoter businesses were placed at the entrepreneurial end and trustees at the administrative end. The promoter's sole intent was pursuing and exploiting opportunities regardless of re- sources controlled, while the trustee strives to make the most efficient use of its resources pool (as "required" by fiduciary responsibility). Certain business and environmental factors pull individuals and businesses towards entrepreneurial behaviour or towards administrative behaviour. In his recent work, Stevenson categorized the entrepreneurial-oriented-management behaviour of the promoter and trustee types along six dimensions: Strategic Orientation, Commitment to Opportunity, Commitment of Resources, Control of Resources, Management Structure and Reward Philosophy (Stevenson ,1983; Stevenson and Gumpert, 1985). He has lately developed his thoughts with slight variations in a series of subsequent papers where he somewhat explicitly added two more dimensions:- Entrepreneurial Culture and Growth Orientation (Stevenson, 1985; Stevenson and Jarillo, 1990).

However, there was lack of systematic discussion about how those factors are related in influencing the knowledge flow of SMEs from both theoretical and empirical aspects. At present studies regarding the correlation between entrepreneurial condition and enterprises' growth, and entrepreneurial activities have been springing up. But systemically discussing the entrepreneurial condition's effect on the entrepreneurial result was attributed to the innovation development and progress of the organizational ecological system theory. According to this theory, business practices fundamentally affect the business world, the environment and lives ecology implies community, and ecological entrepreneurs understand the connections between their actions and the greater community. The major aspect is socially important because ecological entrepreneurs are instrumental in reshaping and uplifting the way they approach the environment and its relation to business through different degree of innovation development with their psychological and social capital entrepreneurship factors (Khessina, 2008).

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Additionally, innovation was benefited by knowledge flow through the intra-organizational ties based on internal interface between project groups, functional departments, and divisions [Conway, and Steward, 1998]. Being a discipline studying individual, reasoning and development, and cognitive psychology seems well equipped to study bias at the individual level of analysis through the owners' entrepreneurship. The study of Van Diermen (1995) also showed that top managements through the entrepreneurial behaviours have positive effect of tendency of innovation development. Several researches on entrepreneurship supported a positive relationship between cognitive bias, norms, share-practice entrepreneurship and performance or outcomes through innovative making decision process (Barringer, and Bluedorn, 1999; Covin, Green and Slevin, 2006). The study of cognitive bias was an essential at the heart of work in cognitive psychology, which has contributed to identify systematic deviations from normative models in multiple areas: probability judgment and decision making (Kahneman and Tversky, 1982), deductive and inductive reasoning (Federick, 2005; Kahneman and Tversky, 1982), trusted-base relations and social relations that have to evidently be tested through the following hypotheses.

Hypothesis 6 (H6). Each of independent variables is the positive effect on entrepreneurial orientation.
Hypothesis 7 (H7). Each of independent variables is the positive effect on strategic orientation.
Hypothesis 8 (H8). Each of independent variables is the positive effect on resource orientation.
Hypothesis 9 (H9). Each of independent variables is the positive effect on management structure.
Hypothesis 10 (H10). Each of independent variables is the positive effect on reward philosophy.
Hypothesis 11 (H11). Each of independent variables is the positive effect on growth orientation.
Hypothesis 12 (H12). Each of independent variables is the positive effect on entrepreneurial culture.

Conceptual Framework

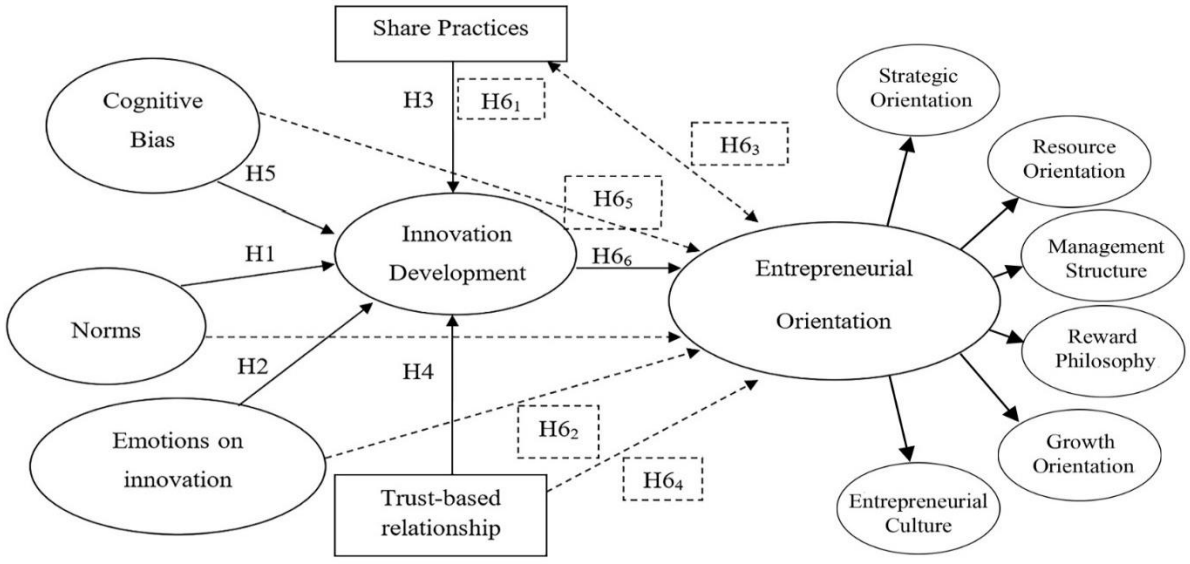

Figure 1: Conceptual Framework for Hypotheses 1-6

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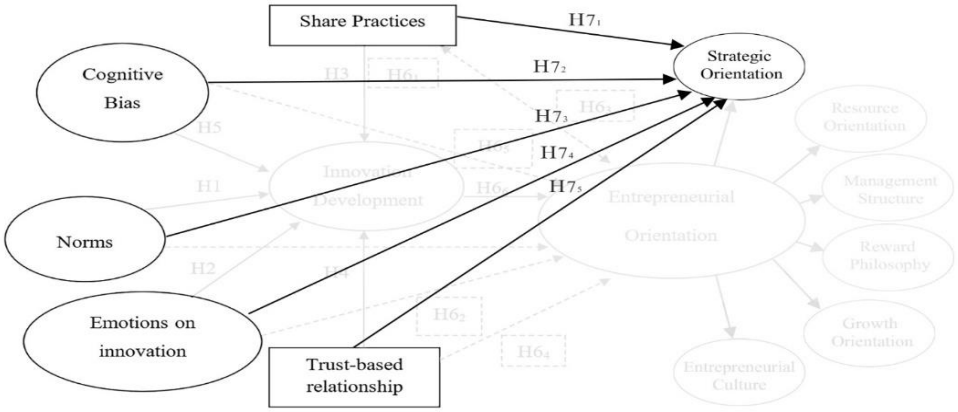

Figure 2: Conceptual Framework for Hypothesis 7

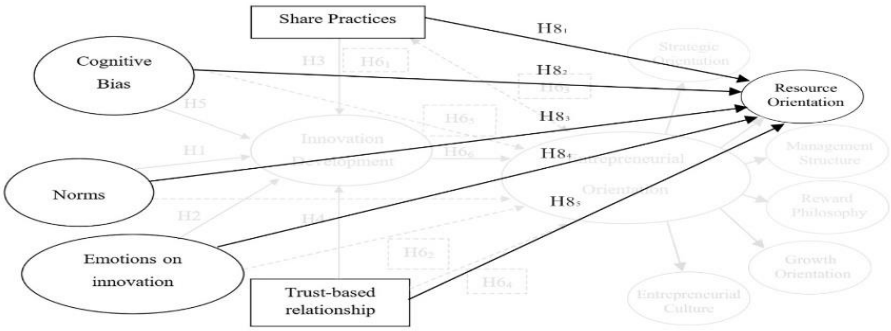

Figure 3: Conceptual Framework for Hypothesis 8

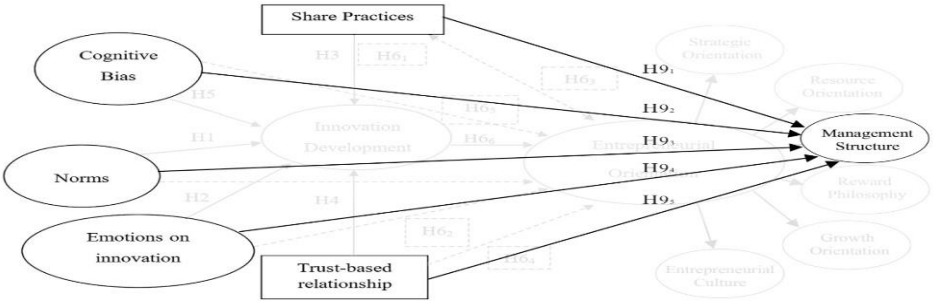

Figure 4: Conceptual Framework for Hypothesis 9

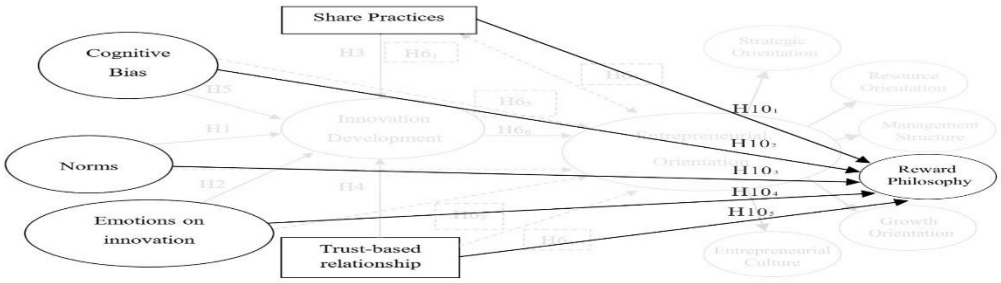

Figure 5: Conceptual Framework for Hypothesis 10

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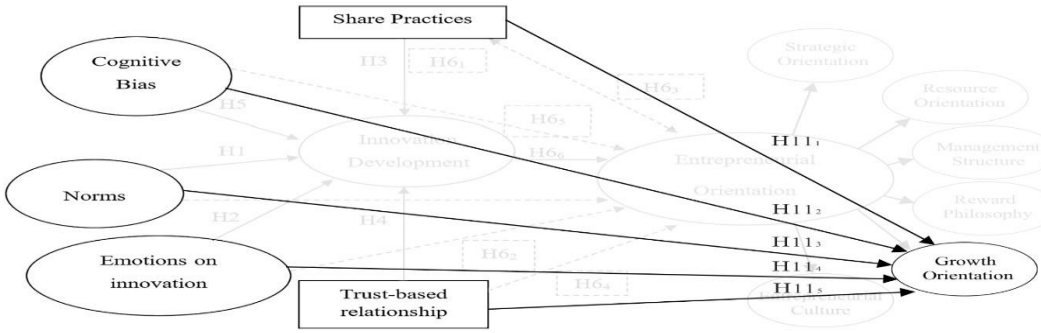

Figure 6: Conceptual Framework for Hypothesis 11

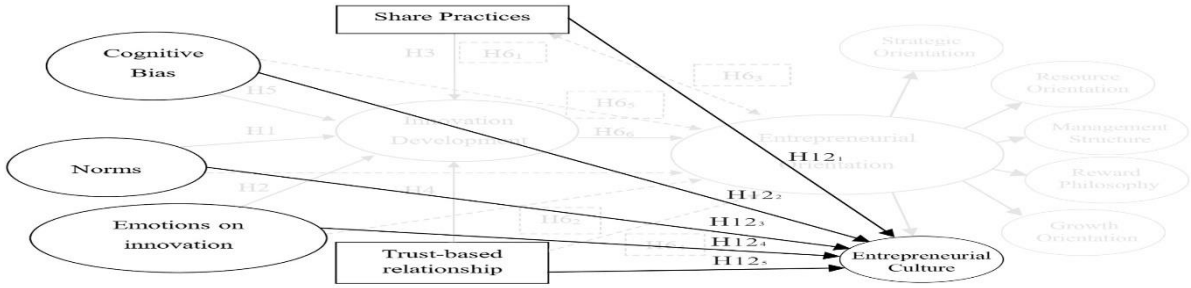

Figure 7: Conceptual Framework for Hypothesis 12

Methodology

The descriptive with quantitative research was conducted.

Samples and Procedures

The samples were owners or key decision-maker of Thai owned small and medium herbal manufacturing enterprises including the community-based enterprises such as the housewives' community-based societies and networks in Thailand who have operated their enterprises with between 5-100 employees and or capital registered 5-15 million Thai Baht ($151,500 & $454,500) for at least 5 years. These small and medium-sized businesses included the community-based enterprises such as leaders of the housewives' community-based societies and networks whose products consisted of herbal products for cosmetic and personal care and had headquarters located in Thailand. According to the SMEs statistics in Thailand, the number of herbal-product manufacturers is 879 enterprises. There are 128 medium-sized and 751 small-sized enterprises. Sample size was calculated from the formula as follow (Yamane, 1967).

$$\mathbf{n} = \frac{\mathbf{N}}{\mathbf{1} + \mathbf{N}(\mathbf{e})^{\mathbf{2}}}$$

Given

N = population size
e = Sampling error 5 percent
n = sample size

Therefore $n = \frac{879}{1+879(0.05)^2}$

$= 274$

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Sample size was 274 owners or managers of the enterprises. There are proportionally 40 medium-sized and 234 small-sized enterprises that were purposively and classified by enterprises' size were selected.

Data Collection

Data was collected using a structured-questionnaire distributed to 290 small and medium-sized businesses whose products consisted of herbal products for cosmetic and personal care. 35 online survey forms of questionnaire and 15 questionnaires were conducted by personal interview for medium-sized enterprise owners. And 165 online survey forms of questionnaire and 75 questionnaires were conducted by personal interview for small-sized enterprise owners. Convenience sampling was purposively followed by email as an effective way for supporting the variety and qualifications of respondents. An online survey has more advantages than post or paper surveys because of the capability for quick replies without the limitation of geography. All of the 110 paper questionnaires were completed and returned, whereas only 154 of the 200 online questionnaires were completed. Therefore, online survey and personal interview replies were then collected within five weeks, to give a total of 264 respondents, giving a 91.03 percent response rate.

Research Instrument

A questionnaire with closed-end questions was designed from the study of data from textbooks, documents, concepts, theories, and related research. All indicators were adopted from previous research and measured using a five-point Likert scale. Accordingly, there were six major independent variables as cognitive bias, emotions on innovation, shared practice, trust-based relations, norms, and innovation development, while the dependent variable, entrepreneurial orientation, was identified

.

Measurement Validity and Reliability

A pre-test is run on a random sample of the population (n = 20) to establish research procedure to follow and answer the questionnaires. There are three purposes of a pre-test study. First, to find out if each item in the questionnaire is easily read and interpreted by the interviewer and is understood by the interviewee; second, to obtain the estimated time required to administrative the questionnaire; and lastly, to assess its reliability and validity.

The reliability and validity of the measures were established according to standard procedures recommended by (Lawshe, 1975).

The content validity and reliability are tested for each subscale used in this study to achieve the acceptability of the scale of measurement of the questionnaire. This study calculated the content validity which is Content Validity Ratio (CVR). To assess the accuracy of the content, ten experts on organizational behaviour, management, industry, psychology, and human resource development were recruited to test, rate, and examine all measures. Results indicated that the accuracy of the content varied between 0.7 and 1.00. The CVR was evaluated by ten experts as a content evaluation panel. A minimum CVR of 0.62 was required to satisfy the five percent level of significant (Lawshe, 1975). CVR was equal to .80 which met this criterion was retained in the final form of the questionnaire.

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Measure reliability was also examined for internal consistency by computing Cronbach's alpha coefficient. The obtained Cronbach alphas of cognitive bias, emotions on innovation, shared practiced, trust-based relationship, norms, and innovation development as 0.759, 0.782, 0.721, 0.754, 0.898, and 0.711, respectively as well as those of entrepreneurial orientation scale was classified as 6 types as strategic orientation, resource orientation, management structure, reward philosophy, growth orientation, and entrepreneurial culture were 0.747, 0.734, 0.802, 0.933, 0.769, and 0.708, respectively. The obtained alpha coefficient that are approximately equal or higher than .70 are considered acceptable to measure the variables for this study (Nunnally, 1978).

Data Analysis

Descriptive statistics via mean and standard deviation were calculated to depict the conceptual variables. The established hypotheses H1, H2 H3, H4, H5, and H6 were tested by the Pearson Product-Moment Correlation method. And Multiple Regression Analysis were performed to test the H7, H8. H9, H10, H11, and H12 with the .05 statistically significance.

Results

This study revealed the results according to the objectives of the study.

Cognitive Biases, Emotions On Innovation, Share-Practiced, Trust-Based Relations, Norms, Innovation Development, And Entrepreneurship.

Descriptive statistics data indicated that the characteristics of the sample are as follows; 74 percent are female, while the rest are male which are mainly operating as community groups or housewife groups. Products selling the most were soap, shampoo or hair conditioner, massage oil, body lotion or cream, spa products, and skin scrub treatment as 36.8 percent, 22.4 percent, 15.8 percent, 13.2 percent, 7.9 percent, and 3.9 percent, respectively. 62 percent of the businesses have operated for 1-5 years and 22 percent of the businesses have operated for more than 10 years. Additionally, 56 percent of the entrepreneurial firms had their innovative products within 2 years as shown in Table 1.

Table 1: Mean and Standard Deviation of Entrepreneurial Orientation and Independent Variables (*n* = 264)

Entrepreneurial orientation	$\bar{x}$	*S.D.*	Level	Independent Variable	$\bar{x}$	*S.D.*	Level
Strategic Orientation	4.12	.662	almost agree	Cognitive Bias	3.92	.572	Mostly Agree
Resource Orientation	3.65	.992	almost agree	Emotion on Innovation	4.10	.759	Mostly agree
Management Structure	4.13	.627	almost agree	Shared Practice	4.04	.680	Mostly agree
Reward Philosophy	4.02	.787	almost agree	Trust-Based Relationship	4.11	.754	Mostly agree
Growth Orientation	4.44	.787	Mostly agree	Norms	4.04	.799	Mostly agree
Entrepreneurial Culture	4.34	.745	Mostly agree	Innovation Development	3.97	.808	Mostly Agree
Grand mean					4.12	.552	almost agree

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In addition, the owners rate the means and standard deviations of trust-based relations, emotions on innovation, norms, shared practice, innovation development, and cognitive bias as 4.11, 4.10, 4.10, 4.04, 3.97, and 3.92, respectively (the possible mean value ranged from 1.0 to 5.0).

Most firm owners generally rate determinants of cognitive bias ranging from 4.28 to 2.86, those of emotions on innovation ranging from 4.26 to 3.92, those of shared practice ranging from 4.32 to 3.64, those of trust-based relations ranging from 4.38 to 3.78, those of norms ranging from 4.18 to 3.92, those of innovation development ranging from 4.20 to 3.82 (the possible mean value ranged from 1.0 to 5.0).

Furthermore, the means and grand mean of entrepreneurial orientation which is classified as 6 types as strategic orientation, resource orientation, management structure, reward philosophy, growth orientation, entrepreneurial culture, and entrepreneurial orientation are 4.12, 3.65, 4.13, 4.02, 4.44, 4.34, and 4.12, respectively (the possible mean value ranged from 1.0 to 5.0).

The Relationships Between These Independent Variables And Innovation Development And Entrepreneurial Orientation.

Semi-partial correlation coefficients were calculated to test the established hypotheses (H1-H4). From Table 2, there were the positive relationships between cognitive bias (X1) trust-based relations (X2), emotions on innovation (X3), norms (X4), shared practice (X5), and innovation development (X6) with entrepreneurial orientation (EO), strategic orientation (SO), resource orientation (RO), and management structure (MS). And there were positive relationships between emotion on innovation and resource orientation (RO) while trust-based relationship related negatively with resource orientation (RO).

Table 2: Pearson Product-Moment Correlation Coefficients of the Hypothetical Variables

Variable	X1	X2	X3	X4	X5	X6	SO	RO	MS	RP	GO	PC	EO
X1	1.0												
X2	.779**	1.0											
X3	.771**	.776**	1.0										
X4	.727**	.688**	.685**	1.0									
X5	.694**	.893**	.692**	.532**	1.0								
X6	.608**	.701**	.599**	.488**	.596**	1.0							
SO	.522**	.201	.102	.053	.016	.036	1.0						
RO	.468**	.316**	.037	-.227*	.021	.017	.064	1.0					
MS	.536**	.075	.033	.089	.045	.064	.287*	.145*	1.0				
RP	.114	.029	.017	.116	.112	.087	.331*	.095	.287*	1.0			
GO	.087	.113	.006	.075	.094	.045	.286*	.369**	.117	.365**	1.0		
PC	.096	.085	.047	.014	.032	.102	.101*	.412**	.487**	.421**	.212**	1.0	
EO	.592**	.613**	.433**	.399**	.581**	.144*	.392**	.335**	.389**	.202*	.341**	.136*	1.0

*Note: * $p < 0.05$, ** $p < 0.01$*

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The Influence Of Cognitive Biases, Emotions On Innovation Share-Practiced, Trust-Based Relations, Norms, And Innovation Development On Entrepreneurial Orientation.

Multiple regression analysis using hierarchical and stepwise method was performed to study the association between independent variables (cognitive biases, emotions on innovation share-practiced, trust-based relationship, norms, and innovation development) and dependent variable (entrepreneurial orientation) in order to predict the entrepreneurial orientation from these independent variables as

X_1	represents	Cognitive bias
X_2	represents	Emotions on innovation
X_3	represents	Shared practice
X_4	represents	Trust-based relationship
X_5	represents	Norms
X_6	represents	Innovation development, and
EO	represents	Predicted entrepreneurial orientation
SO	represents	Predicted strategic orientation
RO	represents	Predicted resource orientation
MS	represents	Predicted management structure

In the regression procedures, the basic assumptions of multiple regression were verified and most of them were satisfactorily met as follows. The multi-collinearity concern was the first concern because there is some prior research evidence that some independent variables may be strongly correlated. For this study, there was no evidence of strong multi-collinearity by checking the Variance Inflation Factors (VIF's) and entries in the correlation matrices of the independent variables. Both VIF's and correlation entries were adequately low (less than 10) given levels recommended by (Draper and Smith , 1988). Residual plots were also checked for homoscedasticity of variance and no serious violation of constant variance assumption was found. However, there were some outliers or influentials that were found based on Cook's D statistics and residual plots; these results will be discussed in the section on limitations of the study, in addition, the normality of dependent variables was checked with normal probability plots and Shapiro Wilk's test. There were some indications that the normality assumption was violated; however; the transformation was not necessarily used to correct this problem because the impact of non-normality was generally thought to be minimal when the other assumptions were satisfied (Draper and Smith, 1988).

The ten multiple regression models for established hypotheses testing were formulated. The first three models were the multiple regression models of entrepreneurial orientation on main effects of cognitive biases, emotions on innovation share-practiced, trust-based relationship, norms, and innovation development as well as two interaction effects. The unstandardized hierarchical multiple regression models were regressed on entrepreneurial orientation, strategic orientation, resource orientation, management structure, respectively as follows.

Table 3 illustrated the unstandardized hierarchical multiple regression models that are regressed on entrepreneurial orientation (EO), strategic orientation (SO), resource orientation (RO), and management structure (MS).

Model 1: EO = 1.974 + 0.433 (x_1)
Model 2: SO = 1.411 + 0.833 (x_1)
Model 3: RO = 2.142 + 0.646 (x_1) + 0.476(x_2) – 0.299(x_4)
Model 4: MS = 1.860 + 0.572 (x_1)

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And the standardized hierarchical multiple regression models (Z model) that are regressed on entrepreneurial orientation (EO), strategic orientation (SO), resource orientation (RO), and management structure (MS) as the following model (1), model (2), model (3), and model (4) as follows.

Model (1): $Z_{EO} = 0.052\ (Zx_1)$
Model (2): $Z_{SO} = 0.197\ (Zx_1)$
Model (3): $Z_{RO} = 0.125(Zx_1) + 0.084(Zx_2) - 0.054(Zx_4)$
Model (4): $Z_{MS} = 0.095\ (Zx_1)$

The adjusted coefficient of determination (Adjusted R^2) from the model 1, model 2, model 3, and model 4 were .445, 499, .418, and .446, respectively. And based upon the regression correlation coefficient values of the significant variables, cognitive bias was the most important predictor, followed by emotions on innovation.

Table 3: Summary Results of the Hierarchical Regression Analysis with Dependent Variables (*n = 264*)

variables	Constant & Independent variables	Model 1 (dependent variable: EO)	(l) Standardized	Model 2 (dependent variable: SO)	(2) Standardized	Model 3 (dependent variable: RO)	(3) Standardized	Model 4 (dependent variable: MS)	(4) Standardized
	(Constant)	1.974**		1.411**		2.142**		1.860**	
Control Variables	Gender	0.001	0.01	0.012	0.00	0.002	0.00	0.012	0.11
	Education	0.093	0.03	0.035	0.03	0.023	0.21	0.003	0.01
	Type of Business	0.032	0.02	0.022	0.00	0.042	0.19	0.022	0.09
	Capital registration	0.043	0.03	0.023	0.00	0.001	0.00	0.023	0.00
Research Variables	X_1	0.433**	0.052*	0.833**	0.197**	0.646**	0.125**	0.572**	0.095**
	X_2	0.038	0.08	0.034	0.07	0.476**	0.084*	0.024	0.03
	X_3	0.027	0.07	0.003	0.02	-0.299*	0.001	0.003	0.07
	X_4	0.015	0.06	0.004	0.00	0.015	-.054*	0.004	0.00
	X_5	0.024	0.04	0.019	0.01	0.024	0.02	0.019	0.02
	X_6	0.038	0.08	0.008	0.02	0.039	0.04	0.008	0.02
	R^2	0.445		0.499		0.418	0.08	0.446	
	F-value	F(1, 261) = 23.65		F(1, 261) =17.52		F(3, 259) = 29.65		F(1,261) =37.45	
R-Square-Adjusted		0.445		0.499		0.418		0.446	
	VIF	4.58		3.79		7.55		8.21	
		Z_{EO} = 0.052 Zx1		Z_{SO} = 0.197Zx1		Z_{RO} = (0.125Zx1) + (0.084 Zx2) – (.054 Zx3)		Z_{MS} = 0.095 Zx1	

Note: * $p < 0.05$, ** $p < 0.01$

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From Table 3 represented the relationship between cognitive determinants and innovation development with entrepreneurial orientation of herbal products manufacturing SMEs owners. The hierarchical multiple regression models were regressed on entrepreneurial orientation, strategic orientation, resource orientation, management structure was supported (H6, H7, H8, and H9).

Discussion

This study found that such the external variables as cognitive biases, emotions on innovation share-practiced, trust-based relations, norms, and innovation development correlate positively with innovation development. Some results from this study support previous empirical research findings in innovative development as follows. General conclusively innovation can be categorized into two types: product innovation and process innovation. For herbal products manufacturing SME owners, product innovation might relate and refer to how to adopt new and/or appropriated technology to produce something that others cannot with their new formulas of soap, shampoo, and spa products.

For instance, in the innovation development of herbal products like spa treatment products, many workers in production lack basic knowledge about production technology. This basically became a main impediment of knowledge flow between technology departments and other functional departments. Second, shared interests are essential in accessing and sharing knowledge (Carlile, 2004). When there were shared interests, employees are willing to exchange knowledge and to accept knowledge generated in a different context. However, when interests were in conflict, that lead to "pragmatic boundaries" at which costs for learning new knowledge and transforming 'current' knowledge being used were needed to share knowledge. As a result, people might be unwilling to make such a change and accept ideas or knowledge developed in a different context. This entrepreneurship was all about the identification of an opportunity, creation of new organization, and pursuing new ventures. This does not include incremental changes that routinely occur in organizations. Entrepreneurship deals with quantum changes as well as environmental and social pressures and grow cultural-based orietation (Cossette, 2014; Zhang and Cueto, 2015; Stevenson and Jarillo, 1990).

The results of the study also added support to previous studies that may be interpreted to define between cognitive bias, emotions on innovation and entrepreneurial orientation, strategic orientation, resource orientation, and management structure as part of the same underlying business-opportunity philosophy. This study was supported the findings of Powpaka's study (1998) that confirmed the importance of the attitudinal-cognitive bias of SMEs owners toward innovation in management orientation and its antecedents as key determinants in the adoption of entrepreneurial orientation.

The study by Edelman, Bresnen, Newell, Scarbrough and Swan (2004) suggested that cognitive bias was the crucial role and important to indirectly create a "helpful, trusting, knowledge-sharing environment; however, if abused they can induce individuals to closely guard their knowledge and thus, be a disincentive to knowledge dissemination". Additionally, emotion on innovation which was an ability, skill, or a self-perceived ability to identify, assess, and control the emotions of oneself, of others, and of groups was certainly related to resource orientation. However, cognitive bias was always existed with emotion on innovation in entrepreneurial orientation of SMEs (Nahapiet and Ghoshal, 1998; Kilenthong et al., 2016).

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Among three types of cognitive bias, confirmation bias of the business owners contributed to overconfidence in pre-existing beliefs that can result in negative effects on decision making. The shared history of cooperation helped them develop shared these beliefs through language, meaning and understanding, which made it reversely easy for them to share knowledge for decision making process. Consequently, lack of shared meaning, language and understanding through cognitive bias can develop confirmation bias and impede knowledge and innovation initiative. In the other hand, these findings were consistent with the study by Storey and Barnett (2000) showed that lack of shared understanding about the knowledge management programmers impeded knowledge and led eventually to the failure of knowledge management initiative and opportunity loss. However, the studies of Carlile (2002) and Nouri et al. (2017) indicated that the negative effects of cognitive bias may be due to no platform of common knowledge between different parties; and ambiguous meanings and not-well-explained differences make it difficult for SMEs owners and staffs to understand the 'new' knowledge and prevent to innovation initiative.

The effects of the cognitive and relational sharing on knowledge were in general associated with organizational structures and cultures. Since this research focused exclusively on entrepreneurs in small and medium-sized enterprises, the complementary nature of cognitive bias and innovation development and entrepreneurship orientation is highlighted in the context of flattened span of control in small and medium-sized entrepreneurial companies in the herbal manufacturing and distributing industry. This flattened structure allows people in organization to access information and exchange ideas with others easily, while a hierarchical structure restricts information flow from exceeding the rules of communication defined by the structure. Organizational cultures through entrepreneurial orientation might inclusively affect cognitive bias in an unintended way, leading to lack of shared values and interests, and then, cause negative effects on knowledge flow in the Thai SMEs' management culture style. For instance, in Bate's study (1994), because of the Thai conservativism culture, people had different interests regarding making change. This lack of shared interests can impede innovation because people may not accept others' opinion (Bate, 1994; Kilenthong et al., 2016).

Surprisingly, the study showed that there was negative relationship between trust-based relationship and resource orientation. This finding contradicts most previous studies on the relationship between these two variables (Nouri, et al., 2019; Tidd and Bessant, 2018). As a matter of fact, the Thai herbal products SMEs are still mostly family-oriented, harmony-oriented towards an average quality-based performance, and a flexible system that leads to relatively low-concern on these valuable human resources system. However, most entrepreneurial orientation studies reported that the relationships between these variables were still questionable and further studies are needed.

Managerial Implications and Recommendations

This study would recommend some improvements for the continuous development and transfer of knowledge, through a network development and technology-based learning method. In several aspects including risk taking, management skills through cognitive bias and emotion on innovation continuously improved opportunity-based entrepreneurship behaviour. With these few adjustments, it is hoped that SMEs owners would draw and impress more and more customers and efficiently compete with the competitors with the valuable inter-functional organization knowledge flow and resources coordination through their entrepreneurship.

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Most SMEs in many countries, including Thailand may not have enough resources to overcome market entry barriers and may have to utilize the cognitive bias and emotion on innovation aspects to seek resources and share their knowledge from internal and external sources through their strengths and opportunities, and capability. Thai herbal products businesses should be dynamic and often interrelated family and social relationships to advance and enhance their spirit of entrepreneurship. The opportunity-based firm behaviour strategy as the growth and knowledge sharing integration strategy should be dynamic and catch the changeable current and future market needs. By breaking up their cognitive bias and emotion on innovation focus differentiation was the businesses approach to compete with the competition in niche markets. Branding and reputation building are firm key resources that allow the herbal manufacturing SMEs' organization to be successful over an extended innovation-based period.

Recommendations

The future research recommended in this study are as follows.

1. Methodological recommendations. Future research should expand the sample size and conduct the survey in different locations. A Structural Equation Model (SEM) should be established and utilized to study the cause and effect relationship of the cause-effect model. And a logistic regression analysis and a discriminant analysis should be performed to study the relationship between cognitive determinants, related barrier variables and entrepreneurial orientation through innovation development. A comparative study across cultures should also be done to extend the results.

2. Research and theoretical foundation recommendation. Future studies should ask questions such as "How do the individual factors develop and change through cognitive determinants on the decision making?", "How can firm owners develop their entrepreneurial strategies to achieve the consumers' needs?", "What is the appropriate way to make the appropriated decision making for innovation?", and so on. Furthermore, other theoretical models such as a model of altruistic behaviour, and a model of Value-Cognitive bias and behaviour should be utilized as the theoretical foundation of the future study. The utilization of cognitive determinants to utilize in their decision-making process and negotiation is also recommended in future research.

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