Regulatory Focus, Ambidextrous Learning and Opportunity Recognition

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Abstract

Why do entrepreneurs behave differently in learning after experiencing failure? How do entrepreneurs' cognitive traits affect how they adopt the different types of learning from failure and how do these types of learning from failure subsequently influence their opportunity recognition? In order to systematically address these research questions, our study suggests that entrepreneurs' regulatory focus make entrepreneurs behaviour differently in learning after experiencing project failure. What's more, these different types of learning, namely explorative and exploitative learning, have various effects on the entrepreneurs' opportunity recognition. Thus, this study focuses on exploring the mediating role acted by ambidextrous learning in the relationship between regulatory focus and opportunity recognition

Building on experiential learning theory and organizational ambidexterity theory, we use a sample of 237 project leaders from high-technology ventures and build a conceptual model to explore the relationship between regulatory focus and opportunity recognition, as well as the mediating role of ambidextrous learning after failure, namely, exploratory learning and exploitative learning. Using hierarchy regression analysis, we find that promotion focus has a positive effect on opportunity recognition through three paths. The first one is the direct path, and the second and third are indirect paths through exploratory learning. Besides, the promotion focus has an indirect effect on opportunity recognition via the mediating effect of exploitative learning. However, some insignificant hypotheses testing have been clarified, namely prevention focus has no effect on exploitative learning, and exploitative learning does not mediate the relationship between prevention focus and opportunity cognition.

Key words

Regulatory focus, ambidextrous learning, opportunity recognition, project failure, experiential learning theory

Introduction

Although scholars primarily focus on the failure of projects within a venture (e.g. Liu, Geng, Xia, & Bridge, 2017; Nguyen, Chen, & De Cremer, 2017), it appears that the process of learning from failure and identifying new potential opportunities from such failure also benefits the whole venture, through the application of that knowledge learned to subsequent projects or business (e.g., McGrath, 1999). Particularly, identifying and selecting the right opportunities from new product development (NPD) project failure for sustainable development are particularly important for NPD teams regarding the high rates of NPD failure. Shane and Venkataraman (2000) define opportunity recognition as a process whereby individuals identify potential opportunities to improve and develop new products. Recent research on opportunity recognition have mostly focused on the roles of individual's personality traits (Corbett, 2005), human capital (Gruber, MacMillan, & Thompson, 2012; Ucbasaran, Westhead, & Wright, 2008), entrepreneurial experience and failure experience (Ucbasaran, Westhead, & Wright, 2009), prior knowledge (Shane, 2000; Shepherd & Patzelt, 2018), divergent thinking and general mental ability (Gielnik, Krämer, Kappel, & Frese, 2014), social source of information (Ozgen & Baron, 2007), learning orientation (Lumpkin & Lichtenstein, 2005), self-regulation (Tumasjan & Braun, 2012), and bricolage (An, Zhao, Cao, Zhang, & Liu, 2018).

Scholars such as Eckhardt and Shane (2003), Gaglio and Katz (2001), and Tumasjan, and Braun (2012) generally agree that there are individual differences in opportunity recognition. The extant theories on opportunity recognition explicate that such differences are the result of a multitude of cognitive and individuals' other psychological process (Baron, 2006; Busenitz & Barney, 1997; Eckhardt & Shane, 2003; Shane, 2003; Gielnik et al., 2014; Shepherd & Patzelt, 2018). In addition, entrepreneurship scholars have adopted a cognitive perspective to explain how and why some individuals and not the others are able to identify particular innovative opportunities (e.g., Gaglio & Katz, 2001; Gregoire, Shepherd, & Schurer Lambert, 2010; Gielnik et al., 2014; Shepherd & Patzelt, 2018). They posit the existence of two distinct modes of how individuals regulate their own behaviours: promotion focus and prevention focus (Higgins, 1998). Promotion-focused individuals are primarily concerned with advancement, growth, and accomplishment and therefore motivated to seek gains and new achievements. Contrarily, prevention-focused individuals are primarily concerned with protection, safety and responsibility and thus tend to be motivated to avoid losses or setbacks. However, the underlying transformation mechanism from regulatory focus to opportunity recognition is still a black box, especially under certain context, for example, the frequent

phenomenon-project failures.

Project failure relates to "the termination of a project due to the realization of unacceptably low performance as operationally defined by the project's key resource providers" (Shepherd, Covin, & Kuratko, 2009: 499). In general, researchers recognize that NPD is an entrepreneurial process of learning to acquire and exploit new knowledge and market opportunities (Shane, 2000; Zahra, Ireland, & Hitt, 2000). The two types of learning processes that affect NPD are exploratory learning and exploitative learning. NPD project failures likely have a negative effect on those experiencing such events. From an exploration-versus-exploitation perspective, the losses associated with project failures in terms of both time and resources could serve to reduce the likelihood of subsequent attempts. As argued by March, "the search for new ideas, markets, or relations has less certain outcomes, longer time horizons, and more diffuse effects than does further development of existing ones…because of these differences, adaptive processes characteristically improve exploitation more rapidly than exploration" (March, 1991:73). Theory suggests that substantial failure of exploration initiatives could serve to eliminate one's desire to continue those efforts and replace them with projects that are more exploitative in nature. However, as previously mentioned, NPD activities are critical for high technology ventures (DiMasi, Hansen, & Grabowski, 2003; Girotra, Terwiesch, & Ulrich, 2007; Nerkar & Roberts, 2004), and they cannot merely eschew exploratory projects in the face of failure. Rather, they must find a way to cope with failures and understand these experiences to enhance the potential for success in subsequent efforts. Because of this unique combination of the need to remain committed to R&D efforts in an environment where the likelihood of failure is high and results in significant negative consequences, the high technology industry and the ventures operating within it present an ideal context in which to situate the current study. Thus, we plan to explore the potential mediating role of ambidextrous learning, namely exploratory and exploitative learning, between the entrepreneurs' regulatory focus and opportunity recognition in the context of NPD project failure.

Theoretical development and derivation of hypotheses

Regulatory focus and opportunity recognition

Fruitful empirical studies have investigated the relationship between regulatory focus and opportunity recognition (e.g., Baron, 2002; McMullen & Shepherd, 2002; Tumasjan, & Braun, 2012). Baron (2002, 2004) and McMullen and Shepherd (2002) argue that when facing the

same stimuli, promotion-focused individuals usually set lower thresholds for whether an opportunity actually exists and are more willing to act on this opportunity. Contrarily, the prevention-focused individuals will set higher criteria for a potential opportunity and be more cautious about acting on such an opportunity. In line with previous studies (e.g., Baron, 2002; Tumasjan, & Braun, 2012), we propose that the entrepreneurs' promotion focus will have a direct positive effect on opportunity recognition and prevention focus will have a negative effect on opportunity recognition under NPD failure context. The reasons are as follows:

First, promising business ideas result from forward-looking visions (Brockner, Higgins, & Low, 2004) which are typically derived from the underlying motives of promotion-focused rather than prevention-focused individuals' ideals and aspirations. When facing NPD failure, the promotion-focused individuals are prone to be more open-minded and consider a wide range of information from failure and thus get an advantage in generating new possibilities, considering novel alternatives and conceive of creative ideas and information which in turn facilitate opportunity identification (Crowe & Higgins, 1997; Brockner, Higgins, & Low, 2004), whereas the opposite should be true for prevention-focused individuals.

Second, promotion-focused individuals going for attaining gains makes them stick to novel information (Tumasjan, & Braun, 2012) which in turn increases the likelihood of engaging in more thorough information processing facing failure. They may regard the failure as another opportunity for searching for new solutions or new development direction. They follow the law of "trial and error" and hold the idea that success comes after the large amount of failure. Contrarily, prevention-focused individuals are more hesitant to spend time on processing novel information and are thus more likely to discount signals of a potential opportunity; instead, they will accept the NPD failure with a negative emotion and regard it as just a failure.

Third, promotion-focused individuals are usually more creative, remaining more open to new ideas and information, active to find problem solutions and generating a higher number of alternatives in dealing with NPD failure than prevention-focused individuals (Crowe & Higgins, 1997; Friedman & Foerster, 2001, 2005).

Thus, this leads us to propose the following:

Hypothesis 1a: *The level of promotion focus has a positive effect on opportunity identification.*

Hypothesis 1b: *The level of prevention focus has a negative effect on opportunity identification.*

Regulatory focus and ambidextrous learning

As promotion focus is associated with reaching for "maximal goals" (Idson, Liberman, & Higgins, 2000), these entrepreneurs are expected to pursue goals such as improving their NPD project's competitive position to the best possible level. Hence, typical achievements that entrepreneurs with high levels of promotion focus perceive as "hits," which help them to achieve their overall professional goals, include but are not limited to: attracting new customers, launching new products, and improving financial indicators relative to previous years and/or competitors. Engagement in exploratory learning—the active search for new business opportunities (Raisch & Birkinshaw, 2008)—might lead to perceived rewards in the form of new product launches or an expansion of the customer base (Shepherd et al., 2009).

Research has long emphasized the uncertain nature of exploratory activities given the lack of knowledge about their effective future payoffs (Kline & Rosenberg, 1986). In fact, many exploratory projects fail over time (Cooper, 2008). Given those entrepreneurs' desire to avoid the negative emotions associated with such a situation, the high levels of promotion focus also induce entrepreneurs to continuously focus on exploitative leaning. For instance, refinement activities that improve product or service quality, and those that enhance process reliability enable project leader to achieve rather predictable short-term "hits" in the form of increased customer satisfaction or decreased production costs and, subsequently, higher profit margins (e.g., Gibson & Birkinshaw, 2004; He & Wong, 2004). Integrating the existing evidence, we propose the following:

> ***Hypothesis 2a and 2b****: The level of promotion focus has a positive effect on: (a) exploratory learning and (b) exploitative learning.*

High levels of prevention focus are typically associated with striving for "minimal goals" (Idson et al., 2000), which are defined as the "lowest goal whose end state will produce satisfaction" (Brendl & Higgins, 1996: 104). Hence, high levels of prevention focus encourage project leaders to improve their NPD's market position to a minimum threshold level that satisfies the demands of stakeholders as well as their own needs for security and responsibility.

As argued above, the exploration of non-paradigmatic business opportunities bears a high probability of failure (Anderson & Tushman, 1990) due to the unknown outcomes and frequent failure of such search processes (Cooper, 2008; Kline & Rosenberg, 2010). Entrepreneurs with high levels of prevention focus are generally sensitive to the possibility of failure and aim to avoid it. Hence, regulatory focus theory implies that these entrepreneurs' basic need for safety likely motivates them to avoid any potential failure associated with

engaging in uncertain exploration, even if that implies missing potentially promising opportunities (Hmieleski & Baron, 2008).

Besides, entrepreneurs with high levels of prevention focus strive to fulfil their minimal goals and thereby meet stakeholders' demands. Those minimal goals typically relate to improving product or service quality according to customer requests or increasing the NPD's profit as requested by the board. Due to their basic need for responsibility, individuals with high levels of prevention focus have been shown to be intrinsically motivated to continuously reduce error rates (Pennington & Roese, 2003).

As argued by March (1991: 73), "the search for new ideas, markets, or relations has less certain outcomes, longer time horizons, and more diffuse effects than does further development of existing ones…because of these differences, adaptive processes characteristically improve exploitation more rapidly than exploration". Theory suggests that substantial failure of exploration initiatives could serve to eliminate one's desire to continue those efforts and replace them with projects that are more exploitative in nature (Wolfe, 2012). As such, entrepreneurs with high (as compared to low) levels of prevention focus are more likely to steadily engage in exploitative quality-improvement measures in order to meet not only customer demands but also their own quality standards. This argumentation is in line with previous research that theorizes that entrepreneurs with high levels of prevention focus often have experience in throughput functions, such as production, which are closely tied to exploitative improvements (Chiaburu, 2010). Integrating the existing evidence, we propose:

> ***Hypothesis 3a and 3b****: The level of prevention focus has: (a) a negative effect on exploratory learning and (b) a positive effect on exploitative learning.*

The mediating role of ambidextrous learning

The first six hypotheses link regulatory focus with opportunity recognition and ambidextrous learning. Implicitly, the discussion suggests that regulatory focus affects opportunity recognition not only via direct influencing but its effects on ambidextrous learning. Herein, we further explore how ambidextrous learning mediates the relationship between regulatory focus and opportunity recognition.

Exploitation arises out of a necessity for new ventures to fully use their limited resources in existing technology and product-market domains. This enables the new venture to identify more new opportunities to improve NPD efficiency by building on and replicating both the firm's and the founders' prior technological and product market knowledge and experience (Shane, 2000). It provides greater opportunities for new combinations and recombination of

existing knowledge from which new insights may emerge, thus benefiting the NPD process (Cyert & March, 1963). Besides, exploration enhances opportunity identification because it increases the entrepreneurs' abilities to add new variants of knowledge to their knowledge repertoire (March, 1991). By providing new insights into the design of new features and benefits into a product, exploration ensures that entrepreneurs to find more new opportunities that may differentiate it from competitors (Katila & Ahuja, 2002).

Taken together, the above considerations describe a model in which regulatory focus has a direct influence on opportunity recognition (Hypothesis 1a and 1b) and exploratory learning (Hypothesis 2a and 3a) and exploitative learning (Hypothesis 2b and 3b). In sum, the above hypotheses specify a mediating model, in which ambidextrous learning mediates the relationship between regulatory focus and opportunity recognition (see Figure 1). Thus, we propose the followings:

> ***Hypothesis 4a and 4b****: Exploratory learning from failure mediates: (a) the relationship between (a) the level of promotion focus and (b) the level of prevention focus and opportunity recognition.*
>
> ***Hypothesis 4c and 4d****: Exploratory learning from failure mediates: (a) the relationship between (c) the level of promotion focus and (d) the level of prevention focus and opportunity recognition.*

Insert Figure 1 about here

Methods

Data (I will rewrite it later)

We obtained a list of 1812 high-tech ventures, spreading across almost all of the 16 administrative districts of the Shanghai City, provided by the *Technology-Based SMEs List of Approved Technology-Innovation Projects in Shanghai 2017* issued by *Shanghai Science and Technology Committee* (STCSM) on 6th June 2017. The survey was conducted between June and September 2018, via an initial online survey, and followed three waves of reminders (using email, telephone, and on-site visit). Finally, we received 262 responses; after deducting unusable questionnaires, a final sample of 237 was entered in our analysis – an effective response rate of 13.08%. This response rate corresponded to that of similar studies in China, e.g. 14.5% in Wang, Wang, Yang, Yang, Yuan, & Song, 2018).

Our respondents were NPD project leaders, as nominated by the executives of the ventures. We obtained details of the executives from the company's registration records on China's *National Enterprise Credit Information Publicity System (NECIPS)* which is run by the Chinese *State Administration for Industry and Commerce (SAIC)*. Table 1 summarizes the profile of our respondents. NPD project leaders were expected to have comprehensive knowledge of projects, including project goals, operations, and failure- whether the project falls short of its goals (Jenkins & McKelvie, 2016). This approach is consistent with extant empirical studies, which claim that failure is ultimately based on the assessment of the project leader in charge (cf. Liu et al., 2017; Shepherd, Patzelt & Wolfe, 2011; Shepherd, Patzelt, Williams & Warnecke, 2014).

To assess non-response bias, we compared the firm ages of the 237 respondent firms with those of 1550 non-respondent firms provided in the NECIPS. The average age of the respondent firms and non-respondent firms are 6.304years (standard deviation 4.331) and 6.375years (standard deviation 3.333) respectively. The t-statistics were insignificant, confirming that non-response bias was not a serious concern and that there was good external validity in this study.

The survey questionnaire was initially in English and then translated into Chinese, following a rigorous and iterative back-translation process (Brislin, 1970), until the Chinese and English versions reached consensus. The questionnaire was also pre-tested with two British academics with expert knowledge in the relevant field and cross-cultural questionnaire surveys. Following this, a pilot study was conducted with 10 NPD project leaders from different Chinese high-tech ventures. Feedback from the pre-test and the pilot study was fully incorporated in the

final questionnaire.

Insert Table 1 about here

Measures

In order to maximize construct validity we used existing scales and items wherever possible (see Table 2). The three main constructs were measured using seven-point Likert scales.

Opportunity recognition. This crucial dependent variable was measured by three items selected from previous research (Ozgen & Baron, 2007; Singh, Hills, Hybels, & Lumpkin, 1999) relating both to the ability to recognize opportunities (e.g., "I can recognize new venture opportunities in industries where I have no personal experience") and to alertness to opportunities when they exist ("I have a special 'alertness' or sensitivity toward new venture opportunities").

Regulatory focus. Regulatory focus is measured with the 18-item general regulatory focus measure developed by Lockwood, Jordan and Kunda (2002) which assesses promotion and prevention focus by means of nine items, respectively (e.g., promotion focus: "Overall, I am more oriented toward achieving success than preventing failure"; prevention focus: "In general, I am focused on preventing negative events in my life."). Since in the original measure four items are worded specifically targeting the academic context, this study rewords those items to fit the context of our sample (e.g., in the item "I often think about how I will achieve academic success" the word "academic" was replaced by "project"). Ratings are added within each dimension to form separate promotion focus and prevention focus scores.

Ambidextrous learning. Scholars frequently measure learning processes by subjective management assessments because of a lack of good objective data proxies (e.g., Yli-Renko, Autio, & Sapienza 2001; Zahra et al., 2000). Based on the research conducted by Atuahene-Gima and Murray (2007), to measure exploitative learning, this study develops five items that tapped the extent to which the learning activities during the NPD process focused on the acquisition of information in the neighbourhood of the venture's market and product knowledge base for the purpose of improving productivity and efficiency. For example, "Our goal was to search for information to refine common methods and ideas in solving problems in the project". To tap exploratory learning, this study develops five items that asked respondents to indicate the extent to which the NPD team leaders have searched for and use information during the NPD process that is unrelated to the firm's current market and product experience

and knowledge base for the purpose of experimentation. For example, "Our aims were to collect new information that forced us to learn new things in the product development project."

Control variables. According to previous studies (Hankin & Abramson, 2001; Sherpherd et al., 2011), there is a potential for individuals to differ in ways that could potentially confound the results, such as age (Mroczek & Kolarz, 1998), gender (Hankin & Abramson, 2001), and experience (Cropanzano, James, & Konovsky, 1993). As such, we included these variables as controls. Education was assessed by asking participants for their highest degree (1=less than bachelor degree, 2=bachelor degree, 3=master degree, 4=Ph.D. degree). Besides, to capture managing experience and failure experience, respondents are asked to answer: "the total number of NPD projects you have managed at your current position?" and "the total number of failed NPD projects you managed?"

Reliability and Validity

We conduct a rigorous process to purify and validate the measurement scale items, as advocated by Gerbing and Anderson (1988) and Hair, Anderson, Tatham and Black (2005). Table 2 displays the exploratory factor analysis results of promotion focus, prevention focus, exploratory learning, exploitative learning and opportunity recognition. All of the item factor loadings are greater than 0.6, which are in the accept range. The results show that all the items load cleanly on the expected factors, showing no significant cross-loadings. Using these series of fit indices, the confirmatory factor analysis results in DELTA2=0.982, CFI=0.982, TLI=0.981, and RMSEA=0.032 ($\chi 2$ (424) =523.864, p=0.001), which also indicates adequate model fit.

To assess the measures' reliability, we calculate two indicators, namely: coefficient alpha reliability, and the composite reliability indices. First, the results show that all coefficient alpha reliabilities exceeded the accepted 0.7 threshold (Cronbach, 1951). To complement the results, we also calculate composite reliability using Fornell and Larcker's (1981) procedures. Results show that the composite reliabilities for the all scales are higher than the minimum threshold of 0.7 (Hair et al., 2005).

For assessing convergent validity, we use two methods. First, within the CFA setting, we calculate average variances extracted (AVE) using the Fornell and Larcker (1981) procedures. The Table 2 shows that the AVE of all the five constructs, are greater than the minimum threshold of 0.5 recommended by Fornell and Larcker (1981), except for exploitative learning (AVE=0.480). Second, the author observes that convergent validity is evident as the

path coefficients from latent constructs to their corresponding manifest indicators are statistically significant (i.e., $t > 2.0$) (Anderson & Gerbing, 1988). All items load significantly on their corresponding latent construct, with the lowest t-value at 9.448, providing evidence of convergent validity.

Skewness and kurtosis for all scale items are within the acceptable to -2 and +2 range (Shepherd et al., 2011), indicating that the data are normally distributed. Discriminant validity is assessed by comparing the squared correlation between pairs of constructs and the AVEs of the constructs. All the squared correlations are lower than the AVEs, indicating sufficient discriminant validity (Fornell & Larcker, 1981).

Common method variance

Following Podsakoff, Mackenzie, Lee and Podsakoff (2003), we integrated both procedural methods and statistical techniques to reduce the potential of common method variance. Respondents were assured that their answers were confidential and that there was no right or wrong answers to the questions in the survey; thus, to reduce the respondents' evaluation apprehension. With statistical techniques, Harman's one factor test is performed (Podsakoff & Organ, 1986). In Table 2, the EFA for all of the multiple-item constructs result in the expected factor solution, which accounted for 70.993% of the total variance, with the first factor only accounting for 24.218%. Because a single-factor solution does not emerge and the first factor does not explain most of the variance, common method bias was not a serious concern in our study.

Insert Table 2 about here

Results

Correlation analysis

Table 3 presents the means, standard deviations, and bivariate correlations for the variables. The result shows that promotion focus (mean=5.302) is slightly higher than prevention focus (mean=4.118). Moreover, promotion focus (r=0.459, p<0.001), exploitative learning (r=0.507, p<0.001) and exploratory learning (r=0.602, p<0.001) have positive correlations with opportunity recognition. The prevention focus has a negative correlation with opportunity recognition (r=-0.196, p<0.01).

Insert Table 3 about here

Regression analysis

We used hierarchical linear regression analysis to test each of the eight hypotheses, starting with the control variables, followed by adding the independent and mediating variables. Table 4 presents the results of the hierarchical regression analysis. The dependent variable is opportunity recognition from Models 1-4. Model 1 displays the baseline model with control variables only. The author stepwise introduced independent variable and mediators from Model 2 to Model 4. The dependent variable is exploitative learning from Models 5 to 6. Model 5 displays the baseline model with control variables only. We introduce independent variables in model 6. Besides, the dependent variable is exploratory learning from Models 7 to 8. Model 7 displays the baseline model with control variables only. The author introduced independent variables in model 8. The maximum VIF of each model is below the threshold of 10 and indicates that multi-collinearity is not a serious problem.

As shown in Table 4, the Model 1 as a base model explains a significant amount of the variance in opportunity recognition ($R^2 = 0.065$; $p < 0.05$). Model 1 shows that the position ($\beta = 0.109$, $p < 0.01$), failure experience ($\beta = -0.080$, $p < 0.01$), and number of project members ($\beta = 0.058$, $p < 0.05$) have positive effects on opportunity recognition. The Model 5 as a base model explains a significant amount of the variance in exploitative learning ($R^2 = 0.061$; $p < 0.05$). Model 5 shows that only the position ($\beta = 0.156$, $p < 0.05$) has positive effects on exploitative learning. The Model 7 as a base model explains a significant amount of the variance in exploratory learning ($R^2 = 0.072$; $p < 0.05$). Model 7 shows that the position ($\beta = 0.109$, $p < 0.05$), managing experience ($\beta = 0.033$, $p < 0.05$), and failure experience ($\beta = -0.067$, $p < 0.1$) have effects on exploratory learning.

In Model 2, promotion focus has a positive effect on opportunity recognition (β =0.549, p<0.001), thus hypothesis 1a is supported. Prevention focus has a negative effect on opportunity recognition (β =-0.113, p<0.05), thus hypothesis 5b is supported. What's more, in the full model 4, promotion focus has a positive effect on opportunity recognition (β =0.193, p<0.05), thus hypothesis 5a is supported again. Prevention focus has a negative effect on opportunity recognition (β =-0.113, p<0.1), thus hypothesis 1b is weakly supported.

In Model 6, promotion focus has a positive effect on exploitative learning (β =0.557, p<0.001), supporting hypothesis 2b. However, prevention focus has no effect on exploitative learning (β =-0.004, p > 0.1), thus the hypothesis 2a is not supported.

In Model 8, promotion focus has a positive effect on exploratory learning (β =0.533, p<0.001), supporting hypothesis 3b. Besides, prevention focus has a negative effect on exploratory learning (β =-0.080, p<0.1), thus hypothesis 3a is weakly supported.

As Model 4 shows, the positive effect of promotion focus on opportunity recognition decreases from 0.549 (p<0.001) to 0.193 (p<0.001) and the negative effect of prevention focus on opportunity recognition decreases from -0.113 (p<0.05) to -0.079 (p<0.1) after the author introduced exploitative learning and exploratory learning. According to Baron and Kenny (1986), exploratory learning and exploitative learning partially mediates the promotion focus - opportunity recognition relationship and the prevention focus - opportunity recognition, supporting hypothesis 4a, 4b, 4c and 4d.

Insert Table 4 about here

Discussion

Based on the viewpoint that "numerous unanswered questions remain surrounding what factors facilitate opportunity identification as well as how and why these factors are so crucial" (Shepherd & Patzelt, 2018, p. 25), to shed light on these issues, this study, focuses on exploring the underlying mechanism individuals utilize to identify opportunities. More specially, we mainly investigated the previously unaddressed relationships: What is the relationship between individuals' regulatory focus and opportunity recognition after experiencing project failure?

The hypotheses testing results show that promotion focus has positive effects on opportunity recognition (hypothesis 1a), exploratory learning from failure (hypothesis 2a), and exploitative learning from failure (hypothesis 2b). Prevention focus has a negative effect on opportunity recognition (hypothesis 1b). These findings support Tumasjan and Braun's (2012)

research and also add values to it by showing that promotion focus not only has positive effect on opportunity recognition but also ambidextrous learning, which broadens the theoretical boundary of organizational ambidexterity theory.

Besides, these empirical evidences on the mediating role of ambidextrous learning show that exploratory learning mediates the relationship between promotion focus and opportunity cognition (hypothesis 4a) and also the relationship between prevention focus and opportunity cognition (hypothesis 4b). The exploitative learning mediates relationship between promotion focus and opportunity cognition (hypothesis 4c). However, prevention focus has no effect on exploitative learning (hypothesis 4b) and exploitative learning does not mediate the relationship between prevention focus and opportunity recognition (hypothesis 4d).

Theoretical Contributions

Our study contributes to entrepreneurship literature in two principal ways. On the one hand, we contribute to open "the black box" of the underlying process of learning from failure by applying explorative learning and exploitative learning to answer the question that, "how learn from failure?". "Entrepreneurship is a process of learning, and a theory of entrepreneurship requires a theory of learning" (Minniti & Bygrave, 2001, p7). It is essential and fundamental to explore when and how learning happens during the entrepreneurial process (Wang & Chugh, 2014). We move away from previous static approaches and develops a more dynamic perspective on the process of entrepreneurial learning (Gemmell, 2017; Minniti & Bygrave, 2001; Politis & Gabrielsson, 2005), as it does not solely focus on the direct relationship between entrepreneurs' cognitive trait (i.e. regulatory focus) and the development of entrepreneurial knowledge (i.e. opportunity recognition), but also to the intermediate process mechanism (i.e. ambidextrous learning) under the special context of new product development project failure. The hypotheses testing results shows that the different types of learning from failure act various roles in these relationships. The hypothesis 4a and hypothesis 4b justified that the exploratory learning mediates the relationships between regulatory focus (namely prevention focus and promotion focus) and opportunity recognition. However, the results illustrate that the exploitative learning only mediates the relationship between promotion focus and opportunity recognition (namely hypothesis 4c) but has not mediating effect on the relationship between prevention focus and opportunity recognition. These findings not only support the argument that "entrepreneurial learning is an important intermediary step in the relationship between problems and venture progress" (Funken, Gielnik, & Foo, 2018, p17), but

also extends the existing literatures (e.g. Tumasjan & Braun, 2012) by providing a more nuanced view on the relationship between regulatory focus and opportunity recognition via the intermediary presence of ambidextrous learning in the context of NPD project failure.

Hence, we put its focus on the transformation process of entrepreneurs' learning from failure mechanism (Minniti & Bygrave, 2001), rather than only the direct link between entrepreneurs's cognitive trait and its outcomes (e.g. Politis, 2005) or the moderating effects on this relationship (e.g. Politis & Gabrielsson, 2005).

On the other hand, our study is in line with the cognitive perspective in entrepreneurship research supporting the notion that individuals' cognitive framing strategies influence entrepreneurial behavior (e.g., Gregoire et al., 2010; Mitchell et al., 2002, 2007; Tumasjan & Braun, 2012). We complement the empirical evidence on the role of regulatory focus for different stages of the entrepreneurial process. In contrast to previous entrepreneurship studies which have concentrated on the role of regulatory focus in opportunity exploitation (e.g., Hmieleski & Baron, 2008), entrepreneurial intentions (e.g., McMullen & Shepherd, 2002), decision heuristics (e.g., Bryant, 2007), moral awareness (e.g., Bryant, 2009), employee creativity (e.g., Wu, McMullen, Neubert & Yi, 2008) and on the early phase stage of opportunity recognition (e.g.Tumasjan & Braun, 2012) , our study focuses on both to the ability to recognize opportunities and to alertness to opportunities when they exist (Ozgen & Baron, 2007). Thus, our study highlights differential effects of regulatory focus in opportunity recognition and opportunity exploitation (Shane & Venkatamaran, 2000). It also adds value to McMullen and Shepherd's (2002) study showing that promotion focus leads not only to higher entrepreneurial intentions but also to more successful opportunity recognition.

Limitations and Future Directions

Notwithstanding the theoretical and practical contributions, there are several possible limitations to this study that can be addressed in future research. First, our study primarily relies on self-reports. Although we asked the interviewees about specific results or changed behaviour and respective examples, our study theorizing does not necessarily extend to learning that results in increased accuracy or improved performance but certainly future research could do so. Another question concerning the operative implementation is the question of when to start collecting the data as a failure is not an event but a gradual process. We are looking forward to new research approaches to tackle this issue and following longitudinal research approaches. Besides, there are many concerns with the use of interviews to research cognitions

(Ellsworth & Scherer, 2003). Self-reporting and introspection may contain many biases and errors (DeTienne, Shepherd, & Castro, 2008) such as retrospective bias (Aaker & Day, 1986), and attribution bias (Fiske & Taylor, 2013). There is also a risk that relying upon participants' self-reporting may yield a distorted picture through self-selection bias (Beaver & Jennings, 2005), where the participant may have their own motivations for wanting to share or not share their experiences (Askim & Feinberg, 2003). Finally, teams are common in the creation and development of new ventures (Klotz, Hmieleski, Bradley, & Busenitz, 2014). The dynamics in a funding team of a new venture, or, in the top management team of a more matured venture, make the learning of entrepreneurs a social process. It is thus beneficial for entrepreneurship scholars and practitioners to further explore the inputs, processes, and states of such a social process (Klotz et al., 2014). The input factors of learning in entrepreneurial teams may include the prior experience, learning behaviours, and cognitive styles of team members, whereas processes and states-related factors may include the membership change, affective tone, cohesion, and psychological safety in these entrepreneurial teams. A detailed investigation of the interplay of cognition and emotion, both at the individual and team level, will create additional insight into entrepreneurial learning.

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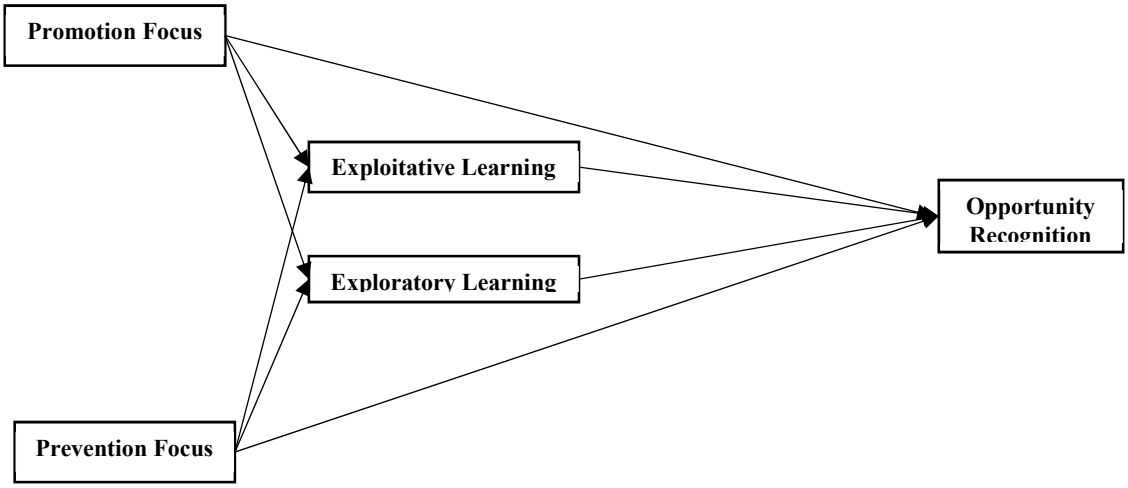

Figure 1 Conceptual model

Table 1 Sample profile

Characteristics		Frequency	Percentage
Gender	Male	128	54.0
	Female	109	46.0
Age	29 or less	35	14.8
	30 to 40	87	36.7
	41 to 50	97	40.9
	51 and above	18	7.6
Position	CEO	19	8.0
	Top manager	61	25.7
	Department manager	63	26.6
	Project manager	94	39.7
Education	Below bachelor	3	1.3
	Bachelor	166	70.0
	Master	65	27.4
	PhD	3	1.3
Venture size	50 or less	47	19.8
	51 to 100	108	45.6
	100 to 150	32	13.5
	151 to 200	18	7.6
	201 to 250	16	6.7
	251 to 516	16	6.8
Venture age	1 to 5	126	53.2
	6 to 10	75	31.6
	11 to 15	26	11.0
	15 to 20	7	2.9
	21 to 25	3	1.3
Ownership type	Joint share	20	8.4
	Privately owned	196	82.7
	Foreign invested	17	7.2
	Stated owned	4	1.7
Industry type	Electronic information	103	43.5
	New energy and materials	41	17.3
	New biotechnology	32	13.5
	Integrated optical	35	14.8
	Others	26	11.0

Table 2 Measurements

Items description summary	Standardized loading	t-value
Prevention Focus (α=**.974; CR=.974; AVE= .807**)		
1. I am anxious that I will fall short of my responsibilities and obligations.	1.000 [a]	
2. In general, I am focused on preventing negative events in my life.	.972	15.346
3. I often think about the person I am afraid I might become in the future.	.934	14.726
4. I often worry that I will fail to accomplish my career goals.	.890	15.683
5. I often imagine myself experiencing bad things that I fear might happen to me.	.917	15.576
6. I frequently think about how I can prevent failures in my life.	.869	16.005
7. I am more oriented toward preventing losses than I am toward achieving gains.	.934	16.404
8. My major goal in venture right now is to avoid becoming a career failure.	.896	14.509
9. I see myself as someone who is primarily striving to become the self I "ought" to be- to fulfil my duties, responsibilities, and obligations.	.945	15.191
Promotion Focus **(α=.944; CR=.945; AVE=.655)**		
1. I typically focus on the success I hope to achieve in the future.	1.000 [a]	
2. In general, I am focused on achieving positive outcomes in my life.	.894	21.186
3. I often think about the person I would ideally like to be in the future.	.986	22.560
4. I often think about how I will achieve career success.	.944	23.165
5. I often imagine myself experiencing god things that I hope will happen to me.	.938	25.487
6. I frequently imagine how I will achieve my hopes and aspirations.	.917	22.360
7. Overall, I am more oriented toward achieving success than preventing failure.	.942	24.520
8. My major goal in venture right now is to achieve my career ambitions.	.955	23.771
9. I see myself as someone who is primarily striving to reach my "ideal self" - to fulfil my hopes, wishes, and aspirations.	.884	21.501
Exploitative Learning **(α=.819; CR=.821; AVE=.480)**		
1. Our goal was to search for information to refine common methods and ideas in solving problems in the project.	1.000 [a]	
2. Our aim was to search for ideas and information that we can implement well to ensure productivity rather than those ideas that could lead to implementation mistakes in the project and in the marketplace.	.835	9.986
3. We search for the usual and generally proven methods and solutions to product development problems.	.813	9.823
4. We used information acquisition methods that helped us understand and update the firm's current project and market experiences.	.864	11.037
5. We emphasized the use of knowledge related to our existing project experience.	.860	9.448
Exploratory Learning (α=**.843; CR=.844; AVE=.520**)		
1. We preferred to collect information with no identifiable strategic market needs to ensure experimentation in the project.	1.000 [a]	
2. In information search, we focused on acquiring knowledge of project strategies that involved experimentation and high market risks.	.903	10.016
3. Our aim was to acquire knowledge to develop a project that lead us into new areas of learning such as new markets and technological areas.	.959	10.217
4. We collected novel information and ideas that went beyond our current market and technological experiences.	.984	10.176
5. Our aims were to collect new information that forced us to learn new things in the product development project	.957	9.692
Opportunity Recognition (α=**.792; CR=.792; AVE=.559**)		
1. I have a special alertness or sensitivity toward new opportunities (e.g., about new products, new markets, and new ways of organizing the firm).	1.000 [a]	
2. While going about day-to-day activities, I see potential new ideas (e.g., on new products, new markets, and new ways of organizing firms all around me).	.889	10.512
3. Seeing potential new opportunities comes very naturally to me.	.944	10.329

Model fit: χ^2 (424) = 523.864, d.f. =424; DELTA2 = 0.982; CFI =0.982; TLI = 0.981; RMSEA=0.032; p=0.001.

[a] Fixed factor loading. α = Cronbach's alpha, CR = Composite Reliability, AVE = Average Variance Extracted

Table 3 Descriptive Statistics and Correlations

Variables	**Mean**	**S.D.**	1	2	3	4	5	6	7	8
1. Managing experience	5.810	4.415								
2. Failure experience	1.797	1.785	0.630***							
3. Number of projects	2.443	2.527	0.436***	0.507***						
4. Prevention focus	4.118	1.041	0.061	-0.021	-0.055	*0.898*				
5. Promotion focus	5.302	0.709	-0.046	-0.116†	-0.111†	-0.104	*0.809*			
6. Exploitative learning	5.555	0.741	0.003	-0.033	-0.067	-0.061	0.547***	*0.693*		
7. Exploratory learning	5.354	0.793	-0.136*	-0.039	0.031	-0.171**	0.506***	0.603***	*0.721*	
8. Opportunity recognition	5.259	0.882	0.020	-0.013	0.126†	-0.196**	0.459***	0.507***	0.602***	*0.748*

N = 237; S.D. = Standard deviation; *p < 0.05; **p < 0.01; ***p < 0.001;
Italic figures on the diagonal are the square root of the average variance extracted for the constructs.

Table 4 Results of Hierarchy Linear Regression Analysis

Measure	**Opportunity recognition**				**Exploitative learning**		**Exploratory learning**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Gender	-0.125	-0.105	-0.172	-0.108	0.117	0.147	-0.106	-0.084
	(0.114)	(0.101)	(0.095)	(0.090)	(0.096)	(0.082)	(0.102)	(0.089)
Age	0.120	0.079	0.076	0.067	0.029	0.006	0.060	0.025
	(0.099)	(0.087)	(0.081)	(0.077)	(0.083)	(0.071)	(0.088)	(0.077)
Position	0.109†	0.073	0.020	0.010	0.156*	0.116*	0.140**	0.105*
	(0.060)	(0.171)	(0.050)	(0.047)	(0.050)	(0.043)	(0.053)	(0.047)
Education	0.026	0.010	-0.013	0.026	0.081	0.051	-0.051	-0.071
	(0.113)	(0.100)	(0.093)	(0.088)	(0.095)	(0.081)	(0.101)	(0.088)
Managing experience	0.027	0.011	0.009	0.002	0.016	0.005	0.033*	0.020
	(0.017)	(0.015)	(0.014)	(0.013)	(0.014)	(0.012)	(0.015)	(0.013)
Failure experience	-0.080†	-0.043	-0.055	-0.036	-0.004	0.026	-0.067†	-0.034
	(0.044)	(0.039)	(0.037)	(0.035)	(0.037)	(0.032)	(0.044)	(0.034)
Number of projects	0.058*	0.069*	0.074*	0.062*	-0.025	-0.012	0.013	0.025
	(0.026)	(0.026)	(0.022)	(0.021)	(0.022)	(0.019)	(0.024)	(0.021)
Independent variables								
Prevention focus		-0.113*	-0.111*	-0.079†		-0.004		-0.080†
		(0.049)	(0.045)	(0.043)		(0.039)		(0.043)
Promotion focus		0.549***	0.296***	0.193*		0.557***		0.533***
		(0.072)	(0.052)	(0.077)		(0.058)		(0.063)
Mediating variables								
Exploitative learning			0.455***	0.250**				
			(0.077)	(0.081)				
Exploratory learning				0.407***				
				(0.075)				
R-squared	0.065	0.280	0.377	0.450	0.061	0.334	0.072	0.310

Adjusted R-squared	0.036	0.251	0.349	0.423	0.032	0.308	0.044	0.283
Highest VIF	1.945	1.973	1.979	2.000	1.945	1.973	1.945	1.973
F change	2.232**	33.909***	35.206***	29.747***	2.131*	46.767***	2.556*	39.148***

N = 237; Unstandardized coefficients are reported; Robust standard errors are in parentheses. †p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001