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The Impact of Managerial Alertness on Enterprise Cross-Border Innovation

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Abstract:

This research introduced managerial alertness as a pivotal instrument that can be used to maximize enterprise cross-border innovation outcomes. This study explores the relationship between managerial alertness and Enterprise of cross-border innovation. We conceptualized resource bricolage as the mediating factor in these relationships and also introduced cognitive structure (cognitive flexibility and complexity) as a moderating construct. To validate hypotheses, we employed multiple regression analysis and analyzed data from 313 managers from various cross-border enterprises around 28 cities in China. Results indicated that managerial alertness positively impacts enterprise cross-border innovation. Moreover, resource bricolage also mediates the relationship between managerial alertness and enterprise cross-border innovation. This research also found the moderating relationship cognitive structures (flexibility and complexity) have on the relationship between managerial alertness and enterprise cross-border innovation. This study not only contributes to extant literature but also provides new insights into how managerial alertness affects enterprise cross-border innovation.

Keywords: Managerial Alertness (MA), Resource Bricolage (RB), Enterprise Cross-Border Innovation (ECBI)

1. Introduction

The global economy has become interconnected, which comes with many opportunities and threats at the same time to enterprises (Çetin et al., 2023), making it difficult for enterprises to stay competitive, maintain growth, and expand their business at the same time (Tariq et al., 2023). To stay competitive and maintain growth, enterprises now try to look outside the traditional ways of “market penetration” typically increasing their market share by selling existing products or services in the international market, “product adaptation” making changes to products to meet the standard of foreign buyers or the traditional “cost minimization” strategy. Enterprises have realized that these traditional ways of staying competitive, maintaining growth and expanding at the same time are not sufficient anymore and are all adapting many different innovative strategies to thrive and remain competitive. In that regard, enterprise cross-border innovation has become a new tool for enterprises and has been gaining significant attention due to its role in helping sustain growth in the marketplace. Enterprise cross-border innovation is the process of enterprise developing and implementing new ideas and solutions by utilizing knowledge, skills, and information that comes from across the enterprise border or outside the enterprise (Li & Wu, 2022; Satheesh et al., 2023; Xue & Wang, 2024; Zander & Sölvell, 2000). Research like Shi et al. (2023) examines enterprise cross-border innovation through a digital lens and points out the importance of collaboration and information sharing. Satheesh et al. (2023) also investigated enterprise cross-border innovation of public managers on project performance and pointed out the importance of enterprise cross-border innovation in the public sectors. Other research explored many antecedents of enterprise cross-border innovation, including its impact on e-commerce (Pan et al., 2023), short and long-term effects (Ding et al., 2024), and knowledge sharing (Jiang et al., 2023). Enterprise cross-border innovation has now gained so much attention that understanding the factors that drive it is very important for cross-border enterprises. In our research, we introduce managerial alertness as one of the driving forces of enterprise cross-border innovation and suggest how the relationship between managerial alertness and enterprise cross-border innovation is important for enterprise innovation. Managerial alertness refers to the degree to which decision-makers or managers predict opportunities in the current and future business environment and is a key factor affecting the identification, construction and implementation of opportunities Kirzner (2009). It is very important to examine the relationship between managerial alertness and enterprise cross-border innovation for reasons such as strategic decision-making (Sulich et al., 2021). Understanding this relationship can help enterprises improve strategic decision-making processes. Understanding this relationship will also give enterprises a competitive advantage; enterprises could gain a better understanding of how to leverage managerial capabilities to stay ahead of the competition (Li & Yang, 2023). Innovation activities across enterprise borders involve risk and uncertainties for enterprises; studying this relationship will help enterprises anticipate and minimize the risks involved by empowering managers to proactively identify and respond to

potential threats (Vu & Nwachukwu, 2021; Zhao et al., 2021). Thus, the first gap in this research is the investigation of the relationship between managerial alertness and enterprise cross-border innovation.

Moreover, we introduced managerial cognitive structure as a moderator affecting the relationship between managerial alertness and enterprise cross-border innovation. We also introduce the two dimensions of management cognitive structure: flexibility and complexity. Antecedents on management cognitive structure have found several positive implications of the concept, including how it is important for innovative development and strategy decision-making (Kwilinski & Kuzior, 2020), organizational ambidexterity (Kiss et al., 2020), and internationalization (Niittymies & Pajunen, 2020). The concept has also been used as a moderator or a mediator for predicting the relationship between other constructs like dominant logic and innovation (Khan et al., 2021), social media addiction and phubbing (Tanhan et al., 2024), emotions and performance (Lin et al., 2014), creativity (Zuo et al., 2019). Drawing on the social cognitive theory, which poses that individuals' behaviors, cognition and environment do interact with each other in similar ways (Bandura, 1989, 2023) and also suggests that individuals' cognitive structures influence their problem-solving ability, how the individual process information, and makes a decision (Bandura, 1989, 2023). Therefore, understanding the role cognitive structure plays in the relationship between managerial alertness and enterprise cross-border innovation provides insights into the cognitive mechanisms underlying innovation processes. The social cognitive theory also emphasises the importance of adaptive learning. Understanding the relationship between managerial alertness and enterprise cross-border innovation helps identify cognitive factors that foster adaptive learning in an enterprise cross-border innovation environment.

We designed a quantitative study that measures managerial alertness, resource bricolage, management cognitive structure (flexibility and complexity), and enterprise cross-border innovation among a sample of enterprises operating in China. Data were collected from managers of enterprises using a survey questionnaire. After the data were collected, they were coded using Microsoft Excel and then analysed using SPSS software. Descriptive statistics and variable correlation were done using SPSS, and the reliability and validity of constructs were also determined. Multiple regression analysis and bootstrapping mediation test were employed to test all hypotheses. All proposed hypotheses were accepted, which contribute theoretically to the literature on organizational behavior and innovation by providing evidence of the underlying panels through which enterprise cross-border innovation is enhanced. It provides theoretical contribution by providing evidence of the impact of managerial alertness on enterprise cross-border innovation, the moderating role of cognitive structure and the mediating role of resource bricolage.

2. Literature Review

2.1. Enterprise Cross-Border Innovation

Enterprise cross-border innovation is referred to as the step an enterprise usually takes to establish and maintain ties with other enterprises outside the enterprise to accomplish its broader goals (Krishnan, 2010; Yang et al., 2021). When enterprises engage with other cross-border enterprises, they expect to benefit from the combined projects in managing the expectations of customers, discovering novel innovation opportunities and obtaining external sources of information (Satheesh et al., 2023). Since the development of the knowledge economy, enterprises have started coming together to share ideas and make novel innovations that can open other markets (Castaneda & Cuellar, 2020). Meissner et al. (2021) suggest that enterprise cross-border innovation involves enterprises implementing all activities together, which usually occurs at the borders of all enterprises involved. In today's globalized world, enterprises are increasingly searching outside their boundaries for new markets, growth prospects, or external resources. The concept of cross-border innovation is very broad and there is cross-regional innovation, which is concerned with how enterprises innovate across geographical boundaries, which happens mostly between enterprises from different nations (Tian & Lu, 2023). There is cross-field innovation, which is concerned with how enterprises integrate knowledge outside of the enterprise value chain to solve problems (Tan & Xue, 2023). There is also cross-industry innovation (Carmona-Lavado et al., 2023) and cross-organizational innovation (Fragapane et al., 2022; Zhao et al., 2023). This study focuses on cross-organizational innovation, which is referred to as enterprise cross-border innovation in this research.

Management research has shown how important enterprise cross-border innovation is for helping enterprise overall performance (Lyu et al., 2022), entering into different markets (Papanastassiou et al., 2020), and knowledge transfer (Lyu et al., 2022). Enterprises involved with cross-border innovation notice a tremendous change in their performance. Enterprise cross-border innovation helps give access to additional resources and share risks, which better positioned these enterprises to thrive (Li & Wu, 2022). Enterprise cross-border innovation literature also provides insights for multinational cross-border enterprises. Zander and Sölvell (2000) highlight that multinational enterprises can gain a competitive advantage in complex and dynamic marketplaces by utilizing global talents proved by their international innovation partners. Li and Wu (2022) highlighted the importance of enterprise cross-border innovation in allowing enterprises to acquire cutting-edge technologies and achieve their own innovation breakthroughs. Lyu et al. (2022) also stated that enterprises should proactively pursue cross-border cooperation initiatives and widen their avenues of knowledge acquisition. Overall, this will enable enterprises to effectively search outside of their own borders for new ideas from other organizations and the external market. As such, enterprises should actively cultivate a positive network of external relationships, seize new opportunities as they arise, and pick up additional new knowledge.

Different standards are available to assess enterprise cross-border innovation since research objects and perspectives differ. A brief review of the literature revealed that the following five perspectives make up the majority of the current evaluation of enterprise cross-border innovation behavior:

- To obtain insight into the various types of behavior that emerge and change across borders, researchers must study the cross-border innovation behavior of teams or individuals in the workplace. Ancona and Caldwell (1992) have created a commonly used scale to classify the behavior of cross-border innovation. According to this scale, these behaviors fall into four categories: guard function, task coordination, ambassador conduct and scanning.
- The number of frontiers crossed in terms of resource and technology flow is used to quantify the enterprise cross-border innovation. The primary boundaries encompass departmental, organizational, technological, industrial, and supply chain domains. Rosenkopf and Nerkar (2001) carried out an in-depth study on the optical disk market. Based on the collision point of resources and technology, they distinguished four different categories of enterprise cross-border innovative behavior: radical cross-border innovation, internal cross-border innovation, external cross-border innovation, and regional search.
- The different kinds of resources that move across enterprise borders are examined to gauge the level of enterprise cross-border innovation activity. Thus, according to Krishnan (2010), enterprise cross-border innovation behavior is divided into three categories: knowledge cross-border innovation, social cross-border innovation and operational cross-border innovation.
- According to role theory, Tushman and Scanlan's (1981) research provides the most insight into the distribution of duties performed by border spanners in connected organizations. They divided boundary spanners into two primary groups: internal liaisons and gatekeepers.
- Based on the classification of the degree of creative cross-border activity and its effects, the degree and level of interaction with external resource channels that businesses rely on for innovation are measured by this indicator. This indicates the degree to which businesses are exposed to the outside world. Laursen and Salter (2006) introduced the principles of depth and breadth in their examination of the relationship between organizations and the surrounding environment.

This study aims to examine the correlation between managerial alertness and enterprise cross-border innovation within enterprises. The fifth measurement scale is utilized as a metric to assess enterprise cross-border innovation. Enterprise Cross-border innovation can be categorized into two dimensions: breadth and depth. Breadth refers to the number of distinct sources of resources utilized by an organization in its cross-border innovation activities. It reflects the diversity of industries and fields from which the enterprise acquires resources (Ofstein, 2013). On the other hand, depth pertains to the extent to which an organization absorbs information and resources from its surroundings (Laursen & Salter, 2006). This is demonstrated by the enterprise's capacity to effectively utilize and transform internal or external resources, its reliance on information sources for innovation, and its control over resources in enterprise cross-border innovation (Zahra et al., 2000).

2.2. Managerial Alertness

Managerial alertness concept has been deeply rooted in strategic management and entrepreneurship literatures and has gain significant attention due to its ability in helping enterprise achieve good outcomes (Tang et al., 2023). Managerial alertness is defined as the degree to which managers or decision-makers are able to predict opportunities or threats in the current or future business environment (Kirzner, 1973; Tang et al., 2023). Managerial alertness is famous for its role in identifying, constructing and implementing opportunities (Kirzner, 1973; Tang et al., 2023). The term "managerial alertness" was first introduced by Kirzner (1973), which describes a manager's ability to spot opportunities in uncertain times. The concept was further developed by Shane and Venkataraman (2000), who emphasized the role managerial alertness plays in recognizing and exploiting market imperfections. The concept has become an important indicator in distinguishing managers who are proactively looking for opportunities from those who are not (Srivastava et al., 2021). Recent findings on alertness have shown that most successful managers or entrepreneurs have a high level of alertness (Srivastava et al., 2021; Tang et al., 2023). However, research on this idea is still limited. Managerial alertness involves managers actively scanning, interpreting and making sense of the environment around them. It helps managers identify trends and predict changes in the market, which helps shape enterprise outcomes. Relative empirical research has demonstrated the relationship between managerial alertness and many other concepts like innovation performance (Fellnhofner, 2022; Levasseur et al., 2020; Urban, 2019), opportunity identification (Bilal et al., 2022; Li et al., 2022), business model innovation (Lew et al., 2023), and new venture creation (Crespo et al., 2022). This study believes that managerial alertness can guide attention and information processing in such a way that managers are highly sensitive to changes in their environment, which is helpful for enterprise cross-border innovation because managers with high managerial alertness have more insights on the market than others, is also able to discover new market demand in time. Research on the dimensions and measurement of managerial alertness is still in the exploratory stage. The academic research on how to measure managerial alertness is still limited. Kaish and Gilad (1991), in their article, divided managerial alertness into two dimensions: reading alertness and open alertness. Gaglio and Katz (2001) divided the concept into three dimensions: the correct perception of the market environment, the key drivers of the Identification, and the inference of dynamic relationship between various factors. Valliere (2013) proposed four dimensions: Parallel, forgetting, exploring and embellishing. Tang et al. (2012) proposed three dimensions: Search and scan, association and connection, evaluation and judgment. After combining the literature on the dimensions of managerial alertness, we found that all the existing research on the measurement of managerial alertness is based on the perspective of information processing, and they take alertness as an information processing ability. Research on managerial alertness is now improving from the opportunity identification perspective and now including the resource allocation perspective. Therefore, this paper will use the method of Tang et al. (2012) to measure managerial alertness.

Tang et al. (2012) describe managerial alertness as a process involving three dimensions. In each of these dimensions, managers improve the original idea of the enterprise business by adjusting timely. The first dimension is search and scan. Tang et al. (2012) pose that individuals are very attentive to information within their environment, but they must also search for new information that complements their original idea. The second dimension is association and connection, which is concerned with how individuals work with the information they have obtained through the first dimension. Tang et al. (2012) pose that in this dimension, individuals apply their level of creativity because they must analyze the information they have to identify similarities or differences that allow them to create value. The last dimension is evaluation and judgment. When individuals reach the last dimension, they should decide whether the opportunity they have uncovered is worth it or not. The last dimension serves as the decision-making stage of alertness; managers will decide and make a move (Tang et al., 2012).

Author	Dimension	Journal
Kaish and Gilad (1991)	Reading alertness and open alertness	Journal of Business and Venturing
Gaglio and Katz (2001)	The correct perception of the market environment, the key drivers of the Identification and inference of dynamic relationships between various factors	Small business Economics
Tang et al. (2012)	Search and Scan, Association and connection, Evaluation and judgment	Journal of Business and Venturing
Valliere (2013)	Parallel, forgetting, exploring, embellishing	Springer

*Table 1: Dimensions of Managerial Alertness
Source: Organized by Author*

3. Hypothesis Development

3.1. Managerial Alertness and Enterprise Cross-Border Innovation

Managerial alertness is famous for its role in identifying, constructing and implementing opportunities. The concept has three important attributes which are very important and useful to enterprises involved with cross-border innovation activities. The first dimension of managerial alertness, search and scan, aligns with the breadth of enterprise cross-border innovation. Enterprise cross-border innovation breadth refers to the number of distinct sources of resources utilized by the enterprise in its cross-border innovation activities. It reflects the diversity of industries and fields from which the enterprise acquires resources (Ofstein, 2013). According to Tang et al. (2012), managerial alertness - scanning and search - indicates that individuals are very attentive to information within their environment. However, they must also search for new information that complements their original idea. This concept perfectly aligns with the breadth of enterprise cross-border innovation because alert managers who actively scan and search their environment for new information or opportunities are more likely to identify diverse sources of resources that are available across the enterprise borders. By being attuned to many different enterprises, industries and fields, they automatically increase enterprise cross-border innovation breadth or the breadth of resources utilized within innovation activities. The scan and search alertness attribute of managers provides enterprises with a wider range of opportunities and knowledge, which will help enterprises with cross-border innovation processes. Secondly, managerial alertness also focuses on association and connection, which is concerned with how individuals work with the information they have obtained through searching and scanning. Tang et al. (2012) pose that with this attribute of alertness, individuals apply their level of creativity because they must analyze the information they have to identify the similarities or differences that allow them to create value. This perfectly aligns with the dept. of enterprise cross-border innovation, which is concerned with the extent to which enterprises absorb information and resources from their environment (Laursen & Salter, 2006). Dept. is demonstrated by the enterprise's capacity to effectively utilize and transform internal or external resources, its reliance on information sources for innovation, and its control over resources in innovation activities (Zahra et al., 2000). As managers search and gather information from different sources, they will need to creatively analyze and connect the different pieces of information to create novelty, which is where managerial alertness association and connection fill in the gap. The process of association and connection is concerned with identifying similarities or differences and putting them together to create value. Through association and connection managers will be able to effectively integrate internal and external resources, thereby improving the capacity of the enterprise to innovate. Lastly, Managerial alertness is also concerned with evaluation and judgment. When individuals reach the last dimension, they should decide whether the opportunity they have uncovered is worth it or not. This serves as the decision-making stage of alertness, where managers will decide and make a move. This attribute is essential for cross-border activities because of the many uncertainties innovation brings. By evaluating and making good judgments, managers will be able to determine which cross-border opportunities are worth pursuing, which will greatly help enterprises to effectively allocate their resources. Therefore, we propose the following hypothesis:

- *H1: Managerial alertness has a positive impact on enterprise cross-border innovation.*

3.2. *The Mediating Role of Resource Bricolage*

Resource bricolage emerges as a crucial mediator between managerial alertness and enterprise cross-border innovation, serving as the mechanism through which managerial insights and proactive behaviors are translated into tangible outcomes in the marketplace. Resource bricolage, a term borrowed from anthropology and adapted to the business context by Garud and Karnøe (2001), refers to the process of assembling and reconfiguring disparate resources in novel ways to address organizational challenges and seize opportunities. Managerial alertness has some effects on resource bricolage. Firstly, in identifying resource gaps and opportunities, managers with a higher level of alertness are more attentive to scanning and searching their environment for potential resources that could be of help to enterprise innovation processes. The scanning and searching abilities enable managers to identify gaps and opportunities that can be addressed through resource bricolage. Secondly, managerial alertness and resource-bricolage connections also help enhance creativity and problem-solving. Managerial alertness dimension of association and connection involve creatively analyzing and connecting different pieces of information from different sources. This creative process is very important to resource bricolage, where managers put together resources that are available in novel ways to overcome constraints. When managers have high alertness, it helps foster an environment of constant search, making resource bricolage a natural outcome. Lastly, the evaluation and judgement dimension of managerial alertness indicates that alert managers are able to actively assess the importance and applicability of all the resources they come across. The ability of managers to evaluate and adapt different resources to fit a certain context is important for resource bricolage, which relies on the flexible and judicious use of available material to meet new challenges. Therefore, we propose the following hypothesis:

- *H2: Managerial alertness has a positive impact on resource bricolage.*

One important characteristic of resource bricolage is its ability to enable enterprises to make the most out of their existing resources by repurposing and reconfiguring the resources in innovative ways which reflect the enhancement of resource utilization. This enhanced utilization can help make innovation processes more effective and efficient, especially in complex and diverse contexts of enterprise cross-border innovation where there may be limited resources or resources that are difficult to access. Secondly, resource bricolage can lead to increased flexibility and adaptability in enterprise cross-border innovation activities. Through resource bricolage, enterprises become more flexible and adaptable in their strategies for innovation. Adaptability is very important in enterprise cross-border innovation activities, especially because changing market conditions, regulatory environments, and cultural differences require enterprises to be flexible and responsible. Through flexibility and adaptability, resource bricolage encourages creative problem-solving and fast adjustment of resources to new circumstances. Lastly, resource bricolage helps promote cost-effective innovation by leveraging resources rather than investing heavily in new ones. Since in enterprise cross-border innovation, activity costs are very high because of logistics, regulations and cultural challenges, resource bricolage's cost-effective ability serves as an added advantage to enterprises. By reducing expenditures on resources and increasing the use of available resources, enterprises can sustain their innovation efforts more efficiently. Therefore, we propose the following hypothesis:

- *H3: Resource bricolage has a positive impact on enterprise cross-border innovation.*

In the context of enterprise cross-border innovation, resource bricolage refers to the ability of an enterprise to create new value through the use of many resources, both tangible and intangible, including technological, human, financial and relational resources across the geographical and cultural divide. In several ways, it can be observed that there is a significant correlation between managerial alertness and enterprise cross-border innovation that is moderated by resource bricolage. Firstly, alert managers, sensitive to market cues and potential developments, possess the skills to detect unexplored assets and opportunities. Thus, thanks to their proactive position, they are able to explore the environment, identify hidden demands, and establish symbiotic relationships with other enterprises. However, the simple recognition of opportunities is not enough. It is the subsequent reconfiguration of resources that drives innovation and value generation. Alert managers, therefore, practise resource bricolage by deploying their cognitive flexibility and market intelligence to pull together multiple resources such as technologies, knowledge, and contacts from a variety of sources in order to meet market demands and exploit market opportunities.

Secondly, resource bricolage enables firms to overcome the resource constraint associated with cross-border enterprise innovation. Typically, expansions entail factors such as resource deficiency, unpredictability, and cultural, regulatory, and financial constraints. Such challenges are managed by alert managers using resource bricolage techniques, which involve the manipulation of resources within their organizations and the use of partnerships to supplement their competencies. By reconfiguring the resources and using them in new contexts and in a way that is appropriate for the changing market needs, firms ensure that they are more robust and ready to face the challenges in markets, thereby promoting enterprise cross-border innovation. Moreover, resource bricolage ensures that knowledge learning into cross-border transfers is enhanced, which in turn helps make managerial alertness more effective in relation to innovation. Therefore, we propose the following hypothesis:

- *H4: Resource bricolage mediates the relationship between managerial alertness and enterprise cross-border innovation.*

3.3. *The Moderating Role of Managerial Cognitive Structure*

Managerial alertness encompasses active processes of scanning, interpreting, and making sense of the business environment (Kirzner, 2009). We are aware that it enables managers to anticipate market trends, predict changes, and seize emerging opportunities, thereby driving organizational adaptation and value creation in global markets. However, the effectiveness of managerial alertness in fostering enterprise cross-border innovation may vary depending on the cognitive structures of managers. Manager cognitive structure refers to the underlying mental frameworks, processes and capabilities that managers employ to perceive, interpret and respond to information and stimuli in their environment. It

encompasses how managers organize and make sense of complex information, reason, make decisions and adapt their thinking in response to changing circumstances (Martin & Rubin, 1995). A manager's cognitive structure has two dimensions: cognitive complexity and cognitive flexibility. Cognitive complexity refers to the degree to which individuals are capable of processing and synthesizing diverse information and perspectives (Mintzberg, 1973). Managers with high cognitive complexity exhibit a nuanced understanding of market dynamics, recognizing patterns and interrelationships that others may overlook. This heightened cognitive complexity enables them to navigate the complexities of cross-border environments, discerning subtle nuances in cultural, regulatory, and market conditions. As a result, they are better equipped to leverage their alertness to identify opportunities and drive innovation in international markets.

Empirical research also highlights the role of cognitive complexity in enhancing the effectiveness of managerial alertness in driving innovation. For example, Vogus and Sutcliffe (2007) found that managers with high cognitive complexity were better able to detect and respond to environmental changes, leading to more innovative organizational outcomes. Similarly, Gupta et al. (2006) observed a positive relationship between cognitive complexity and strategic decision-making, which is crucial for navigating the complexities of global markets. Thus, managers with high cognitive complexity are likely to amplify the impact of their alertness on cross-border innovation by synthesizing diverse information and perspectives to generate novel insights and solutions. The second dimension of management cognitive structure is cognitive flexibility, which refers to the ability of individuals to adapt their thinking and behavior to changing circumstances or new information (Martin & Rubin, 1995). Managers with high cognitive flexibility demonstrate openness to new ideas, willingness to explore alternative perspectives, and readiness to adapt their strategies in light of emerging opportunities or challenges. This adaptive capacity enables them to translate their alertness into action, seizing opportunities and driving innovation in dynamic cross-border environments. Evidence from the research also supports the role of cognitive flexibility in enhancing the effectiveness of managerial alertness in driving enterprise cross-border innovation. For instance, Eisenhardt and Martin (2000) found that managers with high cognitive flexibility were more adept at experimenting with new approaches and adapting to changing market conditions, leading to higher levels of organizational innovation. Similarly, De Dreu et al. (2008) observed that cognitive flexibility was positively associated with creative problem-solving, which is essential for overcoming the challenges of enterprise cross-border innovation. Thus, managers with high cognitive flexibility are likely to leverage their alertness to identify opportunities and adapt their strategies in response to evolving market dynamics, thereby driving innovation in international markets.

Thus, managerial cognitive structure, with its dimensions of cognitive complexity and cognitive flexibility, serves as a crucial factor that influences the relationship between managerial alertness and enterprise cross-border innovation. Managers with high cognitive complexity and cognitive flexibility are better equipped to leverage their alertness to identify opportunities, navigate the complexities of global markets, and drive innovation in international contexts. By cultivating these cognitive attributes, organizations can enhance the effectiveness of their managerial talent in driving enterprise cross-border innovation, thereby gaining a competitive edge in the global marketplace. Therefore, we propose the following hypothesis:

- *H5: Management cognitive complexity positively influences the relationship between manager alertness and enterprise cross-border innovation.*
- *H6: Management cognitive flexibility positively influences the relationship between manager alertness and enterprise cross-border innovation.*

Based on the above analysis, the theoretical model is shown in figure 1.

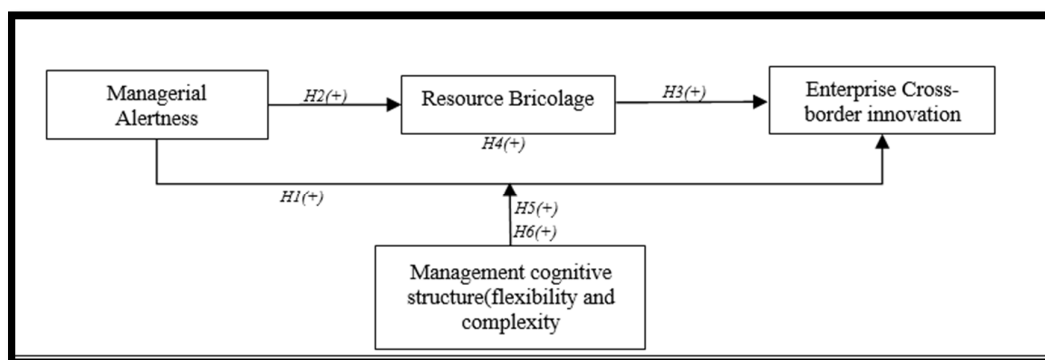


Figure 1: Theoretical Model

4. Methodology

4.1. Data and Sample

The data used in this study was obtained from CEOs and managers of cross-border enterprises in China. We focus on top managers because the research reflects the alertness of these individuals relative to how their alertness will impart enterprise cross-border innovation processes. 28 cities across China were sampled. About 402 questionnaires were sent out for data collection, and due to difficulty in reaching some managers, only 313 responses were received. We use Google Forms to conduct the online survey and in-person for offline collection. For statistical purposes, the data gathered from the survey was coded and transformed into numbers.

4.2. Variables and Measures

This study used a well-established and validated questionnaire to collect data. The questionnaire was designed based on existing scales and was modified after consultation with domain scholars. To measure the independent variable managerial alertness (Boso et al., 2019; Tang et al., 2012), the mediator resource bricolage (Senyard et al., 2014), and dependent variable enterprise cross-border innovation (Ofstein, 2013) respondents were asked to rate each item on a seven-point scale ranging from 1 (very inconsistent) to 7 (very consistent) based on how well the items applied to themselves and their firms. The moderator, cognitive structure, has two dimensions: cognitive flexibility and cognitive complexity. Cognitive flexibility (Martin & Rubin, 1995) was also measured using the seven-point scale ranging from 1 (very inconsistent) to 7 (very consistent).

Cognitive complexity was measured using the Role Construct Repertory Test (RCRT) developed by Kelly (Bieri, 1955; Kelly, 1995). The test consists of a 10x10 grid with each column representing 10 roles evaluated, all of which are individuals from the respondent's life or surroundings. Each row represents the evaluation of these roles' characteristics, all of which include positive and negative dimensions. Evaluations on the positive dimension are scored from 1 to 3, while evaluations on the negative dimension are scored from -1 to -3. At the beginning of the test, according to instructions, respondents write down the names of individuals who fit the role information next to each column and then rate the role on various characteristics. Researchers calculate cognitive complexity scores based on the respondents' scoring. If the respondent's evaluation of the role's characteristics is positive, scores range from +1 to +3; if negative, scores range from -3 to -1. The scoring method is as follows: Compare the score of each role on each characteristic with scores on other characteristics. If the scores are the same, it counts as a match, scoring 1 point; if different, 0 points. The average of all matching counts among the 10 roles is the respondent's cognitive complexity score. Since the possible number of matches is $(NR \times NC \times (NC-1))/2$, where NR is the number of roles and NC is the number of characteristics, the minimum number of matches is 40, and the maximum is 450. The cognitive complexity score ranges from 4 to 45 points. A higher number of matches indicate that the respondent made similar evaluations across more characteristic dimensions, suggesting a lower level of cognitive complexity. Conversely, fewer matches indicate that the respondent can discern subtle differences in each role across various characteristic dimensions. Therefore, a higher score indicates lower cognitive complexity, while a lower score indicates higher cognitive complexity.

Moreover, Consistent with the previous study, we controlled a set of variables at the firm and individual levels. At the firm level, larger firms have more resources, facilitating innovation activities. Thus, the size of firms was measured with a five-step categorical scale, where 1 = less than 100 employees, 2 = 101–500 employees, 3 = 501–1500 employees, and 4 = 1500 employees above. Moreover, different R&D inputs affect the discovery of innovation opportunities (He & Wong, 2004). Therefore, R&D intensity was measured by the ratio of R&D inputs to total sales revenue. The value of 1 was assigned when the R&D intensity is less than 1%, 2 when it is 1%–2%, 3 when it is 2%–3%, 4 when it is 3%–5%, and 5 when it is more than 5%. We also control for the type of industry and the location of the firm for descriptive purposes. At the individual level, we controlled for the senior executives' gender, age, and education level, which are considered to influence the outcomes of observations (Kiss et al., 2020).

5. Analysis and Results

5.1. Descriptive Statistics and Correlations

Correlation is a measure of the relationship between two variables. The Pearson correlation coefficient (r) varies over a range of +1 through 0 to -1, where +1 is a perfect correlation representing an absolute positive linear relationship, and -1 is a perfect negative correlation representing an inverse relationship. 0 means no linear correlation at all, representing no linear relationship. The coefficient's sign signifies the direction of the relationship (Simon, 2017). The result from the correlation analysis reflected in table 2 below shows that all factors are related. The correlation table below also includes the mean and standard deviation of variables. All the means of all significant variables are higher than their standard deviation, which indicates that all responses are relatively homogeneous.

MA	1***										
RB	0.379***	1***									
CF	0.023***	0.384***	1***								
CC	0.051	0.085	0.054	1***							
ECBI	0.592***	0.443***	0.444***	-0.282***	1***						
Gender	-0.068	-0.036	0	-0.108*	0.023	1***					
Age	0.087	0.163***	0.053	0.073	0.144**	0.001	1***				
Education	-0.031	-0.023	-0.029	-0.094*	0.028	0.053	-0.042	1***			
Size	0.195***	0.179***	0.016	-0.04	0.226***	-0.113**	0.395***	-0.064	1***		
R&D	0.086	0.055	-0.111**	-0.025	-0.007	-0.053	-0.004	0.044	-0.001	1***	
Social Network	-0.123**	-	-0.076	-	-0.07	0.03	-	0.011	-	-	1***
		0.472***		0.146***			0.153***		0.145**	0.033	
Mean	4	4.2	4.25	16.5	3.25	1	3	2	2	0.035	4.25
SD	1.43	1.435	1.27	8.1	1.142	0.467	0.83	0.626	0.872	0.043	1.454

Table 2: Descriptive Statistics and Correlation

Note: * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

5.2. Reliability, Validity and CMV

For CMV, we ran a Harman one-factor test in which all the perceptual items were loaded into an exploratory factor analysis(EFA) (Podsakoff et al., 2003). The result indicated that the largest factor accounted for 33.384%. Common method variance is unlikely to be a concern in our data. KMO, which determines if the sample is appropriate for factor analysis, is 0.913, which is very good, indicating that the research is useful with the data to be analyzed. Using SPSS and Excel, the average variance extracted (AVE) and composite reliability (CR) were calculated. The composite reliability (CR), Cronbach's alpha, and AVE are as follows:

- Managerial alertness (CR=0.894, α =0.933, AVE=0.61),
- Enterprise cross-border innovation (CR=0.894, α =0.895, AVE=0.513),
- Cognitive flexibility (CR=0.892, α =0.892, AVE=0.509), and
- Resource bricolage (CR=0.886, α =0.888, AVE=0.606)

The reliability and validity test of all variables shows that all CR values are >0.70, all Cronbach's alpha values are >0.70, and all AVE values are >0.50, which indicates good reliability and satisfactory convergent validity. Thus, the variables proposed for this study are confirmed to be good for the final research study.

Variables and Items	Loading
Managerial Alertness (CR=0.894, α=0.933, AVE=0.61)	
1. I frequently interact with others to obtain new information	0.822
2. I am always actively seeking out new business information.	0.794
3. When looking for information, I always keep an eye out for new business ideas.	0.763
4. I can find connections between seemingly unrelated information.	0.785
5. I can often discover connections between information systems that were previously unrelated.	0.755
6. I am good at finding "correlation points" between different information.	0.779
7. I have a gut feeling about potential opportunities.	0.726
8. I can differentiate between profitable opportunities and unprofitable opportunities.	0.809
9. When faced with multiple opportunities, I can choose the better opportunity.	0.786
Resource Bricolage (CR=0.886, α=0.888, AVE=0.606)	
1. When faced with new challenges, we believe in our ability to use existing resources to find feasible solutions.	0.847
2. We are happy to use our existing resources to take on more challenges than other companies.	0.769
3. We will use any existing resources to respond to new problems or opportunities.	0.709
4. While dealing with new problems or opportunities, we will do our best to find feasible solutions and take action	0.756
5. We integrate resources that have other uses to meet new challenges.	0.841
Cognitive Flexibility (CR=0.892, α=0.892, AVE=0.509)	
1. I can express an idea in many different ways	0.688
2. I can find workable solutions to seemingly unsolvable problems	0.713
3. I am willing to use creative methods to solve problems	0.749
4. I can take appropriate action in any situation	0.739
5. The actions I take are all decided after careful consideration.	0.736
6. I can cope with any situation with ease	0.685
7. I have difficulty applying my experience and knowledge to practical situations	0.707
8. I have the confidence to use different methods to deal with various problems	0.689
Enterprise Cross-border Innovation (CR=0.894, α=0.895, AVE=0.513)	
1. The company has established relationships with many online user innovation communities.	0.867
2. The company has established relationships with many competing companies.	0.763
3. The company has established relationships with many banks, Internet financial companies and government departments	0.7
4. Companies often send personnel to other departments within the company to understand the overall situation of the company.	0.681
5. The company understands the goals and actors of our participation	0.649

in innovation networks.		
Variables and Items		Loading
6. Enterprises have strong capabilities to find, evaluate, and select partners and have various types of partners.		0.677
7. The company has a strong ability to establish trust and mutual benefit with its partners.		0.683
8. Enterprises have a strong ability to occupy the central position of cooperation networks.		0.755

Table 3: Measurement Items and Validity Assessment

5.3. Hypothesis Testing

This study utilized hierarchical regression analyses to test the hypotheses of direct effects, including H1, H5 and H6. Furthermore, the mediation technique was used to test H2, H3 and H4. Examining mediating effects, this study executed two types of mediation effect analyses, namely, the four-step method proposed by Baron and Kenny (1986) and the bootstrapping multiple mediation analysis. As shown in table 3, model 1 includes only the control variables on the dependent variable (ECBI). Model 2 is the regression of the independent variable (Managerial alertness) on the dependent variable (ECBI). Model 3 is the regression of the mediating variable (Resource bricolage) on the dependent variable (ECBI). Model 4 is the regression of the independent variable (Managerial alertness) on the mediating variable (Resource bricolage). Model 5 is the combined effect regression of the independent variable (Managerial alertness) and mediating variable (Resource bricolage) on the dependent variable (ECBI). Model 6 is the combined direct effect of the independent variable (Managerial alertness) and moderating variable (Cognitive complexity) and the moderating effect of cognitive complexity on the relationship between managerial alertness and ECBI. Lastly, model 7 is also the combined direct effect of the independent variable (Managerial alertness), moderating variable (Cognitive flexibility) and the moderating effect of cognitive flexibility on the relationship between managerial alertness and ECBI.

Variables	Model 1 (ECBI)	Model 2 (ECBI)	Model 3 (ECBI)	Model 4 (RB)	Model 5 (ECBI)	Model 6 (ECBI)	Model 7 (ECBI)
Gender	0.097	0.156	0.112	0.003	0.188*	0.079	0.157*
Age	0.079	0.077	0.04	0.099	0.064	0.120*	0.05
Education	0.045	0.076	0.063	-0.025	0.086	0.009	0.077
Size	0.268***	0.137**	0.210***	0.057	0.113*	0.088	0.144***
R&D	0.087	-1.277	-0.539	0.666	-1.676	-1.721	0.177
Social network	-0.039	0.007	0.138***	-0.421***	0.118***	-0.029	0.035
Industry	Control	Control	Control	Control	Control	Control	Control
Location	Control	Control	Control	Control	Control	Control	Control
MA		0.465***		0.303***	0.390***	0.471***	0.445***
RB			0.391***		0.245***		
CC						-0.044***	
CF							0.434***
MA×CC						-0.012***	
MA×CF							0.055**
R ²	0.169	0.427	0.308	0.406	0.484	0.529	0.617
Adjusted R ²	0.146	0.346	0.209	0.321	0.408	0.458	0.559
F	F(38,274)=1.240 P=0.169	F(39,273)=5.244 P=0.000***	F(39,273)=3.126 , P=0.000***	F(39,273)=4.804 , P=0.000***	F(40, 272)=6.39 P=0.000***	F(41, 271)=7.449 , P=0.000***	F(41,271)=10.659 , P=0.000***

Table 4: Multiple Regression Analysis

Abbreviation: N=313, *p<0.05. **p<0.01. ***p<0.001

Regarding hypothesis 1, model 2 illustrates that MA is positively related to ECBI ($\beta=0.465$, $p<0.001$), thereby confirming hypothesis H1. As for hypothesis 2, the regression results presented in model 4 demonstrate that MA ($\beta=0.303$, $p<0.001$) is positively related to RB. Thus, hypothesis 2 is supported. For hypothesis 3, the regression results presented in model 3 show that RB ($\beta=0.391$, $p<0.001$) is positively related to ECBI. Thus, hypothesis 3 is also supported.

Regarding hypothesis 4, the hierarchical regression method was also used to verify the mediating effect of relationship strength. This can be seen in models 2, 4, and 5. In model 2, MA has a significant positive impact on ECBI ($\beta=0.465$, $p<0.001$). The model 4 results also show that MA has a significant positive impact on RB ($\beta=0.303$, $p<0.001$). It can be seen from the results of Model 5 that when MA and RB are regressed as independent variables at the same time, the positive impact of MA ($\beta=0.390$, $p<0.001$) and RB ($\beta=0.245$, $p<0.001$) on ECBI is still significant. However, the impact of MA on ECBI dropped from 0.465 to 0.390, indicating that RB plays a partial mediating role in the relationship between MA and ECBI.

To further test the mediation hypothesis, we conducted bootstrap tests using the bias-corrected nonparametric percentile method with 5000 repetitions and a 95% confidence interval level, as presented in table 5. The results of the bootstrap mediation analysis provide compelling evidence supporting the hypothesis that RB mediates the relationship between MA and ECBI. Specifically, we found a significant indirect effect ($\beta = 0.080$, $p < 0.001$, 95% CI [0.041, 0.119]) of MA on ECBI through RB. This indicates that MA not only directly influences ECBI ($\beta = 0.384$, $p < 0.001$, 95% CI [0.310, 0.457]) but also exerts an indirect influence through its effect on RB. Moreover, the total effect of MA on ECBI, considering both direct and indirect pathways, was statistically significant ($\beta = 0.463$, $p < 0.001$, 95% CI [0.395, 0.532]). Thus, hypothesis 4 is also supported.

Effects	Observed coef.	Bootstrap std. Err.	Z-score	P> z	[95% conf. Interval]	
					Lower CI	Upper CI
Indirect effect	0.080	0.019	3.99	0.000	[0.041,	0.119]
Direct effect	0.384	0.037	10.27	0.000	[0.310,	0.457]
Total effect	0.463	0.034	13.24	0.000	[0.395,	0.532]
Effects	Observed coef.	Bootstrap std. Err.	Z-score	P> z	[95% conf. Interval]	
Indirect effect	0.080	0.019	3.99	0.000	[0.041,	0.119]
Direct effect	0.384	0.037	10.27	0.000	[0.310,	0.457]
Total effect	0.463	0.034	13.24	0.000	[0.395,	0.532]

Table 5: Bootstrapping Mediation Effects

Note: Bootstrapping Approach Performed on 5,000 Subsamples. IV (Independent Variable): Managerial Alertness (MA), Mediator: Resource Bricolage (RB), DV (Dependent Variable): Enterprise Cross-Border Innovation (ECBI)

In model 5, the first moderating variable (CC), independent variable (MA), and interaction variable (MA \times CC) were added. Interaction variable is created by multiplying the independent variable (Managerial alertness) with the moderating variable (Cognitive complexity). The finding reveals that the interaction variable (MA \times CC) has a significant correlation with ECBI ($\beta = -0.12$, $p < 0.001$). CC was ($\beta = -0.044$, $p < 0.001$), and MA was ($\beta = 0.471$, $p < 0.001$). Thus, hypothesis 5 is confirmed. Moreover, in model 7, the second moderating variable (CF), independent variable (MA), and interaction variable (MA \times CF) were added. The finding reveals that the interaction variable (MA \times CF) has a significant correlation with ECBI ($\beta = 0.055$, $p < 0.01$). CF was ($\beta = -0.434$, $p < 0.001$), and MA was ($\beta = 0.445$, $p < 0.001$). Thus, hypothesis 6 is confirmed.

6. Discussion and Conclusions

This study identifies managerial alertness as a managerial attribute particularly relevant to enterprise cross-border innovation and examines the mediating role of resource bricolage. Firstly, our empirical study proves that managerial alertness promotes enterprise cross-border innovation activities. The results show that managers with higher levels of alertness are more likely to notice new opportunities and take advantage of them amidst uncertainty, which promotes enterprise cross-border innovation activities. Secondly, using a four-step approach and bootstrapping mediation analysis, this study examines and proves the mediating role of resource bricolage between managerial alertness and enterprise cross-border innovation. The results of the empirical analysis demonstrate a partial mediating effect of RB in the relationship between managerial alertness and ECBI, indicating that through resource bricolage alert managers are able to leverage their cognitive agility and market insights to assemble diverse resources like technologies, expertise, and networks, from different sources to address market needs and focus on emerging opportunities. Third, we also found a moderating relationship between management cognitive structures (cognitive flexibility and cognitive complexity) and the relationship between managerial alertness and enterprise cross-border innovation. This finding indicates that alert managers with high cognitive complexity and cognitive flexibility are better equipped to leverage their alertness to identify opportunities, navigate the complexities of global markets, and drive innovation in enterprise-cross-border contexts. It proves that by cultivating these cognitive attributes, organizations can enhance the effectiveness of their managerial talent in driving enterprise cross-border innovation, thereby gaining a competitive edge in the marketplace.

6.1. Theoretical Implications

The findings of this study contribute to the literature on organizational behavior and innovation by shedding light on the underlying mechanisms through which managerial alertness influences enterprise cross-border innovation. Drawing on the Attention-Based View (ABV) theory, which suggests that managerial attention plays a crucial role in improving organizational outcomes (Ocasio, 1997; Ocasio et al., 2018), the result of our research provides empirical support for the idea that alert managers are more likely to identify and exploit opportunities for innovation in enterprise cross-border contexts. Moreover, our findings extend the Resource-Based View (RBV) theory (Lockett & Thompson, 2001) by demonstrating the mediating role of resource bricolage in the relationship between managerial alertness and enterprise cross-border innovation. This finding shows the importance of resource management practices in driving innovation outcomes, particularly in the context of enterprise cross-border innovation where resource constraints and

uncertainties are common. The moderating effects of management cognitive structures (flexibility and complexity) on the relationship between managerial alertness and enterprise cross-border innovation provide valuable insights into the mechanisms driving innovation processes in organizations. This finding contributes to the growing body of literature on cognitive perspectives in organizational behavior and innovation by demonstrating the interactive effects of cognitive factors on managerial behavior and organizational outcomes. Specifically, our results align with theories of cognitive complexity and flexibility, suggesting that managers with higher cognitive abilities are better equipped to process and respond to complex, dynamic environments, thereby enhancing their innovative capabilities.

6.2. Practical Implications

Enterprise cross-border innovation is now strategically necessary for firms looking to stay competitive and prosper in a variety of markets in today's globalized world. It is vital to understand how managerial alertness, resource bricolage and management cognitive structures (complexity and flexibility) combined might affect enterprise cross-border innovation. After conducting our research, we found that the relative findings have a number of extremely significant practical implications for organizations and individuals engaged in enterprise cross-border innovation activities.

Firstly, this research provides evidence that proves that managerial alertness is a very important attribute for managers in enhancing enterprise cross-border innovation and resource bricolage activities in enterprises. By enhancing their level of alertness, managers will be able to identify new opportunities and potential threats in the marketplace, which is very important for cross-border enterprises. This means enterprises should start investing more in training programs and initiatives that are aimed at enhancing managerial alertness among managers.

Secondly, the positive impact of managerial alertness on resource bricolage suggests that alert managers are more capable of leveraging the enterprise's existing resources in novel ways to tackle challenges and opportunities presented by cross-border innovation activities. Therefore, enterprises should foster an environment of resourcefulness and creativity among their managerial staff to benefit from this relationship.

Thirdly, the finding that resource bricolage is positively related to enterprise cross-border innovation and the mediating role of resource bricolage also points out the importance of resource optimization in enterprises and the need for managers to actively engage in resource management practices to help improve enterprise cross-border innovation activities. Resource bricolage being positively related to enterprise cross-border innovation suggests that Enterprises should promote flexible resource utilization strategies that will allow improvisation and experimentation, thereby fostering innovation in cross-border operations. The mediating role of resource bricolage highlights the need for enterprises to develop frameworks and processes that help managers to effectively identify, acquire and deploy resources across enterprises to support innovation activities.

Lastly, the moderating hypothesis provides evidence that the cognitive readiness of managers and their cognitive structures, cognitive flexibility and complexity are conditioning factors in the relationship between managerial alertness and enterprise cross-border innovation. Thus, organizations are not only required to have alertness, but they should also enhance the cognitive ability of the managers. As a matter of fact, the training programs and interventions that are aimed at developing cognitive flexibility and complexity in managers can be seen as practical applications in organizations. Such programs may include activities to develop problem-solving ability, decision approaches, and the chance to interact with multiple points of view and experiences. Cognitive instruments will help managers clearly understand complicated and dynamic cross-cultural conditions, and organizations will be able to utilize managerial alertness fully for innovation purposes. Moreover, this should be done by the organizations noticing and taking advantage of the different ways of thinking among their managers. Certain managers may possess a natural proclivity for cognitive flexibility and complexity, which is above average levels, while others may need additional training to facilitate their development. By grasping the cognitive individual profiles of their managers, organizations can customize their training and development programs to be sure that they effectively manage their managerial teams and foster enterprise cross-border innovation.

6.3. Limitations and Future Research Directions

While this study offers a valuable contribution to extant literature, additional surveys with a wider range of participants are needed to strengthen the validity and reliability of the scale. Because of difficulties in reaching management teams in enterprises in China, there were just 313 participants, which is good but could be better. While the study primarily focuses on a national sample of Chinese enterprises, its conclusions might not hold true in other parts of the world, considering cultural differences. Future studies may also extend the instrumentalization of this study by using other methodologies and sources of information. Other interesting opportunities for research in this area lie in performing more specific sector analyses. Other research can use one or two sectors to investigate further and broaden the scope by investigating other environments. Another gap is exploring beyond managers and considering employees. The alertness of all employees could be explored.

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