The Indirect Impact of Entrepreneurial Gender on Innovation of Enterprises in China

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ABSTRACT

This research examines the mediation effects of prior experience, access to finance, government regulation, and workforce skills on entrepreneurial gender and corporate innovation in China. The aim is to study the factors that influence innovation decisions of women entrepreneurs and to promote corporate innovation in women-owned enterprises in developing countries like China. The data of this research comes from China Enterprise Survey conducted by World Bank in 2012. The findings revealed that prior experience, government regulation, and workforce skills have significant individual mediation effect on the relationship between entrepreneurial gender and corporate innovation. Also, prior experience, access to finance, government regulation, and workforce skills together played a significant overall mediating effect on corporate innovation in women-owned enterprises. The results of this study will provide important insights to women owners of enterprises, policy makers, and researchers to further understand the influence of prior experience, access to finance, government regulations, and workforce skills on corporate innovation in China and other emerging countries.

Keywords: Entrepreneurial Gender, Innovation, Prior Experience, Access to Finance, Government Regulation, Workforce Skills

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1. Introduction

Entrepreneurship and innovation are seen as indispensable for social development and business growth in many empirical studies. Entrepreneurship affects economical sustainability positively through opening the windows of market opportunities (Kamberidou, 2013), creating job opportunities (Economidou et al., 2018), and alleviating poverty (Sutter et al., 2019). Innovation drives development by providing innovative economic models that implement the transformation of economic growth pattern by shifting the extensive development mode to the intensive model (Akhmetshin et al., 2018). Innovation also leads to additional production potentials and increased competitive capability of an economy through providing new solutions for products, processes, and services (Lundvall, 2010; Knight, 1967). Since entrepreneurship activities usually involve looking for and taking advantage of innovations to create new ventures or grow existing ones (Hofstrand, 2010), innovation is inextricably linked to entrepreneurship.

Proceeding research has already realized that innovation plays a vital role in the entrepreneurial process required by businesses to achieve competitive advantages (Annamalai, 2019; Farinha et al., 2018). Schumpeter defined an entrepreneur as an innovator. Shackle listed innovative thinking, quality related to personal background and education, and pre-entrepreneurial experience as important abilities for an entrepreneur (Deakins, 2009; Della-Giusta & Phillips, 2006). Also, since innovation can continuously provide businesses with new opportunities to achieve competitive advantages, enterprises participating in innovation activities have a greater chance to succeed (Kahn, 2018).

In recent decades, the increasing education opportunities for women and the rapid growth of technology have become a pull factor that attracts more women to the management of new ventures or innovation activities (Dai, Byun, & Ding, 2019). Women are using their wealth of talent and leadership to create working opportunities for both themselves and others. Women owned businesses are therefore becoming essential powers fueling competitive growth and diversity within the global market (Murphy et al., 2019). However, women entrepreneurs still face many

challenges in the growth and sustainability of their business (Coleman et al., 2019; Annamalai, 2019; Hasan & Almubarak, 2016). Literature has highlighted several factors including prior experience (Garzón-Vico et al., 2016), funding (Terjesen et al., 2015), and environmental factors (Hasan & Almubarak, 2016), etc. that will influence the innovation performance of women owned enterprises. According to the crucial role women played in modernizing growing economies, there is a need to understand the challenges faced by women entrepreneurs. Therefore, the current study aims to identify the influence of prior experience, access to capital, government regulations, and workforce skills on innovation activities in women-owned enterprises.

1.1 Female in Entrepreneurship and Innovation

A woman entrepreneur is defined as "the women or group of women, who initiate, organize and operate a business enterprise" (Pandian & Jesurajan, 2011). In 2012, an estimated 126 million women were starting or running new businesses in 67 economies around the world, and approximately 48 million female entrepreneurs and 64 million female business owners currently employ one or more people in their businesses (Kelly et al., 2013). Gundry (2014) also pointed out that in the Russian context of the early 21st century, family firms' sustainability is influenced by the risk-taking attitudes of their women leaders. Although the participation of women in entrepreneurial activities has increased around the world (Bosma et al., 2019-2020), there are still several factors challenging the growth and sustainability of their business (Annamalai, 2019; Hasan & Almubarak, 2016).

In the past, women entrepreneurs were perceived as less innovative than their male counterparts. However, many empirical findings show clear evidence that entrepreneur gender indirectly affects innovation activity through some mediators (Marvel, Lee, & Wolfe, 2015), but not that woman entrepreneur per se is less innovative (Bijedić et al., 2016). Cohoon et al. (2010) highlight that there are still some potential gender characterization differences among entrepreneurs, although male and female entrepreneurs are similar in many aspects. The widespread gender inequality in social and economic life is a critical factor led to this problem.

One of the most obvious evidence is that in most countries far fewer women than men study and work in STEM (science, technology, engineering, and maths) subjects (Marvel et al., 2015; OECD, 2016). Lacking the skills and experience necessary for technical innovation, women are rare in the sort of fields that produce most technological innovations (Annamalai, 2019).

Gender stereotypes also lead to inequities. Bijedić et al. (2016) point out that "a combination of institutional constraints and traditional role models contribute to women self-selecting into less innovation-prone professions and working structures" (P67). Research indicates that female entrepreneurship is partly driven by flexible schedules to balance work and family goals, whereas male entrepreneurship is usually related to higher financial motivation (Yacus et al., 2019; Giotopoulos et al., 2017; Marvel, Lee, & Wolfe, 2015). Beliefs such as women are emotional, their minds are limited, they are not good for big capitals, and may leave their work because family is their first priority, are directly influencing women entrepreneurs' growth orientation (Hasan & Almubarak, 2016). On average, female entrepreneurs have fewer financial and time investment which is required for the often money- and time-intensive innovation activities (Bijedić et al., 2016). These inequalities generated by the gender stereotypes hindered women entrepreneurs engage in innovation activities.

Women's career prospects are also limited by the inequality caused by inflexible economic and social structures. These may indirectly affect female entrepreneurs by limiting their ability to access to social, cultural, human, and financial capital, which means it is difficult for them to generate personal savings, have credit histories attractive to resource providers, or engage the interest of loan officers, angel investors, and venture capitalists (Gatewood et al., 2003; Gupta et al., 2009; Marlow & Patton, 2005; Sara & Peter, 1998). From all above, evidence showed that entrepreneur gender does not directly influence the firms' innovation ability but will indirectly affect innovation activities through some mediators.

1.2 Female Entrepreneurship in China

The development of entrepreneurship in China has been greatly facilitated by China's

economic transition (He et al., 2019). Particularly, the 13th Five-Year Plan (2016-2020) has recognized innovation as one of the top priorities during this period. Entrepreneurship and innovation have been recognized as a new engine fueling China's economic growth. To encourage mass entrepreneurship and innovation, the Chinese government has made enormous efforts in developing policies and programs that will promote the development of innovative entrepreneurial companies. Since 1982, the Chinese government has introduced various government-subsidized R&D programs including "The Key Technologies R&D Program", "The National High-Tech R&D Program (The 863 Program)", and so on to promote technical upgrading and to develop innovation capacity of Chinese companies (Li et al., 2019). During the 2016 G20 Hangzhou summit, after proposed the G20 entrepreneurship action plan with the other member countries, China launched the Entrepreneurship Research Center aiming to promote decent work and economic growth through entrepreneurship (Bosma et al., 2019-2020). To further enhance the institutional environment of entrepreneurship in China, the Chinese government issued a guideline for strengthening the protection of intellectual property rights (IPR) in September 2019 (State Council of P.R. China, 2019b). Entrepreneurship and innovation development in China are entering a golden era.

Research conducted by Han et al. (2019) highlighted the promoting effect of female top managers on corporate innovation. Realizing women's power in promoting mass entrepreneurship and innovation, the Chinese government has been committed to encouraging women to engage in the activities of entrepreneurship and innovation in recent years. Under the efforts of the Chinese government and people, women's social and political status has improved significantly, women's rights have been safeguarded properly, and women's educational level has risen further (State Council of P.R. China, 2019a). For this progress, more Chinese women are engaging in the activities of China's economic development. Since 2009, more than 380 billion yuan of small loans have been issued to encourage women to start their own businesses. Also, the Chinese Women's Federation, Ministry of education, Ministry of human resources and social security, and China Women Entrepreneurs Association have launched a serious of entrepreneurship training courses,

established a number of women entrepreneurship demonstration bases, and created a plenty of women entrepreneurship and innovation incubator service platforms to support women realizing their dreams of entrepreneurship (China News, 2019). According to the reports from Global Entrepreneurship Monitor (GEM), Chinese female/male Total early-stage Entrepreneurial Activity (TEA) ration has increased to 0.84 in 2020 from 0.73 in 2016 (the beginning of the 13th Five-Year Plan) (Bosma et al., 2019-2020; Herrington & Kew, 2016-2017). This provides clear evidence that the strategies of the Chinese government to encourage women entrepreneurship have achieved remarkable results.

However, although Chinese female entrepreneurship has made a marked progress, there is still a certain gap compared with western female entrepreneurship. According to the GEM 2019/2020 report, China's female TEA rate only ranked 31st out of the 50 economies (Bosma et al., 2019-2020). According to the Mastercard Index of Women Entrepreneurs report carried out in 2019, although there is no gender bias in higher education admissions in China, women's role as business leaders or business owners is lower than expected (Mastercard, 2019). In China, women make up approximately 48.9% of the total population, hence it is necessary to encourage more women to participate in entrepreneurial activities to improve the poverty situation, decrease the unemployment rate, and boost economic growth.

1.3 Research Problem

The research problem is concerned with the innovation ability of women owned businesses in China. The extent of the mediation impact is different based on the socio-cultural contexts which the enterprises embedded in, since these contexts will determine the nature and extent of the cultural and structural obstacles faced by the entrepreneurs. It is important to conceive of entrepreneurial gender and enterprises' innovation ability as embedded in the social-cultural context which defines the criterion of innovation. China's success in improving its innovation capacity is notable. According to the Global Innovation Index, the ranking of China moved up to 14th among 129 countries in 2019, whereas China only ranked as 34th among 141 countries in

2013 (‘Global Innovation Index 2019’, n.d.). Research shows that the role of Chinese women entrepreneurs in both China and the global economy is noteworthy (Orlova, 2004). To learn this development of China’s innovation capacity, a further study on innovation ability in women-owned enterprises in China is necessary.

The effects of prior experience, access to capital, government regulations, and workforce skills on the innovation ability of women-owned enterprises within different region blocks such as Europe and America have been proven in proceeding literature, but articles studying the impact of them on women-owned businesses in China are lacking. Therefore, it is worth to learn whether the findings derived from developed economies are could also be applied in China or even emerging countries. Because of the gap in the literature regarding the mediation effects of those factors on women-owned enterprises in China, there is a need to understand the roles of prior experience, access to capital, government regulations, and workforce skills on the innovation ability of women-owned businesses in China. In order to address this research need, this study aimed at obtaining a comprehensive understanding of the mediating roles of prior experience, access to capital, government regulations, and workforce skills on the relationship between gender and innovation ability of enterprises in China.

1.4 Research Purpose

It is expected that this study will make at least three contributions to the areas of innovation and entrepreneurship research. First, as more is known about the relationship between gender and innovation, it will be possible to more clearly understand the influence of mediators within this relationship. This research study is viewed as a piece of this puzzle.

Second, the study is the first attempt to investigate the mediation effects of prior experience, access to capital, government regulations, and workforce skills on the relationship between gender and corporate innovation in China. Although there are many prior studies on these factors and innovativeness in women-owned firms, none of them are studied based on a Chinese context. As different country has different culture and institutions which will influence innovation activities in

enterprises, the research questions related to a country should be analyzed under the country's own background. This study should contribute to a better understanding of the mediation effects of those four factors on the relationship between gender and innovation based on a Chinese context. This is also helpful to learn whether the findings of this relationship in China are consistent with that in developed countries.

Finally, the ultimate issue underlying the study is encouraging more women to engage in entrepreneurship activities. It is anticipated that the study may advise institutions on what factors are influencing women's innovation capacity in China or countries with similar institutions. While this is an enormous undertaking, the study could prove to be a small step in this direction.

To achieve these purposes, this study was divided into five parts. The first part of this study is an introductory part that puts forward the research questions and main contents through a simple review. The second part provides a literature review and research hypotheses. While the third part includes the study methodology and a description of the data. The fourth part is organized to display the results from the statistical tests and discussions. Lastly, the conclusion and study limitations are set in the fifth part.

2. Literature Review and Hypotheses

2.1 Innovation Performance

Innovation can improve enterprises' overall performance by fulfilling customer needs, increasing productivity, and enhancing cost-effectiveness; therefore, it provides enterprises with sustainable competitive advantages (Annamalai, 2019; Lundvall, 2010). It is important to develop and publish its definition of innovation when an organization chooses to pursue innovation as its way to success (C.-J. Chen & Huang, 2009). Innovation was defined in many ways in different articles. For example, Dougherty and Hardy (1996) describe innovation as a capability of an establishment to generate new products and services ideas. Cady and Valentine (1999) give the definition to innovation as the number of new ideas generated (p.731), which is more concerned

to the quantity but not the quality of innovation. Miller and Triana (2009) define innovation as strategies that can provide companies with new opportunities to create products and services. However, according to the extant literature, those definitions are usually donated as innovation where technology helps enterprises ensure market domination and growth through maintaining their growth in the existing market (Walsh & Kirchhoff, 2002; Wilson, 2004).

Smith-Doerr (2010) highlights the potential negative impact of technological innovation on the participation of women. The reason is that the educational and training aspects related to natural science, technology, engineering and mathematics (STEM) are less interest among women (Nissan et al., 2012). This difference in education and training has resulted in barriers for women to access innovation activity and entrepreneurial activity in high-technology sectors (Delmar, 2003; Carrasco, 2014). Pettersson and Lindberg (2013) problematize that innovation is an area presented "either by blindness or male dominance" (p.327). They point out that innovation is usually related to mechanical machines and technical products but not to subjects considered feminine, such as social, organizational and service innovation. In the regards above, there is a need for a broader definition of innovation to facilitate such innovations dominated by women but not considered as innovations in the traditional male sense. Justified by acknowledging both innovation-generating and innovation-adopting aspects in organizations, the definition of innovation was broadened by Eriksson. This version of definition also includes innovations that are considered as feminine. Eriksson (2014) describes innovation as "the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (p.165). In recent years, research has developed innovation as a multi-stage process including the generation of new ideas, the promotion and practice of these ideas using existing resources (Lu et al., 2015).

A company's innovation performance is determined by its activities related to innovation. For an organization pursuing innovation, it should encourage the introduction of new technologies, processes, and ideas that will result in new products, services, and working methods (Halim et al., 2014). In many prior literatures, scholars mainly take the occurrence of innovation behaviors as

measurement standards (J Chen & Zheng, 2016). Therefore, the number of innovation activities engaged by enterprises are taken as a measurement standard in this paper.

2.2 Prior Experience of Manager and Corporation Innovation

BarNir (2014) proposed that previous managerial experience is positively associated with innovation. Based on a sample of 982 nascent entrepreneurs, her study made it clear that previous managerial experience can improve one's abilities to deal with challenges associated with innovation activities and thereby affects the extent of innovation. Garzón-Vico et al (2016) argue that experience can lead to developing skills and abilities to evaluate and develop future projects. Prior experience also allows entrepreneurs to draw on relevant examples to predict the course of action and potential problems for new tasks (Ericsson & Charness 1994). Under these circumstances, entrepreneurs can draw meaningful comparisons between current tasks and similar previous tasks (Thompson, Gentner, and Loewenstein, 2000), and thereby improve the innovation performance of their firms. Shane and Venkataraman (2000) also point out that the knowledge earned from experiences is essential for people to identify and exploit opportunities. Therefore, experience is seen as an important determinant of firms' ability to innovate.

In the context of China, the skills and expertise accumulated from prior experiences will help Chinese entrepreneurs better understanding the unique economic and business environment of China and thereby catching potential business opportunities rapidly when it appears. Before adopting economic reforms in the 1970s, China had operated as a planned economy for decades. Within planned economies, most of the establishments were state-owned. Enterprises' development plans and resources are all distributed by the Chinese government; therefore, the personal management skills and capabilities of the organization managers are not that important (Zhou & Li, 2007). It was not until the carrying out of the economic reform that the importance of prior experience has been recognized in China when most Chinese entrepreneurs have to learn how to run a business from scratch (Yang et al., 2018). Prior experience can not only lead to capabilities crucial for entrepreneurship but also help entrepreneurs develop relationships (known

as *guanxi* in Chinese) with stakeholders (Peng & Luo, 2000). Given the social collectivism of the Chinese culture and historical concerns of "*guanxi*", this kind of relationship gives entrepreneurs access to business networks and allows them to acquire the latest news related to enterprise survival and business development (Yang et al., 2018).

However, according to Liberal Feminism Theory, both legal discrimination and traditional gender stereotypes caused less experience of women than that of men (Fischer, Reuber, & Dyke, 1993). For example, the tendency for encouraging women to take less "practical" types of education or to seek jobs that claim less technical knowledge is seen to diminish their abilities and opportunities to achieve technological innovations. After survey 136 (11 female) manufacturing firm owners, 156 (29 female) retail firm owners, and 216 (20 female) service firm owners, Fischer et al. (1993) find that women entrepreneurs were less experience in managing employees, in working in similar businesses, or in helping to start-up new ventures than their male counterparts. They also suggest that women's lesser experience may help to explain the smaller size and the slower development of their enterprises. A lack of industry experience and professional training can lead women entrepreneurs to smaller networks (Lim & Suh, 2019) and the lack of access to important resources for enterprise development (Shahriar, 2018). From above, the current research expects that:

Hypothesis 1. Prior experience has a mediation effect on innovation in women-owned enterprises.

2.3 Access to Finance and Corporation Innovation

Funding is critical at each stage of the creation and development of an enterprise (Desiree & Kengne, 2016; Leitch et al., 2018). Research indicates that there is a positive relationship between firm performance and access to finance (Lim & Suh, 2019). In the process to achieve competitive advantages, innovation plays a positive role (Farinha et al., 2018); however, there are significant costs involved in innovation processes. To pursue new products or services, firms usually have to invest large amounts of money on R&D activities. Cincera and Ravet (2010) give evidence that R&D activities may be sensitive to cash-flow changes. The adequate fund is important to the

implementation of R&D activities. Both men and women entrepreneurs who want to engage in R&D activities need support and resources from others (e.g. suppliers, bankers, venture capitalists, etc.) to acquire material and human resources (Gatewood et al., 2003; Gupta et al., 2009). However, as its low collateral value, R&D projects usually meet financial constraints when applying for a loan (Czarnitzki, Hall, & Hottenrott, 2014). Consequently, hard to accessing finance becomes one of the factors that hinder firms' innovation.

Chinese innovative entrepreneurial firms suffer from more financial constraints than that of developed countries (He et al., 2019). Due to the weak protection of intellectual property rights (IPR) in China, imitating or stealing others' innovation ideas only faces a lower probability of legal sanctions (Ang et al., 2013). To keep their competitive advantages, most Chinese innovative enterprises choose to keep their important product and operation information as secrets. This information asymmetries between companies and their potential investors caused more severe constraints when companies applying for investment or bank loans (Li et al., 2019). The resources providers usually have to make investment decisions under the uncertainty of lacking complete information of the innovations and thus may be particularly vulnerable to the influence of stereotypes (Heilman, Martell, & Simon, 1988). Gupta et al., (2009) highlight that people are more likely to provide supports to entrepreneurs who fit their stereotype of potentially successful innovator.

However, most of the resource providers are more likely to see innovations as masculine products due to their stereotypes of women and innovation. These stereotypes limited female's ability to access to social, cultural, human, and financial capital (Carter & Rosa, 1998; Gatewood et al., 2003; Marlow & Patton, 2005; Aidis, 2016). For example, Aidis (2016) analyzed three cases based on the experiences of three successful and innovative female entrepreneurs from Brazil, Colombia, and Bolivia. Collected in 2012 and updated in 2015, the data in her study came from three different countries as well as three different sectors: personal services (Beleza Natural), industrial services and recycling (Ingerecuperar) and manufacturing (Origenes Bolivia). In her paper, all the three successful women entrepreneurs met problems when accessing capital which

is crucial for their business growth. As they are women, the bank even did not view them as "legitimate entrepreneurs". This argument is also supported by Lim and Suh (2019), whose research suggests that female entrepreneurs are facing a lower chance of getting access to finance owing to gender stereotypes. Access to finance has been and continues to be a great barrier in the growth and sustaining of women-owned enterprises (Yacus et al., 2019). Many innovations are never pursued by women who do not have enough capital to finance their business operations (Aidis, 2016).

Realizing this problem that hindered women entrepreneurs engaging in innovation activities, four departments including the Women's Federation of China and the Ministry of Finance of China implemented the policy of financial discount for small guaranteed loans. The People's Bank of China and the Women's Federation of China also jointly issued a notice named "Innovating financial services to support women entrepreneurship and employment" to solve the financial problem for women entrepreneurs. From 2009 to 2017, a total of 322.10 billion yuan of loans for women entrepreneurship were issued in China and helped over 5.89 million women to start their own businesses (State Council of P.R. China, 2019a). At present, the policy support stimulates the enthusiasm and belief of Chinese women in entrepreneurship and innovation. Therefore, the current research expects that easier access to capital can promote the innovation of women-owned enterprises in China. This research will exam the following hypothesis:

Hypothesis 2. Access to finance has a mediation effect on innovation in women-owned enterprises.

2.4 Government regulation and Corporation Innovation

Entrepreneurs should act within the constraints that formed by the context in every society. The context is made up of institutions that form the "rules of the game" (North, 1990). These institutions legally define an individual's rights and freedom through culture, customs, laws, and traditions (Aidis, 2016). In general, the most powerful institution in a country is the government. Both firms' establishment and daily operations cannot avoid dealing with the government. Therefore, the attitude of governments toward innovation and entrepreneurship crucially

influenced entrepreneurs. Commonly, entrepreneurs experience impediments and barriers from "the bureaucracy".

There is a growing number of studies in the field of female entrepreneurship have adopted an institutional lens (De Bruin, Brush, & Welter, 2007). A study titled Women, Business and the Law shows that more gendered legal restrictions result in fewer female-owned business (World Bank, 2013). In Aidis's (2016) paper, a respondent in the interview said that she had waited for an entire year before she was given the permit to open her cosmetics factory since the local officials did not believe her innovation would be profitable. It is the fact that applying licenses, permits, and copyrights for any innovation requires time or sometimes failed. However, the long waiting time may result in missing the appropriate entry time of an innovation, and the failure of applying for permits or licenses may even lead to the failure of innovation. Although many countries have realized the importance of women entrepreneurs to the development of a country's economy and give some preferential policies to them, stereotypes of females make them face more bureaucratic barriers than their male counterparts when implementing innovation activities (Aidis, 2016).

Realizing the negative effect of bureaucracy on entrepreneurship and innovation activities, the Chinese government has made efforts to simplify government approval flow and to eliminate sex discrimination in the process. In present, China is under the economy transition period. The institutional environment, economic structures, and business market in transition economies are significantly different from those in developed economies (Yang et al., 2018; Peng & Shekshnia, 2001). For this reason, the amount of time spent on dealing with government regulations in transition economies may have effects on enterprise innovation:

Hypothesis 3. Government Regulation has a mediation effect on innovation in women-owned enterprises.

2.5 Workforce Skills and Corporation Innovation

Toner (2011) pointed out that an increase in innovation-related investments such as R&D is associated with an increase in the demand for higher workforce skills. The reasons for this

cumulative causality in the field of production and consumption are various. These include, for example, the rapid growth in the 'volume' of productive knowledge requires enterprises and individuals with higher capacity to identify, evaluate and adapt this knowledge. Uncertainties brought by the increased rate of technical change require enterprises an increased adaptability and problem-solving skills. Also, the ever-growing intensity of competition within the marketplace compelled companies pursuing higher workforce skills to adapt strategy shifts and technology changes (Toner, 2011; Streeck, 1989; Vickery & Wurzburg, 1996).

Past studies on gender and entrepreneurship have pointed out that social and human capital acquired by male and female are different (Robb & Coleman, 2010). Owing to both legal discrimination and traditional gender stereotypes, most women chose the family as their first priority and thus, have limited chances to expose to the business environment (Simmons et al., 2019). As a result, social and human capital accumulated by women entrepreneurs are smaller, less varied, and more family-oriented than that of men (Lim & Suh, 2019). Since human capital has been proved to be an important predictor of enterprise survival and success (Bosma et al., 2004; Carter et al., 1997; Coleman, 2007; Robb & Coleman, 2010), firms with less human capital are less attractive to external capital including skilled workforce. For this reason, women entrepreneurs may possess fewer skilled workforce in their new ventures, which may have an adverse impact on the firm's innovation capacity. However, this may be different in the Chinese context.

Due to the mass entrepreneurship and innovation strategy of the Chinese government, there appear many innovative enterprises in China. However, because of late started and less experience compared with Western developed countries, innovative enterprises in China have a weaker ability of independent innovation (Chen et al., 2011). Research has recognized the ability of enterprises to absorb knowledge as a crucial factor of corporate innovation (Chen & Chen, 2006). Cohen and Levinthal (1990) emphasized that the individual knowledge absorptive capacity of employees is the basis of the knowledge absorptive capacity of enterprises. They believe that the past knowledge and experience of individuals are closely related to their own knowledge absorptive capacity. For

this reason, more of today's Chinese enterprises choose to employ individuals with higher education levels, encourage internal learning, and introduce training programs within organizations for enhancing their workforce skills to promote enterprise innovation. Especially for Chinese women entrepreneurs, they need to prove their own values as an entrepreneur through promoting corporate innovations and therefore, they are paying more attention to the cultivation of human capital (Li et al., 2017). Thus, the current research expects that a higher level of workforce skills is positively related to innovation in women-owned enterprises in China:

Hypothesis 4. Workforce skills have a mediation effect on innovation in women-owned enterprises in China.

3. Method

3.1 Data Sources

The data of this research comes from China Enterprise Survey (2012). The standard Enterprise Survey topics which are related to the current research include firm characteristics, gender participation, workforce composition, access to finance, business-government relations, and innovation and technology. Over 90% of the questions objectively ascertain characteristics of the country's business environment. The mode of data collection is face-to-face interviews.

The reason for selecting this data source is based on the following reasons: First, the availability and authority of data. Generally, microdata at the company level is difficult to be achieved by the Chinese public, and this is the latest publicly released by the World Bank Survey of Chinese Enterprises (Han et al., 2019). Second, the representativeness of the sample. Since non-listed companies make up most of the Chinese market, based on the comprehensive consideration of the make-up of market entities, the World Bank conducted a stratified sampling survey method and investigated 2848 enterprises in various industries, establishment sizes, and regions.

Between December 2011 and February 2013, the China Enterprise Survey is answered by business owners and top managers in 25 cities throughout 12 provinces (cities) including Beijing City (municipalities), Chengdu City, Dalian City, Dongguan City, Foshan City, Guangzhou City,

Hangzhou City, Hefei City, Jinan City, Luoyang City, Nanjing City, Nantong City, Ningbo City, Qingdao City, Shanghai City (municipalities), Shenyang City, Shenzhen City, Shijiazhuang City, Suzhou City, Tangshan City, Wenzhou City, Wuhan City, Wuxi City, Yantai City, Zhengzhou City. A total of 2,700 privately-owned and 148 state-owned were successfully interviewed over this period. To maintain comparability of the China Enterprise Surveys to surveys conducted in other countries, only the data set of the 2,700 privately-owned companies will be employed in this research. All questions referring to the last complete fiscal year refer to FY2011.

3.2 Sampling Cleaning

In order to better conduct research, this paper screens and process original data from China Enterprise Survey. The main steps are as follows: (1) Considering the validity of data, this paper deleted data that does not match with the reality. Observation data labeled “No, does not match” according to question A5: “Sector match between screener information and sample frame” (three options are given: 1. Yes, screener and sample frame info match; 2. No, screener and sample frame do not match but establishment still does activities which match sample frame; 3. No, does not match.) is deleted. Observation labeled “not truthful” according to question A16: “It is my perception that the responses to the questions regarding opinions and perceptions” (three options are given: 1. Truthful; 2. Somewhat truthful; 3. Not truthful.) is deleted. Observation labeled “Are arbitrary and unreliable numbers” according to Question A17: “The responses to the questions regarding figures” (three options are given: 1. Are taken directly from establishment records; 2. Are estimates computed with some precision; 3. Are arbitrary and unreliable numbers.) is deleted; (2) Considering the comparability of sample, subsidiary companies are deleted due to their different governance models with parent companies. Observations with the answer “Yes” according to Question A7: “Establishment is part of a larger firm?” (two options are given: 1. Yes; 2. No, a firm on its own.); (3) For the sake of prudence, missing values from all variables are deleted from all models and will not apply any replacement. As a result, there are a total of 1062 observations left in the models.

3.3 Theoretical Model

James and Brett (1984) proposed that if the independent variable X affects the dependent variable Y through the influence of the variable M, then the variable M is expressed as an intermediate variable. Baron and Kenny (1986) indicated that to ensure the mediation effect of the intermediary variable M, four conditions must be met: First, the independent variable X must be correlated with the dependent variable Y significantly. Second, the independent variable X must be correlated with the intermediary variable M significantly. Third, the intermediary variable M must be correlated with the dependent variable Y significantly. Forth, after adding the mediating variables, if the effect of X on Y is significantly decreased, then the mediator M has a partial mediation effect; if the effect of X on Y disappears, then the mediator M has a complete mediation effect. Based on the theory of mediation effects and considering the possible connections within the mediators, this article establishes the intermediary effects model to test the hypotheses mentioned above. The theoretical model is shown in Figure 1.

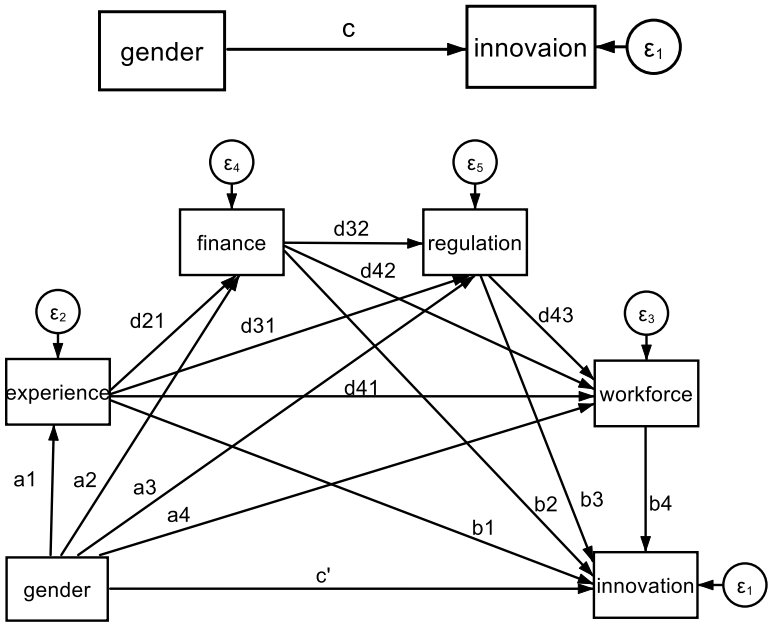

Figure 1. Theoretical Model

In this paper, STATA 16.0 is used to conduct empirical analysis. The analysis of multiple mediating effects includes individual mediating effect tests and overall mediating effect tests. The

individual mediating effect test is to analyze the significance of independent mediating effect and chain mediated effect. The significance of the overall mediating effect does not constitute a necessary condition for the analysis of individual mediating effects (H. Li & Cai, 2018). Based on the intermediary effects test process recommended by Zhonglin et al. (2014), this research will conduct empirical analysis by the following steps: First, the "casual steps approach" and the "bootstrapping method" will be carried out to test the research hypotheses separately. The regression equations which will be used in this step are:

$$Innovation=\alpha_1+cGender+\Sigma\gamma_kControl+\varepsilon \quad (1)$$

$$Mediators=\alpha_2+aGender+\varepsilon \quad (2)$$

$$Innovation=\alpha_3+c'Gender+bMediators+\Sigma\gamma_kControl+\varepsilon \quad (3)$$

Then, a structural equation model (SEM) will be built to test the total mediating effects of all the mediators. The regression equations which will be used in this step are:

$$Innovation=\alpha_1+cGender+\Sigma\gamma_kControl+\varepsilon \quad (4)$$

$$Experience=\alpha_2+a_1Gender+\varepsilon \quad (5)$$

$$Finance=\alpha_3+a_2Gender+d_{21}Experience+\varepsilon \quad (6)$$

$$Regulation=\alpha_4+a_3Gender+d_{31}Experience+d_{32}Finance+\varepsilon \quad (7)$$

$$Workforce=\alpha_5+a_4Gender+d_{41}Experience+d_{42}Finance+d_{43}Regulation+\varepsilon \quad (8)$$

$$Innovation=\alpha_6+c'Gender+\sum_{j=1}^{4} b_jMediators+\Sigma\gamma_kControl+\varepsilon \quad (9)$$

Of these, innovation represents the dependent variable of corporate innovation behavior, and gender represents the independent variable of the gender of top managers. Control represents the control variables including competition degree, firm size, regional characteristics, and sectoral characteristics. Mediators represent the mediating variables of experience, access to finance, government regulation, and workforce skills. α represents constant terms, and ε represents random error terms.

3.4 Variables

In this paper, the number of innovation activities engaged by the establishments is set as the

dependent variable. Gender of the top managers of the establishments is set as the independent variable. The year of experience of top manager has, the proportion of external financial resources, the percentage of seniors' time spent on dealing with regulations, and the percentage of full-time permanent workers who completed secondary school are set as mediation variables. Firm size, competitive degree, region characteristics, and region characteristics are set as controlled variables. Details will be seen in Table 1.

3.5 Dependent Variable

Innovation is a time-intensive process and cannot simply be measured by its result. In fact, corporate innovation requires both incremental innovation and radical innovation. Incremental innovation activities may include a combination of actions for process improvement, cost reduction, product quality improvement, etc., whereas radical innovation is mainly based on the introduction of new products or services (Han et al., 2019). In prior research, scholars mainly take the occurrence of both innovation behaviors as their measurement standards (Cui et al., 2017). According to the questionnaire, question CNo.14 (Over the last three years (2009-2011), what type of innovation activities has this establishment engaged in? CNo.14a: Introduce new technology and equipment(s) for product or process improvements; CNo.14b: Introduce new quality control procedure in production or operations; CNo.14c: Introduce new managerial/administrative processes; CNo.14d: Provide technology training for staff; CNo.14e: Introduce new product or new service; CNo.14f: Add new features to existing products or services; CNo.14g: Take measures to reduce production cost; CNo.14h: Take actions to improve production flexibility.) can be used to measure the innovation activities within the enterprises. Therefore, the number of innovation activities that the corporate engaged in is taken as the measurement standard in the current research. In this case, one score will be obtained if there is one of the above innovation behaviors, and a score of 0 if there is no innovation activity of any kind. The higher score an enterprise obtains, the more diverse innovation activities it engaged.

3.5.1 Independent Variable

The independent variable of the current research is the gender of top managers. According to question B7a (Is the top manager female?), if the answer is “Yes”, the value assigned will be “1”, otherwise, the value given will be “0” which means the gender of the top manager is male.

3.5.2 Mediation Variable

In this paper, experience of top managers, access to finance, bureau barriers, and workforce skills are established as mediation variables.

Experience of top managers can be identified according to question B7 (How many years of experience working in this sector does the Top Manager have?). The higher score for this question means the more prior experience the manager has.

Access to Finance can be identified according to question K3 (Over fiscal year 2011, the proportion of corporation's working capital that was financed from each of the following sources? Working capital is used to pay for day to day operations.) is employed in the current research. Five listed financial sources include internal funds or retained earnings, borrowed from banks, borrowed from non-bank institutions, purchases on credit from suppliers and advances from customers, and others. The money borrowed from banks, non-bank financial institutions, and others are considered as external financial resources. The higher number of this variable means the easier the company access to finance.

Government Regulation can be identified according to question J2 (In a typical week over the last year, what percentage of total senior management's time was spent on dealing with requirements imposed by government regulations?). The higher score gained in this question means the company spends more time on dealing with government regulations.

Workforce Skills can be identified according to question L9b (What is the percentage of full-time permanent workers who completed secondary school?). The higher score gained in this question means the higher the level of workforce skills that company owned.

Table 1. Design and Description of Variables

Type of Variable	Designation of Variable	Description of Variable	Serial Number of Question in the Questionnaire	Variable Assignment
Dependent Variable	Innovation Behaviors	Innovation Behaviors may be a combination of one of more of the following behaviors. For example, process improvement, management improvement, cost reduction, new products and technology introduced, and etc.	CNo14a, CNo14b, CNo14c, CNo14d, CNo14e, CNo14f, CNo14g, CNo14h	"Yes"=1; "No"=0, and final summation. The score reflects the diversity of the innovative behavior of enterprises, that is, the higher score is, the more diversified the innovation behavior of the company is.
Independent Variable	Gender of Top Managers	Is the top manager female?	B7a	"Yes"=1; "No"=0.
Mediation Variable	Experience	How many years of experience working in this sector does the Top Manager have?	B7	Year of top manager's prior experience.
	Access to Finance	Over fiscal year 2011, the proportion of corporation's working capital that was financed from external financial resources.	K3	The percentage of total working capital that was financed from banks, non-bank financial institutions, and moneylenders.
	Government Regulation	In a typical week over the last year, what percentage of total senior management's time was spent on dealing with requirements imposed by government regulations?	J2	The percentage of total senior managements time spent on dealing with government regulations.
	Workforce Skills	What is the percentage of full-time permanent workers who completed secondary school?	L9b	The percentage of full-time permanent workers who completed scondary school.
Control Variable	Degree of Competition	Degree of Competition	E2b	Dummy Variable is set, "High degree of competition" = 0; "Low degre of competition" = 1.
	Firm Size	Number of full-time employees	L1	Natural logarithm
	Regional Characteristics	The city where the sample is located	A2	According to the classification standards prescribed by the National Bureau of Statistics of China, all regions are divided into four economic regions, namely, Pan-Yangtze River Delta Region, Pan-Pearl River Delta Region, Pan-Bohai Sea Region, and other economic Regions.
	Industry Characteristics	Industry Code	A4	Sector distribution shown on the questionnaire

Firm Size can be interpreted according to question L1 (Number of full-time employees). Since there are major differences in the operating behaviors of enterprises in different scales, firm size is set as a control variable.

Industry Characteristics are the sector distribution shown on the questionnaire according to question A4 (The industry of establishments). From the line charts below, it can be found that there are more women entrepreneurs in Garments industry and Hotel and Restaurants industry, which are less popular among male entrepreneurs. Textiles industry and Services of motor and vehicles are also popular among women. However, most of the manufacturing industries and high-tech industries are less attractive to women entrepreneurs. This is accord with the descriptions in the literature review that women are more likely to choose less innovation-prone professions than men.

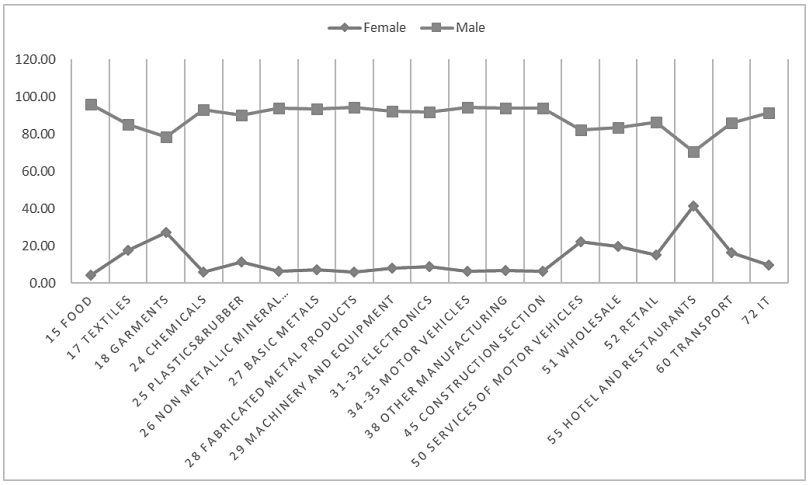

Figure 2. Percentage of Male and Female in Different Sectors

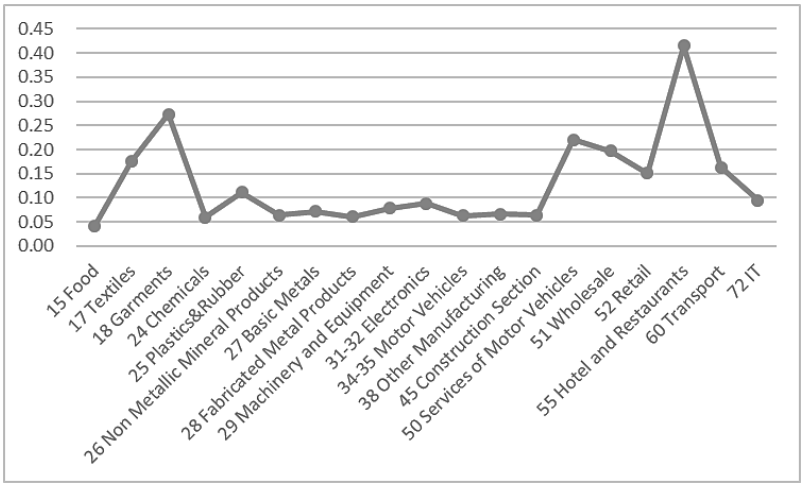

Figure 3. Ratios for Female/Male in Different Sectors

Regional Characteristics are divided according to classification criteria prescribed by the National Bureau of Statistics of China. The 25 cities selected in the survey are divided into four economic regions, namely, Pan-Yangtze River Delta Region, Pan-Pearl River Delta Region, Pan-Bohai Sea Region, and Other Economic Regions. The Pan-Yangtze River Delta Region includes Shanghai, Nanjing, Wuxi, Suzhou, Nantong, Hefei, Hangzhou, Ningbo, and Wenzhou. Pan-Pearl River Delta Region includes Guangzhou, Shenzhen, Foshan, and Dongguan. Pan-Bohai Sea Region includes Beijing, Shijiazhuang, Tangshan, Jinan, Qingdao, and Yantai. The Other Economic Regions include Zhengzhou, Luoyang, Wuhan, Shenyang, Dalian, and Chengdu.

The regional distribution of companies is shown in Table 2. It can be observed that there are more female-owned enterprises located in the Pan-Yangtze River Delta Region, which occupied 33.33% of the total female observations. Pan-Bohai Sea Region owns the least proportion of female-owned enterprises, which is only 19.23%.

Table 2. Regional Distribution of Observations

Gender	Pan-Yangtze River Delta Region	Pan-Pearl River Delta Region	Pan-Bohai Sea Region	Other Economic Regions	Total
Male	319	193	262	213	987
	32.32	19.55	26.55	21.58	100.00
Female	23	21	15	16	75
	30.67	28.00	20.00	21.33	100.00
Total	342	214	277	229	1,062
	32.2	20.15	26.08	21.56	100.00

3.6 Descriptive Statistics

Sample statistical results are showed in Table 3. In this research, there are a total of 1062 observations. (1) In terms of Innovation Behaviors, the mean value is 4.417 and the full range is 8. This indicates that although Chinese enterprises have performed some degree of innovation activities, there still have room for improvement in this regard. (2) In terms of the Gender of top managers, there are 75 female top managers, accounting for 7.06% of the total of observations. This low percentage of female top managers indicates that female entrepreneurs in China are

relatively few and the positions of CEO are usually male dominated. (3) In terms of the Prior Experience of top managers, the average year of CEO's prior experience is 16.637. (4) In terms of Access to Finance, the mean value is 6.444 and the full range is 100, indicating that access to finance is still a severe barrier to most of the Chinese corporations. It may influence enterprises' innovation behavior to some extent, which will be analyzed in the later steps. (5) In terms of Government Regulation, the average percentage of time that Chinese corporations spend on dealing with government regulations is 1.281 and the maximum percentage is 35. (6) In terms of Workforce Skills, the mean value of the percentage of full-time permanent workers who completed secondary school is 47.178, which indicates that many Chinese enterprises are realizing the positive influence of possessing a well-educated workforce on company operation.

Table 3. Statistical table of variables

Variable	Full Sample (N=1062)				T-test
	Minimum Value	Maximum Value	Mean Value	Standard Deviation	
CEO's Gender	0	1	0.073	0.256	——
Innovation Behavior	0	8	4.417	2.790	-1.043***
CEO's Experience	1	47	16.637	7.371	1.561*
Access to Finance	0	100	6.444	14.213	-2.822*
Government Regulation	0	35	1.281	3.113	-0.918**
Workforce Skills	0	100	47.178	27.295	-8.832***

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed)

4. Analysis and Results

4.1 Correlation Analysis and Multicollinearity Test

The result of correlation analysis and multicollinearity test is shown in Table 4. Pearson correlation is conducted to analyze the correlations within the variables. The results indicate that there are strong correlations among dependent variable, independent variable, and mediating variables, yet further tests remain to be conducted. In the process of using cross-section data, the multicollinearity between variables may affect regression results; therefore, a variance expansion factor (VIF) test was conducted. The result shows that the VIF values of the core variables are less

than 10 (the critical criterion for multicollinearity), which means there is no need to worry about the multicollinearity effect in the regression analysis.

Table 4. Correlation Analysis and VIF Test

	Innovation Behavior	CEO's Gender	CEO's Experience	Access to Finance	Government Regulation	Workforce Skills	VIF
Innovation Behavior	1						——
CEO's Gender	0.096***	1					1.05
CEO's Experience	0.060*	-0.054*	1				1.06
Access to Finance	0.118***	0.051*	0.103***	1			1.08
Government Regulation	0.197***	0.076**	-0.048	0.115***	1		1.13
Workforce Skills	0.117***	0.083***	0.006	0.127***	0.193***	1	1.19

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed)

4.2 Model Analysis

Due to the low proportion of female entrepreneurs (7.06% in this paper), the problem of heteroscedasticity is found universally in prior research using the same dataset (Han et al., 2019; Withisuphakorn & Jiraporn, 2017). For the selection of a specific model, the regression method from existing literature is referenced (Han et al., 2019; Cui et al., 2017). In order to reduce the influence of heteroscedasticity, the robust standard error is adopted in the regression analysis of this paper.

4.2.1 Individual Mediation Effects Analysis

First, the direct effects of gender on corporate innovation behavior, experience of top managers, access to finance, bureaucratic barriers, and workforce skills are tested by OLS method and the results are shown in Table 5. The results suggested that the gender of top managers has a significant positive effect on corporate innovation behavior (a=0.963, p-value=0.004), which means that female top managers in companies in China have promoted corporate innovation. This is consistent with the research of Han et al., (2019) that because of the external environment, many Chinese female CEOs promote corporate innovations to acquire others' recognitions.

Table 5. Regression Analyses on Direct Effects

Variable and Regression Result	Innovation Behavior	CEO's Experience	Access to Finance	Government Regulation	Workforce Skills
CEO's Gender	0.963***	-1.561*	2.822	0.918*	8.832**
	(0.334)	(0.892)	(1.831)	(0.516)	(3.533)
ΔR^2	0.0864	0.0029	0.0026	0.0057	0.0069
F	3.62***	3.06*	2.38	3.16*	6.25**
Root MSE	2.7012	7.3638	14.202	3.106	27.214

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed). The number in brackets is the standard error.
The regression results of control variables were omitted.

The negative effect of gender on experience is significant on 90% confidence level (a=-1.561, p-value=0.080), which is consistent with the viewpoint in the literature review part that females are likely to have less business experience than their male counterparts. Gender also has a significant positive effect on government regulation (a=0.918, p-value=0.076). This indicates that women entrepreneurs spent more time on dealing with requirements imposed by government regulations than man did. The significant positive effect of gender on workforce skills (a=8.832, p-value=0.013) means that the average educated level of workforce in female owned companies is higher than that of male owned companies. This indicates that more Chinese women entrepreneurs are realizing the importance of higher-level workforce skills in promoting corporate innovation (Wang & Wang, 2016) and are more willing to choose candidates with a higher education level in the recruitment process.

The relationship between gender and access to finance is not significant (a=2.822, p-value=0.123). However, because of the existence of type II error, there is a possibility that the intermediary effect still exists although the direct effect of the independent variable on the mediation variable is relatively small (Zhonglin et al., 2004). According to the intermediary effect test process introduced by Zhonglin et al. (2014), a bootstrap test is conducted in the next step to test whether the indirect effect of access to finance on the relationship between gender and corporate innovation exists.

Table 6. Regression Analyses on Intermediary Effects

Variable and Regression Result	Model 1	Model 2	Model 3	Model 4
CEO's Gender	1.000*** (0.338)	0.915*** (0.336)	0.827** (0.325)	0.858** (0.335)
CEO's Experience	0.023* (0.012)			
Access to Finance		0.021*** (0.006)		
Government Regulation			0.162*** (0.039)	
Workforce Skills				0.010*** (0.003)
ΔR^2	0.0899	0.0970	0.1173	0.0956
F	3.64***	3.96***	4.90***	3.90***
Root SME	2.6973	2.6868	2.6565	2.6888

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed), The number in brackets is the standard Error. The regression results of control variables were omitted.

The result of the regression analysis on the mediation effects is shown in Table 6. Model 1 tests the mediation effect of prior experience on the relationship between gender and corporate innovation. The coefficients of gender (c'=1.000, p-value=0.003) and experience (b=0.023, p-value=0.060) in the regression equation are both positive and significant. This result shows that the experience of top managers exerts a partial intermediary effect on the relationship between gender of top managers and corporate innovation and positively affects this relationship, indicating that H1 is right.

In the previous step, the result of regression analysis shows that the direct effect of gender on access to finance is not significant; therefore, a bootstrap test is conducted to test whether the indirect effect exists. The result of bootstrap test is shown in Table 7. The result shows that the 90% confidence interval of the indirect effect includes 0, which means the indirect effect of access to

finance on innovation in female-owned enterprises does not significant, indicating that H2 is rejected. However, in past studies, scholars have already recognized the importance of financial capital on innovation and women-owned companies (Coleman et al., 2019; Li et al., 2019). One possible explanation for the result in this research is that the proportion of women entrepreneurs only occupied 7.06% of the entire sample, and this relatively low proportion of women observations cannot show the difference in access to finance obviously. Further research is required when a dataset that includes more female observations is available.

Table 7. Bootstrap Test of the Indirect Effect of Access to Finance

	Observed Coef.	Bias	Bootstrap Std. Err.	[90% Conf.Interval]		
_bs_1	-0.05301263	-0.0005418	0.04449324	-0.0136345	0.1334295	(P)
r(ind_eff)				-0.0023356	0.1492925	(BC)
_bs_2	0.99625001	0.0000346	0.32235237	0.4397410	1.5070950	(P)
r(dir_eff)				0.4408653	1.5084670	(BC)

(P) percentile confidence interval

(BC) bias-corrected confidence interval

Model 3 tests the mediation effect of government regulation on the relationship between gender of top managers and corporate innovation. The coefficients of gender (c'=0.827, p-value=0.011) and government regulation (b=0.162, p-value=0.000) in the regression equation are both positive and significant. This result shows that the government regulation exerts a partial intermediary effect on the relationship between gender of top managers and corporate innovation. It can be considered that H3 is right. The positive coefficients of the variables also indicate that the time spent on dealing with government regulations has promoted corporate innovation in women-owned enterprises. One potential reason for the result is that due to the "mass entrepreneurship and innovation" strategy of the Chinese government, some of the requirements of government regulation are aiming to promote corporate innovation.

Model 4 tests the mediation effect of workforce skills on the relationship between gender of top managers and corporate innovation. The coefficients of gender (c'=0.858, p-value=0.011) and workforce skills (b=0.010, p-value=0.001) in the regression equation are both positive and significant. The result shows that the level of workforce skills has a positive significant partial

intermediary effect on innovation in women-owned enterprises, indicating that H4 is verified.

Given the potential count nature of the dependent variable, the current research also employed negative binomial (NB) estimations to complement the OLS regressions. The results of the NB regression are shown in Appendix I and II. The results support the findings of the OLS analysis.

4.2.2 Total Mediating Effects

After testing the individual mediation effects, a total mediation effect test is conducted by Structural Equation Model (SEM). The result is shown in Table 8. It can be found that the mediation variables may have chain intermediary effects on corporate innovation. Prior experience has a significant effect on access to finance (d=0.204, p-value=0.001). This means that access to finance may have a chain mediation effect on corporate innovation together with prior experience, although the individual mediation effect of access to finance is not significant. Also, access to finance has significant effects on both government regulation (d=0.026, p-value=0.000) and workforce skills (d=0.197, p-value=0.001). Government regulation also has a significant effect on workforce skills (d=1.544, p-value=0.000). From the result, it can be found that the mediation variables may have chain intermediary effects on corporate innovation. However, there are still some paths that are not significant.

Table 8. The Result of SEM Analysis For Theoretical Model

Variable	CEO's Experience	Access to Finance	Government Regulation	Workforce Skills	Innovation Behavior
CEO's Gender	-1.561*	3.142*	0.808	6.901**	0.784**
	(0.891)	(1.830)	(.498)	(3.433)	(0.329)
CEO's Experience		0.204***	-0.24	0.026	0.022*
		(0.070)	(0.016)	(0.114)	(0.012)
Access to Finance			0.026***	0.197***	0.015**
			(0.007)	(0.066)	(0.006)
Government Regulation				1.544***	0.146***
				(0.295)	(0.040)
Workforce Skills					0.005*
					(0.003)

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed), The number in brackets is the standard Error. The regression results of control variables were omitted.

In order to make the model more accurate, combing with previous research, some paths which are not significant are deleted. The modified model is shown in Figure 4. The regression result and the goodness of fit index is shown in Table 9.

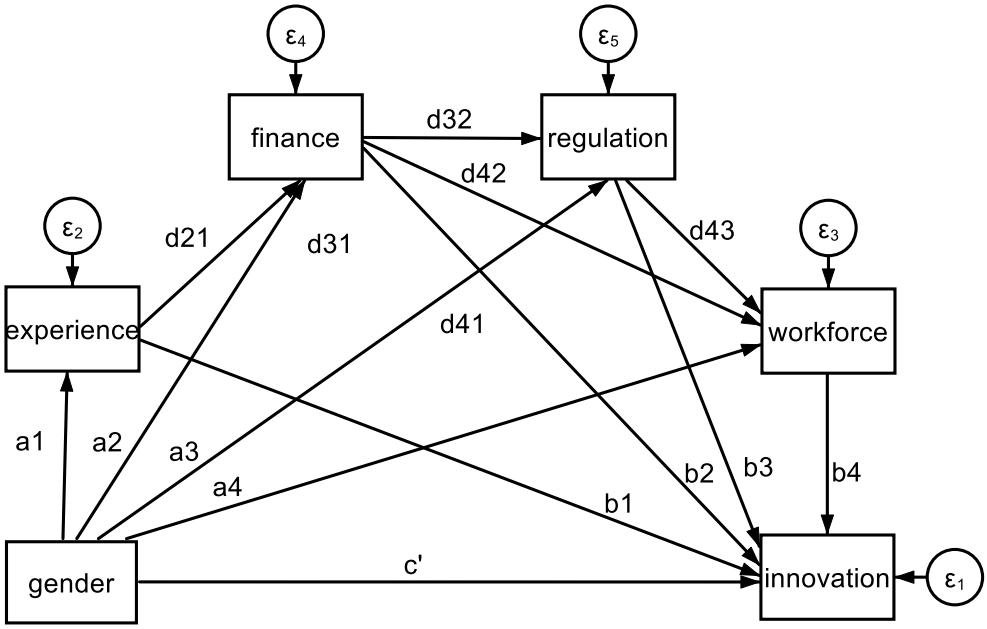

Figure 4. Modified Model

The result in Table 9 indicates that prior experience, access to finance, government regulation, and workforce skills together played a significant overall mediating effect on the relationship between the gender of top managers and corporate innovation and the proportion of the total effect that is mediated is 20%. Prior experience exerts a significant negative mediating effect and the total mediation effect of prior experience is -0.040. This result is consistent with the hypothesis that women entrepreneurs generally have less experience than men and a lack of experience can lead to a weaker innovation ability in women-owned enterprises. Access to finance and workforce skills have a significant positive mediating effect on the relationship, which is consistent with the hypothesis that the easier to get access of external financial resources and possessing more workforce with higher educated levels can promote corporate innovation. In China, there are many preferential policies for women to start businesses. This may make it easier for female

entrepreneurs to access external financial resources including bank loans or other credits. The time spent on dealing with government regulations has a significant positive mediation effect on the relationship between gender of top managers and corporate innovation. One possible explanation for this result is that some of the requirements of government regulation are aiming to promote corporate innovation. The specific policies and regulations that have influenced corporate innovation positively are worth further research in the future.

Table 9. The Result of SEM Analysis For Modified Model

Variable	CEO's Experience	Access to Finance	Government Regulation	Workforce Skills	Innovation Behavior
CEO's Gender	-1.561* (0.892)	3.142* (1.830)	0.848* (0.508)	6.859** (3.431)	0.784** (0.329)
CEO's Experience		0.204*** (0.070)			0.022* (0.012)
Access to Finance			0.025*** (0.007)	0.199*** (0.066)	0.015** (0.006)
Government Regulation				1.541*** (0.293)	0.146*** (0.040)
Workforce Skills					0.005* (0.003)

$\chi^2(2)=3.446(1.723)$, RMR=0.012, RMSEA=0.026, GFI=0.999, IFI=0.991, CFI=0.990, TLI=0.928

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed), The number in brackets is the standard deviation. The regression results of control variables were omitted.

5. Conclusion

A growing number of women in China are starting their own businesses and engaging in innovation activities, but there are few studies that analyze the influence of mediating factors on the innovation of women entrepreneurship in this specific context. As a developing country, China is experiencing a period of economic transformation. Learning more about the social, cultural, and personal factors that will affect women entrepreneurship and innovation is essential for promoting economic development and social equality. In the current study, data from the World Bank Survey

of Chinese Manufacturing Enterprises 2010 is used to analyze the mediation effect of personal experience, access to finance, government regulation, and workforce skills on the innovation activities in women-owned enterprises.

The research results show that women entrepreneurs usually possess less industry experience than their male counterparts and this lack of experience will have a negative influence on both access to finance and engaging in innovation activities in women-owned companies. Although the individual mediating effect of access to finance is not significant, it still affects innovation behaviors when combining with other factors. The results indicate that the easier to get access of external financial resources and possessing more workforce with higher educated levels can promote corporate innovation. Women entrepreneurs are also proved that they spent more time dealing with government regulations. However, the time they spent in dealing with government regulations positively affects their innovation behaviors. This may be because some of the requirements of government regulation are aimed at promoting enterprise innovation. The positive impact of specific policies and regulations on enterprise innovation is worth further study.

5.1 Implications

Firstly, this study shows that female entrepreneurs contribute to promoting corporate innovation in China. Because of many preferential policies launched by the Chinese government, more women are devoting to starting their own businesses. Playing a crucial role in technological innovation, female innovators fuel innovation as an inexhaustible power. For this reason, the value and power of women should be respected in the business world. However, due to gender stereotypes, the value of women only means childbearing and household duties in some societies. The social status and authority of women often cannot be guaranteed. Thus, there is a need to affirm and respect the value of women in the workplace and positively utilize their advantages in promoting innovation. This is not only beneficial for improving women's living conditions but also for promoting social and economic development.

Current study findings also show significant relationships between prior experience, access

to finance, government regulation, workforce skills, and innovation in women-owned enterprises in China. This shedding light on the internal and external factors affecting innovations in women-owned businesses provides women entrepreneurs with suggestions to identify the strengths and weaknesses of their company along with existing opportunities and threats. Officials can also consider such factors and encourage an environment that promotes women entrepreneurship and innovation. This study can also stimulate women to enhance their educational background and industry experience to familiarize themselves with entrepreneurial and innovation capabilities that are crucial for corporate survival and development.

As one of the emerging economies, China shares many common characteristics, including market volatility, growth and investment potential, improvement of education, efforts to lifting the status of women, etc., with other emerging countries (Kolodko, 2018). For this reason, the current research also gives a sound reference to other emerging countries that are considering the same questions.

5.2 Limitations

The current study has several limitations and suggestions for further research. First, because of the limitations of data availability, the proportion of female entrepreneurs in the entire sample is relatively low. As a result, the generalisability of the results may be limited. For future research, the recommendation is to increase the sample data of female entrepreneurs, so that the accuracy and depth of the research can be improved. Another limitation of the research is the cross-sectional nature of data. Longitudinal data should be exploited in future research to capture the dynamic nature of innovation activities and their determining factors. Last, the result of government regulation's effect on corporate innovation is opposite to expected. As the information on government regulation is limited in this research, the influence of government regulation on corporate innovation is worth further research.

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Appendix: The Results of Negative Binomial Regression Analysis

Appendix I. NB Regression Analyses on Direct Effects

Variable and Regression Result	Innovation Behavior	CEO's Experience	Access to Finance	Government Regulation	Workforce Skills
CEO's Gender	0.202***	-0.098*	0.373*	0.562**	0.174***
	(0.065)	(0.058)	(0.208)	(0.250)	(0.065)

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed). The number in brackets is the standard error.
The regression results of control variables were omitted.

Appendix II. NB Regression Analyses on Intermediary Effects

Variable and Regression Result	Model 1	Model 2	Model 3	Model 4
CEO's Gender	0.212*** (0.066)	0.193*** (0.065)	0.169*** (0.065)	0.181*** (0.064)
CEO's Experience	0.005* (0.003)			
Access to Finance		0.005*** (0.001)		
Government Regulation			0.034*** (0.008)	
Workforce Skills				0.002*** (0.001)

Notes: * p < .10, ** p < .05, *** p <.01 (two-tailed), The number in brackets is the standard Error. The regression results of control variables were omitted.