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Article

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Empowering women's entrepreneurship: The role of green knowledge, innovation, and family support

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ABSTRACT

In the current era, women are often recognized as successful entrepreneurs due to their innovative capabilities and strong drive for robust economic growth. Their effective role in job creation, family income etc. is now recognized at an international level. Given the significant contribution, this study explores the factors influencing women's entrepreneurial success. The study underlines the effective role of family support in strengthening the relationship between green knowledge, innovation capabilities, and green social behaviour and women's entrepreneurial success. The data for the study was collected from women entrepreneurs in China using survey questionnaire, adopted from previous studies. The researchers analysed the data using SmartPLS by applying partial least squares structural equation modelling. Findings indicate that green knowledge, green social behavior and innovative capabilities positively influence women's entrepreneurial success. The moderation results show that family support significantly moderates the relationship between green knowledge and women's entrepreneurial success. However, family support appears to be an insignificant moderator in the context of green social behaviour. Our results explain that the significance of family support varies among women, based on their family dynamics. In some cases, family support plays essential role, while in other scenarios, the relevance diminishes when alternative support systems including strong network and adaptability, prove more beneficial. In certain culture, family support is indeed a significant element but primarily within personal domains only. Thus, it can be concluded that in some contexts women's entrepreneurial success is viewed as an independent factor, separated from family dynamics, especially where individual's achievements, regardless of gender, are admired and celebrated.

Introduction

Unemployment and poverty are major challenges faced by both developed and developing states. The global rates of unemployment and poverty have been increasing rapidly, particularly following the recent health crisis and financial downturn. Various projects and strategies have been implemented globally to reduce these rates, amongst, with the entrepreneurial efforts of the countries standing out particularly (Bierwiaczonek & Pyka, 2023; Roy et al., 2022). Entrepreneurship involves the process of planning, establishing, and administering a novel business venture aimed at generating profits while considering financial risks and potential losses. Thus, it is viewed as a driver of innovation, economic growth, employment, improved living standards. However, countries often certain challenges in promoting successful entrepreneurship including access to credit, market dynamics and regulatory barriers (Agarwal et al., 2022). In this regard, Women play essential role in entrepreneurial activities and are likely to bring significant change. With their exceptional capabilities and skills, they contribute to innovation, creativity, productivity, and overall economic growth (Borisov & Vinogradov, 2022; Xheneti et al., 2019).

Literature also embarks that women entrepreneurs can effectively promote entrepreneurship within an economy. They excel at multitasking, meaning they can handle multiple tasks simultaneously without becoming overwhelmed and accomplish them at the same time. This allows them to save time and cost, making resources more productive overall (Tien et al., 2022). Women entrepreneurs are great at relationship building and networking. They are constructive, courteous, and influential in their communication and negotiation skills. They are

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generally better at managing partnerships and able to generate more from investments (Rashid & Ratten, 2020; Rozkwitalska & Lis, 2022). Women entrepreneurs are, however, risk averse. They tend to take all possible options into consideration before making any decision and think carefully. They try to avoid unnecessary risks that can damage business reputations or hinder business progress. Additionally, women entrepreneurs are more detail-oriented than their men counterparts. They tend to pay heed to small details that are likely to make big differences to business progress and the accomplishment of business goals. This attention to minute details enables them to plan and develop strategies for contingent events, ensuring smooth and efficient business operations (Goel & Madan, 2019).

However, scholarly discourse argues that women's entrepreneurial success and promotion of start-ups are influenced various factors such as green knowledge, innovative capabilities, and green social behaviour. Green knowledge refers to the understanding of services, techniques, or processes that are likely to reduce pollution from business operations. Women entrepreneurs who oversee all aspects of business operations are more likely to attain economic goals in all business areas (Kim, 2023). When women entrepreneurs implement green knowledge, they significantly improve their businesses by reducing pollution, maintaining good will with improved marketing tactics. Therefore, green knowledge plays a critical role in women's entrepreneurial success (Aggarwal & Johal, 2021). On the other hand, innovative capabilities shape women entrepreneurial efforts to bring novelty in business processes, ultimately improving firm's productivity and generating long-term profitability. Thus, it can be argued that innovative capabilities are crucial for women's entrepreneurial success (Osei & Zhuang, 2020; Shahzad et al., 2022). Additionally, green social behaviour, an eco-friendly behaviour on the part of entrepreneurs and the stakeholders also influences business strategies. Thus, the compelling argument highlights that these factors help women translate their entrepreneurial efforts more effectively, resulting in greater entrepreneurial success (Akter et al., 2019).

In the context of China, private enterprises have been emerging in socialist China since 1980, following the 1978 open-door policy. About 80 % of private businesses in China since 1995 have been registered by women entrepreneurs. However, the percentage of women entrepreneurs remains lower than that of men entrepreneurs. The Chinese Women Entrepreneurs Survey of 2017 demonstrates that women entrepreneurs have an average age of 45.8. Amongst these women entrepreneurs, 9.3 % are aged 57 years and above, 38.9 % are between the age of 47 and 56 years, and 37.1 % in the range of 37 to 46 years. Approximately 66 % of the enterprises led by women entrepreneurs are in the eastern part of China (Anderson & Ojediran, 2022). Of the women entrepreneurs in the survey, 86.6 % had started small to medium-sized firms, while only 3.5 % worked for state-owned firms, which generally have a broader scope than private firms (Huang et al., 2021; Lewandowska et al., 2023).

Many female graduates seek to start their own businesses, particularly in Shanghai, Beijing, and other eastern areas. Many are expected to become entrepreneurs, and it is likely that women entrepreneurs will be younger in the future. Women entrepreneurs in China serve in the manufacturing and service sector, including telecommunications, the Internet and other information services, satellite transmission services, radio and television, leasing and business services, and professional technological services. However, women's entrepreneurship is less prominent in China compared to men's entrepreneurship, despite women being a long-term asset to the country (Zhao & Yang, 2021).

In terms of traditional gender roles, women often share common traits that shapes their social behaviour. Literature argues that women tend to be more oriented toward other's well-being, making them social facilitators. Studies argue that, in comparison to males, females are more focused on goals with higher social value (Angel et al., 2018). Thus, the emergence of female participation in sustainable development has garnered attention from scholars. While the responsible practices of women have been explored extensively, their relation to entrepreneurial success is an interesting area that warrants further exploration (Cruz et al., 2019; Francoeur et al., 2019). Thus, we conduct this research to address several key research questions: Can entrepreneurial success be achieved through green knowledge, innovative capabilities, and green social behaviour? If so, under what circumstances can the relationship be affected? An additional research question is an extension of the previous one, with the addition of family support as a moderator. Thus, the present work contributes to the existing paradigm in various ways. The study also uses a family embeddedness lens to investigate the constructs while incorporating the idea of sustainability in women's entrepreneurship, a unique inclusion, which is a contemporary concern of developing economies.

The rest of the paper organized as follows. A literature section, which centres on the debate relevant to key constructs of the study. A theoretical lens is also explained in the section to support the proposed conceptual model. Methodology section outlines procedures for data collection and the methods used to analyse data. The fourth section presents the findings and key discussion on it in light of the prior literature. The final section discusses study's implications, conclusions, and limitations.

Theoretical background and hypothesis development

Family embeddedness refers to the influence of family' characteristics on business creation process (Aldrich & Cliff, 2003). It explains how entrepreneurship is entangled with the family, and how the vital role of family significantly affects both the entrepreneurial process and business decisions (Webb et al., 2015; Cooke & Xiao, 2021). One could speculate that family acts as source of embeddedness which is transferrable to business. This whole transfer process offers various potential benefits for entrepreneurs in early phases of the business including amplifying social networks and expanding financial support for start-up activities (Ge et al., 2019). From a relational perspective, family embeddedness allows entrepreneurs to maximize capital resources through family resources, which hasten the procedure, promote knowledge sharing, and build trust.

Scholars argue that inadequate resources repeatedly constrain women entrepreneurs due to the challenging barriers (Hahn et al., 2020; Xu et al., 2020). This implies that family embeddedness is crucial for entrepreneurs, because family domain provides access to resources especially when family members are supportive. Thus, this study intends to assess how various factors, in the presence of family support, could be instrumental for entrepreneurial success, while focusing on women, because the support for a specific gender might be affected by their social role in the family domain (Dewitt et al., 2023; Shastri et al., 2022).

Since business and family are intertwined for women entrepreneurs, family support plays a critical role. Additionally, factors such as green knowledge, innovative capabilities, and green social behaviour are also significant, as they ensure entrepreneurial success. Thus, varying outcomes, based on the outlined factors, and gender, demand exploration across various contexts (Lubinski & Gartner, 2023; Xu et al., 2020).

Green knowledge and women's entrepreneurial success

For organizations to succeed with optimistic prospects, women entrepreneurs need to operate in ways that do not create problems for stakeholders or the local community. Such businesses are favoured by stakeholders, who provide investment, goods, and markets as well as emotional, legal, or social support (Soomro et al., 2020; Moslehpour et al., 2023). Women entrepreneurs who possess green knowledge and apply green business strategies in resource management and operations, can run businesses that do not harm the environment, deplete natural resources, or negatively impact human health, while still delivering desired quality products and services. As a result, such women entrepreneurs are more likely to achieve success in their businesses (Suchitra & Gopinath, 2020). Recent literature also highlights the crucial role of

green knowledge in entrepreneurial success. For instance, Maziriri et al. (2019) examined the influence of green knowledge on women's entrepreneurial success within the context green entrepreneurship. They employed non-probability convenience sampling to target female green entrepreneurs operating in Gauteng Province, South Africa. Findings of the study suggest that green knowledge helps women entrepreneurs make informed decisions about which materials, energy resources, and technologies to utilize in production processes, enabling them to avoid releasing toxins into the air. Such women entrepreneurs are in better position to achieve success in maintaining a green business. Similarly, Kamberidou (2020) examined the relationship between green knowledge and women's entrepreneurial success and concluded that Women with green knowledge are better at handling human resources. They train individual effectively to allocate resource in an eco-friendly manner, run eco-friendly technologies, and properly dispose of waste from production processes. Green human resource management and knowledge help women entrepreneurs in achieving sustainable business progress. Based on this discussion, the following hypothesis is presented:

H1. Green knowledge is positively linked to women's entrepreneurial success.

Innovative capabilities and women's entrepreneurial success

Women with innovative capabilities can identify potential talents, generate novel ideas, and adopt new technologies. With innovative capabilities they gain ability to assess improvements in business processes, products, and marketing once innovation is applied. As a result, they are able to achieve sustainable goals. Therefore, it can argued that innovative capabilities increase the success of women's entrepreneurial efforts (Suseno & Abbott, 2021). Empirical literature also supports the claim as various studies conducted in the area documented the similar conclusion. For instance, Qodriah et al. (2021) examined the relationship between innovation capability and women's entrepreneurial success in small and medium-sized organizations. The authors used survey method to collect data through questionnaires from 149 small and medium-sized firms in the traditional culinary industry of Indonesia. Path analysis is used to test the accuracy of the constructed hypothesis. Finding of the confirmed that entrepreneurs with innovative capabilities successfully build organizational structures where even subordinates are encouraged to share their ideas and experiences with management. In such environments, individuals' opinion are respected and they are free to expose their creative nature. Hence, innovation can be brought through learning orientation, market orientation, and technology orientation, and women's entrepreneurship can be successful in responding to market trends and achieving higher profitability. Cho et al. (2020) also examined the relationship between innovation capabilities and women's entrepreneurial success. The study argued that women entrepreneurs with innovative capabilities, are more creative in their business approach and effectively utilize cutting-edge resources. They implement strategies to shift from outdated and polluting energy resources to renewable energy. This shift helps them to subdue environmental harm, leading to improved business outcomes. Therefore, it can be hypothesized that:

H2. Innovative capabilities are positively linked to women's entrepreneurial success.

The attitudes and behaviours of stakeholders is linked to organizational representatives, thus, influence business strategies of firm. When such individuals exhibit green social behaviour, women entrepreneurs are compelled to reconsider the environmental factors, both within and outside their businesses. If they identify any signs of environmental pollution, they reconsider their approach and become more flexible to embrace changes in organizational practices. These adjustments not only restrict environmental harm but also enhance entrepreneurial growth of a business (Liñán et al., 2022). In this lieu, study of Moreira et al. (2019) interrogated the relationship between green social behaviour and women's entrepreneurial success using a qualitative research design. Their sample consisted of 11 women entrepreneurs from 9 small-scale business located in three cities in Western Sweden, a region where tourism is the dominant industry. They conducted 13 in-depth interviews with the 11 entrepreneurs over two phases, in 2017 and 2019. The study concluded that green social behaviour makes a positive contribution to women's entrepreneurial success. Similarly, Cardella et al. (2020), assessed the influence of green social behaviour on women's entrepreneurial success through a systematic literature review. The authors analysed 2848 peer-reviewed international articles on women's entrepreneurship, published between 1950 and 2019, sourced from Scopus database. The study found that when women entrepreneurs indulge in green social behaviour, they embrace sustainability principles in their existing business models, thus, creating a clean, comfortable, and healthful working environment. As a result, employees become more committed and productive, paving the way for women entrepreneurs to become more successful. Hence, we propose:

H3. Green social behaviour is positively linked to women's entrepreneurial success.

Moderating role of family support

In most of the culture, Women can pursue entrepreneurship only if they are no family restriction or related barriers, hence, their success often relies on family support. This particular support can take many forms such as emotional, cognitive, financial, or physical assistance (Dai et al., 2022; Gopinath & Chitra, 2020). When women entrepreneurs have family support, they are more likely to get quality education and attain green knowledge. Family support provides them greater convenience, comfort, and mental peace, further shaping their entrepreneurial abilities. Nevertheless, family support makes women's green knowledge more influential in their business ventures (Muhammad et al., 2022). For instance, Muhammad et al. (2022) argued that when women have supportive family, who actively prioritize well-being and participate in their psychological and physical development, it significantly improves their entrepreneurial orientation. Access to quality education and resources provided by such families shape their entrepreneurial efforts and women entrepreneurs from these backgrounds can easily acquire green knowledge and positioning their business on a path toward sustainable development. Hence, family support improves the relationship between green knowledge and women's entrepreneurial success. Rudhumbu et al. (2020) also explained that when family support is given equally to female and male members, and women are provided with all resources they need, including effective sources of learning, women entrepreneurs can gain more green knowledge, and can be successful in their entrepreneurial path. This literature leads us to the hypothesis:

H4. Family support is a significant moderator between green knowledge and women's entrepreneurial success.

When women gain support from their respective families in both personal and professional aspects, they are likely to gain more chances to have complete access to resources and education that are foundation for building innovative capabilities. Additionally, when family members show support to their women, they feel more encouraged, motivated, and dedicated to start their venture. This implies that with strong family backing, women are better equipped to improve their innovative capabilities, leading them to successful entrepreneurial journey (Korreck, 2019; Štreimikienė, 2023). Korreck (2019) argued that women with supportive family, can leverage + their learning resources to increase entrepreneurial knowledge and innovative capabilities, Women entrepreneurs with effective innovative skills and capabilities are capable of developing such products that fulfil consumer demand. Therefore, family support plays essential role in strengthening the relationship between innovative capabilities and women's entrepreneurial success.

Kaciak and Welsh (2020) also argued that family support encourages women not to give up their entrepreneurial abilities and efforts. This perseverance motivates women to become more innovative in order to operate successful ventures. When women entrepreneurs remain persistent in their efforts, they successfully develop innovative capabilities, needed for operating businesses. Thus, family support strengthens the relationship between innovative capabilities and women's entrepreneurial success. On this basis we put forward the hypothesis:

H5. Family support is a significant moderator between innovative capabilities and women's entrepreneurial success.

Strong family relationships and supportive behaviour from family members positively influence women's emotions and their well-being. Such families understand the fundamental human need to thrive function in an environment where women lead businesses. As a result, women become aware of green social requirements and adopt green social behaviour to secure the environment for future generation (Yodchai et al., 2022; Welsh & Kaciak, 2019). Women entrepreneurs with green social behaviour effectively respond to market and public demands and by introducing eco-friendly practices to business. This commitment helps them in achieving entrepreneurial success. In addition to this, family support strengthens the relationship between green social behaviour and women's entrepreneurial success (Ayatakshi-Endow & Steele, 2021). Noor et al. (2021) also claimed that when women entrepreneurs live in a family where family members are supportive and share their resources, time, and information, it is more likely they exhibit green social behaviour. Moreover, when families provide financial, social, and emotional support, women entrepreneurs can develop and execute better strategic plans in order to achieve environmental and economic goals. Therefore, family support plays moderating role between green social behaviour and women's entrepreneurial success.

H6. Family support is a significant moderator between green social behaviour and women's entrepreneurial success.

Methodology

The present study proposes a model to explore the impact of green knowledge, innovation capabilities, and green social behaviour on women's entrepreneurial success while also investigating the moderating role of family support. The study employs quantitative research and utilizes cross-sectional research design to collect data from study participants. The sample of the study was drawn from female-oriented business. Since, study participants were women entrepreneurs; hence, the data was specifically collected from women entrepreneurs in China. The study used survey method to collect the required data using structured questionnaires. The sample size was determined by using Daniel sooper technique as it is necessary to ensure statistical validity. The constructs are measured with the items extracted from past literature. Green knowledge is viewed as an independent variable and measured with five item-scale, extracted from Yu et al. (2022). Innovation capabilities is also viewed as an independent variable of the study and measured with five-item scale extracted from Al-Hawary and Aldaihani (2016). Green social behaviour is also considered an independent variable and measured with thre-item scale, adopted from Al-Ghazali and Afsar (2021). Women's entrepreneurial success, a dependent variable of the study is measured with nine-item scale adopted from Bernard et al. (2020). Finally, family support is viewed as a moderating variable and measured with three item-scale extracted from Chu (2010) (See Tables 1–5).

The women entrepreneurs were selected based on simple random sampling. The researchers distributed 529 surveys and received 294 valid responses after a month, resulting in 55.58 % response rate. The researchers analysed the data using Smart PLS, applying partial least squares structural equation modelling (PLS-SEM). This is a suitable tool for analyzing primary data. It provides optimal outcomes for large datasets and complex frameworks (Hair et al., 2017). It assesses item correlation, variable correlation, and associations among the variables. The measurement model assessment deals with constructs' validity and

Table 1
Green Knowledge Items.

Item	Statement
GKN1	My organization regularly acquires information about environment-friendly products from external stakeholders.
GKN2	My organization regularly acquires information about environment-friendly products from internal stakeholders.
GKN3	My organization regularly arranges training sessions for employees to develop their knowledge about environment-friendly products.
GKN4	We have a well-developed information system through which employees can acquire the required information.
GKN5	My organization encourages and supports the employees to acquire knowledge about environment-friendly products.

Source: Yu et al. (2022).

Table 2
Innovative Capabilities Items.

Item	Statement
INC1	Our company adopts innovative reward systems.
INC2	Our company adopts innovative work designs.
INC3	Our company adopts innovative administration aiming at new product development.
INC4	Our company engages in organizational reconstruction to pursue operational efficiency.
INC5	Our company engages in business process re-engineering.

Source: Al-Hawary & Aldaihani (2016).

Table 3
Green Social Behaviours Items.

Item	Statement
GSB1	I plan to act in an environmentally friendly way.
GSB2	I intend to show environmentally friendly behaviour.
GSB3	I intend to show environmentally beneficial behaviour.

Source: Al-Ghazali & Afsar (2021).

Table 4
Women Entrepreneurial Success Items.

Item	Statement
WES1	Profits of my enterprise tend to increase
WES2	Turnover of my enterprise tend to increase
WES3	Number of employees of my enterprise started to increase
WES4	Number of products of my enterprise tend to increase
WES5	Number of buyers of my enterprise tend to increase
WES6	HH/family income tend to increase
WES7	HH/family expenditure tend to increase
WES8	HH/family assets tend to increase
WES9	HH/family savings tend to increase

Source: Bernard et al. (2020).

Table 5
Family Support Items.

Item	Statement
FS1	When I have problems with my business, my family will help me out.
FS2	When I have problems with business dealings, my family encourage and comfort me.
FS3	My family always supports me in all aspects of my business concerns.

Source: Chu (2010).

reliability, while the structural model assessment examines associations among the variables. In measurement model, the item correlation factor loading values must be greater than 0.50, while the average variance extracted (AVE) values must be greater than 0.50 (Hair et al., 2014). Additionally, cronbach's alpha values must be above 0.70, and the composite reliability (CR) values must be higher than 0.70 (Hair Jr et al., 2020).

The study employs the Fornell-Larcker criterion, cross-loadings, and heterotrait monotrait (HTMT) ratio to assess the validity of the model (Ringle et al., 2015). The relationships between the constructs is scrutinized through t-values and p-values, which should exceed 1.96 and be below 0.05, respectively (Hair et al., 2017).

Data analysis and results

The study examines the construct validity and reliability using AVE, Cronbach's alpha, and CR. The threshold values for AVE and CR are set at greater than 0.5 and 0.7, respectively. Table 6 shows that the results meet these threshold criteria, with all variables in the study (FS, GKN, GSB, INC, and WES) exhibiting acceptable AVE and CR values.

The correlation between variables is examined using the Fornell-Larcker criterion. The outcomes show that the first value is higher than the others in the column, indicating weak correlations among the variables. These values are presented in Table 7.

Table 8 presents the estimated relationships within the reflective measurement model. The researchers test the outer loadings for the given dataset. The results indicate that there is no cross-loading or duplication errors in the data, with all variables and their respective items appearing in their designated columns instead of collapsing into other item's columns. Therefore, the outer loadings yield significant results.

The correlation between variables is investigated through cross-loadings, and the values show that the association with the construct itself are stronger than those with other constructs. These values indicate a low correlation among the variables. These values are summarized in Table 9.

The correlation among variables is further analysed using the HTM ratio. As summarized in Table 10, the values of HTMT are lower than 0.85, indicating a low correlation among the variables. Hence, support discriminant validity.

The study examines the relationship among the variables using path analysis. The acceptance or rejection of the hypotheses are declared based on the p-values and t-values (See Fig. 1), with thresholds required below 0.05 and 1.96. Findings reveal that green knowledge and innovation capabilities positively influence women's entrepreneurial success. Green social behaviour is also positively related to women's entrepreneurial success. However, Family support appears to an insignificant moderator in case of innovative capabilities and green social behaviour. Yet, the moderation of family support between green knowledge and women's entrepreneurship is found to be significant (See Table 11 and Fig. 2).

Table 6
Construct Reliability and Validity.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
FS	0.874	0.877	0.922	0.799
GKN	0.889	0.890	0.919	0.693
GSB	0.894	0.896	0.934	0.825
INC	0.868	0.870	0.905	0.655
WES	0.928	0.930	0.940	0.637

Source: authors estimations.

Table 7
Fornell-Larcker Criterion.

	FS	GKN	GSB	INC	WES
FS	0.894				
GKN	0.683	0.832			
GSB	0.576	0.698	0.901		
INC	0.555	0.670	0.629	0.810	
WES	0.615	0.678	0.558	0.649	0.798

Source: authors estimations.

Table 8
Outer Loadings.

	FS	GKN	GSB	INC	WES
FS1	0.899				
FS2	0.896				
FS3	0.885				
GKN1		0.835			
GKN2		0.849			
GKN3		0.827			
GKN4		0.824			
GKN5		0.826			
GSB1			0.899		
GSB2			0.918		
GSB3			0.907		
INC1				0.831	
INC2				0.830	
INC3				0.882	
INC4				0.881	
INC5				0.822	
WES1					0.830
WES2					0.855
WES3					0.853
WES4					0.841
WES5					0.835
WES6					0.807
WES7					0.818
WES8					0.8s21
WES9					0.810

Source: authors estimations.

Table 9
Cross-loadings.

	FS	GKN	GSB	INC	WES
FS1	0.899	0.524	0.519	0.594	0.563
FS2	0.896	0.535	0.546	0.503	0.569
FS3	0.885	0.568	0.476	0.521	0.592
GKN1	0.545	0.835	0.572	0.594	0.570
GKN2	0.504	0.849	0.518	0.537	0.588
GKN3	0.543	0.827	0.523	0.546	0.547
GKN4	0.599	0.824	0.548	0.547	0.542
GKN5	0.551	0.826	0.544	0.551	0.521
GSB1	0.541	0.574	0.899	0.561	0.576
GSB2	0.532	0.505	0.918	0.551	0.549
GSB3	0.493	0.521	0.907	0.565	0.611
INC1	0.501	0.546	0.551	0.831	0.595
INC2	0.522	0.592	0.510	0.830	0.595
INC3	0.564	0.517	0.548	0.882	0.559
INC4	0.587	0.538	0.552	0.881	0.535
INC5	0.445	0.584	0.595	0.822	0.504
WES1	0.566	0.526	0.548	0.566	0.830
WES2	0.533	0.574	0.523	0.512	0.855
WES3	0.527	0.507	0.557	0.569	0.853
WES4	0.598	0.512	0.584	0.535	0.885
WES5	0.521	0.568	0.523	0.522	0.841
WES6	0.580	0.519	0.585	0.571	0.864
WES7	0.550	0.588	0.595	0.577	0.835
WES8	0.482	0.527	0.553	0.557	0.807
WES9	0.578	0.595	0.579	0.508	0.818

Source: authors estimations.

Table 10
Heterotrait Monotrait Ratio.

	FS	GKN	GSB	INC	WES
FS					
GKN	0.673				
GSB	0.549	0.782			
INC	0.615	0.699	0.628		
WES	0.591	0.675	0.688	0.752	

Source: authors estimations.

Discussion

The results reveal that green knowledge is positively linked to women's entrepreneurial success. Results are consistent with the studies, explaining that women entrepreneurs equipped with green knowledge tend be more innovate; this innovative capability encourages them to strategize green practices to meet growing demand of green solutions. Aligned with existing literature, results also showcase that woman entrepreneurs with significant amount of green knowledge, are more likely in better state to utilize their abilities that lead to successful business. The positive relationship also embarks that green knowledge enables a sense of ecological responsibility in women entrepreneurs through which they are able to differentiate their businesses. This not only expands environmentally conscious consumer base but also assure long-term success in competitive markets. These results are also in line with Wu et al. (2019), suggesting that when women entrepreneurs have knowledge about the resources suitable to accomplish economic and environmental goals simultaneously, they can better utilize these resources to achieve entrepreneurial success. Aligned with Radović-Marković and Živanović (2019), findings also advocate that in order to achieve sustainable goals, there must be an effective resource management. Women having knowledge of green resources and processes, and how to employ resources in an ecological manner, enable them to effectively manage their resources and business operations and attain sustainability goals. The findings are consistent with Nair (2020), claiming that green knowledge enables women entrepreneurs to control environmental pollution through green procurement, green product design, green marketing, and waste management. Women entrepreneurs with this knowledge are more likely to be successful in running businesses in a sustainable manner.

The results embark that innovative capabilities are positively linked to women's entrepreneurial success. This explains that women entrepreneurs feel empowered due to their innovative capabilities that advance their skills to address challenges with creative solutions. These capabilities enhance their problem solving skills and make them environmentally responsible individual, leading them toward entrepreneurial success. Consistent with the study of Ge et al. (2022), findings emphasize that women entrepreneurs with innovative capabilities tend to avoid the use of outdated resources and traditional forms of energy. Rather, they remain creative and adopt innovative resources which give better business outcomes. These results are also supported by Cukier and Hassannezhad Chavoushi (2020), suggesting that women entrepreneurs with innovative capabilities actively monitor the current possessions, procedures, and productivity of their businesses, hence, are more adaptable to market requirements. With innovative business techniques, women entrepreneurs are more successful in their careers. The results are also consistent with Chhabra et al. (2020), indicating that innovative capabilities expand the intellectual capital, further bringing value-adding changes to business processes and production. As a result, women entrepreneurs are more successful at responding to market requirements and sustaining business development. The results further reveal that green social behaviour is significantly linked to women's entrepreneurial success. In line with prior literature, findings confirm that women entrepreneurs when actively involve in green social behaviours, they may get immense support from consumers, investors and other stakeholders who value environmental agenda, ultimately leading to success (Rharzouz et al., 2024; Martínez-Alonso et al., 2023). The positive and significant link also indicates that women are famous due to their nurturing roles, hence, they likely to show more care toward

Table 11
Path Analysis.

	Original sample (O)	T statistic (|O/STDEV|)	P value
GKN -> WES	0.186	2.004	0.045
GSB -> WES	0.351	3.812	0.000
INC -> WES	0.262	2.123	0.034
FS x GKN -> WES	0.264	2.368	0.018
FS x INC -> WES	0.122	0.875	0.318
FS x GSB -> WES	0.073	0.623	0.534

Source: authors estimations.

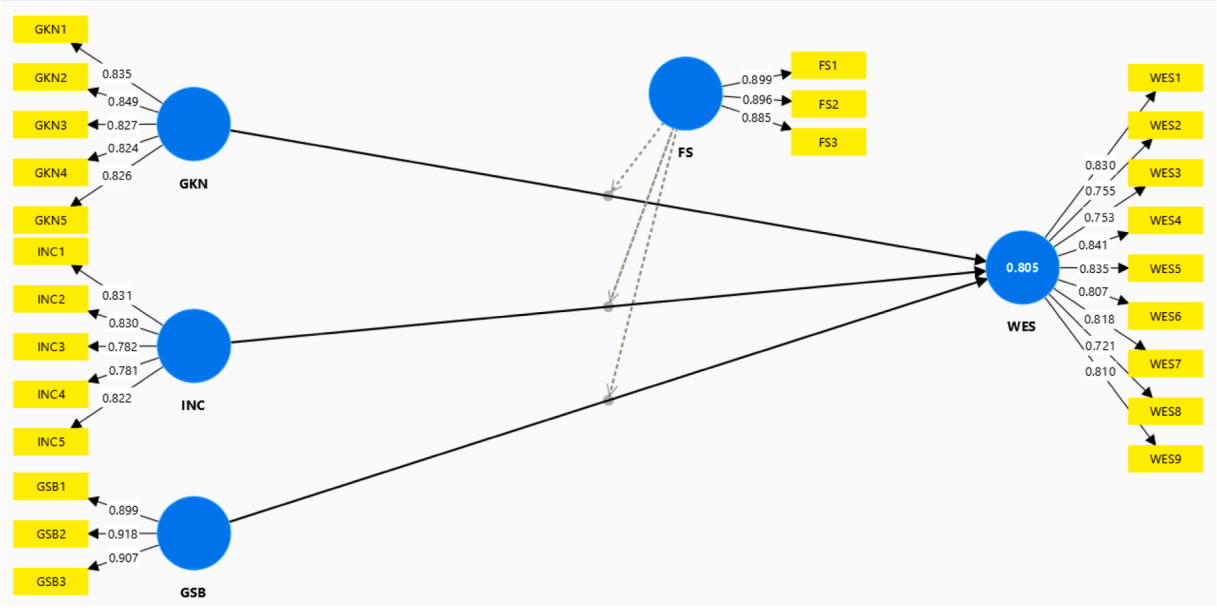

Fig. 1. Measurement model.

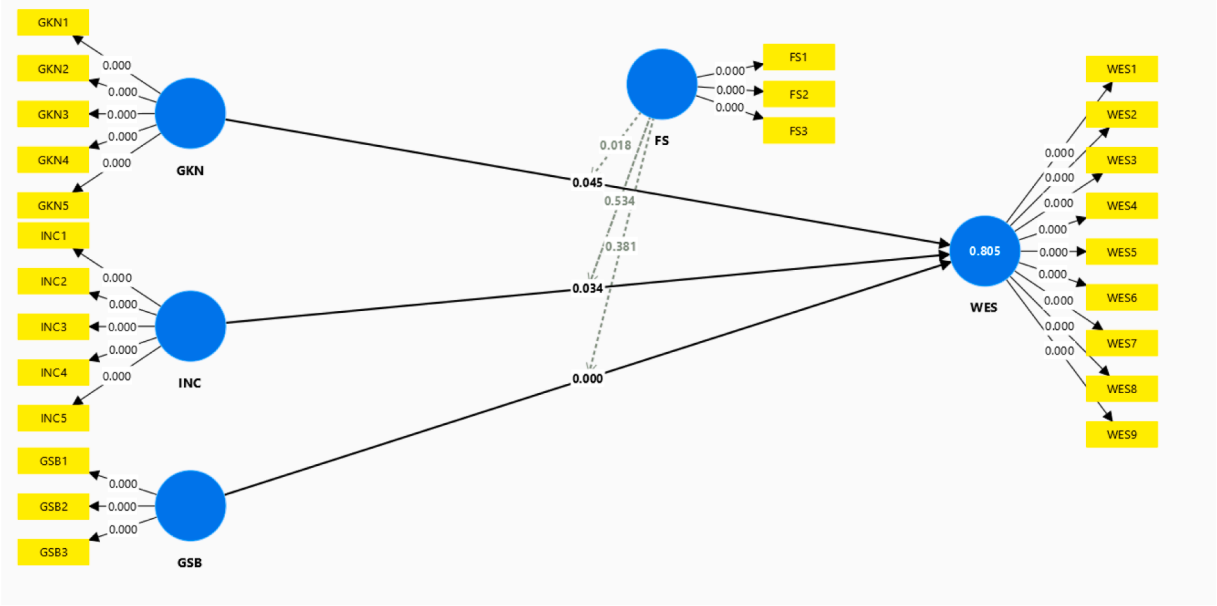

Fig. 2. Structural Modelling.

sustainable values, thereby, their own personal connections integrated with business strategies improves overall business performance. Besides, green behaviour of women often benefits society and institutions. Their engagement in green practices allow them to gain support from institutions and consumers who themselves are socially responsible, hence, acknowledge women efforts and ensure entrepreneurial success.

The results also show that family support is a significant moderator between green knowledge and women's entrepreneurial success. Findings highlight that family role plays crucial part in facilitating women to get leverage on green knowledge. Since, green knowledge requires a proper understanding of green practices and environmental issues, which is not possible without resources, and emotional support. Therefore, family support is needed for emotional support which eventually ensure entrepreneurial success in the context of sustainability. Consistent with literature, it is also confirmed that family as well as social support shape women's entrepreneurial abilities specially when they have right amount of knowledge, needed for their sustainable journey. Similarly, Alam et al. (2011) indicate that the key success factors in women's entrepreneurial success in the Southern region of Malaysia are family support, social ties, and internal motivation, all of which positively and significantly influence the success of women entrepreneurs. Chhabra et al. (2022) also explained that the key factors in building the entrepreneurial capacity of female entrepreneurs include financial literacy, family support, effective management skills, and support from the government. These results are also in line with Rosca et al. (2020), who advocate that with supportive family, women have better access to knowledge, resources, and education. In these circumstances, women take potential risks. The support of family members gives encouragement. Therefore, with supportive family, women entrepreneurs can gain better green knowledge, and prove themselves successful in entrepreneurial journey. On the other hand, findings also highlight that family support may not serve as a strong moderator between green social behavior and women entrepreneurial success. Results contradict and show consistency with prior literature at the same time (Al-Kwifi et al. (2020)). The insignificant results highlight that it may occur due to social behaviour nature. As green social behavior demands community driven actions, hence, the dependency often lies on external relationship rather than internal relationship (family), thus, it may restrict the influence of family support in this particular scenario. Secondly, women entrepreneurs who adopt green social behaviour succeed in managing business operations and bring expansion. So, even without family support it can be assumed that green social behaviour and women's entrepreneurial success are strongly intertwined. Green social behaviour exerts a significant influence on the success of women entrepreneurs. It increases their commitment to sustainability, through which eco-conscious customers can be served efficiently. Green social behaviours also allow female entrepreneurs to distinguish their businesses from competitors by ensuring the provision of eco-friendly products or services which can potentially contribute to the success of female entrepreneurs (Majeed et al., 2022; Song et al., 2019).

The argument can further be backed up by the study of Constantinidis et al. (2019) who explained that if women live in a family where they are provided with emotional and cognitive support, the family gives them time and shares their knowledge about green products and procedures as precautions. So, entrepreneurs have prior green knowledge. The supportive family provides assistance to women to initiate and carry entrepreneurship. However, a lack of family support does not make much difference in terms of the green social behavior which drives women's entrepreneurial success. Although family support holds great significance, previous literature explains other ways in which entrepreneurial success can be attained by women without family support (Maziriri et al., 2022; Raimi et al., 2023).

The findings confirm that family support is also an insignificant moderator between innovative capabilities and women's entrepreneurial success. There could be plausible factors to justify why family support is not a potential moderator between innovative capabilities and women entrepreneurial success. As endorsed by Li et al. (2023), although family support is viewed a critical factor to ensure entrepreneurial success, however, its influence on innovative capabilities in the context of women entrepreneurial journey may not be more pronounced. Factors such as education, technology access, relevant market opportunities and strong networking are more important to shape innovative capabilities. In line with the literature, it can be argued that although family support helps in manage work and life, however, it has no direct relation with innovation process of business as they generally depend on external resources and relevant factors. In addition to this, studies indeed reveal that family support increases business performance, however, it might not be a relevant factor in nurturing innovative capabilities. With family support, the stability can be achieved, however, it does not help directly in developing innovative thinking. Besides, entrepreneurial innovation of women is normally shaped by right mentorship, professional networks and access to resources and

finance rather than family support. Therefore, without adequate family support, female entrepreneurs can still have a positive influence on the environment and attain entrepreneurial success. In the light of the findings, it can be deduced that the significance of family support varies based on their family dynamics. In some cases, family support happens to play essential role, while, in some scenarios the relevance does not matter if alternative support system is more helpful including strong network and adaptability. In some culture, family support is indeed a significant element but in personal domains only. Thus, it can be concluded that in some contexts women's entrepreneurial success is viewed as an independent factor that is not linked to family dynamics especially where individual's achievements regardless of gender are admired and cherished. The study also suggests that women entrepreneurs must acquire green knowledge, which enables them to be successful in their entrepreneurial journey. It also presents a guideline that women entrepreneurs must develop innovative capabilities to achieve success in their entrepreneurial efforts. The study suggests economists and governments develop green social behaviour so that women entrepreneurs can achieve their goal. There must be a support from families for women, so that women entrepreneurs can gain green knowledge and be successful in entrepreneurship.

Conclusion

Recently, concerns have been raised about the socially responsible aspect of entrepreneurship as a driver of sustainability. Responsible female entrepreneurship not only fosters an inclusive and sustainable economy but also promotes gender equality. The growing popularity of female entrepreneurship in recent years has encouraged scholars to explore the effectiveness of responsible entrepreneurship on women's entrepreneurial success. However, questions regarding which exact factors are helpful in improving women's entrepreneurial success are yet to be answered, due to inconclusive evidence. Building on family embeddedness theory, we propose an integrated model to examine the influence of green knowledge, innovative capabilities, and green social behaviour on women's entrepreneurial success with family support serving as a moderator. Structured questionnaires were distributed to Chinese women entrepreneurs to collect data. Findings reveal that green knowledge, innovative capabilities, and green social behaviour positively women's entrepreneurial success. The results show that women entrepreneurs' green knowledge encourages green business proceedings such as green procurement, green product design, green advertising, green marketing, waste management, etc. Hence, female entrepreneurs can run businesses smoothly with sustainable outcomes. The results reveal that the innovative capabilities of women entrepreneurs allow them to acquire advanced resources, and apply novel business techniques. In this situation, female entrepreneurs can achieve business goals. If women themselves have green social behaviour or are influenced by the green social behaviour of stakeholders, they show more concern for environment. When entrepreneurs try to meet their environmental responsibilities, they bring improvements in business practice and improved business policies which ensure success. According to the findings, family support is a significant moderator between green knowledge, and women's entrepreneurial success. It is evident from the literature review that the women who have high levels of support from the family, acquire green knowledge, and with green knowledge women entrepreneurs can take the lead in sustainable business. The results also show that women entrepreneurs with family support develop innovative business capabilities and administer entrepreneurship more successfully.

Although the study offers both theoretical and empirical implications, it still has some limitations that future authors should address. The study focused on a limited set of factors such as green knowledge, innovative capabilities, and green social behaviour, to evaluate women's entrepreneurial success. There are many other factors, such as economic conditions, financial resources, and education levels, which also influence women's entrepreneurial success. The absence limits the comprehensiveness of study, suggesting future authors to include these factors to expand the scope of the research. Additionally, the study discusses the moderating role of family support in the relationship between green knowledge, innovative capabilities, and green social behaviour and women's entrepreneurial success. To enhance the applicability of the research, future researchers could add mediators in the framework. Moreover, the study only examined relationship between green knowledge, innovative capabilities, green social behaviour, and women's entrepreneurial success in China's context. A single country cannot provide sufficient evidence to ensure the generalizability of findings. Future authors must include other countries to expand the scope of the study.

CRediT authorship contribution statement

Yanying Zhang: Visualization, Data curation, Conceptualization. **Hui Wang:** Writing – original draft, Investigation, Formal analysis. **Kengcheng Zheng:** Writing – review & editing, Software, Resources, Methodology. **Wanjun Yang:** Validation, Supervision, Project administration.

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