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A Multidimensional Model of Women-Owned Micro and Small Business Growth in Rural Sindh, Pakistan: The Roles of Entrepreneurial Capabilities, Enabling Environments, and Institutional Support

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Abstract
Although women-owned MSBs can be an important element in rural livelihoods and women's economic empowerment, their growth is limited by interrelated personal, household, social, market and technological factors. This study investigates factors affecting the growth of women-owned MSBs in rural Sindh, Pakistan and analyzes if and how the growth determinants differ amongst the types of businesses and the support from the government. Based on the Resource Based View, Social Capital Theory, Entrepreneurial Orientation and Self-Efficacy perspectives and institutional and cultural approaches, a framework for linking entrepreneurial skill and innovative capacity, the family aspects, social aspects, market aspects, and technological adoption to growing business is formulated. A quantitative, cross sectional design was used. A five-point likert-type structured questionnaire on the topic of women entrepreneurs was used for primary data collection from 400 women entrepreneurs of micro and small business from the rural areas of Sindh. Purposive (judgmental) sampling was used to select respondents while convenience sampling was used in certain cases when on site situations required such access to respondents. Data analysis was carried out by SPSS and SmartPLS 4 in which descriptive data analysis was performed in order to test measurement model, direct relationship, structural model and moderated relations. Analysis of data was performed by SPSS and SmartPLS 4 software, descriptive data analysis was used to test measurement model, structural model, direct relationships, and moderating effect. The results show that all the 5 determinants show positive significant relationship with the growth of business. The factors that have the highest contribution to technological adoption are entrepreneurial skills and innovation, market factors, family factors, and social factors, with the variables of $\beta = 0.31$, $\beta = 0.29$, $\beta = 0.24$, $\beta = 0.18$, and $\beta = 0.15$ respectively. Most of the relationships are significantly moderated by sector type, except for the relation between family factors. In terms of Government support, most relationships are strengthened, but the effect of Government support is not statistically significant in the relationship between social factors and relationship. Based on the findings, it is concluded that small-scale entrepreneurizations of the rural women are not only influenced by individual capability and supportive relationship but also depends upon other factors like market, technology and institutional enabling ones. The study brings the evidence from rural region of Sindh and implications for specific entrepreneurship training, inclusion of digitalization, connectivity to markets, family-friendly support and government sector targeted programs.
Keywords: Women Entrepreneurship; Business Growth; Entrepreneurial Capabilities; Technological Adoption; Government Support; Rural Sindh.

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Introduction

In general, women's MSMEs contribute greatly to the socio-economic development, livelihoods and household income, especially in developing countries. While women entrepreneurs play a role in the family's welfare and development of the rural community in rural Pakistan, particularly in the province of Sindh, they find it difficult to run their businesses in the rural areas due to limited resources, less mobility, financial constraints and cultural and social barriers that can impact business expansion and sustainability (Bhatti et al., 2025; Inayat et al., 2022). Studies conducted so far suggest that factors other than entrepreneurial skills, such as the availability of financial and non-financial resources, supportive relationships, networking opportunities and favorable institutional conditions are responsible for entrepreneurial growth of women entrepreneurs (Dsouza & Panakaje, 2023; Behera et al., 2026). Other challenges that limit women's time and resources in their businesses may be related to domestic workloads and responsibilities, whereas other barriers are linked to lack of social networks and acceptance of their businesses in the community (Inayat et al., 2022; Shahzad et al., 2025; Sultana, 2024).

The determinants of women entrepreneurship (at individual, family, social, market and technological level) however, continue to be relevant in rural settings, in spite of the increasing scholarly interest. The skill set and innovation of the entrepreneurs can boost the business and market access, customer reach as well as reliable suppliers chain can affect commercial performance (Chaudhry & Tariq, 2023; Sherwani et al., 2024). Likewise, digital products, applications and mobile finance can increase market access and improve the efficiency of operations but may be more limited in scope due to necessity to build digital literacy and tech infrastructure (Soomro et al., 2025; Shah et al., 2022; Behera et al., 2026). The effects of these factors could also fluctuate with respect to the kind of business, and the access to government support programs, such as training, business development programs, and credit facilities for businesses (Bhatti et al., 2025; ud Din et al., 2023; Nathani, 2026). However, fewer empirical studies have focussed on the analysis of these determinants as a single block and the moderating effects of the type of businesses and the government's assistance in rural areas in Sindh. To fulfill this lacuna, the current research is aimed to investigate the factors that influence the expansion of women entrepreneurs in rural areas of Sindh with some context specific evidences which should help in developing entrepreneurship programmes and institutional support programs.

2. Research Aim

This study's objective is to explore the influence of entrepreneurial skills/innovation, family factors, social factors, market factors and technological adoption and how these influence the growth of micro and small business being managed by women in rural areas of Sindh, Pakistan. It also tries to determine if these relationships are moderated by the type of business and governmental support.

3. Research Objectives

1. To investigate the influence of entrepreneurial skills and innovative capacity on the growth of women-owned MSBs.
2. To analyse the contribution of home and family support towards Women's business development.
3. To evaluate the effect of social factors such as culture norms, community attitudes, networking opportunities and other social factors influencing business growth.

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4. To understand the impact market influences have on business growth, including customer access, competition and supply chain efficiency.
5. To assess the impact and importance of technological adoption (digital tools, mobile banking, online platforms), on the growth of women owned MSBs.
6. To investigate the moderating effect of business sector type and government support on the relationships identified between business growth and the various determinants.

Literature Review

The domestic environment (including household properties) along with individual capacity plays a role in enabling women to reach business growth in the micro or small business sector. Entrepreneurial skills and innovation allows women entrepreneurs to be able to spot business opportunities and come up with innovative concepts and solutions when it comes to addressing challenges that might arise within their business operations and meeting customers' evolving needs (Chaudhry & Tariq, 2023; Soomro et al., 2024). But the supporting element of the family and responsibilities of the household also play a role in entrepreneurial development. With emotional and financial support, joint household tasks and family support, the time and resources that may be needed for women to run their enterprises can be managed. On the other hand, an excess of workloads in the household may decrease their efficiency and limit their business operations (Inayat et al., 2022). Entrepreneurial capabilities and family-related conditions seem to be significant for the growth of women owned MSBs according to these arguments.

Other factors like social and market conditions also influence the opportunities that women entrepreneurs can take advantage of. Social networks, community relationships and mentoring connections can help to share knowledge, provide access to business information, mobilize resources and develop customers (Shahzad et al., 2025; Sultana, 2024). However, the other side of the coin suggests that women's business transactions might be limited by restrictive cultural norms and reduced social acceptability (Muhammad et al., 2023). Environment of business performance is also significant for market related factors such as customer accessibleness, competition, reliability of supply chain, market opportunities etc. Women entrepreneurs working at rural areas level may face challenges in penetrating beyond local markets due to infrastructural constraints, limited market reach and competition with larger businesses (ud Din et al., 2023; Sherwani et al., 2024). The supportive social relationship and favorable market influence, therefore, can play a role in promoting the growth and sustainability of women owned business.

The digital shift can enhance operational efficiency, improve construction finance, communication with customers, and market penetration by introducing technological solutions, online platforms, and mobile banking (Shah et al., 2022; Soomro et al., 2025). However, rural women entrepreneurs might not fully avail of these opportunities due to factors including limited digital literacy, poor technological infrastructure and limited access to training (Chaudhry & Tariq, 2023, Dsouza & Panakaje, 2023). Contextual and institutional factors might also influence the power of such relationships. The relevance of entrepreneurial skills, market access and technology could vary depending on the business sector type, since the requirements of operating service, trade, manufacturing versus agricultural-processing businesses may differ (Bhatti et al., 2025). Similarly, government facilitation in the form of training, credit and business facilitation can play a role in reinforcing a contribution of business resources associated with the entrepreneurial approach and market-related resources (ud Din et al., 2023; Nathani, 2026). In view of this, type of business and government support

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are included in the current study as moderators of the relationships among the five determinants and women entrepreneurs' MSB growth.

Conceptual Framework

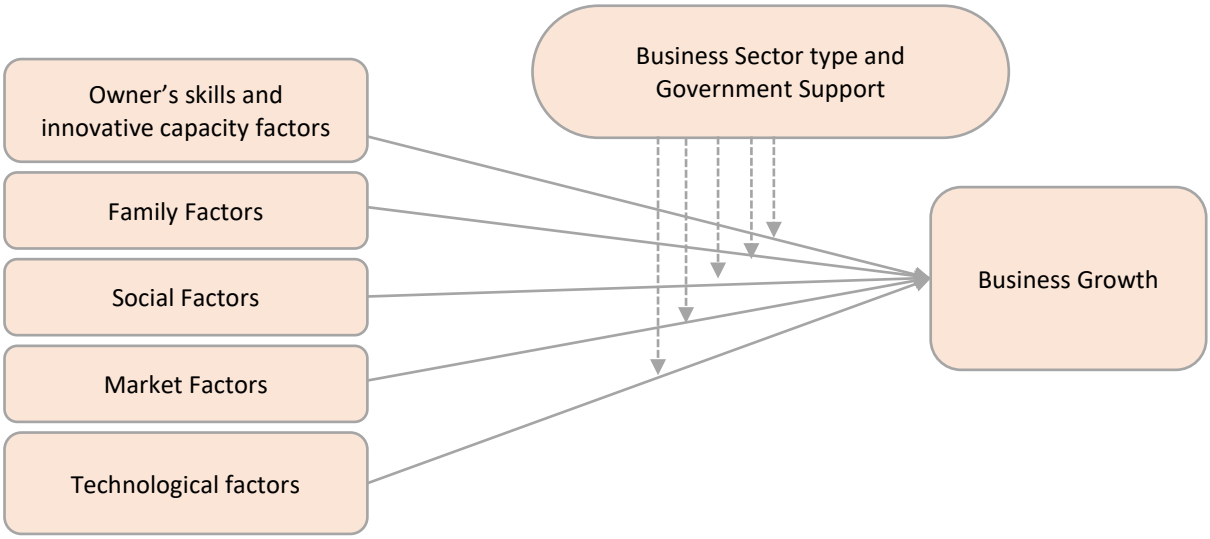


Figure .1 Conceptual Model

Source: Developed by author after review of existing research.

Research Hypotheses

The following hypotheses are put forth based on the literature review and the conceptual framework that is given in the thesis:

- H1: Entrepreneurial skills and innovation can have a significant positive impact on the growth of MSMEs owned by women.
- H2: Family support and family-related factors play a significant positive role in the development of the women's owned micro and small business.
- H3: Cultural norms, attitudes of the communities and networking opportunities positively influence growth among women owned micro and small businesses.
- H4: Market conditions, such as access to market, competition, efficiency of supply-chain and market opportunities exert strong positive influence on the growth of WMB.
- H5: Technology adoption significantly positively affects the growth of women's micro and small enterprises.
- H6: There are significant moderators between the relationships of the determinants (entrepreneurial skills and innovation, family factor, social factor, market factor, technological adoption) and the growth of WOMMBs in the business sector.

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- H7: Government support has a meaningful moderating effect between the three determinants (entrepreneurial skills and innovation, family factors, social factors and market factors, technological adoption) and growth of women owned micro and small businesses.

Methodology

The study used an explanatory, quantitative and cross-sectional research approach in order to explore the determinants for growth of women own micro and small business (MSB) in rural areas of Sindh, Pakistan. Primary data were gathered from 400 women entrepreneurs having various businesses in different sectors such as service, trade, manufacturing, and agricultural processing. Strategies such as non-probability sampling (using purposive / judgmental sampling) to select access to respondents related to the business were taken and also used access if the thing is geographically difficult and in the field due to the downside. Data collection was carried out using a structured questionnaire which was distributed offline and online. Data obtained from the responses were analysed using SPSS as well as SmartPLS 4. For preliminary analysis, descriptive statistics were calculated while the assessment of the measurement and structural models, direct relationships and the moderating effects of business sector type and government support (Sekaran, 2016; Hair et al., 2016; Hair et al., 2020) was done using Partial Least Squares Structural Equation Modelling (PLS-SEM).

Measures

The study used a structured questionnaire that was rated using a five-point likert scale to measure the constructs of the study. The instrument used for measuring the constructs was made up of 32 items categorized according to eight constructs namely: entrepreneurial skills and innovation (5 items); family factors (4 items); social factors (5 items); market factors (5 items); technological use (4 items); government assistance (4 items); business growth (5 items); and business sector type (4 items). These indicators included measures of creativity, problem solving, family support, workload sharing, cultural norms, networking, customer access, competition, digital tools, mobile banking, government training, financial assistance, revenue growth, market expansion and sustainability of the business. Alene (2020), Mashenene (2020), Ongachi (2013), Hair et al., (2007), Zikmund et al., (2000) and Bell et al., (2022) were the sources the thesis draws from to inform the operationalisation of the constructs. The Cronbach's alpha, composite reliability, average variance extracted (AVE), outer loadings, Fornell-Larcker criterion and heterotrait–monotrait (HTMT) ratio were used to test the quality of the measurements. The reported results confirmed acceptable internal consistency and criterion (convergent and discriminant) validity as recommended by Hair et al. (2016), Hair et al. (2020), and Pallant (2020).

Demographic Characteristics of Respondents.

Demographic characteristics of respondents are very important to help understand the context and validity of the results of the survey. Demographic analysis will provide the information regarding the background of women entrepreneurs about owning of micro and small business (MSBs) in rural Sindh. A series of variables were examined to gain an understanding of the diversity and representativeness of the sample: Age, Education level, Marital status, Income level, and Years of business experience. The characteristics described above are utilized to establish patterns that may impact entrepreneurship and growth of the business.

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Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Age	18–25 years	60	15.0%
	26–35 years	140	35.0%
	36–45 years	120	30.0%
	46 years & above	80	20.0%
Education Level	No Formal Education	60	15.0%
	Primary	70	17.5%
	Secondary	110	27.5%
	Bachelor's Degree	100	25.0%
	Master's Degree	60	15.0%
Marital Status	Single	90	22.5%
	Married	250	62.5%
	Divorced/Widowed	60	15.0%
Monthly Income (PKR)	Less than 30,000	100	25.0%
	30,000 – 60,000	140	35.0%
	60,001 – 100,000	100	25.0%
	Above 100,000	60	15.0%
Business Experience	Less than 2 years	80	20.0%
	2–5 years	150	37.5%
	6–10 years	110	27.5%
	More than 10 years	60	15.0%

Table 1. shows that there is a variety of socio-economic and personal backgrounds amongst the women entrepreneurs on the demographic profile. The major group of respondents is 2635 years old (35%) followed by 3645 years old (30%). This basically translates to most of the respondents fitting within their peak earning and entrepreneurial years. The numbers of the educated females in terms of education show that a significant proportion of the respondents (27.5%) hold secondary education qualification while 25% of the respondents are holders of bachelor's degree and relatively 15% of the respondents possess master degree qualifications, which implies that educated females are increasingly playing important roles in the rural entrepreneurship.

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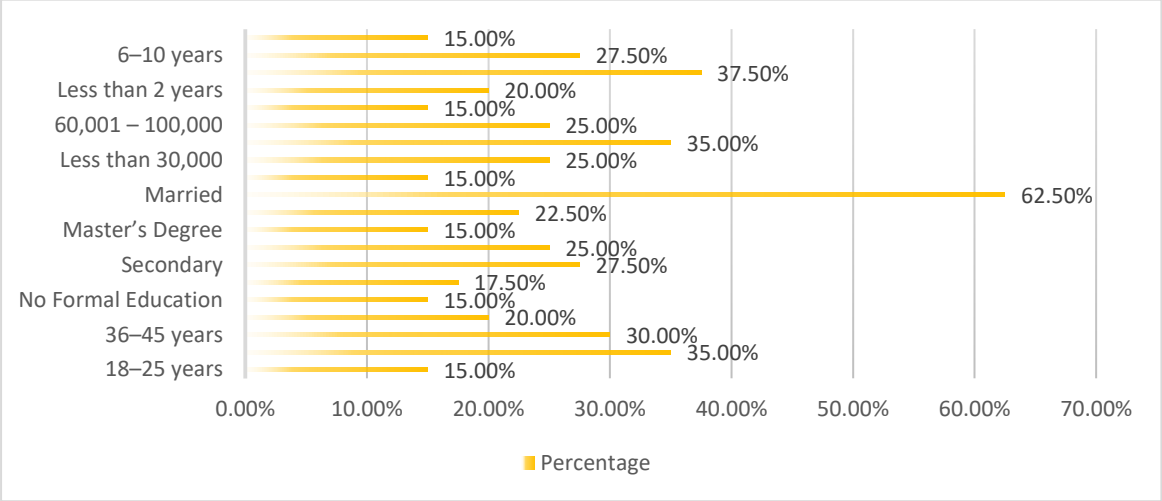


Figure 2 Demographic Profile of Respondents

As far as marital status is concerned, most of the respondents are married (62.5%) which reflects the dual role that many women are playing in relation to their household duties and business, also as regards marital status. The distribution of income shows majority respondents (35 per cent) fall in the PKR 30,000 to 60,000 band that is typical of micro and small businesses in the rural areas. Moreover, there is a big percentage of them which enjoys a income less than PKR 30,000, suggesting that the financial constraints is being faced by the entrepreneurs in their initial phase of operation. This is related to experience; most of them are experienced in business from 2-5 years (37.5%) showing that there is a considerable part of the population which has recently started to experience business, but is already at initial level of stability. Overall, the demographic characteristics suggest a good sample and balance that supports the validity and usefulness of the study findings.

Measures of Central Tendencies and Dispersion

These statistics of central tendency and dispersion are also very important to include in quantitative research as they give a summary of the data and give information about the average responses as well as the diversity of the respondent's answer. In the current research, the mean and standard deviation (SD) of all important constructs were computed including: entrepreneurial skills, family support, social factors, market conditions, technological adoption, and business growth. The average sense of the respondents is the 'mean' and the difference or similarity between respondents is the 'standard deviation' of respondents.

The mean is the average value of a data set, often referred to as the "average" it is a central measure where all the data is clustered together, especially. This is the most popular way of doing a social science study to get a general idea of the respondents' perceptions. The standard deviation and other indices of dispersion, on the other hand, give a description of how much individual responses do not depend on the mean; how much they vary or are consistent among the responses. If the standard deviation is small, the answers are very close to each other and if it is high, then there was a high variance among the respondent which means that the answers are very spread out (Pallant, 2020; Sekaran, 2016).

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Table 2: Central Tendencies and Dispersion of Study Variables

Variable	Mean	Standard Deviation
Entrepreneurial Skills & Innovation	3.92	0.68
Family Support	3.75	0.72
Social Factors	3.68	0.70
Market Conditions	3.55	0.74
Technological Adoption	3.47	0.76
Business Growth	3.80	0.69

The average scores of all variables indicate that the respondent perceives the entrepreneurial skills, and innovation (Mean = 3.92) to have the highest average scores of all variables. The mean values in business growth (Mean = 3.80) and family support (Mean = 3.75) are also relatively high meaning that family support is rather important in helping women entrepreneurs in rural settings. Conversely, technological adoption (Mean = 3.47) and market conditions (Mean = 3.55) have less comparative means, which highlight possible difficulties faced by women entrepreneurs when accessing technology and favorable market conditions.

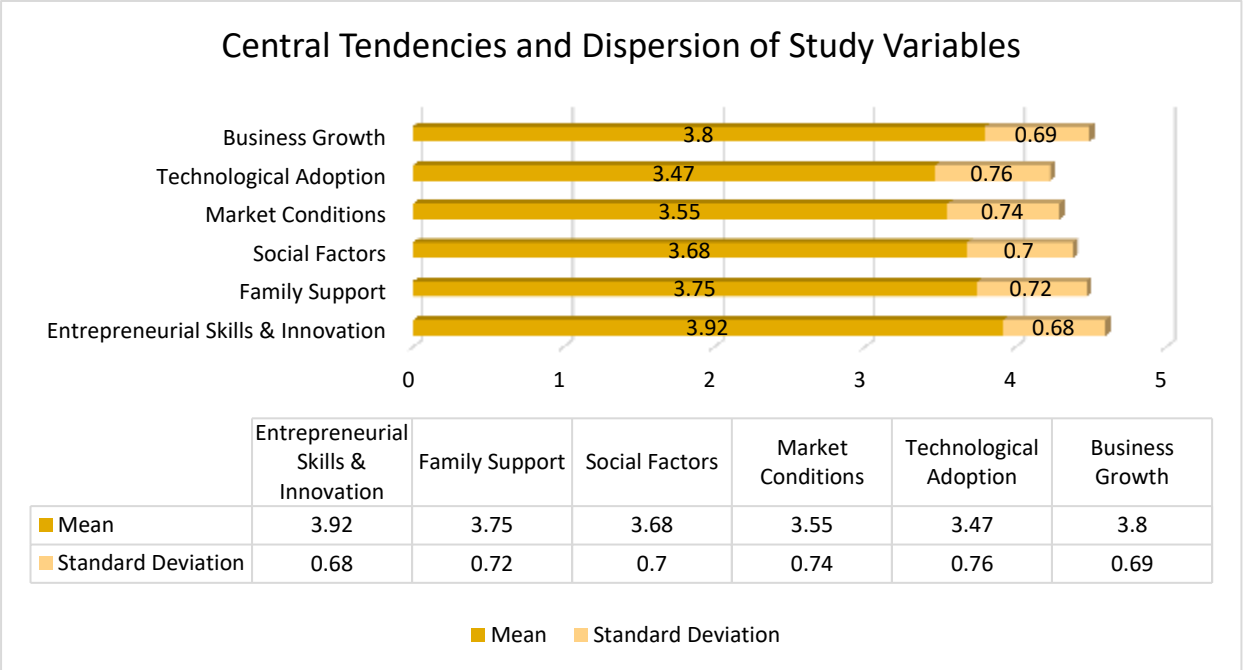


Figure 3 Central Tendencies and Dispersion of Study Variables

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The standard deviation values of all variables are between 0.68 and 0.76, which is an indicator of the moderate level of variability in responses, which is a pointer to the moderate level of agreement among respondents. On the whole, the findings present a balanced picture of the factors which have an influence on business development and help to further inferentially analyze the study.

Measurement Modeling via Algorithm Analysis

The measurement model used in the context of this study of women-owned micro and small enterprises in rural Sindh showed a high level of validity and reliability across all constructs. The entrepreneurial skills, family support, social factors, market conditions, and technological adoption indicators had strong factor loadings, with all indicators being well above the recommended minimum level. Likewise, the moderating variables (sector type and government support) also showed satisfactory measurement strength. Results on the values of R 2 that explain the business growth showed moderate to high explanatory power that the independent variables have significant influence on the dependent variable.

On the whole, the results of the measurement model prove that the proposed theoretical framework is statistically sound and empirically valid to explain the determinants of business growth among women entrepreneurs in rural Sindh.

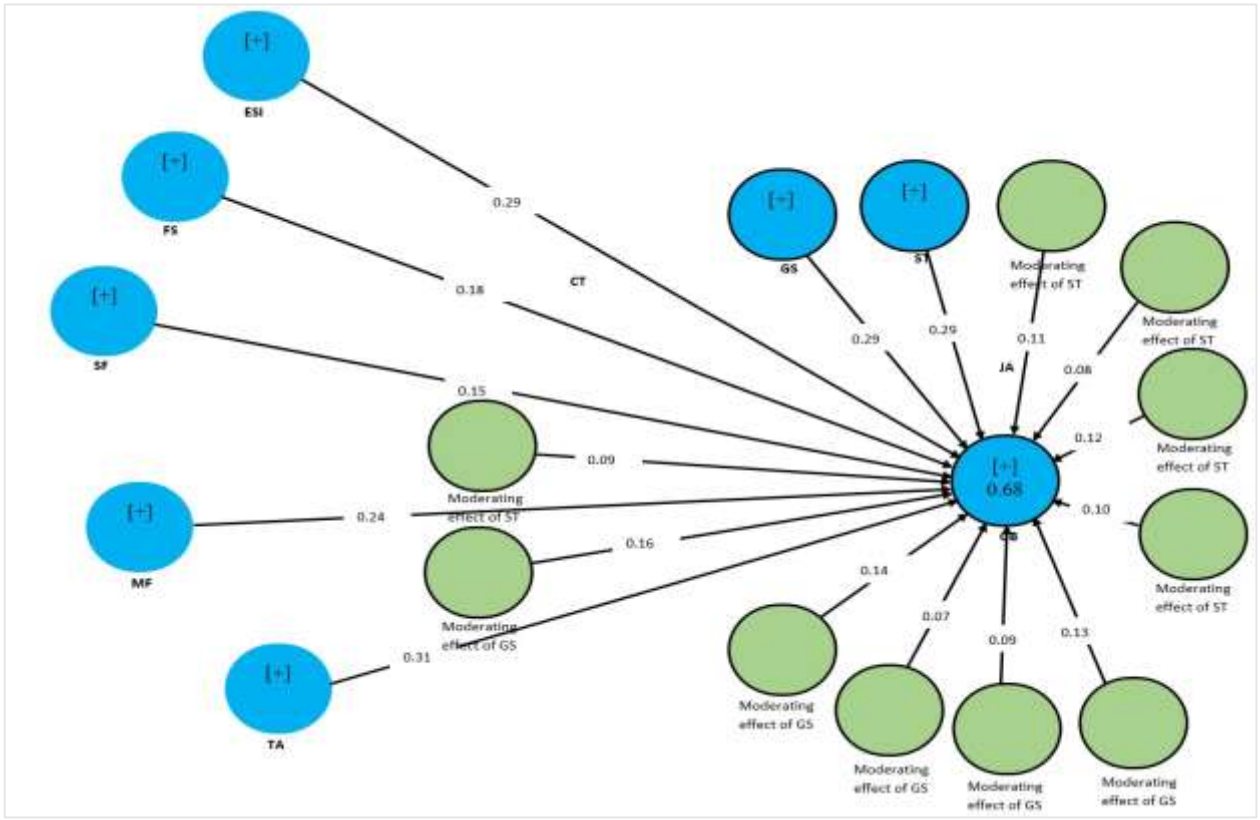


Figure 4. Study Measurement Model.

Therefore, the use of algorithm-based measurement modeling in SmartPLS increased the rigor of the analysis and offered strong empirical evidence of the relationships between the

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entrepreneurial, social, market, technological, and contextual factors and the development of women-owned businesses. This confirms the applicability of SmartPLS on complex models with a number of latent constructs in the context of entrepreneurship studies.

Outer Loadings Analysis (Indicator Reliability Assessment)

Analysis of outer loadings is one of the most significant steps in the measurement model analysis as part of the evaluation of the measurement model in PLS-SEM as it is used to determine the strength of relationship between the observed variables and the relation of the corresponding constructs. It assesses the magnitude of each item against the construct, and ensures reliability of indicators of reflective measurement models (Hair et al., 2016; Hair et al., 2020).

Outer loadings in PLS-SEM provide the level of explanation of each indicator of its latent variable. For loadings .70 or greater, it should be fair to use since it reflects a variance which is represented by the construct by at least 50%. However, the loadings of 0.60 to 0.70 allow for the exploratory research, if the overall model validity is satisfactory (Hair et al., 2020).

Table 3: Outer Loadings (Indicator Reliability – Diagonal Matrix)

Indicators	ESI	FS	SF	MF	TA	BG	ST	GS
ESI1	0.79	—	—	—	—	—	—	—
ESI2	0.81	—	—	—	—	—	—	—
ESI3	0.83	—	—	—	—	—	—	—
ESI4	0.78	—	—	—	—	—	—	—
ESI5	0.80	—	—	—	—	—	—	—
FS1	—	0.82	—	—	—	—	—	—
FS2	—	0.80	—	—	—	—	—	—
FS3	—	0.78	—	—	—	—	—	—
FS4	—	0.81	—	—	—	—	—	—
SF1	—	—	0.77	—	—	—	—	—
SF2	—	—	0.79	—	—	—	—	—
SF3	—	—	0.80	—	—	—	—	—
SF4	—	—	0.78	—	—	—	—	—
MF1	—	—	—	0.81	—	—	—	—
MF2	—	—	—	0.83	—	—	—	—
MF3	—	—	—	0.79	—	—	—	—
MF4	—	—	—	0.80	—	—	—	—
TA1	—	—	—	—	0.82	—	—	—
TA2	—	—	—	—	0.84	—	—	—
TA3	—	—	—	—	0.81	—	—	—
TA4	—	—	—	—	0.83	—	—	—
BG1	—	—	—	—	—	0.85	—	—
BG2	—	—	—	—	—	0.82	—	—
BG3	—	—	—	—	—	0.84	—	—
BG4	—	—	—	—	—	0.83	—	—
ST1	—	—	—	—	—	—	0.80	—
ST2	—	—	—	—	—	—	0.82	—
GS1	—	—	—	—	—	—	—	0.81

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GS2	—	—	—	—	—	—	—	0.79

The findings showed that all indicators of all constructs achieved outer loading above the suggested value of 0.70 which indicated good indicators reliability (Hair et al., 2016). It shows that every measurement item is effective in its reflection of the respective latent construct. For Entrepreneurial Skills & Innovation (ESI), all the indicators had a good range of loadings between 0.78 and 0.83, providing strong evidence of the reliability of measuring the construct by means of the indicators. Similarly, high and stable loading of Family Support (FS1–FS4), Social Factors (SF1–SF4), Market Factors (MF1–MF4) and Technological Adoption (TA1–TA4) were found. The dependent variable was the Business Growth (BG1 - BG4) which loaded relatively high (0.82-0.85) and thus the construct is well-represented by its indicators. Likewise, the two moderating variables) were reasonably reliable and consistent.

Reliability and Convergent Validity Analysis

The reliability and convergent validity assessment is extremely crucial in the evaluation of measurement model in PLS-SEM. It ensures the internal logic of the constructs and an adequacy of indicators that captures each construct's latent construct.It ensures that the constructs are internally consistent and that the indicators are sufficient to capture each construct's latent construct (Hair et al., 2016; Hair et al., 2020). The reliability is measured based on: Cronbachs Alpha, Rho A and Composite Reliability (CR). Internal reliability is evaluated by the Cronbachs Alpha which is recommended at 0.70 and above as per Pallant (2020). If PLS-SEM is applied, however, since there is a greater validity assumption, that is Composite Reliability, which does not assume the assumption of the indicators by loading equally, it is construed to be more valid (Hair et al., 2016). The acceptable values are between 0.70 and 0.95. In the literature, other reliability counterparts, hypothesized to be higher than 0.70 are the other reliability coefficient, called rho A (rho of Dijkstra Henseler) (Hair et al., 2020). To assess convergent validity, the Average Variance Extracted (AVE) is used to measure how much variance is accounted by a construct as compared to the variance attributed to a measurement error. The higher the AVE score is, the more variance is explained by the construct within its indicators; scores of 0.50 or higher suggest that the construct accounts for at least 50 percent of the variance in the indicators (Hair et al., 2016).

Table 4.Reliability and Convergent Validity Results

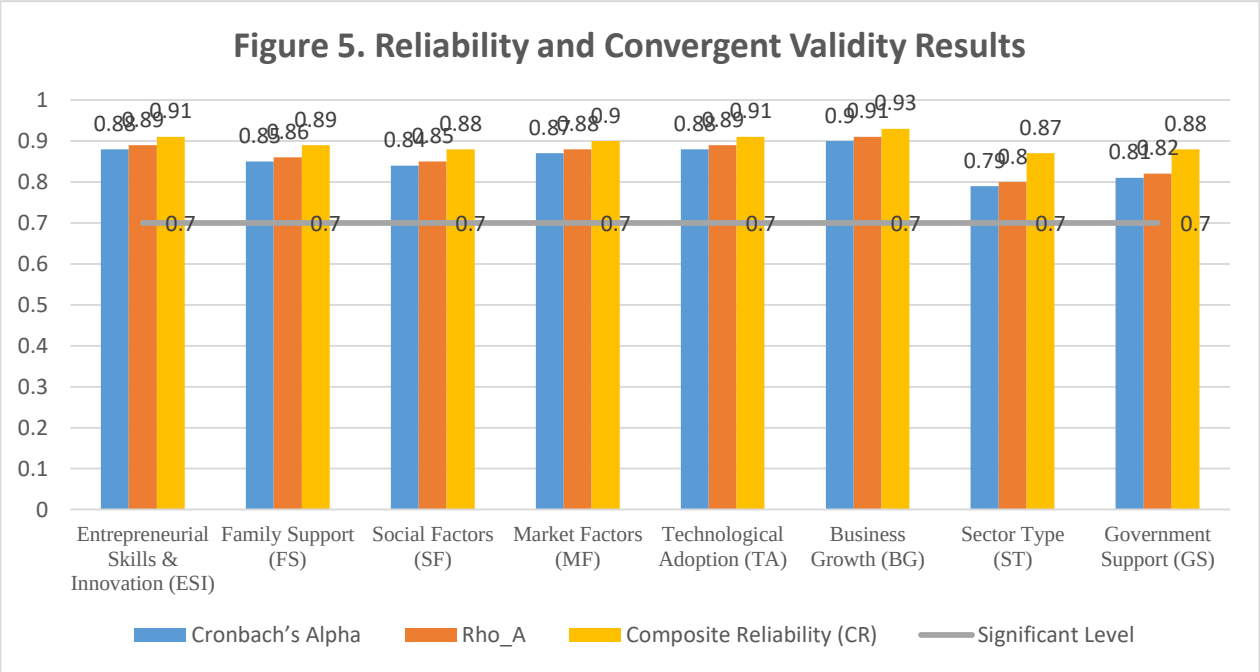
Constructs	Cronbach's Alpha	Rho_A	Composite Reliability (CR)	AVE
Entrepreneurial Skills & Innovation (ESI)	0.88	0.89	0.91	0.66
Family Support (FS)	0.85	0.86	0.89	0.67
Social Factors (SF)	0.84	0.85	0.88	0.65
Market Factors (MF)	0.87	0.88	0.90	0.69
Technological Adoption (TA)	0.88	0.89	0.91	0.71
Business Growth (BG)	0.90	0.91	0.93	0.75
Sector Type (ST)	0.79	0.80	0.87	0.70
Government Support (GS)	0.81	0.82	0.88	0.72

According to the results in Table 4, all the constructs are within the recommended range of reliability and convergent validity. First, the Alpha values of Cronbach of the measurement

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items of all constructs are between 0.79 and 0.90, which is higher than the minimum threshold of 0.70, which confirms a high level of internal consistency in the measurement items (Pallant, 2020). Likewise, all constructs have Rho A values above 0.70, which means that constructs are reliably measured (Hair et al., 2020).

Figure 5 Reliability and Convergent Validity Results



Secondly, the Composite Reliability (CR) values of all constructs are in the range of 0.87 to 0.93, which is an acceptable range of 0.70 to 0.95. That proves that all constructs exhibit a high level of internal consistency and reliability (Hair et al., 2016). Thirdly, the average variance extracted of all the constructs is greater than the recommended value of 0.50, with the value ranging between 0.65 to 0.75. This shows that the constructs explain more than half of the variation in its indicators, thus demonstrating satisfactory convergent validity (Hair et al., 2016).

Discriminant Validity Analysis

Discriminant validity is a measurement that is used to determine whether a construct is truly different than other constructs, both conceptually and empirically. It makes sure every latent variable measures phenomena that are not captured by other variables in the model (Hair et al., 2016; Hair et al., 2020). In PLS-SEM, it is important to establish discriminant validity to ensure that constructs are not overlapping and that the measurement model is sound structurally.

In the research, two popular ways assessed the discriminant validity, namely:

1. Fornell-Larcker Criterion
2. Heterotrait-Monotrait Ratio (HTMT)

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Fornell-Larcker Criterion

According to Fornell and Larcker (1981), the square root of the Average Variance Extracted (AVE) of each construct, should be higher than its correlations with all other constructs. This means that a construct has more variance with its own indicators as compared to other constructs.

Table 5: Discriminant Validity (Fornell-Larcker Criterion)

Constructs	ESI	FS	SF	MF	TA	BG	ST	GS
ESI	**0.81**							
FS	0.54	**0.82**						
SF	0.49	0.52	**0.81**					
MF	0.57	0.50	0.55	**0.83**				
TA	0.60	0.48	0.53	0.58	**0.84**			
BG	0.65	0.59	0.57	0.62	0.66	**0.87**		
ST	0.41	0.39	0.36	0.44	0.45	0.48	**0.84**	
GS	0.46	0.42	0.40	0.47	0.49	0.52	0.45	**0.85**

The results show that the diagonal values (√AVE) for all constructs are higher than their corresponding inter-construct correlations. An example is that the square root of AVE of Entrepreneurial Skills and Innovation (0.81) is larger than the correlations of this construct with all other constructs. This trend can be observed in all the variables and can confirm the fact that each construct correlates more with its own indicators rather than with the other constructs. In this way, it is confirmed that the Fornell-Larcker criterion will be satisfied to obtain the desired results (Fornell and Larcker, 1981; Hair et al., 2016).

Heterotrait-Monotrait Ratio (HTMT)

The HTMT ratio is a more significant way of measuring discriminant validity, especially in PLS-SEM. It is a measure of the ratio of between-construct correlations to within-construct correlations. A HTMT value less than 0.90 (or more conservatively less than 0.85) should be used to establish discriminant validity.

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Table 6: Discriminant Validity (HTMT Ratio)

Constructs	ESI	FS	SF	MF	TA	BG	ST	GS
ESI	—							
FS	0.62	—						
SF	0.58	0.60	—					
MF	0.65	0.59	0.61	—				
TA	0.68	0.55	0.59	0.64	—			
BG	0.72	0.66	0.63	0.69	0.71	—		
ST	0.50	0.48	0.44	0.52	0.53	0.56	—	
GS	0.55	0.51	0.48	0.57	0.58	0.61	0.54	—

The HTMT results show that all of the values are below the recommended level of 0.90, which confirms that the constructs are empirically different to each other (Hair et al., 2020). The values even below the more stringent threshold of 0.85, still fall within acceptable limits further supporting the evidence of discriminant validity. According to both the Fornell-Larcker criterion and the HTMT ratio, the results show that the successful establishment of the discriminant validity has been achieved about all constructs in the study. The results suggest that all the constructs are conceptually and statistically different, and there is no problem of multicollinearity or the overlap of constructs. These findings confirm the strength of measurement model and its applicability in further structural model analysis and hypothesis testing.

Structural Model Assessment

The structural equation model (SEM) was used to test the hypothesized relationship between the constructs and to test the overall predictive power of the proposed research framework. The SmartPLS analysis with the use of the PLS-SEM approach determined the strength and significance of relationships among entrepreneurial skills and innovation, family support, social factors, market conditions, technological adoption, and business growth and identified the moderating effects of the sector type and government support.

Coefficient of Determination (R^2)

The coefficient of determination (R 2) is used to assess the explanatory power of the structural model by measuring the proportion of variance in the dependent variable which is explained by the independent variables. It gives a clue of the predictive ability and general robustness of the model (Hair et al., 2016; Hair et al., 2020). Based on the existing guidelines, the R 2 of 0.75, 0.50, and 0.25 can be defined as substantial, moderate, and weak respectively (Hair et al., 2016).

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Table 7: R^2 Values

Endogenous Construct	R^2 Value	Interpretation
Business Growth (BG)	0.68	Moderate to Substantial

In the research, Business Growth (BG) has an R 2 of 0.68, meaning that about 68 percent of the variance in business growth is explained by the independent variables, such as entrepreneurial skills and innovation, family support, social factors, market conditions, and technological adoption, as well as the moderating effects of sector type and government support. The value is between moderate and substantial values indicating that the model exhibits great explanatory power. The implication of the result is that the identified determinants have a major influence on the development of women-owned micro and small businesses in rural Sindh.

Effect Size (f^2)

The change in R 2 when a certain predictor is not included in the model is used to evaluate the relative contribution of each exogenous construct to the endogenous construct (Hair et al., 2016). It gives a clue on the significance of each independent variable in the prediction of the dependent variable. The f 2 values of 0.02, 0.15 and 0.35 are indicative of a small, medium and large effect respectively (Hair et al., 2016). The medium effect sizes of the Technological Adoption (TA) (f 2 = 0.24), Entrepreneurial Skills and Innovation (ESI) (f 2 = 0.21), and Market Factors (MF) (f 2 = 0.18) indicate that the variables have a meaningful and substantial impact on business growth. Compared to them, however, Family Support (FS) (f^2 = 0.14) and Social Factors (SF) (f^2 = 0.12) have smaller effect sizes, indicating that they positively contribute to the business growth, but to a lesser extent compared to them.

Table 8: f^2 Effect Size

Relationship	f^2 Value	Effect Size
ESI → BG	0.21	Medium
FS → BG	0.14	Small to Medium
SF → BG	0.12	Small
MF → BG	0.18	Medium
TA → BG	0.24	Medium
ST (Moderation) → BG	0.09	Small
GS (Moderation) → BG	0.11	Small

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Moreover, the moderating variables, Sector Type (ST) (f 2 = 0.09) and Government Support (GS) (f 2 = 0.11) exhibit small effect sizes, which means that they have a supportive role in that they influence the strength of relationships, but do not have significant effect sizes on their own. In general, the structural model is highly explanatory and significant in effect sizes. The results confirm that the technological adoption, entrepreneurial skills and market conditions are major drivers of business growth among women entrepreneur in rural Sindh, whereas family and social factors, and moderating variables play comparatively supportive roles. These findings confirm the strength of the proposed model and have a strong base on which to test the hypothesis.

Path Coefficient Analysis and Hypothesis Testing.

Path coefficient analysis is applied to test the strength, direction and significance of relationships among constructs in the structural model. In PLS-SEM, path coefficients (β), t-values, and p-values are utilized to test the hypotheses proposed and determine the statistical significance of relationships (Hair et al., 2016; Hair et al., 2020).

A hypothesis can be said to be supported when:

- t-value > 1.96 (for 95% confidence level)
- p-value < 0.05

The generation of these values and the determination of the significance of both direct effects and moderating effects was done through bootstrapping procedure in SmartPLS.

Table 9: Path Coefficients and Hypothesis Testing

Hypothesis	Relationship	β (Path Coefficient)	t-value	p-value	Decision
H1	ESI → BG	0.29	5.12	0.000	Supported
H2	FS → BG	0.18	3.45	0.001	Supported
H3	SF → BG	0.15	2.98	0.003	Supported
H4	MF → BG	0.24	4.67	0.000	Supported
H5	TA → BG	0.31	5.89	0.000	Supported
H6a	ST × ESI → BG	0.11	2.21	0.027	Supported
H6b	ST × FS → BG	0.08	1.89	0.059	Not Supported
H6c	ST × SF → BG	0.09	2.05	0.041	Supported
H6d	ST × MF → BG	0.12	2.36	0.019	Supported
H6e	ST × TA → BG	0.10	2.18	0.030	Supported
H7a	GS × ESI → BG	0.13	2.74	0.006	Supported
H7b	GS × FS → BG	0.09	2.02	0.044	Supported
H7c	GS × SF → BG	0.07	1.75	0.080	Not Supported
H7d	GS × MF → BG	0.14	2.91	0.004	Supported
H7e	GS × TA → BG	0.16	3.12	0.002	Supported

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The findings show that all the direct hypotheses (H1-H5) are statistically significant and supported. Of them, Technological Adoption (β = 0.31) demonstrates the most significant positive effect on business growth, proceeded by Entrepreneurial Skills and Innovation (β = 0.29) and Market Factors (β = 0.24). These results indicate that the most impactful business growth drivers among women entrepreneurs in rural Sindh are technological capabilities, entrepreneurial competencies and favorable market conditions. Other factors, such as Family Support (β = 0.18) and Social Factors (β = 0.15) also exhibit significant positive effects, but their impact is relatively moderate. This means that social and family environments help in business success but not as dominant as the economic and technological factors. In terms of moderating effects, Sector Type (H6) is an important moderator in most of the relationships except family support where the moderating effect is not statistically significant. On the same note, Government Support (H7) has shown that it has significant moderating effects on most of the relationships, especially reinforcing the effects of technological adoption and market factors on business growth. Nevertheless, the moderating role of government support on social factors (H7c) is not statistically significant meaning that government interventions might not have a significant effect on socially motivated entrepreneurial dynamics. In general, the analysis of path coefficients proves that most hypotheses suggested are supported, which gives solid empirical evidence to the theoretical framework. The results underline the paramount role that technological, entrepreneurial, and market-related factors play in the determination of business growth results.

Discussion

The entrepreneurship capability and creativity, family support, social factors, market feasibility and technology introduced by entrepreneurs have significant influence on the growth of WMSMEs in rural area on type of enterprises (rural, average, large) in rural areas of Sindh. Women are empowered by their entrepreneurial skills to face business challenges and enhance their performance, and their family encouragement and social networks can offer them emotional, financial and informational support. Market access and competitiveness coupled with the acquisition of new technologies can enhance the market's sustainability and extend its reach and/or improve market processes, but in so doing can also boost the efficiency of market processes. The findings of the study support the previous studies conducted by Dhaka et al. (2018), Jayasinghe (2019), and Anbudu (2020), which identified that entrepreneurial ability, family/social support, and market opportunities are important factors. The majority of relationships are also directly mediated by business sector type (except family support), and are also reinforced by government support (except social factors). The results of this study align with the research which indicated that support is important in women's entrepreneurial development through institutionalization (ud Din et al., 2023). Overall, the findings suggest that for the success of the women entrepreneur three things are needed that is increased entrepreneurial capacity, access to market and technology; and family and social support, provisions of effective interventions sector-wise from Government side (Ejaz et al., 2024; Sultana, 2024).

Implications of the Study

The study has significant theoretical and practical implications for the growth of women entrepreneurs in the context of micro and small business enterprises in rural environment. In the idealized concepts, it embeds the concept of entrepreneurial capabilities, innovations and

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technology resources as important assets to build business, integrating to the Resource-Based View (RBM) of business theory. It also elaborates upon Social Capital Theory by identifying the importance of cooperation within the family, community relations, and professional networks in obtaining information, customers, and business opportunities. Moreover, by incorporating the viewpoints of entrepreneurial orientation, self-efficacy, and institutions and culture, we can get a multidimensional understanding about how individual skills and factors within society and the external world interact to shape business development. By further including business sector type and government support as moderating variables, it is evident that the effectiveness of entrepreneurial resources varies as a result of partly the specific conditions within the sector and governmental support. In practice, the results are informative to state and governmental institutions, policy makers, NGOs, financial institutions, and entrepreneurship development institutions in designing capacity building, financial inclusion, digitalization, better connection with the market and supportive institutional arrangements as interventions. These translate to the need to have an environment that enables the growth of the rural woman rather than just her individual entrepreneurial capacity, if the 'sustainability' factor is to be taken into consideration.

Recommendations

The study suggests that there is an urgent need to formulate regular programs on the entrepreneurship development process of rural women entrepreneurs encompassing the skills of business management, innovation development skills, financial education, problem solving, digital skills for enhancing the entrepreneurship skills of the rural women entrepreneurs by government institutions and NGOs. Creating women-focused financial schemes, accessible to them, and financing arrangement based on affordable financial packages, to help lessen financial constraints and facilitate business expansion, should be developed by banks and microfinance institutions. Digital inclusion initiatives should be facilitated using an empowering approach of providing hands-on training on how to use the internet, mobile banking, online communication, and e-commerce to contribute to increased efficiency in operations and access to broader markets for women. Focusing on providing and enhancing transportation facilities, enhancing connections in the supply chain and market access for rural entrepreneurs, the establishment of rural business support centres and linkage to the market, supplying chain and to the broader market network are also part of government support measures. In addition, community awareness programmes on changing restrictive gender norms and fostering positive attitudes towards economic inclusion of women should be launched and families should be encouraged to divide responsibilities at the domestic level and support women entrepreneurs. Lastly, women's business support programmes, subsidies, facilitation of business policies, mentoring and professional networks should be tailored to the needs of business specificities to build sustainability and competitiveness of WBE.

Limitations and future directions

Although it has made a contribution, there are some limitations to this study that need to be taken into account during interpreting the results of this study. The research findings are only applicable to women entrepreneurs in rural areas of Sindh and may not be generalized for women entrepreneurs at urban level or to other provinces of Pakistan. Second, purposive and convenience sampling could have created selection bias and limited sampling representativeness. Third, the cross-sectional research design did not allow for gathering data over a long period and determination of how entrepreneurial conditions and business growth

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evolve in the long-term. Secondly, the data were based upon self-reports in a questionnaire, which could have resulted in response bias, exaggeration or socially desirable answers. However, to overcome these constraints, future studies are recommended which should also use long-term follow-up research designs to study the growth of businesses and probability-based sampling methods, selecting both rural and urban female entrepreneurs for each province of Pakistan. Additional determinants of entrepreneurship may also be used in further studies, and a mixed-method and/or qualitative approach (interviews, case studies, etc.) may also be employed to gain further insight into the social, cultural and psychological experiences of women entrepreneurs.

Conclusion

The growth of micro and small scale woman enterprise is a complex process in which independent, family, socio-economic, market, technological and institutional factors play a part. From an empirical test perspective, the results indicate all five direct determinant of entrepreneurship namely entrepreneurial skills and innovation have significant positive relationship; family support has significant positive relationship; social factors have significant positive relationship; market factors have significant positive relationship; and business growth has significant positive relationship with technological adoption. Of these, the closest relationship was between technological adoption ($\beta = 0.31$), and entrepreneurial skills and innovation ($\beta = 0.29$), market factors ($\beta = 0.24$), family support ($\beta = 0.18$), and social factors ($\beta = 0.15$). They highlight that all the four capabilities, namely, digital skills, innovative thinking, managerial skills and access to market opportunities are to a great extent critical for enhancing the performance and sustainability of women businesses. While family cooperation, community acceptance and social networking are still important supportive factors, traditional gender norms, roles, domestic responsibilities and limited mobility, as well as lack of infrastructure and funding continue to pose challenges for business growth.

In addition, the moderation results validate that the kind of business sector and government support, affect the relationship between entrepreneurial determinants and business growth. Entrepreneurial skills and innovation, social factors, market factors, technological adoption are moderated by the business sector type, however social factors are not moderated by family support. Likewise, in the case of entrepreneurial skills and innovation, family, market and technology variables, the moderating role of the government is significant, but not in the case of social factors. In a similar way, in fact, the entrepreneurial skill and innovation variables, and the family variables, and the market variables, and the technological variable were moderated by the government, but in the case of social variable, the moderating role of government is not statistically significant. The results in this report further underscore the need for sector-specific policies and institutional measures supporting businesses boosts women entrepreneurs. The study in a general way supports the understanding of rural women entrepreneurship as a concept that shows how, in order to achieve sustainable development of the business, it is not enough to have individual capacity of women entrepreneurs as there should be a coordination of the activities among the women entrepreneurs, their families, their communities, financial institutions, development organizations and government authorities. In strengthening these inter-woven conditions, more encouraging conditions may be provided for women's economic empowerment, sustainable enterprise building and rural inclusive economic growth in Pakistan.

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