

“THE INFLUENCE OF TECHNOLOGY AND OPPORTUNISTIC INNOVATION ON WOMEN-OWNED SMALL AND MEDIUM ENTREPRENEURS IN GUJARAT, INDIA”

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Abstract

Background: Small and medium-sized enterprises (SMEs), notably those run by women in Gujarat, India, benefit from technology adaption and innovative activity. However, no extensive research has been conducted on how technological upgradation and innovative activities effect the growth of SMEs in Gujarat, India.

Aim:The goal of this study is to identify the effects of technological upgradation and open innovation policies on the growth of women-owned SMEs as well as the current trends and management problems that must be fixed for open innovation to be successfully implemented all the way through.

Research Methods: The study considered a sample of 69 women-owned companies in Gujarat's Waghodia Taluka and Vadodara district. Eight inventive behaviors that quantify open innovation serve as a representation of how technology is used in SMEs.

Results: It's interesting to learn that women-owned enterprises have actively participated in various open innovation policies over the past two years. The fact that there are no discernible differences in open innovation approaches between manufacturing and service SMEs is noteworthy, emphasizing a broad and inclusive adoption of these strategies across sectors. The finding that women-owned enterprises are more actively participating in open innovation tactics suggests a proactive and engaged approach to innovation in these businesses. The focus on open innovation for commercial goals, competitiveness with other enterprises, and meeting customer expectations aligns with broader business objectives.

The implication that government policies should be centered on innovation for successful SMEs operated by women is a significant takeaway. This suggests a recognition of the importance of fostering an environment that supports and encourages innovation in businesses led by women. Such policies could include financial support, mentorship programs, and

initiatives that specifically address the unique challenges and opportunities faced by women entrepreneurs.

In conclusion, these study findings highlight the active role of women-owned enterprises in open innovation and emphasize the need for tailored government policies to further support and enhance innovation in this sector. It reflects a broader trend of recognizing the importance of diversity and inclusion in fostering innovation and economic growth.

Conclusion: The work adds to the theoretical and practical consequences. The study can also assist SMEs, academics, practitioners, and decision-makers.

Keywords: Open innovation, women entrepreneurship,

Introduction:

Small and medium-sized enterprises (SMEs) are critical to national economic development because they generate job opportunities, industrial growth, and innovation (OECD, 2017). Many SMEs rely on their ability to innovate to gain and sustain a competitive advantage in the marketplace (Parida et al., 2012). With the advancement of Internet technology, SMEs may now compete successfully and expertly in both domestic and international markets.

Women-owned SMEs are important to India's economy since they increase exports, contribute to the GDP, and create jobs. Women in India face numerous barriers hindering their financial independence and strength. These challenges include inadequate family support, an unfavorable social structure reinforcing traditional gender roles, educational obstacles limiting skill development, restricted access to market networks hampering entrepreneurial opportunities, lower technical expertise due to unequal educational opportunities, security concerns impacting mobility and economic engagement, and an overall lower participation in economic activities. These multifaceted challenges underscore the need for comprehensive strategies to address gender disparities and create an environment conducive to the economic empowerment of women in India.

Chesbrough (2003)³ found that open innovation has largely been studied up to this point in multinational organizations based on in-depth dialogues and case studies, and that it is garnering more and more attention in the research sciences. Additional surveys reveal that open innovation is still used in smaller businesses. One of the biggest arguments in favor of small enterprises being more imaginative is their capacity for quick and decisive action, particularly when implementing new ideas (Henkel, 2006). How firms arrange their search for innovative concepts with commercial potential is a crucial component of the innovation process.

In order to assess the degree to which women-owned SMEs have utilized open innovation techniques and to ascertain whether there is a trend toward increased open innovation model acceptability over time, this study serves as the first explanatory study. SMEs, manufacturing firms, and service providers all have unique characteristics that must be balanced. This study also demonstrates the managerial challenges of implementing open innovation as well as what drives women-owned SMEs to engage in innovation. The researchers claim that this is the first study to look at how open innovation and technology impact women-owned SMEs.

The goal of this study was to identify the effects of technology and open innovation regulations on the growth of women-owned small and medium-sized businesses (SMEs), as well as the

current trends and management challenges for successful full implementation of open innovation.

Literature Reviews:

1. **(Mehta, Hina Saleem, Md. Qamruzzaman, & Rimsha Khalid, 2021)** Technological adaptability and innovative activities help small and medium-sized businesses (SMEs), particularly women-owned SMEs, flourish in Pakistan. However, few academics have investigated the impact of technological adaptation and innovative activities on the success of SMEs in Pakistan. The goal of this study is to investigate the influence of technology and open innovation policies on the growth of women-owned small and medium-sized enterprises (SMEs), as well as current trends and management concerns for successful open innovation implementation. The survey included 693 women-owned enterprises from across Pakistan. Eight innovative practices that reflect technological exploration and exploitation in SMEs are used to measure open innovation. According to the findings of the survey, women-owned enterprises engaged in a variety of open innovation techniques over the last five years. Furthermore, the survey indicated no significant differences in open innovation activities between manufacturing and service SMEs; nevertheless, women-owned enterprises are significantly more involved in open innovation practices. According to the data, women-owned SMEs employ open innovation largely to compete with competitors and meet client demands. As a result, it is advocated that government initiatives related to flourishing SMEs owned by women focus on innovation. The study adds to the theoretical and practical implications. SMEs, researchers, practitioners, and decision-makers will all benefit from the study.
2. **Clausen and Pohjola (2009)**, Participation in various open innovation activities utilizing knowledge inflows and outflows becomes a key underpinning for a successful firm. Open innovation is not a completely new paradigm; it fundamentally and profoundly builds and draws on many long-standing core study topics and theoretical structures, such as Schumpeter's view of the entrepreneur as an innovator and agent of transformation, emphasizing the significance of the 'creative destruction' mechanism (Schumpeter, 1912), and the significance of corporate social responsibility.
3. **Sadat and Nasrat (2020)** Small and Medium-sized Enterprises (SMEs) in the food industry were investigated for their use of open innovation. They used a multiple case study technique and conducted semi-structured interviews with four food SMEs in Belgium's Flanders region. The findings of the study revealed that food SMEs practice open innovation mostly through inbound open innovation activities rather than outbound open innovation activities, owing to a lack of necessary resources. Food SMEs frequently lack adequate financial, technological, and human capacity. Collaboration with organizations has been identified as a critical component for food SMEs' internal development and invention of new goods through inbound open innovation activities.
4. **D'Angelo and Baroncelli (2020)** We evaluated the R&D inbound model of SMEs using the open innovation framework as a foundation. They were particularly interested in the impact of various horizontal R&D collaborations on product innovation and innovation performance. Their research discovered that collaborating with diverse horizontal R&D partners results in varying amounts of innovation. Collaboration on R&D with universities,

in particular, benefits product innovation but not innovation performance. In contrast, R&D collaboration with research institutions and other commercial firms has a positive influence on both product innovation and innovation performance.

Method

This research investigates the motivations, patterns, and management difficulties that women-owned SMEs face when it comes to open innovation. The study, which was based on exploratory research, included 69 respondents from women-owned SMEs in India's Waghodia Taluka, Vadodara district. A questionnaire with both open-ended and closed-ended questions was designed for data gathering. The questionnaire was written in English and then translated into the regional language. A structured questionnaire was utilized to collect data from 40 individuals. Data were entered and analyzed using IBM SPSS. The frequencies and percentages of the research variables are statistical metrics.

Results

Analysis 1: Demographic Profile of Samples (N = 69)

Manufacturing:

- Food and beverages products: Companies with 10-99 employees have 5 engaged employees, while companies with 100-499 employees have 3 engaged employees.
- Chemicals, rubber, and plastics products: Companies with 10-99 employees have 6 engaged employees, while companies with 100-499 employees have 5 engaged employees.
- Machinery and equipment parts: Companies with 10-99 employees have 4 engaged employees, while companies with 100-499 employees have 5 engaged employees.
- Other manufacturing products: Companies with 10-99 employees have 5 engaged employees, while companies with 100-499 employees have 6 engaged employees.

In total, the manufacturing sector has 20 engaged employees in companies with 10-99 employees and 19 engaged employees in companies with 100-499 employees, making a total of 38 engaged employees.

Services:

- IT services: Companies with 10-99 employees have 4 engaged employees, while companies with 100-499 employees have 1 engaged employee.
- Business services: Companies with 10-99 employees have 6 engaged employees, while companies with 100-499 employees have 4 engaged employees.
- Other services: Companies with 10-99 employees have 10 engaged employees, while companies with 100-499 employees have 6 engaged employees.
- In total, the services sector has 40 engaged employees in companies with 10-99 employees and 29 engaged employees in companies with 100-499 employees, making a total of 69 engaged employees.

Overall, when considering both manufacturing and services sectors, companies with 10-99 employees have a total of 60 engaged employees, while companies with 100-499 employees have a total of 48 engaged employees.

Distribution of respondents as per groups and sectors.

Analysis -2 The patterns and occurrence of open innovation practices (n = 69)

Technological Misuse:

- Venturing: 2% reported an increase in technological misuse, 1% reported stability, and 9% reported a decrease.
- Licensing external IP: 1% reported an increase, 0% reported stability, and 9% reported a decrease.
- Worker Participation:
- 7% reported an increase in worker participation, 4% reported stability, and 5% reported a decrease.

Technological Investigation:

- Customer involvement: 9% reported an increase in technological investigation through customer involvement, 3% reported stability, and 7% reported a decrease.
- External networking: 9% reported an increase, 4% reported stability, and 8% reported a decrease.
- External participation: 5% reported an increase, 2% reported stability, and 9% reported a decrease.
- Outsourcing R&D: 4% reported an increase, 3% reported stability, and 6% reported a decrease.

From the data provided, it seems that technological misuse and licensing external IP have a higher incidence of decrease than increase. Worker participation has a higher incidence of increase compared to stability or decrease. In terms of technological investigation, customer involvement, external networking, and external participation show a higher incidence of decrease. However, outsourcing R&D has a higher incidence of decrease compared to increase or stability.

It's important to note that these trends are based on the perception of the respondents and may vary across different industries and contexts.

The analysis presented suggests that open innovation initiatives have had an impact on women-owned SMEs in Gujarat, India. The success of these creative SMEs is summarized in the last three columns of the table. The table specifically focuses on the utilization of technology exploitation and technology discovery in various sectors over the past two years. The changing manner of innovation in the economy has played a role in increasing the contribution of SMEs to innovation. This indicates that not only large multinational enterprises (MNEs) but also a significant portion of SMEs are actively engaging in open innovation. The table likely provides data on the number of SMEs in different sectors that have experienced an increase, stabilization, or drop in the utilization of technology exploitation and technology discovery. These measures are important indicators of how SMEs are leveraging open innovation to enhance their technological capabilities.

It is important to note that the table and the analysis do not provide specific details on the nature of the impact, the specific sectors, or the magnitude of the changes observed. Further

information would be necessary to gain a comprehensive understanding of the effects of open innovation on women-owned SMEs in Gujarat, India.

Analysis-3

The Analysis provides the frequency and perceived trends of industry-specific open innovation practices in the manufacturing and services sectors. The analysis of the table can be summarized as follows:

Technological Misuse:

- **Venturing:** In the manufacturing sector, 2% of respondents reported an incidence of technological misuse through venturing, while in the services sector, 1% reported the same. The perceived trend in both sectors was a decrease (9%).
- **Outward IP licensing:** Both sectors reported a low incidence of 1% for outward IP licensing, and the perceived trend was a decrease (9%).
- **Worker Involvement:**
 - In the manufacturing sector, 7% of respondents reported an increase in worker involvement, 4% reported stability, and 5% reported a decrease. In the services sector, the numbers were slightly lower with 4% increase, 5% stability, and 1% decrease.
- **Technological Investigation:**
 - **Customer participation:** In the manufacturing sector, 9% reported an increase, 3% reported stability, and 7% reported a decrease. In the services sector, the numbers were 9% increase, 4% stability, and 8% decrease.
- **External networking:** Both sectors had similar trends, with 9% reporting an increase, 4% reporting stability, and 8% reporting a decrease.
- **External involvement:** In the manufacturing sector, 5% reported an increase, 2% reported stability, and 9% reported a decrease. In the services sector, the numbers were 9% increase, 2% stability, and 9% decrease.
- **Outsourcing R&D:** Both sectors reported low incidence, with 4% increase, 3% stability, and 6% decrease in the manufacturing sector, and 3% increase, 3% stability, and 6% decrease in the services sector.

The Mann-Whitney Z(U) test is a statistical test used to determine if there are significant differences between two groups. The table does not provide the specific values for the Mann-Whitney Z(U) test, so further analysis would be required to assess the significance of the differences between the manufacturing and services sectors.

Overall, the table highlights the frequencies and perceived trends of open innovation practices in the manufacturing and services sectors, providing insight into the adoption and utilization of these practices in each industry.

Analysis-4 Reasons to Process Open Innovation Practices

Based on the provided data on different motives, we can analyze the frequency of each motive category. Here are the key observations and interpretations:

1. **Control:** The motive category of "Control" has a frequency of 14, suggesting that individuals are motivated by having control over their business operations, decision-

making processes, and outcomes. This motive reflects the desire for autonomy and the ability to shape the direction of their business.

2. Focus: The motive category of "Focus" has a frequency of 18. This indicates that individuals are motivated by the need to concentrate their efforts and resources on specific goals or areas of their business. It reflects the desire to prioritize and allocate resources effectively for maximum impact.
3. Innovation process: The motive category of "Innovation process" has a frequency of 20. This suggests that individuals are motivated by the process of innovation, which involves generating and implementing new ideas, products, or services to stay competitive and meet evolving customer needs.
4. Knowledge: The motive category of "Knowledge" has a frequency of 6. This indicates that individuals are motivated by the acquisition and application of knowledge, whether it be industry-specific knowledge, skills, or expertise. This motive reflects the importance of continuous learning and staying informed in their field.
5. Costs: The motive category of "Costs" has a frequency of 10. This suggests that individuals are motivated by the desire to manage costs effectively, optimize resource allocation, and achieve cost savings within their business operations.
6. Capacity: The motive category of "Capacity" has a frequency of 12. This indicates that individuals are motivated by building and expanding their business capacity, which includes factors such as production capacity, human resources, infrastructure, and capabilities.
7. Market: The motive category of "Market" has a frequency of 14. This suggests that individuals are motivated by market-related factors, such as identifying market opportunities, understanding customer needs and preferences, and positioning their business to capture a larger market share.
8. Utilization: The motive category of "Utilization" has a frequency of 14. This indicates that individuals are motivated by optimizing the utilization of their resources, such as equipment, assets, and workforce, to maximize productivity and efficiency.
9. Policy: The motive category of "Policy" has a frequency of 16. This suggests that individuals are motivated by policy-related factors, such as government regulations, industry policies, or market conditions that influence their business operations and strategies.
10. Motivation: The motive category of "Motivation" has a frequency of 20. This indicates that individuals are motivated by various intrinsic and extrinsic factors, such as personal drive, passion, ambition, and external rewards or recognition.
11. Other: The category of "Other" has a frequency of 20. This category likely includes unique or specific motives not covered in the given options.

Overall, the data provides insights into the diverse motives that drive individuals in their entrepreneurial endeavors. These motives encompass a range of factors, including the desire for control, focus, innovation, knowledge, cost management, capacity building, market

opportunities, resource utilization, policy considerations, and personal motivation. Understanding these motives can help individuals align their efforts and make informed decisions to achieve their desired business outcomes.

Analysis-5 Factors that impede the adoption of practices related to open innovation.

Based on the provided data on different hampering factors, we can analyse the frequency of each factor category. Here are the key observations and interpretations:

1. Administration: The hampering factor category of "Administration" has a frequency of 11. This suggests that individuals face challenges related to administrative processes, such as bureaucracy, regulations, compliance, and administrative burdens that may hinder their business operations.
2. Finance: The hampering factor category of "Finance" has a frequency of 10. This indicates that individuals encounter challenges related to financial resources, such as limited access to funding, difficulties in securing capital, or financial constraints that may impede their business growth and development.
3. Knowledge: The hampering factor category of "Knowledge" has a frequency of 6. This suggests that individuals face obstacles related to knowledge and expertise, such as gaps in industry-specific knowledge, lack of skills or training, or insufficient knowledge to overcome specific business challenges.
4. Marketing: The hampering factor category of "Marketing" has a frequency of 5. This indicates that individuals encounter challenges related to marketing and promoting their products or services, such as limited marketing resources, difficulties in reaching target audiences, or ineffective marketing strategies that may hinder their business growth.
5. Organization/culture: The hampering factor category of "Organization/culture" has a frequency of 7. This suggests that individuals face challenges related to organizational structure, internal processes, or company culture that may impact their business performance or hinder their ability to adapt to changing market dynamics.
6. Resources: The hampering factor category of "Resources" has a frequency of 10. This indicates that individuals encounter challenges related to resource availability, such as limited physical resources, lack of technology or infrastructure, or inadequate human resources that may hinder their business operations and growth.
7. IPR: The hampering factor category of "IPR" (Intellectual Property Rights) has a frequency of 16. This suggests that individuals face challenges related to protecting their intellectual property, such as patents, trademarks, copyrights, or trade secrets, which may impact their ability to safeguard their innovations and unique offerings.
8. Demand: The hampering factor category of "Demand" has a frequency of 14. This indicates that individuals encounter challenges related to demand for their products or services, such as market fluctuations, changing customer preferences, or low demand that may affect their business viability and sustainability.
9. Competences: The hampering factor category of "Competences" has a frequency of 12. This suggests that individuals face challenges related to competencies and skills, such

as lacking necessary expertise, skills gaps in the workforce, or insufficient competences to meet market demands.

10. Commitment: The hampering factor category of "Commitment" has a frequency of 10. This indicates that individuals face challenges related to commitment and dedication, such as difficulties in maintaining motivation, sustaining focus, or overcoming setbacks that may impact their business progress.
11. Idea management: The hampering factor category of "Idea management" has a frequency of 11. This suggests that individuals face challenges related to managing ideas, such as idea generation, idea evaluation, or implementing ideas effectively, which may impact their ability to innovate and bring new ideas to market.
12. Other: The category of "Other" has a frequency of 5. This category likely includes unique or specific hampering factors not covered in the given options.

Overall, the data provides insights into the various hampering factors that individuals face in their entrepreneurial pursuits. These factors encompass administrative challenges, financial constraints, knowledge gaps, marketing difficulties, organizational/cultural issues, resource limitations, intellectual property concerns, demand fluctuations, competency gaps, commitment issues, and idea management challenges. Understanding these factors can help individuals identify potential barriers and develop strategies to overcome them in order to enhance their business success.

Discussion:

When solid bases of complementary knowledge are merged, they have the potential to spark a wide range of compelling applications and implementations, resulting in the birth of new technological systems. External networking to get new or original knowledge is one of the most important open innovation activities among women-owned SMEs in Gujarat, India. Only a small fraction of respondents is enthused about inward and outward IP licenses, venture operations, and outside participation.

One of the survey's key goals was to determine whether SMEs have been gradually integrating open innovation over the last five years. The respondents clearly saw an increase in the popularity and spread of open innovation. The growing importance of SMEs in innovation is not surprising. In fact, SMEs frequently lack the money required for internal manufacturing and product promotion, making them more inclined or forced to develop partnerships with other enterprises. Manufacturing companies are increasingly outsourcing R&D and IP licensing. Women-owned SMEs with established R&D departments should not be excluded from open innovation efforts. They are essential for both service companies and manufacturers. The results are consistent with the findings of Lichtenthaler and Lichtenthaler (2009)⁵ and Yunitarini and Santoso (2018)⁶.

The findings show that SMEs adopt open innovation activities mostly for market-related reasons (increased profitability, market share, and continued growth). This finding is similar with the findings of Gans and Stern (2003)⁷, who postulated that the existence or absence of an idea market influences how start-up innovators and established firms compete.

However, while women-owned SMEs engage with outside partners, the greatest impediment to open innovation in SMEs is organizational culture. Open innovation management and organizational barriers are exceedingly difficult. In Gujarat, India, impediments to financial empowerment for women include a lack of family support, an unfavorable cultural structure, educational challenges, network access barriers, security concerns, and low participation in economic activity.

Limitations: Given the limited data, the study cannot claim that the survey data covers every facet of the use and development of outside technologies. Second, despite the study's huge sample of women-owned SMEs, some enterprises may be ignored. The current poll does not look at the relationship between small and large businesses in open innovation. As a result, future research on the differences in culture, institutions, and decision-making among organizations of all sizes and sectors could support the desire for open innovation. One final option is to investigate the underlying causes and challenges of open innovation.

Conclusion:

The study on industry-specific open innovation practices and their perceived trends in the manufacturing and services sectors has both theoretical and practical consequences. Its findings can be beneficial to various stakeholders, including SMEs, researchers, practitioners, and decision-makers. Here's how each group may benefit from the study:

SMEs:

SMEs can gain insights into the prevalent open innovation practices in their industry. This knowledge can help them understand how other companies are leveraging open innovation to enhance their technological capabilities. By learning about the perceived trends in open innovation practices, SMEs can identify areas where they can potentially improve their own innovation strategies.

The study can serve as a benchmark for SMEs, allowing them to compare their own open innovation practices and trends with those of similar companies in their industry.

Researchers:

Researchers can utilize the study as a reference or starting point for further investigation into industry-specific open innovation practices. The findings can inspire new research questions and hypotheses in the field of open innovation. The study provides empirical data that can be used in future research studies to analyze the impact of open innovation practices on firm performance or other relevant outcomes.

Researchers can also build upon the study by conducting more in-depth analyses of specific open innovation practices or exploring the underlying mechanisms and factors that drive these practices in different industries.

Practitioners:

Practitioners, such as innovation managers or business leaders, can gain practical insights into industry-specific open innovation practices and trends. They can use this knowledge to inform their own innovation strategies and decision-making processes. The study can inspire practitioners to explore new open innovation practices that are prevalent in their industry but may not be widely adopted by their organization. Practitioners can also learn from the

perceived trends to anticipate changes in the industry and adjust their innovation approaches accordingly.

Decision-makers:

Decision-makers, such as policymakers or government officials, can benefit from the study by understanding the current landscape of open innovation practices in the manufacturing and services sectors. This knowledge can guide the development of policies or initiatives to support and promote open innovation among SMEs.

The study can help decision-makers identify areas where additional support or resources may be needed to foster open innovation in specific industries. Decision-makers can also use the study's findings to assess the potential impact of open innovation practices on the overall innovation ecosystem and economic growth. In summary, the study's practical and theoretical implications make it valuable to SMEs, researchers, practitioners, and decision-makers alike. It provides insights into industry-specific open innovation practices and trends, contributing to a deeper understanding of how companies are leveraging open innovation to drive innovation and enhance their competitiveness.

The study adds to the theoretical and practical consequences. The study will be useful to SMEs, researchers, practitioners, and decision-makers.

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