STRATEGIC PLANNING AND MANAGEMENT OF AN INDIAN HANDLOOM SECTOR

Thesis submitted in partial fulfillment for the
Award of Degree

Doctor of Philosophy

By

Meghavatu Krishna Prasanna Naik

DEPARTMENT OF MECHANICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY
(BANARAS HINDU UNIVERSITY)
VARANASI-221005
INDIA

16101501 **2023**

CHAPTER 10

CONCLUSIONS AND SOCPE OF FUTURE WORKS

This chapter presents the conclusion of the entire research work discussing the major contributions, inherent limitations, managerial implications, and the scope for future research.

10.1 Conclusion and Managerial Implications

This research underscores the critical importance of strategic planning and effective management in addressing issues like profitability, migration, and health issues of the weavers within the handloom sector. By thoroughly examining relevant literature, it has become evident that the industry faces a multitude of challenges, including raw material procurement, financial constraints, marketing inefficiencies, technological limitations, and regulatory frameworks. These obstacles threaten the economic livelihoods of weavers and endanger the preservation of traditional craftsmanship and cultural heritage. Through a meticulous exploration of these challenges across different regions and socioeconomic categories, this study has identified key areas requiring targeted intervention. Significant gaps in scholarly inquiry, particularly in understanding consumer preferences and integrating emerging technologies, have been highlighted, particularly in locales like Varanasi. Thus, urgent action is needed to develop and implement a tailored assessment framework to address these challenges comprehensively. This research's outlined objectives and structured chapters provide a roadmap for future initiatives to overcome these obstacles and promote sustainable growth in the handloom sector.

In this research work, an effort was made to understand and analyse the challenges confronting handloom weavers related to raw materials, finance, marketing, technology, worker-related concerns, and government policies. It is evident from the literature that such an analysis of challenges structure-wise has not been done before. So specifically, this effort is of the first kind to understand the challenges structure-wise, i.e. Independent Weavers, Master Weavers, and Cooperative-society Weavers. Analytical Hierarchy Process (AHP) was employed to rank the challenges of each weaver society segment. The findings underscore finance as the primary challenge for Independent Weavers, while marketing and worker-related issues pose significant obstacles for Master Weavers and Cooperative-society Weavers, respectively. Notably, all types of weavers exhibit resistance to adopting new technology. Further analysis through prioritizing sub-criteria clarifies each category's specific challenges, emphasizing the necessity for tailored strategies. Independent Weavers, for instance, express heightened concerns over raw material prices, followed by interest rates on loans and material quality. Conversely, Master Weavers grapple with issues such as customer preference information, effective marketing strategies, low profitability on investments, and workforce migration. Cooperative society Weavers managing cooperatives face challenges related to raw material prices, insufficient customer preference data, and marketing strategy deficiencies. These findings stress the importance of crafting strategies specific to each category of weavers to address their unique challenges and mitigate risks effectively. The pervasive challenge of insufficient customer-related information across all categories further underscores the need for immediate attention to prevent significant losses for weavers.

As a matter of the next step, Chapter 4 presents work on understanding the requirements of customers and establishing strategies to fulfil their requirements was carried out. Comprehending and addressing handloom customers' needs is essential to

optimize purchasing decisions and bolster market competitiveness. Through a systematic exploration of QFD, two primary determinants shaping customer preferences are i) the demand for authentic handloom products and ii) pricing considerations. To effectively meet these, the various approaches were identified as i) furnishing product certifications such as silk marks, handloom marks, and geographical indication marks to show the ingenuity of the products; ii) the adoption of an online marketing and sales strategy emerges as essential for circumventing intermediaries (middle man) and minimizing associated costs; iii) strategic store placement emerges as a crucial consideration, with optimal locations enhancing customer accessibility and fostering brand loyalty; and iv) establishing a network of stores in high-traffic areas, weavers can directly engage with customers, thereby mitigating the influence of intermediaries and maximizing profitability. This comprehensive approach empowers handloom weavers to effectively meet customer demands, streamline operations, and capitalize on market opportunities for sustained growth and prosperity. In this effort, embracing an omnichannel approach further fortifies this strategic framework, facilitating seamless interactions across diverse platforms and augmenting overall customer satisfaction.

Chapter 5 meticulously examines the factors influencing the adoption of omnichannel practices within the handloom sector, employing the Interpretive Structural Modeling (ISM) method for analysis. The intricate interdependencies among these factors reveal a complex network of barriers, many of which mutually reinforce each other. These barriers encompass various autonomous challenges, such as the lack of digital culture, qualified workers, and internet access in rural areas, alongside issues related to implementation costs, distribution networks, payment security, and logistical concerns. Additionally, factors like management understanding and commitment, legal uncertainties, and government support emerge as significant independent and driving barriers to

omnichannel adoption. With these findings, there is an urgent call for government intervention to formulate policies and provide support conducive to the seamless integration of omnichannel practices within the handloom sector. Moreover, coupling omnichannel strategies with augmented reality presents a promising avenue to enhance customer engagement and provide immersive experiences, further strengthening the handloom industry's competitive edge in the digital landscape.

Online sales can further be improved if customers are given an opportunity to check handloom products, especially saree, online. Augmented Reality (AR) is a solution to this extent. Chapter 6 provides a thorough background on augmented reality (AR) and investigates the barriers hindering its adoption within the handloom sector. Leveraging the ISM method and MICMAC analysis, a hierarchical model was developed to assess the interrelationships among these factors. The study identifies four clusters of barriers, categorizing "Lack of IT infrastructure and reliable internet access," "Lack of digital culture," "Fear of failure," and "Inadequate research and development in the sector" as dependent barriers. Conversely, "Lack of skilled workers," "Uncertainty in legal and contractual aspects," "Insufficient funds," and "Lack of government support and policies" are recognized as driving barriers. Notably, the analysis highlights the lack of government support and policies (LGP) as the most significant barrier to AR adoption, which holds significant potential for enhancing the Indian handloom sector. AR technology presents opportunities for weavers to increase sales by offering customers a firsthand online product experience before purchase. Therefore, the government must play a central role in supporting the handloom sector by guiding AR technology adoption and formulating adaptable policies conducive to its implementation. Ultimately, this framework serves as a valuable aid for government officials, policymakers, and practitioners in enhancing the welfare of weavers by developing infrastructure supportive of AR technology usage.

However, it's essential to note that AR technology alone does not address the issue of authentic handloom products, necessitating comprehensive measures to safeguard the integrity of the handloom sector towards customer requirements.

So, Chapter 7 elucidates the meticulous process undertaken to address the requirement for authenticating genuine Indian handloom products, as identified in Chapter 4 exploration of customer needs. Through a combination of expert opinions, literature review, and the application of Quality Function Deployment (QFD) with Analytical Hierarchy Process (AHP), this study presents a novel approach involving the integration of QR codes directly into sarees, a very costly and hallmark product of Varanasi city. The prioritization of strategies, particularly the incorporation of "woven logos and QR codes," emerged as the most viable option, surpassing traditional methods like paper tag marks through the QFD process. Subsequently, the QFD process was extended to develop a design procedure for weaving QR codes and logos onto sarees, with successful prototypes tested in collaboration with the Angika Cooperative Society. This innovative approach enables weavers to sell their products online and offline and empowers customers to purchase genuine items, potentially diminishing the role of middlemen.

All the genuine products of the handloom of Varanasi require direct customer engagement through the strategic design of a network within the historic city of Varanasi, renowned for its significance in pilgrim tourism. As a next step, an effort was made to address the issues of easy access for weavers and their products by such tourists who had high footfall after the development of the Kashi-Vishwanath Corridor. Utilizing k-means and elbow methods, Chapter 8 analyzes data pertaining to both weaver locations and tourist hotspots, with a specific focus on Varanasi and data sourced from 4001 weavers and 82 tourist locations. The study's findings advocate for the establishment of four collection

centers, four stores, and two warehouses at strategically chosen locations within the Varanasi handloom sector. Moreover, the chapter emphasizes the need for handloom sector policymakers to formulate a supportive policy framework that facilitates the development of such a network, thereby enhancing customer accessibility. The placement of stores and collection centers holds the potential for positive social impacts on weavers, as proximity to tourist destinations can enhance exposure and accessibility, leading to heightened product demand and increased work opportunities. Additionally, equipping these centres with online sales capabilities can further promote an omnichannel approach, ultimately contributing to the profitability of weavers and the overall growth of the sector with the imperative to ensure the well-being of weavers remains a central consideration in the planning and operation of the handloom network. This will help increase the profit earned by the weavers and their migration to other professions. In Chapter 1, it was highlighted that the migration of weavers was also associated with health issues. Weavers are facing Musculoskeletal Disorder (MSD) and associated pain owing to long hours of repetitive work.

An effort was made to study these issues and alleviate such MSDs, as presented in Chapter 9. Initial research employing the Nordic questionnaire () highlighted a notable prevalence of MSD pain, particularly in the lower back and hips/thighs among weavers. Leveraging anthropometric data, a novel ergonomic seat—a well-defined plank with back support—was specifically engineered for handloom weavers. Subsequently, data was collected using the Nordic questionnaire, which compared MSD pain experienced with the old plank design to that with the newly developed ergonomic seat over a seven-day study period. Analysis of the MSD data associated with the old plank design revealed that 73% of weavers reported lower back pain, and 63% reported hip/thigh pain. However, with the introduction of the new design, these figures decreased to 59% for lower back pain and

48% for hip/thigh pain, representing a significant reduction of 19.17% and 23.80%, respectively. Further statistical analysis validated these results, confirming a notable difference in reported lower back and hip/thigh pain levels between the old and new designs. The proposed seat design, featuring back support, demonstrated efficacy in alleviating MSD among handloom weavers, particularly in lower back and hip/thigh pain. This innovative seat/plank design holds promise for enhancing weaver comfort and can be readily adopted by master weavers, independent weavers, and cooperative society members, thereby promoting an overall enhancement in weaver well-being.

With the focus on the well-being of weavers and the health of the handloom sector in order to regain the old rich culture and migration of weavers, this research work addresses many issues/challenges and strategies, including the diverse needs of consumers, embracing innovative technologies such as omnichannel marketing and augmented reality, strategically optimizing facility locations and ergonomically designed handloom seats. The next section highlights the managerial implication of this research work.

10.2 Managerial Implications

The managerial implications outlined in the paragraph offer actionable insights and strategies for both handloom businesses and policymakers to navigate the challenges and opportunities in the sector effectively.

First, the identification of distinct challenges faced by different categories of weavers, such as independent weavers (IW), master weavers (MW), and cooperative society weavers (CW), underscores the importance of tailored interventions. For example, addressing financial constraints for IW, improving marketing strategies for MW, and enhancing technological capabilities for CW are essential steps to drive growth and competitiveness in each segment of the handloom sector. Moreover, the emphasis on government support

and policies highlights the critical role of policymakers in facilitating sustainable growth. Initiatives such as skill development programs and support for e-commerce adoption are crucial for addressing sector-specific challenges and ensuring the resilience of the handloom industry in the face of economic uncertainties. Government agencies also need to tailor policies to the classification of weavers, ensuring maximum benefit for each category.

Additionally, the adoption of omnichannel marketing strategies emerges as a key driver of growth and competitiveness for handloom businesses. By leveraging online marketing and sales channels, weavers can connect directly with customers, reduce intermediary costs, and maximize profitability. However, addressing the skills gap among weavers posing a significant challenge, government-led digital training initiatives to equip them with the necessary skills for e-commerce adoption. necessitates Weaving community through NGOs may also move forward to this extent. Furthermore, leveraging emerging technologies like augmented reality (AR) presents new opportunities for handloom businesses to enhance customer engagement and sales. By integrating AR technology into marketing and sales strategies, weavers can provide immersive experiences for customers, showcasing the craftsmanship and heritage of handloom products. However, addressing barriers to AR adoption, such as a lack of government support and technological infrastructure, requires proactive intervention from policymakers to foster innovation and competitiveness in the handloom sector.

Moreover, ensuring product certification and authentication is essential for building customer trust and enhancing brand reputation in the handloom sector. Standardized labeling and warranty systems play a crucial role in ensuring transparency and authenticity in handloom products, thereby bolstering consumer confidence and loyalty. Government

agencies and cooperative societies have to promote the role of geographical indication tags, silkmarks, and handloom marks to customers so they can identify original products and avoid purchasing duplicates. The incorporation of the QR code on the handloom product will be beneficial to handloom customers. Customers can easily scan and find the type of material used, the cost of the product, and manufacturer details, which will also serve as quality assurance. This QR code is also useful for the government, cooperative societies, and weavers to track end-user details and demand for the products. A policy towards this step from the government is essential to reinforce the idea in the current market.

The strategy of optimizing store locations is critical for enhancing accessibility and sustainable development in the handloom sector. The findings from the Quality Function Deployment (QFD) analysis underscore the importance of government support in developing store networks and reducing transportation costs, thereby improving the overall efficiency and competitiveness of handloom businesses. Governments and cooperative societies must collaborate to establish stores near tourist locations, raising awareness about handloom products. Additionally, promoting such clusters across all regions of the handloom sector can eliminate intermediaries, increase profitability for weavers, and provide direct contact points for consumers.

Lastly, the government and cooperative societies must prioritize the health and well-being of handloom weavers. The Ergonomically designed handloom seat offers a practical solution to reduce MSD pain and improve worker comfort. These seats can be provided to all pit loom weavers at a subsidized cost, enabling them to work for extended hours with minimal strain on their bodies. By investing in ergonomic solutions, authorities can enhance the overall quality of life for handloom weavers, promote sustainable productivity in the sector and reduce the migration.

Overall, by implementing these managerial implications, weavers in the handloom sector can benefit significantly from these strategies. These measures not only reduce duplication but also improve marketing effectiveness. By adopting these strategies, handloom businesses can enhance their competitiveness and better reach customers. Understanding customer requirements and improving accessibility will enable handloom weavers to compete effectively with other industries or sectors. This holistic approach will not only drive growth but also ensure the sustainability and long-term success of the handloom sector.

10.3 Limitations

This research undertakes the task of identifying and analysing the challenges faced by Varanasi handloom weavers. This work was focused on Varanasi, and the findings' recommendations are valid for the Varanasi handloom sector. Application of the findings in other clans of the handloom sector needs to be adjusted according to their specific features. Policymakers and government have to be careful in implementing these findings, even in Varanasi, as expert opinion may be biased. The effectiveness of the suggested strategies may vary depending on regional and socio-economic factors, and further research is required to tailor solutions to specific contexts.

However, Understanding the requirements of customers (Chapter 4) to fulfil their requirements provides valuable insights into customer preferences and proposes strategies to meet their needs; it is essential to recognize the dynamic nature of consumer behaviour. So, it is important to learn about location-specific customer requirements when reimplementing QFD. Continuous monitoring and adaptation of strategies may also be necessary to remain responsive to evolving customer demands. Similarly, in analysing barriers to adopting Omnichannel marketing and AR technologies, it is crucial to

acknowledge the evolving nature of technology and market dynamics. New barriers may emerge over time, necessitating ongoing research and adjustment of strategies to ensure the effective implementation of omnichannel practices and AR technologies.

While implementing the strategy for authentication of genuine Indian handloom products with innovative solutions of integrating QR codes into sarees through weaving, it is essential to learn that there are potential challenges related to technology adoption and society acceptance of the same. Also, there may be reliability limitations of QR codes weaved sarees over a long priod as the same was not taken up in this research work.

Considering broader socio-economic factors and stakeholder perspectives in facility planning decisions is important. Designing a network for online and offline direct sales in the areas of Varanasi that need governmental support and interventions. Such developments need heavy infrastructure and investments, which are only possible through government support.

Similarly, when a seat was designed ergonomically for weavers to mitigate the risk of MSDs and prevent the migration of weavers, it is important to know that such designs use the anthropometric data of weavers of Varanasi. Variations in such data may force the design of such seats. So, a caution must taken to collect the anthropometric data of the weavers of a specific location to fine-tune such design of seats for the weavers of that particular region.

The next section presents the future work based on the findings and limitations of this research work.

10.4 Future work

Current research sets some future directions for further following work to extend this work to make more actionable plans.

(i) Addressing country-wide challenges is crucial for the handloom sector to thrive. Conducting comprehensive analyses on a national scale enables policymakers and industry stakeholders to gain insights into region-specific issues, including challenges related to raw materials, finance, marketing, outreach, technology, and worker relations. This understanding allows for tailored interventions and policy frameworks that effectively support handloom weavers and businesses across diverse geographical areas in India by adapting policies according to the region and category of the weaver.

(ii) The deployment of e-commerce platforms customized for omnichannel strategies offers significant opportunities for handloom businesses to expand their market reach and enhance customer engagement. Studying how these channels can be integrated with existing sales channels facilitates a unified shopping experience for customers, overcoming geographical barriers and driving sales growth. Additionally, assessing the impact of this technology on the sales of handloom products is essential for understanding its effectiveness.

(iii) Further studies can focus on developing web-based applications specifically for augmented reality (AR) technologies. These applications can explore how AR platforms interact with handloom customers and evaluate the potential increase in the sales of handloom products resulting from their implementation.

(iv) Ensuring the reliability and durability of QR codes woven into handloom sarees is essential for their effectiveness as authentication tools. Thorough reliability analyses of QR codes for resilience to wear, tear, and environmental factors are essentially the next step for the effective implementation of such an idea to build consumer trust in handloom products as tangible markers of authenticity and origin.

(v) Creating user-friendly PC and mobile applications capable of reading QR codes, even when damaged, ensures uninterrupted access to product information and authentication features. These apps should feature intuitive interfaces and robust scanning capabilities, enhancing consumer convenience and confidence in the authenticity of handloom products.

(vi) Leveraging mathematical modelling techniques to design optimal networks of collection centers, warehouses, and retail stores streamlines operations, minimizing the cost and distance travelled for direct sales.

(vii) Expanding facility development and networks beyond state borders, domestically and internationally, taps into new markets and revenue streams. Establishing a presence in diverse regions fosters growth, sustainability, and cross-cultural exchange on a global scale.

(viii) Research and development efforts focused on redesigning frames and pit looms to incorporate automation while preserving the human touch are essential for the long-term viability of handloom traditions. Integrating automated features increases efficiency, reduces labour intensity, and enhances productivity while maintaining the authenticity and quality of handloom products.