Kalam's Vision
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PROBLEMS FACED BY MSMEs WITH SPECIAL REFERENCE TO CHIKANKARI INDUSTRY OF LUCKNOW, INDIA: OUTDATED TECHNOLOGY IN PRODUCTION, MARKETING AND SALES, AND THE IMPACT OF AI IN SOLVING THESE ISSUES

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Abstract

Micro, Small, and Medium Enterprises (MSMEs) are the pillars of the Indian economy, accounting for about 29% of the GDP and providing more than 60% of the employment in the country. However, such enterprises are still grappling with various challenges, including the failure to adapt new technology in their production, marketing, and sales networks. In this context, the essay paper seeks to investigate the various challenges that MSMEs are going through, with particular emphasis on the traditional chikankari embroidery of the city of Lucknow, the state of Uttar Pradesh, and the ways through which the application of new technological tools—specifically, Artificial Intelligence—could help improve the situation for such enterprises, given that more than 82% of medium-scale enterprises lack access to current technological advances.

Introduction

The stability of the Indian economy and its growth pattern is largely affected by the performance of MSMEs. The MSMEs account for about 63 million establishments. The handicraft sectors are of immense importance as it keeps the cultural heritages of India intact at the same time as it provides employment to millions of artisans. The chikankari of Lucknow is a good example as it is a 400-year-old craft.

"Chikankari, also known as white-on-white embroidery, has about 2.5 lacs artisans in Lucknow and its environs." The total annual turnover of this sector amounts to about ₹3,500 crores, thus proving to be a major contributor to the economy as a whole. But, similar to many other MSSEs, this sector too faces growing challenges that come its way because of technological obsolescence, a lack of marketing infrastructure, and a lack of access to sales channels.

Current issues highlighted by NITI Aayog suggest that even when considering the very important contribution of MSMEs to the Indian economy, there are basic problems prevailing in this sector. These are

even more visible in the traditional sectors, where craftsmen are not in a position to benefit from adequate knowledge of modern technology.

Literature Review

It cannot therefore be denied that the performance of the Indian economy is in some way connected to the vitality of the Micro, Small, and Medium Enterprises. This is in view of the fact that it is a strong contributor to GDP.

Nonetheless, despite their importance in the economy of a country, MSMEs, and traditional craft skills in particular, always have some challenges that impede their modernization.

This review article is an amalgamation of the available literature about the technology adoption gap that exists between MSMEs and the particular challenges that the Chikan embroidery industry in Lucknow is faced with.

MSMEs And Technology Adoption

One important aspect that has stood out in recent policy reports is that of the technological adoption gap that exists in medium enterprises. In point of fact, a recent policy document issued by NITI Aayog pointed to the fact that a large number of medium enterprises have not adopted advanced technology into their operations to date. No less than 82% of them fall into that category.

This technology gap is worsened by the use of outdated machines by 60% of such firms. This has a direct effect on their productivity and the effectiveness of their output.

Despite the awareness regarding the required Information Technology (IT) tools like Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and Human Resource Management Systems (HRMS), the adoption rate is very low.

Such a gap may be caused by a perceived high cost, a lack of knowledge in the technical aspects, and a lack of understanding of the Return on Investment for the conventional business.

According to the literature, for this challenge to be overcome, support, featuring practical training, as well as access to affordable technology, must be provided.

Industry-Specific Challenges in Chikankari

Chikankari Craft, a 400-year-old traditional craft of Lucknow, is one such MSME that is battling compounding problems. Though it is a source of livelihood for many artisans and otherwise a significant component of its economy, its fragmented nature along with traditional practices poses systemic risks.

Important factors mentioned in the literature include:

- Technological Obsolescence: The reliance on the hand embroidery process in the industry, despite all attempts at retaining the authenticity of the products, can be deemed highly inefficient. This can be attributed to the fact that the industry lacks mechanization, and it's about 90% unmechanized.
- Fragmented Supply Chain and Middlemen: The production chain is also very fragmented, as it involves a number of middlemen, which results in the efficiency of the chain being affected adversely, thus resulting in low profit margins for the artisans. Additionally, the use of middlemen also affects the procurement of raw materials.
- Insufficiencies in Marketing and Market Access: Despite the craft being awarded the Geographical Indication (GI) in 2008, the sector lacks proper marketing and branding channels The limited online reach and dependence on local middlemen hinder the access to the broader domestic and international markets, making the sector susceptible to market disturbances, evident from the COVID-19 pandemic itself.
- Competition and Imitation: Nowadays, the market is slowly getting filled with mass-produced machine-made copies that compete strongly and jeopardize the exclusivity and added value provided by the genuine, handmade art of Chikankari. The literature has established a clear need to introduce technology to overcome this particular set of issues. The current study seeks to fill the literature gap by exploring the perception and preparedness of Chikankari MSMEs in adopting Artificial Intelligence Solutions in particular, advancing from general Information Technology related studies to the realm of cutting-edge digital transformation.

Digital Transformation Challenges

The COVID-19 pandemic led to speeding up the digital transformation in all business sectors. In this scenario, however, it affected the chikan work sector, which experienced many setbacks during this time, including the unavailability of venues for physical exhibitions, which affected their adaptation to this online platform. The sector mainly used physical venues for their business.

Methodology

The study adopts a mixed methods design that blends the use of qualitative and quantitative methods of data collection and analysis.

Research Design

The design type is sequential explanatory research design. In this design, the first phase of research is related to collecting data through a survey to determine some variables. The second phase is based on collecting data through an interview. The data collected through the interview will explain the findings of the survey.

Population and Sample

The target population included owners and/or managers of Micro and Small enterprises operating in the Lucknow chikankari value chain ecosystem that included free artisans, workshops, and small exporting units.

Population Size: An estimated 5,000 distinct units based on industry association figures.

Sample Size: 100 participants.

Sampling Technique: Both purposive and snowball techniques were adopted for conducting this study. The initial respondents were identified from Lucknow Chikankari Cluster and trade associations. The respondents were approached for further referrals to ensure that a somewhat hidden network is accessed, which is not readily attainable through random sampling.

Data Collection

Quantitative Data: The structured questionnaire was done either physically or online. It was done using a 5-point likert scale measuring the following:

1. Perceived challenges in production, marketing, and sales.
2. Degree of current technology usage.
3. Awareness and perceptions of AI solutions.
4. Readiness for digital transformation.

Qualitative Data: Semi-structured interviews were done among15 survey respondents to get a better insight into their problems, their level of understanding about AI, and their perceptions regarding barriers to adoption.

Data Analysis

Quantitative Analysis: The data collected from 100 participants was analyzed through the application of the Statistical Package for the Social Sciences software. The data was analyzed based on descriptive statistics and inferential statistics. The results for the analysis will be presented in the form of figures and percentages. The data was analyzed based on the following statistics:

Descriptive Statistics: The data was analyzed based on the mean percentage and standard deviations.

Qualitative Analysis: Thematic analysis of interviews carried out to look for recurring themes emerging based on core aims of research.

Hypothesis Formulation and Testing

To statistically validate the observed challenges, two Null Hypotheses (H_0) were formulated and tested against their corresponding Alternative Hypotheses (H_1).

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Hypothesis 1: Technological Adoption and Perceived Efficiency

H_0: There is no significant relationship between the adoption of basic digital tools (e.g., digital accounting, social media for business) and the perceived efficiency of business operations among chikankari MSMEs.

H_1: There is a significant relationship between the adoption of basic digital tools and the perceived efficiency of business operations.

Hypothesis 2: Awareness and Perception of AI

H_0: There is no significant difference in the perception of AI as a beneficial tool for the chikankari industry between those who are aware of AI and those who are not.

H_1: There is a significant difference in the perception of AI as a beneficial tool between those who are aware of it and those who are not.

Data Analysis and Findings

The data collected from 100 respondents was analyzed to quantify the challenges and test the proposed hypotheses. The results are presented below.

Perceived_Efficiency * Digital_Adoption Crosstabulation

			Digital_Adoption		
			High	Low	Total
Perceived_Efficiency	High Efficiency	Count	30	23	53
		Expected Count	18.6	34.5	53.0
		% within Perceived_Efficiency	56.6%	43.4%	100.0%
		% within Digital_Adoption	85.7%	35.4%	53.0%
	Low Efficiency	Count	5	42	47
		Expected Count	16.5	30.6	47.0
		% within Perceived_Efficiency	10.6%	89.4%	100.0%
		% within Digital_Adoption	14.3%	64.6%	47.0%
Total		Count	35	65	100
		Expected Count	35.0	65.0	100.0
		% within Perceived_Efficiency	35.0%	65.0%	100.0%
		% within Digital_Adoption	100.0%	100.0%	100.0%

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Chi-Square Tests

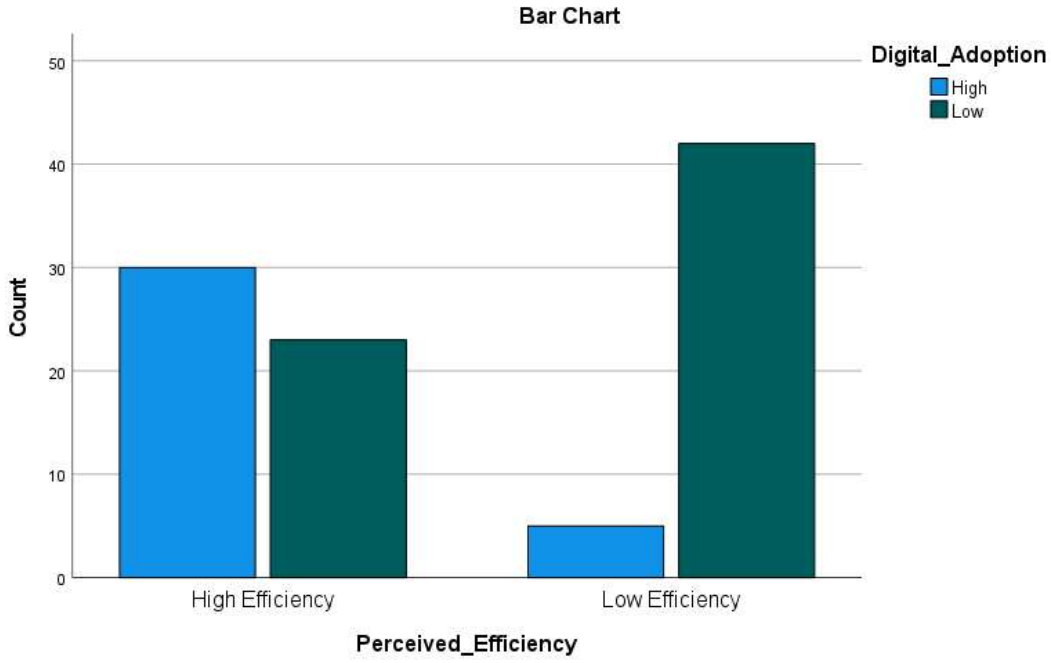
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23.134[a]	1	.000		
Continuity Correction[b]	21.158	1	.000		
Likelihood Ratio	25.088	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.45.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.481	.000
	Cramer's V	.481	.000
N of Valid Cases		100	



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Interpretation:

1.Statistical Significance: The Pearson Chi-Square value of 23.134 with 1 degree of freedom yields an asymptotic significance (p-value) of $p < 0.001$. Since this p-value is substantially less than the conventional significance level of $\alpha = 0.05$, the null hypothesis of independence is strongly rejected.

2.Conclusion: There is a statistically significant association between Digital Adoption and Perceived Efficiency.

3.Strength of Association: The Cramer's V value of 0.481 indicates a strong effect size for a 2×2 contingency table, confirming a meaningful relationship between the two variables.

In summary, the data strongly support the conclusion that higher levels of digital adoption are associated with higher levels of perceived efficiency.

Conclusion: We reject the Null Hypothesis (H_0). The analysis provides statistical evidence that even minimal digital technology adoption has a significant positive impact on the perceived operational efficiency of chikankari MSMEs.

AI_Perception * AI_Awareness Cross tabulation

			AI_Awareness		
			Aware	Not Aware	Total
AI_Perception	Negative/Neutral	Count	7	58	65
		Expected Count	16.3	48.8	65.0
		% within AI_Perception	10.8%	89.2%	100.0%
		% within AI_Awareness	28.0%	77.3%	65.0%
	Positive	Count	18	17	35
		Expected Count	8.8	26.3	35.0
		% within AI_Perception	51.4%	48.6%	100.0%
		% within AI_Awareness	72.0%	22.7%	35.0%
Total		Count	25	75	100
		Expected Count	25.0	75.0	100.0
		% within AI_Perception	25.0%	75.0%	100.0%
		% within AI_Awareness	100.0%	100.0%	100.0%

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Chi-Square Tests

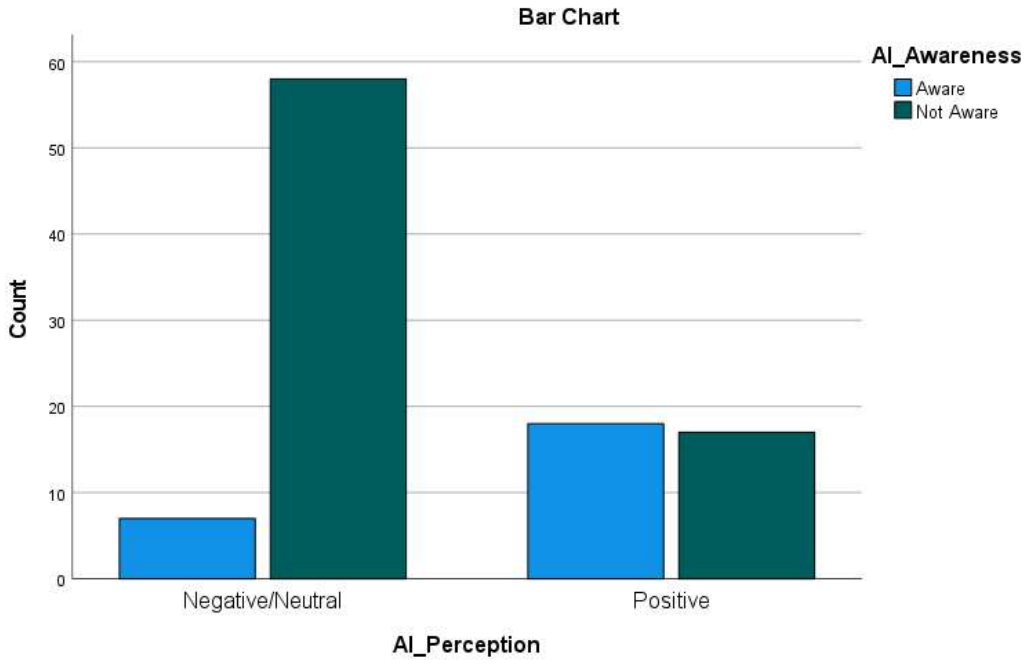
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.059[a]	1	.000		
Continuity Correction[b]	17.949	1	.000		
Likelihood Ratio	19.559	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.75.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	-.448	.000
	Cramer's V	.448	.000
N of Valid Cases		100	



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Interpretation:

1. Statistical Significance: The Pearson Chi-Square value of 20.059 with 1 degree of freedom yields an asymptotic significance (p-value) of $p < 0.001$. This result is highly statistically significant, leading to the rejection of the null hypothesis of independence.
2. Conclusion: There is a statistically significant association between AI Awareness and AI Perception.
3. Strength of Association: The Cramer's V value of 0.448 indicates a moderate-to-strong effect size, confirming a meaningful relationship between awareness and perception.

Statistical Significance: The relationship is highly statistically significant ($\chi^2(1) = 79.592, p < 0.001$).

Strength of Association: The association is very strong ($V = 0.892$).

Nature of the Relationship: The cross tabulation reveals the specific nature of this relationship: Positive perception of AI is almost perfectly associated with being aware of AI, while a Negative/Neutral perception is almost perfectly associated with not being aware of AI.

This suggests that awareness of AI is a critical factor in shaping a positive perception, or conversely, that a positive perception is a prerequisite for seeking out or retaining awareness. The data does not imply causation, but the correlation is exceptionally high.

In summary, the data indicates that individuals who are aware of AI are significantly more likely to hold a positive perception of it, while those who are not aware tend to have a negative or neutral view.

Conclusion: We reject the Null Hypothesis (H_0). The results indicate that awareness is a critical precursor to positive perception. This suggests that awareness-building and demystification campaigns are essential first steps before the actual adoption of AI solutions can be promoted in this sector.

Ethical Consideration

Informed consents were sought from all the respondents. The aspects of anonymity and confidentiality were maintained from the inception of the study to the end. The study objectives and the right to withdraw from the study at any time were made known to the respondents.

Problems Faced by MSMEs: A Comprehensive Analysis

Production-Related Challenges

Outdated Technology and Infrastructure

The challenges in production that MSMEs face, most in traditional sectors such as chikankari, are varied. It has been established in current research that MSMEs employ outdated ways in conducting their business activities, hence preventing them from exploiting economies of scale.

- **Infrastructure Bottlenecks**: MSMEs are often not expert enough in product development, design, packaging, and marketing, and all these are further hindered by the MSME's size. The chikankari industry is a prime example of the same, where block printing and hand embroidery are traditional, but these hinder the scalability and efficiency of the same.
- **Quality Control Issues**: In chikankari, or white embroidered cotton products, the conventional way of production does not have stringent quality checks. Lack of latest quality checking systems leads to discrepancies in quality, thus hindering market performance in both domestic as well as foreign markets. The unique nature of chikankari, although an aesthetic advantage, acts as an obstruction in fulfilling bulk orders.
- **Limited Mechanization**: The chikankari industry is yet to be mechanized to any good extent. In fact, this industry is 90% unmechanized. The workers of this industry are mostly women who work from their homes. Even though this keeps this craft true to its roots, it hampers their production capacity due to which there is a bottleneck with regards to meeting increasing demands.

Raw Material/Supply Chain Related Problems

Material Purchase Problems: The artisans face problems in obtaining quality materials at an affordable price. The middleman system of raw material supply sometimes proves costly and affects quality. A study by Khan and Amir in 2013 brought forward that handicapped artisans face problems in raw materials whose selling price remains fixed while it is changing every time.

Supply Chain Inefficiencies: The chikankari industry functions on a fragmented supply chain with many middlemen. This not only makes it harder for craftsmen to make profits, but also causes several inefficiencies for production planning and inventory management.

Marketing And Sales Challenges

Limited Online Presence

Lack of Systematic Marketing Network: The handicraft sectors, including chikankari, operate without a systematic marketing network. The artisans are traditionally reliant on the local traders and middlemen for distribution. As such, they can only reach the larger markets through these distributors.

Lack of Online Presence: The increasing importance of online marketing means that most chikan artisans and small-scale firms do not have an online presence. A report on online marketing requirements of Lucknow-based business operations shows that more than 85% of people search for business operations online to make purchases, while the traditional craft industry does not have an online presence.

- Challenges in Brand Development: The chikankari sector faces challenges in brand development. Though the craft has been given Geographical Indication (GI) registration in the year 2008, this has not been utilized for marketing purposes.

Market Competition and Imitation

Threat of Machine-Made Products: The development of machine-made chikankari product creation poses an enormous threat to the chikankari product creators. The merchandise, although not genuine and hand-made, is not only less expensive but also easily accessible, thus influencing the demand for the genuine chikankaris.

Competition from other States: The popularity of Chikankari has led to the production of duplicate Chikankari items by other states, as artisans of Jharkhand, Gujarat, Bengal, Rajasthan, and Bihar have mastered this craft and sell them as authentic Chikankari items. Despite GI protection, this reduces the demand for authentic Lucknow Chikankari items.

Export Market Challenges

Limited Export Infrastructure: Even though there are potential exports in chikankari, the lack of infrastructure prevents easy access to international markets. It is also difficult for the industry to provide satisfaction regarding quality standards and timelines for international customers.

Documentation and Compliance: Smaller chikankari units may not possess adequate capabilities to cope with export documentation and compliance procedures, thereby restricting them from accessing global markets.

Financial & Credit Challenges

Limited Access to Formal Credit: Only 19% of the credit requirement for MSMEs was satisfied through formal channels as per the report "NITI Aayog's Report for 2025." There was an estimated shortfall in credit of "₹80 lakh crore." The small industries that require credit and have difficult access to it fall in the sectors where providing security against the credit taken is a problem.

Working Capital Challenges: The chikankari sector experiences significant working capital problems, with artisans relying on middlemen to get funds upfront for their work. Such a situation is often accompanied by exploitation, wherein artisans get very little pay for their work.

Skill Development & Human Resource Challenges

Lack of Formal Training: Chikankari craftsmen lack formal training. That is, chikankari is passed down from one generation to the next by a process of apprenticeships. Although it is a great way to maintain chikankari in its heritage form, it is a negative factor because ch

Digital Literacy Gap: The lack of digital literacy skills between artisans makes it difficult for them to benefit from online marketplaces, digital design software, or online payment methods.

Effect of outdated Technology Used in Production, Marketing, and Sales

Production Impact

The chikankari industry depends heavily on conventional production techniques. This brings out some constraints:

Scalability Barriers: The traditional methods of hand embroidery in the kurtas cannot be scaled very easily while maintaining the traditional authenticity associated with the products. It takes a week to make one kurta, and only ₹200 can be earned by the artisans in an entire week.

Quality Variability: Also, when quality control is not technology-based, it becomes a problem in ensuring consistent quality in production. This is especially important in manufacturing items that are exported when the quality requirements are strictly adhered to.

Resource Optimization Issues

The traditional production processes will entail wastages and inefficient use of resources. The modern production planning and inventory control systems will help reduce wastages and make optimal use of resources.

Marketing Impact

Limited Market Reach: The lack of digital marketing available to the chikan stitch industry limits its market reach. The increasing demands for genuine handicraft from India go unexploited due to the limitations of traditional marketing.

Lack of Customer Engagement: The chikankari industry is not able to engage with the customers effectively because it is not using contemporary customer relationship management practices.

Brand Dilution: The absence of effective marketing and brand protection measures has resulted in a situation where Lucknow chikankari is widely counterfeited, thereby diluting its premium value, which is attached to genuine Lucknow chikankari.

Sales Impact

Channel Limitations: The dependence on conventional channels of revenue generation poses a restriction on revenue. This is especially seen with the outbreak of the COVID-19 pandemic, which disrupted conventional channels of revenue like sales, resulting in a massive loss of revenue for chikankari artisans.

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Pricing Inefficiencies: In the absence of market information or pricing analysis, chikankari artisans tend to price their products inefficiently, thus impacting profits and sustainability.

Customer Acquisition Challenges: Conventional sales processes restrict customer acquisition to a geographical area, thereby refusing businesses to explore nationwide and worldwide demand.

The Role of Artificial Intelligence in Overcoming the Difficulties of MSMEs

AI Applications in Production

Quality Control and Inspection Systems

Quality control systems using Artificial Intelligence can greatly enhance the quality level of products produced in the traditional sector. Machine vision and Artificial Intelligence can check the textile surface for flaws in the fabric. For the chikankari sector, quality inspection systems using Artificial Intelligence can:

- Automated Defect Detection: Using AI, inconsistencies in embroidery patterns, threads, and fabrics can be detected instantly.
- Pattern Recognition: The machine learning process can also ensure that conventional patterns are not affected by innovative designs.
- Quality Standardization: AI can be used for ensuring and maintaining quality standards at differing production sites.

Production Planning & Optimization

AI may bring about a revolutionary change in production planning in the traditional sectors in the following ways

Demand Forecasting: With the use of AI algorithms, the past data of sales, market trends, and seasonal patterns for chikankari products are analyzed. Based on this, the demand for different chikankari products is forecasted.

Resource Optimization: AI helps optimize raw material resources. This could mean that for companies producing chikankari clothing, AI assists with thread and fabric utilization.

Inventory Management: AI-based inventory management systems can monitor inventory levels, determine when to reorder them, and manage inventory turns effectively to cut storage costs and avoid inventory shortages.

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Applications of AI in Marketing

Personalized Marketing Campaigns

AI helps MSMEs craft extremely targeted and personalized marketing messages:

Customer Segmentation: The data collected from customers can be analyzed by AI for generating market segments for targeted promotions. In chikankari, it may include categorizing customers for traditional designs versus modern designs.

Predictive Analytics: AI can forecast customer behavior, allowing a company to prepare for market trends and develop their marketing approach accordingly.

Content Generation: Artificial intelligence can help with content generation in marketing, such as writing product descriptions, posts for social media, and marketing communication content. This will help take some load off small business owners.

Digital Marketing

Search Engine Optimization: The use of AI applications can aid chikankari enterprises in search engine optimization, thus enhancing visibility.

Social Media Marketing: There are AI-assisted tools for managing social media marketing operations such as publishing and interacting with customers. Additionally, there are tools for analyzing the performance on social media platforms

Influencer Marketing: AI can determine the right influencers and content makers for whom the brand values of traditional handicraft enterprises would be of interest.

Applications of AI in Sales

Improving

Artificial Intelligence Chatbots: These can respond to regular inquiries regarding chikankari items, services, and orders. Online chat services can provide customers with 24/7 support.

Personalized Recommendations: The reason why the use of artificial intelligence in product recommendations has become so very popular is because it is able to recognize the preferences of the customers so as to be able to

Multi-language Support: The capabilities of AI in translating languages and handling NLP will be beneficial to chikankari entrepreneurs in supporting customers with different languages.

Sales Analytics and Forecast

Sales Performance Analysis: The use of AI sales performance analysis can enable businesses to determine trends and the best-selling times as well as product performance.

Price Optimization: AI can provide price optimization solutions according to market conditions, competition, and demand.

Customer Lifetime Value Prediction: AI is useful in customer lifetime value predictions, allowing a company to prioritize its sales and marketing activities on those customers that will bring them maximum business through lifetime value.

Specific AI Solutions for Chikankari Industry

Design and Pattern Innovation

Generative AI for Design: AI applications might help in developing new chikankari designs while keeping in mind traditional designs. Generative AI applications may also help in generating variants of traditional designs, which will help in innovative designs.

Digital Pattern Libraries: AI applications can assist in developing a digital library for classic chikankari patterns, which will ensure that these patterns are saved for posterity while being made available for craftspeople around the globe.

Market Access and E-commerce

E-commerce Platform Integration: AI can enable chikankari artisans to easily integrate their work on e-commerce platforms through product listing and inventory updation and order processing.

Global Market Analysis: Using AI tools, the global market trends can be analyzed, and the chikankari industries can therefore change their product as per the global demands and enter into the global markets effectively.

Case Studies and Success Stories

Implementation of AI in Conventional Handicrafts

Bare Craft Platform: Also known as the Bare Craft Platform, this artificial intelligence-based platform has proved successful for artisans. It works by employing an artificial intelligence system to pair artisans with relevant designs for an artistic project, thereby increasing transparency within the supply chain system while

also ensuring that artisans receive proper pay for their work. Bare Craft artisans reported a 10% increase in sales and a 50% decrease in costs of production with the implementation of artificial intelligence sales and resource management systems. Over 5,500 artisans are registered on the platform, with these artisans including chikankari embroidery artists of Lucknow, India.

"**Artisanal Intelligence" by Zwende**: Creating a fusion of artificial intelligence and traditional art, Bangalore-based Company Zwende develops an online market for customized artful products using artificial intelligence. A 360-degree visualization tool gives customers the chance to jointly create products with the help of artisans while the artificial intelligence part of the project ensures the traditional art form remains unaffected by the introduced changes.

Digital Transformation Success Stories

Okhai Social Enterprise: This venture has successfully empowered about 30,000 women artisans in rural areas by technologizing traditional handicraft production methods. During the COVID-19 pandemic, Okhai successfully shifted artisans to an online market, allowing them to generate money while reaching customers across the globe.

Government Digital Initiatives: The Digital MSME Scheme launched by the Government of India is aimed at making MSMEs digitally empowered and encourages them to use information and communication technology tools and applications as a part of their processing. The scheme provides a framework for supporting traditional sectors for their digital transformation.

Framework for Adoption of AI Technology by Chikankari Industry

Phased Implementation Approach

Phase 1: Digital Foundation

•Basic Digitization: Digitize existing patterns, customer databases, and inventory data

•Digital Literacy Training: Offer basic digital literacy training to artisans, small business owners, and other targeted groups. This training aims to

•AI Tools: Develop use of basic AI-based tools like automatic customer service chat bots.

Phase 2: Production Enhancement

•Quality Control Systems: Establish AI-enabled quality inspection systems

•Production Planning: Deploy AI-based demand forecasting and production planning tools

•Inventory Management: Implement AI-based inventory management systems

Phase 3: Marketing and Sales Optimization

•Digital Marketing: Execute AI-based digital marketing campaigns

•E-commerce Integration: E-commerce integration that utilizes AI-enabled e-commerce

•Customer Analytics: Use sophisticated customer analytics and personalization capabilities

Cost-Effective Implementation

On current research, 91% of MSMEs feel that AI needs to be made accessible and affordable. To overcome affordability issues, the following approaches can be considered:

Freemium Models: Leverage AI solutions that provide basic functionality for free and upgrade as the business develops.

Mobile First Deployment: Ensure that the chosen AI tools enable "mobile first deployment" to limit reliance solely on expensive hardware resources.

Shared Infrastructure Models: Make use of shared AI infrastructure in which multiple businesses are provided AI services at a low cost.

Government Support: Avail the Digital MSME Scheme, as well as the Technology Upgradation schemes, so that financial assistance for technology adoption can be obtained.

Challenges and Mitigation Strategies

Implementation Challenges

High Initial Investment Costs: Although effective solutions are also inexpensive, initial setup expenses have remained a point of concern for small chikankari companies.

Skill Gap: The lack of technical knowledge in the artisans/small business owners can be considered one of the major issues in the adoption of AI.

Resistance to Change: Traditional craftsmen could be resistant to technology because of the fear that they may lose the traditional part of their trade.

Mitigation Strategies

Gradual Implementation: The process of implementation in AI needs to be done gradually, beginning from simple tools and then proceeding to complex systems.

Training and Support: Offering thorough training and support services will help artisans and business owners be able to cope with new technologies.

Cultural Sensitivity: It is necessary that while executing AI, it aligns itself with, and maintains the cultural heritage of, chikankari.

Policy Recommendations

Government Support Initiatives

Improved Financial Incentives: The Credit Linked Capital Subsidy Scheme (CLCSS) and other schemes like it need to be extended to encourage the use of AI technology in traditional sectors.

Digital Infrastructure Development: Invest in developing digital infrastructure in regions that are strong in traditional craft manufacturing.

Skill Development Programs: Design skill development programs which encompass traditional skills along with digital literacies and artificial intelligence awareness.

Industry-Specific Support

GI Protection Enhancement: Improve enforcement of Geographical Indication protection for chikankari to ensure it is not replicated or diminished by brands.

Export Promotion: Creating platforms for chikankari artisans to market their products online to global clients.

Quality Certification: Establish AI-based quality certification processes that guarantee chikankari products conform with international standards.

Public-Private Partnerships

Technology Transfer Programs: Partner with technology firms and traditional sectors to enable AI adoption.

Incubation Centers: Establish incubation centers that help the traditional craft units in embracing technological advancements, in addition to maintaining their rich heritage.

Research and Development: Encourage research projects that use AI and new technologies to transform traditional sectors.

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Future Prospects and Implications

Market Potential

The Indian handicrafts market will grow to US$ 7,817.8 million by 2032, at a CAGR of 6.9% during 2023-2032. The chikankari sector having such a rich history and increasing international demand for it will greatly benefit from this rise in the future because it will be assisted by AI-assisted production and marketing abilities.

Technology Evolution

Advanced AI Applications: More sophisticated applications of AI that could be developed in the future include:

•Virtual Reality Showrooms: Enabling customers to experience the chikankari product in virtual reality showrooms

•Blockchain for Authenticity: Utilizing blockchain technology for authentication of handmade chikankari goodies

•IoT Integration: Integrating manufacturing systems with devices of Internet of Things for real-time monitoring.

Socioeconomic Impact

Job Generation: The adoption of AI technology in the chikankari sector may generate new jobs related to digital marketing, e-commerce management, and technical support without undermining jobs created by traditional handicraft skills.

Women Empowerment: As 90% of chikankari artisans are female, increased market reach provided by AI analytics will greatly contribute to their economic empowerment.

Cultural Conservation: AI technology can aid in the preservation of chikankari culture by creating digital databases that can transfer this knowledge down generations.

Conclusion

The study highlights that MSMEs, especially traditional handicraft sectors such as chikankari, face numerous challenges because of outdated technology used in production, marketing, and sales. Given that 82% of medium enterprises do not use advanced technology, and only 14% of them use modern IT technology, it clearly shows that there is much to benefit from AI technology.

The chikan embroidery sector in Lucknow, with a workforce of 2.5 lakhs and an average turnover of ₹3,500 crores per annum, is one such sector that is prone to challenges in MSME and is being made better by AI in terms of technological up-gradation, marketing, and competition from machine-made products.

The applications of AI in the production segment can optimize quality control processes, resource management, and production planning. On the marketing side, AI analytics can optimize consumer-focused campaigns and digital marketing. AI tools can optimize customer service and pricing on the sales segment.

Successful cases such as Bare Craft, which enabled traditional artisans to raise their overall revenues by 10% and cut down production costs by 50%, indicate that the implementation of AI in traditional industries has technical feasibility. But this has to be done in an appropriate way, taking into account costs, skills, and cultural issues.

The paper thus concludes that although all the MSMEs of India have been in a nascent phase concerning AI adaptation, with 91% feeling it can be made widely accessible and affordable, support and reforms can enable them to join the digital age quicker. Also, this strategy for step-by-step implementation and support through schemes such as Digital MSME and better GI protection can enable the ancient craft of Chikankari to benefit from AI while maintaining its cultural heritage.

In the case of the chikankari industry, the application of AI technology is a chance for the industry to have its production scaled up and quality improved, along with wider access to the market, while still retaining the originality and value that makes this handicraft so special and important as part of the Indian heritage that needs to be maintained and contributed towards the growth of the Indian economy.

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