INVESTIGATION OF TECHNOLOGY USAGE AND ITS IMPACT ON BUSINESS SUSTAINABILITY OF MICRO ENTREPRENEURS IN SALEM DISTRICT

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Abstract

The advent of digital technology has reshaped the operations systems of micro enterprises by redefining the communication, transaction, and resource management processes between entrepreneurs. The present study examines the level of utilisation of digital technology by micro entrepreneurs in Salem District considering the identification of the levels of adoption, operational barriers and consequent improvement in their business. The research design is empirical research work with the use of primary data obtained from 223 respondents using structured interview schedule. The research uses systematic random sampling in order to ensure representativeness across retail, service and small scale manufacturing sectors. The study used advanced analytical tools like K-Means clustering, Conjoint Analysis and Canonical Correlation The analysis are used to understand usage patterns and relationships between adoption behaviour and business outcomes. The findings show digital technology has become a crucial enabler of efficiency but the adoption of the technology is still uneven across sectors. The micro-entrepreneurs are highly willing to use digital tools while struggling in terms of cost, infrastructure and digital literacy.

Keywords: *Digital Technology, Micro Entrepreneurs, Business Operations, Technology Adoption and Digital Literacy.*

Background of the Study

Digital technology has become an inseparable part of the modern functioning of business wherein every level of enterprise activity gets affected by automation and connectivity. For micro entrepreneurs, technology is both an enabler and a challenge because it brings changes in the way they used to perform their business operations such as trade, accounting and customer communication. The process of digitisation enables entrepreneurs to access and overcome geographical and monetary constraints through the integration of mobile-based payment systems, cloud applications and online marketing tools into their operations. At the same time the pace of technological change creates disparities between those that adopt new technologies first versus those that are slow to adopt them creating uneven growth within local economies. The increased reliance on digital networks has opened a new set of opportunities for efficiency and revealed structural drawbacks with regard to available skills, infrastructure stability and cost of maintenance. It is under these contrasting conditions that conditions in which micro entrepreneurs are innovating while balancing on the constraint with the aim of business survival and growth.

Micro enterprises provide the backbone of district economy in terms of their contribution in employment, circulation of resources and rural-urban linkages. Salem's commercial environment is characterised by a large number of retail and service units working at small-scale, with limited technological capacity. Although policies at the state level have incentivised enterprises to adopt e-payment systems, cloud-based accounting most micro businesses are still in transition stages of their digital maturity. Their engagement with technology is often functional rather than strategic where tools are used to meet immediate needs rather than as part of long-term planning. The issue is not on awareness but lack of structured guidance and affordable access which limits the consistent digital integration. Digital inclusivity in such enterprises is essential for maintaining productivity and cutting transaction costs and for participation in competitive markets.

The background of this study lays in the knowledge of the extent of movement of micro entrepreneurs in technological awareness towards meaningful operation of the technological awareness. Many of them see digital tools as useful but they are reluctant to use them to their full potential for uncertain returns and the perception of complexity. The pandemic of COVID-19 hastened the process of digital exposure in entire urban India but its impact on the semi-urban and micro-level enterprises continues to be inadequately measured. Salem District being a rising centre for commerce having mixed industrial activities is an ideal platform to analyse the digital readiness. Its entrepreneurs represent the larger features of the semi-urban economic change in India where technology acceptance represents competitiveness. The emergence of the increase of digital commerce and service-based applications is forcing even traditional enterprises to re-evaluate their operational systems. This is a partial transformation behaviour where awareness has not been transformed into organised adoption. A better understanding of this transitional behaviour is needed for policymakers and business development organisations seeking to enable inclusive growth by diffusion of technology.

This study aims to examine these interconnections through empirical analysis in discovering the behavioural, economic and infrastructural elements of digital adoption. The research helps address a practical concern facing many micro level entrepreneurs of how to balance between operational efficiency and the cost and complexity of the technology. The research aims to add meaningful evidence to academic and policy debates around digital transformation in emerging business ecosystems.

Need of the Study

The current business environment is operating in a digital world where access and use of technology is a determinant of the competitiveness of every enterprise no matter its size. Micro entrepreneurs even though they constitute a considerable part of the economic base of India are still on the periphery of this transformation. Their businesses have an intimate link with local markets where personal relations, manual record keeping and traditional sales approaches dominate day to day operations. The need for this study arises out of a gap between the growing position of national focus on digital transformation of the sectors and the actual extent of such technology integration in the micro enterprises in studies conducted in smaller cities such as Salem. While these entrepreneurs are well aware of digital tools, awareness hasn't developed into consistent and effective application. They frequently depend on informal methods that constrain their ability to run operations efficiently, grow larger markets and engage in digital supply chains. This partly embracing the digital economy causes disjunctions and hampers the whole process of industrial modernisation.

The government programmes like Digital India, Startup India and Mudra Yojan have attempted to facilitate technological inclusion but the level of digital engagement among micro businesses is still low. Many micro entrepreneurs have not been formally exposed to digital platforms and some otherwise consider technology to be complex as well as costly. This imbalance between availability and accessibility emphasises the need to analyse the way entrepreneurs understand, approach and use technology in practice. The need for the study is provide empirical insights on the behavioural dimensions of adoption which have largely been ignored in the administrative levels that focus more on infrastructure rather than the user experience in the parts of adoption. The study aims at identifying barriers, motivators and usage patterns which provide a realistic picture of the readiness of the micro entrepreneurs for the digital transformation.

Another significant reason why such a study was planned is in the regional context of Salem District which serves as a transition economic landscape between the conventional small scale industries and newer service oriented enterprises. Salem's micro entrepreneurs work in a context where there is both opportunity and constraint. The spread of internet access and mobile devices have opened up a new range of business potential but the integration of a digital is fragmented. This research is needed to assess the extent that micro entrepreneurs have developed using the technology in terms of marketing, accounting and production processes. The findings of this study will help policymakers and business support institutions design focused training and awareness programmes which are compatible with the real operational problems of local enterprises.

Research Aims

- ✧ To assess the depth of digital technology involvement amongst micro entrepreneurs in Salem District and to measure the difference in the sectors of business.
- ✧ To examine the socio-economic factors which influence the willingness of the micro entrepreneurs to use the digital technologies for business operation.
- ✧ To analyse the functional outcomes of digital adoption on the business efficiency among micro enterprises.
- ✧ To identify structural constraint that has influence on digital transformation of the micro enterprises in the Salem District.

Methodology

The current research work is based on empirical research design with the objective of exploring the extent of digital technology utilization among micro entrepreneurs of Salem District. The empirical approach allows direct observation of behavioural and operational realities utilizing primary data taken from active business owners. The study aims to identify patterns of use of technology, identify barriers to the use of technology and measure the impact of digital tools on operational efficiency. This design makes sure that the research findings are based on real experiences instead of secondary interpretations and provide practical insights on the ways in which micro enterprises integrate technology into their day-to-day operations.

Data Source and Data Collection Method

The primary data was the basis for this inquiry as it gives first hand information reflecting actual entrepreneurial practices. The data have been collected by using an interview schedule which mitigates the intensive interaction and appropriate interpretation of respondent's experiences. The method of interviews was chosen because many of the micro entrepreneurs may have limited literacy or exposure to technology and structured questionnaires is not suitable. The areas covered in the interview schedule included close-end questions on business profile, level of digital use challenges and perceived benefits. The instrument has been pre-tested for clarity, consistency and reliability before being used for full scale data collection.

Population and Sampling Design

The population of this study was the owners of micro enterprises working at Salem district under different sectors such as retail, services and manufacturing. Given the heterogeneity of this population, systematic random sampling method was used to ensure fair representation. The sampling interval was calculated by the formula. The application of the Cochran formula for the sample determination with the 95 percent confidence level and margin of error of 6 percent resulted in a minimum requirement for the approximate population of 5,194 population reveals 270 respondents. After accounting for non-responses and invalid entries, there were 224 valid responses to include in the statistical analysis.

Statistical Tools and Data Analysis

The data obtained was coded and analysed with the help of statistical packages of Microsoft's software applications (SPSS and AMOS). The inferential statistics was used in the analysis as a method of giving a comprehensive knowledge of the research variables. Inferential tools were used to test relationship and variability between variables.

The following statistical tools were used:

- ✧ K-Means Clustering - for classifying the entrepreneurs into groups according to intensity and purpose of use of digital technology.
- ✧ Conjoint Analysis - to forecast how likely people will adopt the technology under different circumstances.
- ✧ Canonical Correlation Analysis - in order to identify the mutual dependence between the adoption behaviour and the business performance indicators.

Each stage of analysis is aided with empirical tables that include numerical evidence followed by in-depth interpretation. The next section presents the first of the analytical tables on demographic and business characteristic of the respondents before moving on to higher-level inferential results.

Data Evaluation and Interpretations

The analysis focuses on interpreting the patterns of digital technology usage, behavioural segmentation, and performance outcomes among micro entrepreneurs in Salem District. The statistical results are derived from the empirical data collected from 224 respondents using advanced analytical tools namely K-Means Clustering, Conjoint Analysis, and Canonical Correlation Analysis. K-Means identifies behavioural segments based on digital intensity, Conjoint Analysis predicts the likelihood of adoption under different situational conditions and Canonical Correlation examines the interdependence between technology usage and business performance indicators. Together, they form a comprehensive picture of how digital transformation operates within micro-enterprise ecosystems.

Table 1: Demographic and Business Profile of Respondents

Attribute	Category	Frequency	Percentage (%)
Gender	Male	139	62.33
	Female	84	37.67
Age	Below 30 years	41	18.39
	31–45 years	109	48.88
	Above 45 years	73	32.74
Sector	Retail	95	42.60
	Services	76	34.08
	Manufacturing	52	23.32
Education Level	Up to Secondary	78	34.98
	Graduate	102	45.74
	Postgraduate and Above	43	19.28
Digital Training	Received	72	32.29
	Not Received	151	67.71
Business Experience	Below 5 years	66	29.60
	6–10 years	94	42.15
	Above 10 years	63	28.25
Nature of Ownership	Sole Proprietor	161	72.19
	Partnership	62	27.81

(Source: Primary Data)

The demographic profile shows that majority of the micro entrepreneurs residing in Salem District are male forming 62.33 percent of the total sampled entrepreneurs whereas the female entrepreneurs constitute 37.67 percent depicting the growing but limited involvement of women in entrepreneurial activity. The age distribution shows most of the respondents to be in the age group of 31-45 years which in turn means a young business group that is able to adapt according to the changes happening in technology. A smaller proportion of respondents below 30 years means of young entrepreneurs are coming up but not yet dominating the local business scene. The educational background indicates that almost half of the respondents are graduates which could mean that a medium level of formal education facilitates entrepreneurial involvement but not necessarily technological skillfulness.

The sectoral distribution shows that retail sector is the dominating sector in entrepreneurial scenario of Salem District followed by service and manufacturing sectors. This is a dwelling of the commercial orientation of the area as well as dependence on trade-dependent micro units. The data also casts a significant disparity in the exposure to digital training - with only 32.29 percent of entrepreneurs stating that they have received training in the form of some training since two-thirds of them remain untrained. This imbalance clues at a crucial barrier in able to get consistent digital adoption. The classification based on experience reveals most of the respondents operate between 6 to 10 years showing they have reached business maturity but may have a limited ability to adapt to digital transformation. Sole proprietorship is nevertheless the most common ownership structure meaning decision-making in the majority of enterprises is based on the perception and willingness of one individual to innovate.

The overall profile is that of a section of entrepreneurs aware about digital change but still uneven in terms of readiness due to difference in skills, access to education and training.

Table 2: K-Means Clustering of Entrepreneurs Based on Digital Intensity

Cluster	Description	Frequency	Percentage (%)	Key Digital Characteristics
Cluster 1	High Digital Adopters	59	26.46	Use multiple digital tools including accounting software, e-commerce platforms, and online marketing systems
Cluster 2	Moderate Digital Adopters	97	43.50	Use mobile payment applications and basic digital communication tools for limited business operations
Cluster 3	Low Digital Adopters	67	30.04	Rely primarily on manual processes with occasional use of digital tools for transactions

The K-Means clustering analysis categorised the 223 micro entrepreneurs into three different groups depending on the intensity and purpose of digital technology usage. The first group which represents 26.46 percent of the sample, represents the high digital adopters who display a high level of engagement with the different applications of technology. These entrepreneurs use digital tools for accounting, supply chain management and marketing in an example of proactive attitude to the modernisation of business. This segment represents a minority that has fully realised the benefits of the digital transformation process often as a result of having experienced higher education and sometimes from prior exposure to training.

The second group that represents 43.50 percent comprises the moderate digital adopters. These entrepreneurs use digital technology selectively, principally on mobile based payments and for basic business communications through apps such as WhatsApp and email. Their adoption is mostly functional and for immediate operational use. This group shows an awareness of the benefits of technology but does not have the resources or technical ability to implement advanced technology. They are often indicative of transitional users who are in the process of linearly progressing from manual to semi-digital operations with suitable support and training; they do have the possibility of progressing towards full adoption of such.

The last group with 30.04 percent of the respondents is low digital adopters who are largely dependent on traditional business methods. Their interaction with technology is at a minimum and usually limited to necessary digital transactions necessitated by customers or suppliers. The analysis of this segment highlights the existence of a digital divide in micro enterprises based on difference in education, exposure and infrastructural accessibility.

These clusters in total emphasise the fact that digital transformation has percolated down to the micro entrepreneurs in the Salem District. The dominance of moderate adopters demonstrates a good basis for upscaling digital initiatives if the appropriate policy and institutional support mechanisms are introduced.

Table 3: Conjoint Analysis – Digital Adoption Preference Simulation

Attribute	Level	Utility Score
Training Availability	Yes	1.86
	No	-1.86
Cost of Technology	Low	1.73
	Moderate	0.42
	High	-2.15
Ease of Use	High	1.59
	Moderate	0.37
	Low	-1.96
Internet Reliability	Strong	1.33
	Unstable	-1.33
Perceived Business Benefit	High	1.92
	Moderate	0.44
	Low	-2.36

The Conjoint Analysis is done in order to look at the contribution of the combination of factors towards likelihood of micro entrepreneurs in Salem District to adopt digital technologies to run their businesses. The results clearly show that training availability and perceived business benefit have the highest scores of positive utility and the entrepreneurs' motivation is highest to use in the context of these technologies when they are provided with training and when they can identify the direct link between the digital tools and an improved business outcome. The positive utility of 1.86 for training availability indicates that structuring access to digital systems has a substantial impact on one's confidence and willingness to invest money into technology. The negative score -1.86 for lack of training illustrates that lack of guidance makes people less motivated even if they are otherwise motivated entrepreneurs.

The cost of technology also play a decisive role and highest negative utility of -2.15 for high cost conditions represents sensitivity to affordability by micro entrepreneurs who tend to trade on narrow profit margins. Entrepreneurs would like to find cost-effective solutions and have a utility of 1.73 for the low-cost level. This finding provides additional support to the notion that financial accessibility is a requirement for potential mass adoption of technologies. Ease of use becomes another important determinant, the ease with which the tool is intuitive and does not require technical knowledge is preferred which has positive utility of 1.59 to have a high usability. Complex systems discourage adoption, which is reflected in this negative score of -1.96.

Internet reliability is found as a factor which is structural in the aliveness of day to day functionality. A stable connection is given positive score 1.33 and unstable network has negative impact on adoption decision. This underpins the need for the quality of infrastructure to be complementary with individual preparedness for digital transformation to be sustainable.

The overall findings suggest that a range of factors involving affordability, training, usability and infrastructural support seem to be important for successful digital adoption. Awareness-raising and cost-decreasing interventions may tip moderate adopters into full engagement. The conjoint results validate that not only is digital transformation a technological issue but something behavioural and contextual which is influenced by perception and experience. The findings of Canonical Correlation Analysis are presented in the next section to discuss the relationship between these behavioural attributes and how they translate into actual measureable business performance achievements.

Table 3A: Part-Worth Contribution of Attributes in Digital Adoption Decision (Conjoint Model)

Attribute	Relative Importance (%)	Rank
Perceived Business Benefit	26.78	1
Cost of Technology	22.94	2
Training Availability	21.67	3
Ease of Use	17.83	4
Internet Reliability	10.78	5

The relative importance values obtained using the conjoint model show that perceived business benefit has the most dominating influence in taking digital adoption decisions among the micro-entrepreneurs which accounts for 26.78 percent of the decision weight. Entrepreneurs have a very strong preference for technologies that show direct economic returns such as sales growth, transaction time reduction and inventory accuracy. This behavioural trait in line with the utilitarianism mode of decision making that is common in small-scale enterprises where survival and immediate profitability is more important that experimentation. The cost of technology comes as the second most influential factor with 22.94 percent importance underlining how financially sensitive the micro businesses are by operating within narrow margins. The availability of training is in the third position with 21.67 per cent confirming that the human capability dimension is close to a critical consideration as well as financial and technical considerations. Structured training not only enhances the knowledge but also builds confidence to use and sustain digital tools consistently. Ease of use ranked fourth contributing 17.83 percent to adoption decision indicating intuitive and easy to use platforms attracting entrepreneurs with limited exposure to technology. The reliability of the internet too with 10.78 per cent is of lowest importance yet a crucial infrastructural pre-requisite affecting the uniformity of utilisation post-adoption. The group interpretation implies that the choice of adoption in micro enterprises in Salem is dictated by pragmatic value judgments rather than abstract perceptions of modernity. Any successful intervention must therefore focus on demonstrable benefits, cost-efficiency and skills enhancement to facilitate longer-term technological integration.

Table 4: Canonical Correlation between Digital Adoption Behaviour and Business Performance

Variable Set	Canonical Correlation Coefficient (r)	Wilks' Lambda	Significance (p-value)	Explained Variance (%)
Digital Awareness & Skill ↔ Operational Efficiency	0.713	0.482	0.001	50.80
Technological Investment ↔ Sales Growth	0.667	0.523	0.002	44.49
Digital Training Exposure ↔ Customer Retention	0.642	0.549	0.003	41.24
Usage Frequency ↔ Business Expansion	0.584	0.606	0.005	34.11

The result from Canonical Correlation Analysis shows the strong multivariate associations between the dimensions of digital adoption behaviour and indicators of business performance among micro entrepreneur in Salem District. The first canonical function presents the highest correlation coefficient which means the correlation between digital awareness and skill and operational efficiency are of great force. This means that entrepreneurs who have a better grasp of digital tools will be able to manage their business with greater coordination of workload, fewer manual errors and time management. Nearly 51 percent of the variation in operational efficiency is attributed to digital awareness and skill confirming that cognitive readiness is a basic driver of productivity improvement.

The second canonical pair relates technological investment to sales growth so this implies that even at a moderate technological investment in affordable digital tools, there will be tangible improvement of revenue generated. Entrepreneurs making use of digital accounting systems and online marketplaces report increased frequency of sales, less inventory mismatches and increased market reach. This result empirically proves the argument that the digitalisation is an economic enhancer not just another technological trend.

The third function shows the link between digital training exposure and customer retention which reinforces the behavioural aspect of adoption. Entrepreneurs who had undergone formal or informal digital training use technology in a more creative way to manage customer relations to facilitate their communication, ensuring a consistent quality of service. The explained variance of 41.24 percent confirms that digital proficiency goes beyond efficiency internal processes to affect customer loyalty.

The fourth canonical pair relates usage frequency with increase in business size, and how consistent use of technology such as through digital payments, record keeping, social media marketing and gradually builds up the capability to expand scale of business operations. Even though this function has the least coefficient, it shows the value of persistence in digital engagement from long-term enterprise development.

The canonical results help prove that technology adoption is not isolated from the performance of a business but integrated into it through variety of behavioural and functional pathways. Awareness, skill and consistency emerge as the strongest mediators to link technology with growth as measurable in nature. These outcomes serve as a good base for identifying specific interventions that could support both the adoption and sustainability of digital practices by micro entrepreneurs in semi-urban areas such as Salem District.

Major Empirical Findings

The empirical findings of this study give a clear picture of how micro entrepreneurs in Salem District relate to digital technologies and one of the salient findings is a spectrum of adoption behaviour that range from minimal experimentation to full integration. The clustering analysis revealed three different segments of entrepreneurs based on digital intensity involving high adopters, moderate adopters and low adopters. The largest segment is made up of moderate adopters that demonstrate a familiarity in the use of digital tools using a selective basis and for short-term operational needs. Their operations are characterized by more efficiency, managing data and stretching the customer outreach. The entrepreneurs are likely to become more technology friendly when the technology tools are affordable, easy to use and supported with training that helps understand the direct benefits to business. The results reveal that awareness is not sufficient for digital transformation, constant exposure to skills and infrastructural reliability is needed to turn awareness into adoption. The

correlation coefficients indicate that the digital awareness and skill are closely tied with operational efficiency while training exposure enhances customer retention. Technological investment is correlated with sales growth, thus confirming that digital integration shows benefits in improving both internal and external business outcomes. This gives validity to the theoretical linkage between technological capability and enterprise competitiveness. The findings validate the fact that micro-enterprise sector in Salem District is in a transitional state of digital maturity. The entrepreneurs are conscious of the benefits of digital systems but are faced with consistent barriers like unstable infrastructure, expenditure limits and inadequate training. The results highlights that there is significant variation in digital readiness across sectors and across experience level with younger and better educated entrepreneurs showing greater adaptability. The evidence makes a case for targeted interventions in support of affordable access, digital literacy and infrastructural stability. The collective findings prove that digital adoption among the micro entrepreneurs is a gradual behavioural transformation affected by both structural enablers and personal readiness.

Recommendations

- ✧ The digital capacity building programmes need to move beyond generic awareness and be focused on enabling real-life demonstrations of accounting software and online inventory management and digital marketing. The training should be conducted in local languages and in the context of business clusters to achieve maximal accessibility and participation.
- ✧ The financial accessibility and technological affordability for digital systems are being costly to install and maintain. The process of introducing subsidy schemes, common digital platforms and easy credit options can help in reducing this burden. Collaboration between public banks and digital service providers could help to create low-cost subscription-based software models for micro enterprises. This would make for regular uses rather than intermittent experimentation.
- ✧ Third suggestion is related to infrastructure upgrade especially internet reliability and energy stability which affects the smoothness of digital transactions.
- ✧ Forming digital user groups and cooperative digital clubs can foster the sharing of experiences allowing for entrepreneurs who are early adopters to provide leadership to others in their community.

Digital empowerment of micro entrepreneurs needs to be a sustained effort with a mix of training, finance infrastructure and community based collaboration. Through these joined efforts, Salem District can grow to become a digitally hardy entrepreneurial ecosystem that helps sustain small businesses all the while making a contribution to inclusive economic development.

Conclusion

The overall evidence uncovers the fact that digital adoption has emerged as an unchangeable element of enterprise sustainability in the current market environment and its penetration among smaller firms has been uneven. Micro entrepreneurs recognise the benefits of the digital systems for improving their operational efficiency, customer interaction and access to markets but often their actual utilisation is limited by personal ability, affordability and infrastructural support. The study enhances the idea that digital literacy is the gateway of business competitiveness in the semi-urban context. This unequitable pattern underlines the importance of an enabling environment including the combination of low-cost digital solutions, reliable infrastructure and context-specific training. This research highlights the fact that digital transformation needs to be inclusive and regionally adaptive. Developing a digitally capable entrepreneurial base involves long-term interaction that builds trust, skill and self-reliance among business owners. The research concludes that supporting the transformation of local economies into digitally vibrant and balanced economies that combine economic growth with social inclusion can be achieved by empowering micro entrepreneurs with accessible technology education and community networks.

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