

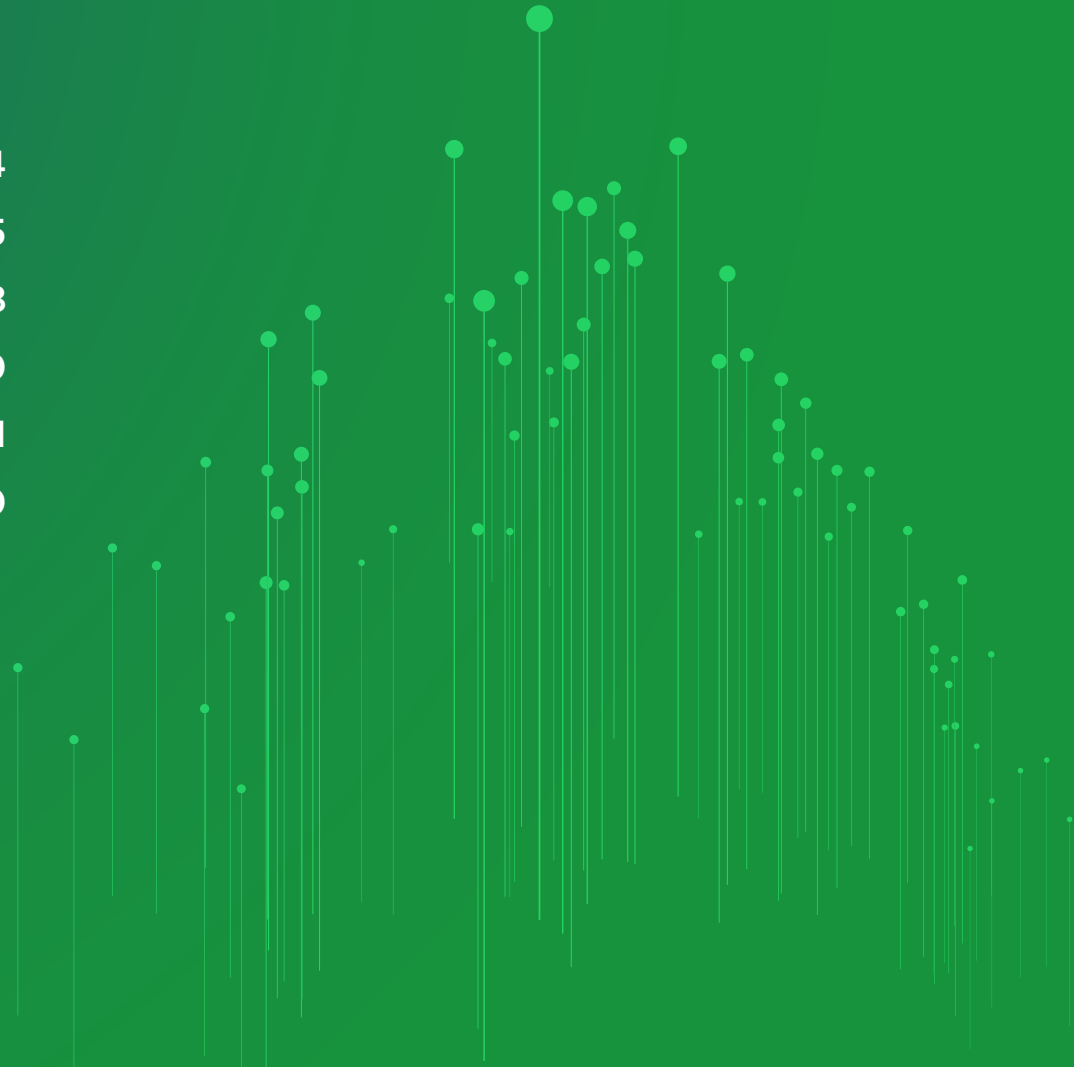
ALTERNATIVE SCORING MODELS ON ACCESS TO CREDIT AMONG THE FINANCIALLY UNDERSERVED

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Summary

Credit is an important element in any country's economic landscape, especially one such as India where its use goes hand in hand with economic progress. The use of credit helps families safely bridge financial downturns and fosters economic pursuits. This is particularly true in the case of microfinance institutions that have enhanced the lives of millions of borrowers through a wide and diversified range of financial products.

The most defining characteristic of India's credit landscape is its heterogeneity. Credit sources and formats are wide and varied, and are accessed by numerous segments of the Indian demography. The credit lifecycle in the country comes with its unique set of challenges that obstruct the lives of both loan providers and borrowers with numerous operational bottlenecks.

The integration of alternate data into credit scoring is bringing about a profound transformation in the country's credit landscape. This needs to be observed closely as a majority of the population still do not have a formal credit history and are unable to access liquidity when in need.

Credit scoring models are also witnessing a phase of evolution as data from diverse sources get integrated into them. Technology is paving the way for new approaches for the assessment of creditworthiness in India.

Some of the significant changes witnessed in today's credit landscape are:

- **Alternative Lending Models:** Emerging fintech models are revolutionising financial services, in particular for last mile delivery to marginalised segments.
- **Inclusive Credit Scoring:** Efforts to include non-traditional data in credit scoring models aim to expand credit access to those without a conventional credit history.
- **Risk assessment:** AI and machine learning are enhancing risk assessment and fraud detection capabilities, leading to more accurate lending decisions.

This report delves into the pioneering initiative by IITMRP, a subsidiary of Indian Institute of Technology Madras (IIT-M), in collaboration with other firms to foster sturdy ecosystems that promote financial inclusion by providing comprehensive support systems. The "10X Fintech for Inclusion Initiative" at IITMRP is one such initiative, a testament to this collaborative spirit. It encapsulates the park's mission to accelerate social and economic inclusion through technology. Companies like Vest in Villages, Dvara e-dairy, Samunnati, and Stellapps, through their groundbreaking work, exemplify the essence of this initiative, harnessing innovation to empower and uplift communities across India.



Background

Importance of Credit in Economic Development

Credit plays a vital role in propelling a nation's economic progress by serving as a conduit for various economic pursuits. Credit has a particularly important role in India, an economy that is growing rapidly at an average rate of 5.41% in the last 15 years.

Micro, Small and Medium Enterprises (MSMEs) constitute around 30 per cent of India's GDP. This number has been consistent for more than a decade. These enterprises, vital to the Indian economic landscape, often depend on credit for expansion, technological upgrades, and maintaining competitiveness. The expansion of MSMEs can be a key driver for advancing broader socio-economic objectives, such as more balanced growth and employment opportunities. This is also evident in India's increasing GDP, where MSMEs contribute significantly.

Credit's significance for economic expansion is also emphasised by India's national financial inclusion agenda. The strategy highlights the need for accessible and affordable credit to drive financial inclusion, which in turn supports broader economic development. This approach reflects a recognition of credit's role not just in business growth but also in individual empowerment. Access to credit can be transformative for impoverished and low-income groups.

Credit's Role in Alleviating Poverty

In India, microfinance institutions have played a significant role in this transformation, offering small loans that lead to significant improvements in borrowers' lives. For example, during the various stages of life, the poor may require credit for diverse needs such as starting a small business, funding education, or managing healthcare expenses.

Credit-eligible farmers are able to use their money to upgrade their practices, which would raise yields and revenue. Beyond agriculture, these loans have enabled small entrepreneurs to start or expand businesses in various sectors.

Credit Sources in the Indian context

India's credit landscape is characterised by its diversity, stemming from a variety of credit sources catering to different segments of the population. For decades and counting, banks and non-financial banking companies (NBFCs), which are considered traditional sources, have been the backbone of the Indian credit system. These institutions offer an array of credit products, ranging from business financing to personal loans. However, they often require extensive documentation and have stringent eligibility criteria, which can be a barrier for many, especially in rural or underserved areas.

Parallel to these are non-traditional credit sources which currently play a crucial role in the lives of many who cannot access formal banking systems. In rural areas and among lower income communities, informal lenders such as local moneylenders and pawnbrokers are prevalent. These sources, while accessible and requiring minimal documentation, often charge exorbitant interest rates, lack regulatory oversight, and may employ predatory collection tactics, which can lead to dire debt cycles.

Emerging fintech companies and peer to peer (P2P) lending platforms have grown to be major participants in the credit market, offering innovative credit solutions to the underserved such as microloans, agricultural loans, and small-scale entrepreneurial funding. These companies leverage technology and alternative data to create new avenues for credit accessibility but they predominantly cater to urban populations, with rural reach being limited due to infrastructural and digitisation constraints.

The accessibility and cost of credit from these sources vary. While traditional banks offer lower interest rates, their processes can be cumbersome and not accessible to the impoverished masses. Fintech and informal lenders provide quicker access but at higher rates due to the costs of capital and risk. The gap in credit availability remains significant, with a substantial portion of the rural population and small businesses relying on informal sources due to lack of adequate access to formal banking. Fintech companies acknowledge infrastructural challenges, like limited internet connectivity, as a barrier to expanding their services to rural areas.

The evolution of credit sources in concert with well-intentioned governance towards financial inclusion has led to the creation of customised credit products, such as the Kissan Credit Card, JAM Trinity, and women-centric credit schemes. While these products address specific needs, they often face challenges such as limited reach and higher interest rates compared to traditional loans.

Challenges Across the Credit Lifecycle

Navigating the credit lifecycle encompasses a spectrum of challenges, both for lenders and borrowers. Lenders grapple with risk assessment complexities, particularly in cases lacking traditional credit histories. Innovations like use of alternative data and AI-driven risk assessment models are being explored, but these come with their own set of challenges, including the need for large volumes of data for training and validation, ensuring model accuracy and mitigating biases.

Borrowers, especially those in rural or low-income segments, face barriers such as complex application processes, high collateral requirements, and often a lack of understanding of the available financial products. Microfinance institutions and community-based lending models are attempting to mitigate these challenges by offering more accessible loan products, but these too face issues such as limited reach and higher operational costs.

These challenges highlight a significant gap in the credit system; the exclusion of a large portion of the population due to outdated risk assessment methods. This gap not only affects borrowers but also limits the market for lenders, pointing towards the need for a more inclusive approach in credit scoring.

Paradigm Shift in Credit Scoring

Recognizing this need, the credit industry in India is witnessing a paradigm shift with the integration of alternate data into credit scoring. This evolution is particularly important in a country where a large segment of the population lacks a formal credit history.

The traditional approach to credit scoring in India has been primarily based on credit or financial histories and collateral. This model, however, fails to account for a large segment of the population with no formal

credit history and where documentation (e.g. bank statements or IT returns) may be sparse or cumbersome. The introduction of alternative data, particularly in digital form, in credit scoring is a game-changer, bringing previously 'invisible' borrowers into the credit fold.

Fintech companies are leading this change by utilising unconventional data points like utility payments, work histories, online purchase histories, and even social media behaviour. While this increases financial inclusion, it also raises critical questions about data privacy, consent, and the potential for data misuse. Additionally, the reliability of these alternative data points in accurately predicting creditworthiness remains an area of ongoing research and debate.

Tech Innovations in Credit Scoring and Delivery

A key aspect of this transformation is the integration of data from diverse sources into credit scoring models. For instance, banks are increasingly relying on data from Self-Help Groups (SHGs) and MFIs to enhance their credit scoring mechanisms. This data provides insights into the financial behaviour of individuals in rural and low-income segments, who might not have a long history of formal credit.

Another innovative development is the creation of specialised credit scores by companies, which may then be offered as APIs to other businesses. A notable example is Northern Arc Capital's 'Nu Score', a model that evaluates creditworthiness using alternative data points. This approach allows institutions to add a layer of risk assessment quickly and cost-effectively compared to developing a scorecard from scratch.

Moreover, there is a growing emphasis on combining on-ground activities with technology to improve credit assessment. An example of this is the strategy of Vest-in-Villages, which utilises local agents to collect data through electronic tablets. These agents assess various risk factors and assign a 'green', 'amber', or 'red' flag to indicate the level of credit risk. This method blends technological tools with local knowledge and presence, providing a more accurate and context-sensitive assessment of creditworthiness.

An Enabling Regulatory Environment

These technological advancements are revolutionising the way creditworthiness is assessed in India. They not only make the process more efficient but also more inclusive, reaching segments of the population that were previously excluded from the formal credit system. However, digital transformation also brings challenges, such as ensuring data privacy and navigating the regulatory landscape, which continues to evolve in response to these new technologies.

Recent initiatives by regulatory bodies, such as the Reserve Bank of India (RBI), focus on ensuring consumer protection, data privacy, and financial stability in the face of digital lending and fintech innovations. These regulations, while necessary, pose challenges for both traditional financial institutions and emerging fintech companies. Compliance with evolving norms requires agility and often significant investment, which in turn can be impeded by unfavourable regulation or even the optics thereof. Keeping this in mind, there's a delicate balance to be struck between fostering innovation in the credit market and ensuring robust consumer protection and systemic stability, that seems yet to be solved..

Emerging Trends and Future Projections

The increasing reliance on big data analytics for credit assessment, the exploration of blockchain technology for secure and transparent transactions, and the heightened focus on cybersecurity in digital finance are key trends shaping the future of India's credit landscape. These advancements show promise in enhancing the efficiency, transparency, and inclusivity of formal credit.

However, a critical question arises: Does India possess the technological and infrastructural capability to effectively utilise alternative data across its diverse population? Given India's vast socio-economic diversity and the complexity of its financial landscape, harnessing alternative data for credit scoring is as much a technological challenge as it is a logistical and regulatory one. While there have been significant strides in public digital infrastructure, challenges persist, especially in rural and underbanked areas.

Despite these challenges, there are noteworthy success stories across India, some nationwide and some localised in a few districts. For instance, the rapid adoption and growth of digital payment platforms like Paytm and UPI (Unified Payments Interface) have significantly contributed to financial inclusion, bringing millions of previously unbanked individuals into the formal financial system. Additionally, initiatives like the Aadhaar-enabled Payment System (AePS) have demonstrated the potential of digital technology in reaching rural populations, offering a glimpse into future possibilities.

These examples, though not directly related, highlight the potential of India's evolving credit ecosystem. The journey ahead will require balancing technological advancement with equitable access, ensuring that the benefits of these innovations reach every corner of the country.



Headwinds/Tailwinds

Headwinds in the Use of Alternative Data



Challenges to Adoption:

- Navigating evolving regulations regarding data privacy and consumer protection.
- Developing robust systems capable of processing and analysing vast amounts of unstructured data takes considerable time, investment, and expertise.



Challenges in Use:

- Ensuring the accuracy and consistency of alternative data sources.
- Preventing biases in credit scoring algorithms and ensuring ethical use of personal data.



Challenges in Continued Use:

- Keeping up with rapidly changing technology and consumer behaviour.
- Ongoing alignment with regulatory changes and compliance requirements.
- Monitoring and mitigating biases.

Tailwinds for Using Alternative Data in Credit Scoring



Adoption by Institutions:

- Large financial institutions are increasingly exploring alternative data to expand their customer base and lower their cost of risk. Common steps include leveraging telecom data, utility payments, and e-commerce behaviour.
- Fintech companies and microfinance institutions are at the forefront, often building their entire credit assessment models around alternative data, targeting particular geographies or segments.



Development of Accurate Scores:

- Fintech startups and data analytics firms are likely to lead in developing the most accurate scores for specific segments, given their agility and innovative approach in handling non-traditional data.



Main Drivers of Investment:

- The primary drivers are financial inclusion and reaching untapped markets – unbanked or underbanked populations who lack traditional credit histories.
- The competitive advantage gained from utilising more comprehensive data for credit assessment, such as visibility of New to Credit (NTC) customers, is a significant motivator.

The IITMRP Fintech Ecosystem - A Snapshot

A deep dive into the journeys of innovators in this space underscores a critical need to foster a vibrant entrepreneurial ecosystem. These companies, with their ambitious missions to drive financial and social inclusion, require more than just capital to scale effectively. They thrive on comprehensive support systems that offer financial backing, social endorsement, and vital connections to larger institutions. Furthermore, the sharing of resources, be it technological expertise, market insights, or strategic partnerships, plays a crucial role in their growth and impact. This is where ecosystems like the IIT Madras Research Park (IITMRP) step in to provide an integrative platform for such transformative endeavours.

IITMRP is an initiative by the Indian Institute of Technology Madras (IIT-M) to facilitate the transfer of technology developed by the academic community to the industry. It serves as a bridge between academia and industry, aiming to foster innovation and entrepreneurship. It houses incubation facilities where startups and companies can develop their technologies and business models. The park hosts companies and startups from various sectors, including information technology, manufacturing, renewable energy, and biotechnology. As part of its broader agenda, IITMRP also focuses on financial inclusion by nurturing fintech companies and startups that aim to make financial services accessible to underserved and unbanked populations in India.

The companies we have featured in this report, each with its unique contributions to financial inclusion and technological innovation, are part of a broader, interconnected ecosystem fostered by the IITMRP. This synergy is not confined to the Chennai region but extends across the country, reflecting a collective drive towards India's inclusive growth agenda. The "10X Fintech for Inclusion Initiative" at IITMRP is a testament to this collaborative spirit. It encapsulates the Park's mission to accelerate social and economic inclusion through technology. Companies like Vest in Villages, Dvara e-dairy, Samunnati, and Stellapps, through their groundbreaking work, exemplify how innovation can be harnessed to empower and uplift underprivileged communities.

Fintech Companies at IITMRP



Vest-in-Villages

Background: Vest-in-Villages has developed a proprietary technology-enabled, one-stop solution called Data Analytics, Rating and Tracking (DART™) services for data collection, analysis, and decision-making at the family and institutional levels for the underserved rural borrowers/nano, micro and small enterprises, who are excluded from the formal financial system. DART assesses their financial health, builds their credit history over time, and provides an authentic scoring mechanism based on extensive analytics of data collected at the family and group levels, which are both quantitative and qualitative. Governments and financial institutions can then make data-backed, sound-lending decisions based on the risk ratings generated by the DART™ tool.

Approach: DART uses technology and expertise to solve this problem. First, it builds comprehensive databases of financial and non-financial data to re-evaluate risk and re-assess the creditworthiness of rural borrowers, and nano/micro enterprises. Second, it provides an innovative method to measure creditworthiness, using both financial and non-financial data as proxies. Third, it assesses the profitability and viability of the nano/micro/small enterprises and equips them with the knowledge and data required to take up the business ventures. By doing

so, lenders can expand their customer base in rural areas, reaching out to households who would otherwise remain unserved or underserved. At the same time, these women entrepreneurs and rural households receive financial education and a strategy to reduce their risk and work towards their future goals, which enables them to access affordable credit and reduce their debt burden. Finally, it offers a tool to track the performance and progress of key parameters in real-time, enabling policymakers and impact agencies to take evidence-based decisions and track impact.

Reach: The DART tool was initially piloted in Rajasthan as part of a peer-to-peer lending platform for 400 households during 2018-2021, in partnership with a non-profit organization Self-reliant Initiatives through Joint Action (SRIJAN). The pilot tool was not digitized and data collection and report generation were manual. Drawing on learnings from this pilot, a digital platform was designed, developed and tested in two districts (Trivallur and Trichy) in Tamil Nadu during 2021-2022, with the Organization for Development Action (ODA). Based on these pilots and testing, the DART tool was commercially launched in 2023 with two partners in Tamil Nadu and Uttar Pradesh.

Vest-in-Villages is in the process of scaling up the DART platform in Tamil Nadu, Uttar Pradesh as well as other states in India.



Dvara e-Dairy

Background: India's dairy sector is valued at USD 140 billion, 80 million rural households are meeting their working capital requirement through income from dairy. Almost 65% of the dairy operations are done by women. However, Small dairy farmers face two broad categories of challenges, lack of access to scientific management of dairy leading to profitability and lack of access to formal financial services. Lending institutions are providing cattle loan without accessing cattle. Insurance companies are facing challenges to assess cattle at scale and to reduce loss ratio. Asymmetry of data is one of the key reasons for these institutions for the inability to scale in the underpenetrated industry.

Dvara e-dairy's mission is to drive profitable growth for small and marginal dairy farmers through cutting-edge digital solutions. They aim to empower these farmers with better access to financial services and integrated value chain markets.

Approach: Digitized cattle for Digital India; leveraging vision computing and advanced veterinary science and practices, Surabhi Score helps financial institutions to accurately underwrite cattle loans and cattle insurance and scale. Each cattle are segregated into Red/Amber/Green to take decision based on accurate, reliable and authentic data.

The company identifies and tackles key challenges in the dairy industry. This includes scaling financial institutions, accurately assessing cattle as assets, estimating milk yields, and handling Non-performing Assets (NPAs) and collection costs. Dvara e-Dairy also focuses on improving access to quality veterinary care and mitigating the risks associated with unqualified diagnoses and delayed purchases, which can harm cattle health. Their flagship innovation, the Dairy Intelligence Platform (DIP), offers a comprehensive solution for the dairy sector. This full-stack platform integrates banking, insurance, and marketplace services, addressing the multifaceted needs of dairy farming. DIP represents a significant leap in optimising dairy operations, enhancing financial inclusion, and supporting the overall wellbeing of dairy farmers and their livestock.

Reach: Positioned at the forefront of the thriving Indian dairy economy, valued at a substantial USD 140 billion, they are dedicated to establishing themselves as the preeminent and reliable platform. They achieve this by offering innovative digital solutions tailored for contemporary demands, while also granting invaluable access to financial resources and expansive value chain markets. Their commitment lies in empowering farmers, while simultaneously securing a prominent standing within this dynamic sector.



Dvara e-Registry

Background: According to Dvara E Registry's estimates, over 50% of India's 126 million small-scale farmers do not have access to credit. Small-scale farmer income flows tend to be irregular, unpredictable, volatile and seasonal, which presents challenges for financial institutions in determining creditworthiness when lending to them. This, however, is changing with the emergence of new models of lending that leverage alternative sources of data to assess creditworthiness of farmers. Dvara E-Registry is an Agri fintech company that works with Farmer Produce Organizations (FPOs) and member farmers to increase farm productivity and facilitate access to agricultural credit for smallholder farmers.

Approach: The company uses a data-driven approach to expand access to credit to small-scale farmers in India through its KhetScore, a predictive risk management tool. They recognize that in order for financial institutions to better understand loan performance, it is important for them to identify the cultivated farm area, verify the farming activity, monitor crop performance, and estimate crop yield. KhetScore has been developed as a tool to bridge this credit gap by running data analytics for a particular plot of land, examining its performance historically (multiple seasons a year) to serve as a proxy for expected cash flow.

This proprietary algorithm provides analytics based on captured (as opposed to self-declared) data to assess sources of risk in farming such as production risk, financial risk and climate risk to create a score for credit assessment. Current and historical data of the farm and crop is generated by leveraging the power of remote sensing (RS), geographic information system (GIS), smartphones, artificial intelligence, (AI) and machine learning (ML).

This data includes, but it is not limited to, cultivation history, farm productivity, growth stage onitoring, crop health assessment, farm area, and yield estimation which are crucial in determining the land's suitability for cultivation/ confirmation of cultivation activity. Data analytics- provided at the land parcel or farm level- uses metadata such as latitude, longitude, and timestamps along with high-resolution satellite imagery and cadastral data to identify the farmer's land parcel. The KhetScore Analytics Package offers data by season that helps banks assess the productivity and risks of a farmer's agricultural activities, guiding their underwriting decisions. Some of the data points examined include georeferenced plot details to verify the existence and location of the plot, verification of geo-referenced plot with government survey numbers (only in select states where plots have been digitized), land use classification to ensure plot is being used for agricultural purposes (via AI algorithms), historical land parcel level drought and flood occurrence, season-wise assessment of plot productivity (sowing frequency), crop health, plant moisture, soil moisture, nutrition, and mechanical damage, and historical weather and temperature range analysis for the plot.

The data above generates the KhetScore, which ranges from 0 to 100 and is used as an underwriting input. Those with scores above 40 are offered credit, those below are not.

Reach: Till date, approximately 23,000 loans have been disbursed using the tool, which stand at 107 Cr with AUM 56 Cr, having an average ticket size of INR 48,000. Given the traditionally high costs and risks associated with lending to this segment, KhetScore can help enable affordable access to credit for smallholder farmers.



Stellapps

Background: Founded in 2011 and incubated by IIT Madras, Stellapps is a trailblazing startup based in Bangalore. The company is dedicated to revolutionising the dairy supply chain in India through digitisation. Specialising in Internet of Things (IoT) applications and focusing on data acquisition and machine learning, Stellapps addresses critical gaps in dairy productivity, traceability, and quality.

In a market characterised by low dairy productivity per cattle, inadequate traceability, and subpar quality, Stellapps' technology interventions are crucial. Their efforts are geared towards digitising the Agri-Dairy supply chain in emerging markets, thereby unlocking significant value on a large scale.

Approach: The cornerstone of Stellapps' innovation is the SmartMoo™ platform. This comprehensive IoT solution digitises and optimises various aspects of dairy farming, including milk production, procurement, and cold chain management. This platform, mobilising

over two billion litres of milk annually, is a pivotal step towards creating measurable value for all stakeholders in the dairy industry, including farmers. It notably provides measurable data crucial for cattle insurance. SmartMoo utilises sensors in milking systems, animal wearables, milk chilling equipment, and procurement peripherals to acquire data, which is then analysed and processed through their Big Data Cloud Service Delivery Platform (SDP).

Reach: Stellapps' technology has been deployed across more than 30,000 villages in India, impacting 2 million registered farmers and 1 million registered cattle. This large-scale deployment underscores the company's significant role in enhancing farm productivity, milk quality, and supply chain traceability. The SmartMoo™ platform, including farm optimisation, milk production, collection, and cold chain operations, manages over 10 million litres of milk each day, leveraging advanced analytics and AI. Through its full-stack IoT platform, Stellapps has established partnerships within the dairy ecosystem, including insurance companies, veterinary services, and cattle nutrition providers.



PayAgri

Background: PayAgri was founded with a vision to offer holistic solutions that address the myriad challenges farmers and MSME Food processors face in accessing markets and finance. **Approach:** PayAgri's digital strategy is designed to streamline processes, eliminate inefficiencies, and promote transparency across the supply chain, from farmers to food processors. By connecting small & marginal farmers and food processors with key stakeholders, this approach aims to boost financial returns, fostering economic stability and growth. PayAgri envisions revolutionizing the agricultural value chain through advanced technology and alternative data, digitizing crucial processes to improve decision-making, risk assessment, and market access.

Approach: PayAgri is building a phygital model that provides financial and market linkages for farmers and MSME Food processors. Farmers benefit from timely access to credit and market linkage., credit access is provided in partnership with Federal Bank enabling digital loans to be disbursed to marginal farmers in under 30 minutes. The integration of financial and technology partnerships helps bridge gaps in working capital needs, offering a comprehensive solution for both farmers and MSMEs.

Reach: Backed by investments from Tamil Nadu Emerging Startup Seed Funds (TNESSF) and Boston-based MFS Investment Management, PayAgri is now exploring opportunities to replicate its agri-value chain intervention model in Africa, with sustainability as a core guiding principle.



Northern Arc Capital (NAC)

Background: NAC is a regulated NBFC that plays a vital role as a bridge between capital market investors and emerging sectors. Operating for over a decade, it is a leading player amongst India's diversified NBFCs. The company emphasises financial inclusion, providing access to credit for under-served households and businesses, both directly and indirectly through their Originator Partners.

As of March 31, 2021, NAC had credit exposure, directly or indirectly, across 657 districts in 28 states and 7 Union Territories of India. Since the inception of its platform, the company has raised over Rs. 1 trillion in funds for its clients, executed over 900 structured finance transactions, and built partnerships with over 220 Originator Partners and over 400 Investor Partners. Additionally, NAC has gathered extensive data on customer repayment behaviour, amounting to over 22 million data points.

Approach: NAC is a notable player in the financial sector, distinguished by its 'Nu Score' model. This model represents a significant shift from traditional credit scoring methods, bringing a more nuanced understanding of financial risk. The Nu Score model offers a strategic advantage to financial institutions. It provides a quick and cost-effective solution for risk assessment, eliminating the need for these institutions to develop their own intricate scoring systems from the ground up.

Reach: By utilising a more inclusive range of data points, the Nu Score model enables a broader segment of the population to be assessed for creditworthiness, including those who may not have a traditional credit history. This approach aligns well with the evolving needs of a diverse and growing economy.

The company continues to work towards tackling challenges in risk management, data digitisation and individual assessment, consent challenges, and staffing and standardisation. NAC has adopted a profiling mechanism through which a full picture can be painted based on the known personas from a loan portfolio based on the available information.



KiVi

Background: KiVi, operating under Agrosperity Tech Solutions Pvt Ltd, is an agri-tech startup founded in 2021 with a vision to transform farming into a preferred livelihood for millions of Indians. This company provides a 'phygital' (physical + digital) platform designed to offer seamless and efficient capital access to farmers and rural entrepreneurs, including areas like cattle maintenance and consumption needs. In its initial year, KiVi achieved an impressive 100 per cent loan repayment rate.

KiVi has strategically positioned itself within the farmgate ecosystem, focusing on farmer households, particularly those who struggle to access formal credit from banks. These farmers need various raw materials like pesticides and seeds and rely on output agents to sell their produce. Equipment, often rented, is another essential requirement for these small-scale farmers. KiVi's credit system is designed to understand and meet these specific needs of farmers.

Approach: KiVi's field agents, equipped with smartphones and a Progressive Web App (PWA), collect comprehensive data on farmer households. This data includes the number of acres, types of crops that can grow, and the number of seasons cultivated per year. KiVi's team,

comprising experienced individuals, then analyses this data to determine the cost of production, expected harvest, and market rates for the crops. They also consider any non-repayment incidents in the past three years from credit bureaus. Notably, 90 per cent of the farmers surveyed have cattle as a non-farm income source. KiVi acknowledges that loan needs are time-sensitive and can extend beyond farming to areas like cattle maintenance and consumption needs.

The company is exploring innovative solutions like direct payments to vendors for equipment rental. KiVi leverages technology effectively, utilising a WhatsApp interface for input store owners and farmers, available in languages like Hindi and Tamil, with plans for further expansion. This technology facilitates bill processing and OTP verification. Notably, 20 per cent of KiVi's clientele are new to credit, underscoring its role in introducing formal credit to previously underserved segments.

Reach: A telephonic survey conducted by 60 Decibels with 200 farmers revealed that 80 per cent obtained agricultural loans from private entities, and 80 per cent reported an increase in income. However, it's unclear if their expenses have also increased. The Net Promoter Score (NPS) was reported at 77 per cent.



Samunnati

Background: In India, 86% of farmers are smallholders with less than 2 hectares of land, meaning over 10 crore farmers and more than 50 crore individuals depend on small landholdings for their livelihoods. The fragmented nature of these landholdings limits farmers' abilities to reduce costs and realize better prices, let alone improve yields through advanced practices. This microeconomic challenge of achieving economies of scale erodes the profitability of smallholder farmers, despite their significant contribution to the macroeconomy, cultivating 46% of India's total cultivable lands. To ensure food security, markets, governments, supply chain players, and consumers need smallholder farmers. However, while markets have historically operated on smallholder farmers, they have not necessarily worked for them. Samunnati was founded with a mission to make markets work for smallholder farmers.

Approach: Innovating to Reverse Causality: Consistent innovation in business models, products, and processes is essential to reverse this causality.

The Power of Aggregation: The first innovation in Samunnati's business model was bifurcating customer segments into Farmer Collectives and Agri Enterprises. By aggregating thousands of smallholder farmers through Farmer Collectives, Samunnati offset the limitations of fragmented landholdings. Samunnati positioned smallholder farmers at the centre and started deploying financial solutions to them through Farmer Collectives. This aggregation model, launched in 2014, positioned smallholder farmers at the center and deployed financial

solutions through Farmer Collectives. By making historically excluded smallholder farmers inclusive in the credit market, this intervention reduced risk exposure and enhanced distribution for Samunnati's business model.

Customized Financial Solutions: Agriculture's cyclical cash flow nature mandates regular innovations in product offerings. Samunnati has structured customized financial products with unique credit assessment mechanisms. It has aligned smallholder farmers' needs with Maslow's hierarchy of needs to ensure mission success: Access to Finance, Access to Customized Finance, Access to Market Linkage, Access to Advisory Services, and Access to a Safety Net. This holistic approach has organically progressed Samunnati into a new customer segment – Agri Enterprises – facilitating Market Linkage for collectives at higher thresholds.

Leveraging Technology for Non-Linear Growth: Recognizing the significance of technology, Samunnati has accelerated its mission through non-linear growth and network effects among its extensive customer bases. FPONext, an in-house digital platform, features integrated marketplaces for credit, inputs, outputs, and consumables, fostering network externalities among all supply chain participants. Additionally, the Agri Assist platform identifies government schemes, maps eligibility, and guides smallholder farmers in availing benefits. The FPO Academy imparts capacity-building knowledge.

Reach: In its 10-year journey, Samunnati has expanded its presence across 22 states, with a customer base of 6,500+ Farmer Collectives on the supply side and 3,500+ Agri Enterprises on the demand side.



Kaleidofin

Background: Founded in 2017, Kaleidofin is a fintech platform with a mission to build a digital ecosystem to ensure finance for everyone, everywhere. The company specializes in offering a range of financial services using advanced machine learning and scalable technology and data platforms. Their services aim to enhance financial inclusion in the informal sector and under-banked segments, with a particular emphasis on women, nano-enterprises and agriculture.

Approach: The Kaleidofin platform combines scalable solutions in a modular, configurable fashion to seamlessly integrate with platform partners such as banks, MFIs, NBFCs, etc and cater to various life stages and requirements of these partners in their journeys.

ki score employs AI and machine learning to provide credit health assessment and critical risk differentiation, enabling lenders with crucial tools for assessing credit worthiness and expanding business to deserving informal sector customers.

ki credit provides scalable middleware rails for lending in all forms alongside debt capital markets structuring capabilities, seamlessly plugging into partner systems with minimal overhead.

ki view is a risk management product suite with automated insights and early warning signal capabilities which enable partners to make informed business and risk decisions.

Reach: Kaleidofin primarily serves the informal sector, focusing on individuals from the agriculture and nano entrepreneur SME space who have low annual income below 5 lakh rupees. To date, ki score has enabled financing of over USD 2.5Bn, impacting more than 4.8 million customers, with 98% of them being women. The company has presence in over 17 states across India, with notable activities in Tamil Nadu, Uttar Pradesh, Bihar, and Jharkhand. This geographic and demographic focus underlines Kaleidofin's commitment to financial inclusion for the under-banked and lower-income groups. Along with India, Kaleidofin is working towards creating an impact in other emerging markets such as Bangladesh and Africa.

Kaleidofin has developed an ensemble of data models, leveraging alternate data and lookalike techniques to predict customer behaviour more accurately. ki score risk performance continues to stay low despite tricky market conditions, enabling use cases such as bulk scoring of customers, pre-approval strategies, risk-based pricing and loan amount recommendations to drive partner growth and higher adoption by large, regulated entities. Kaleidofin adopts a modular, configuration-driven, flexible approach that broadens the impact of its offerings in the financial ecosystem.

Kaleidofin has opened its APIs to Microfinance Institutions (MFIs), offering services like income checks and infrastructure information. This collaborative approach broadens the impact of their financial tools and models, contributing to the wider financial ecosystem. The company is working on developing a virtual agent and a lookalike model to predict customer behaviour more accurately. This model will be particularly beneficial for new-to-credit (NTC) customers, enabling Kaleidofin to offer more personalised and relevant financial services.

Case Study

Agriculture

In India, where agriculture is not just an occupation but a way of life, nearly 60 per cent of the population is engaged in agricultural activities, contributing significantly to the nation's GDP. This sector is predominantly characterised by smallholder farmers, who own and cultivate 2 acres or less of farmland. These individuals often cultivate land that might belong to larger farmers, and in some cases, community entities, including religious institutions. Credit is crucial to these farmers to invest in modern farming equipment and technology, which can increase productivity and efficiency. This includes items like tractors, irrigation systems, or better quality seeds, which might otherwise be unaffordable. Credit can also enable a farmer to diversify into other types of crops or livestock. This diversification can be a crucial strategy for enhancing income stability and reducing vulnerability to market or climatic changes.

Lack of documentation is a crucial issue faced by these farmers: Up-to-date ownership papers, a common requirement for traditional banking systems, are often unavailable to these farmers, placing formal credit beyond their reach. Innovations like the Kisan Credit Card (KCC) were introduced to facilitate easier credit access for small farmers, offering financial support for agricultural inputs and related needs. However, despite the government's mandate, banks often exhibit reluctance in issuing KCCs to smallholder farmers. This reluctance stems from the high costs associated with assessing the credit risk of farmers who lack formal land titles or credit histories.

Digitisation of farmland is not straightforward due to the informal nature of succession, prevalence of verbal agreements, and high cost of operations related to fraud prevention. Cost of risk for the lender is also heightened by the lack of formal history of credit for a large section of small farmers (30 per cent farmers have access to formal finance, the rest rely on informal sources based on Agricultural census, Ministry of Agriculture and Farmers Welfare, 2015-16). Most transactions are cash-based and not digital, making it difficult to standardise bank statement analysis for credit scoring.

The repercussions of limited access to formal credit channels are manifold and severe. Smallholder farmers frequently resort to informal credit sources, which bring their own set of challenges. These include exorbitant interest rates (between 24-60 per cent) that can significantly increase the cost of borrowing, aggressive and often predatory collection practices, and an increased likelihood of falling into a cycle of overindebtedness. These issues not only impede the financial stability of the farmers but also affect the overall productivity and sustainability of the agricultural sector. This is where innovative companies like Samunnati, Dvara E-Registry, and KiVi (AgroProsperity) are making a transformative impact.



Samunnati, leveraging its vast network and understanding of agricultural value chains, uses alternative data such as the farmer's produce type, seasonal yields, and market transactions to assess creditworthiness. This approach bypasses the conventional need for credit histories, enabling more accurate risk assessments and tailored financial products for smallholder farmers. Dvara E-Registry takes this a step further by digitising farmer's land records and employing IoT technology to track agricultural activities, providing a rich dataset that includes soil health, crop rotation patterns, and even local weather conditions. This data is then used to build a more comprehensive credit profile for each farmer, addressing the gap in formal credit histories.

Smallholder farmers often struggle with efficient input procurement, equipment rentals, and output aggregation. The lack of organised supply chains leads to higher costs, inefficiencies, and lower profits. Companies like KiVi and PayAgri are revolutionising this space by using alternative data for smarter input procurement and equipment rentals, and effective output aggregation. Access to credit, facilitated by these data-driven insights, allows farmers to invest in better inputs and equipment, leading to enhanced productivity. Dvara E-Registry employs innovative methods like 'Know Your Farm' and IoT technologies to enhance KYC processes and gain insights into the farming practices of the customer in question. This reduces fraud, lowers the risk for lenders, and leads to more favourable lending terms for farmers.

Many voices from those involved in the strategy of these companies point to the rich diversity of farming practices, socio-economic situations, and skill levels amongst the target segment. Meena Munshi, the founder of Vest-in-Villages, spoke about the difficulty in standardising a credit scoring system between two villages within a district, and the need for multi-dimensional profiling that ML algorithms may not be ready for yet. Northern Arc Capital has an innovative answer to this challenge. Their scoring system profiles the customer based on similar personas within available data, allowing greater visibility among sections of the society who would otherwise have no access to formal credit whatsoever.

As the agrarian landscape evolves, there is an evident and urgent need for widespread adoption and improvement of alternative approaches to credit assessment and risk management, ones that can accommodate the unique circumstances of smallholder farmers in India.



Nano Enterprises

Most enterprises in India are unorganised. If the company has over 10 employees, it is said to be an organised enterprise. The majority of India's unorganised sector is unregistered (estimated 69 per cent), lacking any form of registration under any government authority. Additionally, 84 per cent of the micro enterprise segment of India operates with just one worker. And 44 per cent of India's microenterprises are home-based

The vast gaps within the MSME sector have caused voices to call for a new section of enterprises called nano enterprises. The definition of these companies could include features of these businesses such as involving just one person, unregistered, and without a long track record as a business in terms of regular invoicing, assets or history of credit. These small companies mostly hire locally and create jobs in the community that they are born from once they have grown to that extent. But to get there, they need access to credit on good terms, to buy equipment and stock, expand operations, provide security to their employees and households through insurance, pension schemes, etc.

Additionally, in the case of family run and house-based enterprises, the credit may not only be used for business purposes. And to be fair, expenses made for the family or household do enable the company to continue operations smoothly and function productively. It is, however, intuitive for a bank or other formal financial institutions to see this as a risk since a business loan is usually spent towards increasing the revenue earned by the enterprise.

This is why nano enterprises are more likely to rely on personal loans over formal business loans, except for cases where the size of the loan is so large that it is necessary to move for a business loan. Paying higher interest rates due to choosing a personal loan is the lesser of the evils because many turn to informal means to get their business off the ground, and the high interest rates impedes the growth of the business. Even in urban settings, such as the wholesale fruit and vegetable markets where retailers buy their produce in the mornings, one can spot informal lenders offering their capital at a daily interest rate of 1-2 per cent which is collected at the end of the day upon completion



of sales. One will find it very hard to spot a bank on the ground at the opportune time, prepared to take on the risk of lending and the possible operational effort of collecting from the customer at the end of the day.

The question is: how do we enable these nano entrepreneurs to gain access to formal credit using alternative data? Nano enterprises often operate informally with minimal documentation, which is often sought and procured only at the point when it turns into a necessity for a business goal. Now, without the awareness of the benefits of seeking and gaining access to formal credit, a nano entrepreneur may never collect the documentation that will then make him visible to formal credit sources.

Alternative data solves this problem by allowing lenders to rely on data points such as transaction histories, phone and utility payments, and digital payment records, to understand the cash flow patterns and risk profile of the customer a little better. This not only unlocks a new market in the highly competitive realm of formal credit in India, but also provides an opportunity to apply the technology to add a layer of visibility to their existing customer base. Alternative data can also help to monitor the utilisation of disbursed loans, decreasing the blur between personal and business expenses undertaken by the customer with the loan. This data about previous loans can also be useful during the approval process. Furthermore, understanding these patterns can help tailor credit products that account for flexible requirements, which are commonplace with small businesses entering the growth stage.

With a more accurate risk profile of the customer, formal financial institutions are able to afford to give credit to this (previously) risky segment at considerably better rates. However, traditional institutions may not always be able to keep up with the operational challenges that may be born out of the unique needs of nano enterprises, especially in terms of operational flexibility and timeliness. Fintech companies have the upper hand due to the design of their core operational systems being usually more based in digital, which in comparison to traditional means is much faster and accessible, especially for nano enterprises which are a single person show.

Companies like PhonePe, BharatPe and Paytm have a lot of data about merchant payments to their rural and urban microsellers, a large section of whom are nano enterprises. Some may have just made the jump to

e-commerce, or started using a bank account to receive payments. So, while there may not be a history, it is possible using machine learning models to predict the behaviour of the company and potential based on some simple but key data points.

Kaleidofin utilises alternative data to develop financial products that cater to the specific needs of their target customer. Their customer centric approach in reaching out to their target customer base of low income households in financial solutions based on non-traditional data points aligns well with the requirements of these small-scale businesses.

In an ecosystem where traditional data points are scarce, collecting accurate and relevant data is crucial. This calls for a grassroots approach, executed by professionals who understand local socio-cultural nuances. Mitigating data collector bias is equally important to ensure reliability.

In this context, companies like Vest-in-Villages are making strides in financial inclusion, albeit not directly targeting nano enterprises. Their Data Analytics, Rating, and Tracking system (DART) sets a precedent for how alternative data can be leveraged. Similarly, Kaleidofin and Northern Arc Capital are using innovative data-driven models to tailor financial products for underserved segments. Yubi and Reserve Bank Innovation Hub (RBIH), through their initiatives and policies, could play pivotal roles in shaping an ecosystem that favours the inclusion of nano enterprises.

As these entities harness alternative data, they unlock new market segments in India's competitive formal credit realm and add visibility to existing customers. This approach not only democratises access to credit but also ensures that products are designed to meet the flexible needs of this dynamic sector. The future of nano enterprises in India hinges on this blend of technology, data, and an in-depth understanding of the grassroots economy.

Empowering Women

In India, the gender gap in financial inclusion presents a significant barrier to economic empowerment of women and equitable growth, both part of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs). With the Pradhan Mantri Jan-Dhan Yojana (PMJDY), the gender gap in account ownership has been minimised but the same cannot be said about usage, or any other financial products or services. As of April 13, 2022, 451 million PMJDY accounts were opened, 55.6 per cent of which belonged to women. The gender gap in account ownership in India dropped from 20 per cent in 2014 to 6 per cent in 2017. By 2021, 80.7 per cent of women owned bank accounts compared to 88.1 per cent of men. However, it's important to note that 54 per cent of women account holders reported not using their account in the past year, compared to 43 per cent of male account holders, indicating a gap in usage as well.

The percentage of women with credit access, in relation to the total adult female population, has shown a notable increase from 7 per cent in 2017 to 14 per cent in 2022 according to the Credit Information Bureau India Limited (CIBIL) annual report. Remarkably, the growth rate of women borrowers, currently at 16 per cent, has outpaced that of men, which stands at 13 per cent. Further insights show that women borrowers have a better risk profile. In CY 2022, 57 per cent of women borrowers had a score of prime³¹ and above compared to 51 per cent of male borrowers. This data underscores the significant untapped potential for lenders to extend credit access to women throughout India, fostering empowerment and contributing to the broader goal of financial inclusion.

Across the socio-economic spectrum, there lie obstacles for women to start and continue using financial products and services. Traditional gender roles often restrict women's mobility and access to financial literacy. Many women lack control over financial resources and decision-making authority in households, making it difficult to interact with financial institutions. Women from rural households predominantly engage in informal labour or small-scale entrepreneurship, sectors that are typically under-served by traditional banking systems. The lack of formal employment history or collateral makes it difficult for women to meet the eligibility criteria for loans.

¹ Acceptable ability to repay short-term obligations (Moody)



Microfinance has played a crucial role in bridging the credit access gap for women from rural and low-income households. Group lending practices have created entrepreneurial opportunities for millions of women and their families with low or no collateral. MFIs often couple their lending with financial literacy programs, helping women manage their finances better and understand the benefits of credit. SHGs and MFIs face their own challenges with offering lower interest rates and scaling operations. The interests on these loans are exorbitant to cover operational expenses as well as the cost of risk. Easy access to small loans, coupled with entities also lead to multiple borrowing and over-indebtedness among many women clients, as was seen in the Indian microfinance crisis. With digital lending and reliance on alternate data for underwriting entering the mainstream when catering to impoverished segments, there are companies within IITMRP who are solving the problem at multiple levels.

A prime example is Vest-in-Villages, an organisation that works with households in rural areas. All the last-mile institutions that Vest-in-Villages works with are run by women, with at least 80 per cent of members being women. The organisation empowers women leaders and entrepreneurs, equipping them with skills to develop business plans and understand their role in family financial decision-making. Through their DART (Data Analytics, Rating, and Tracking Tool) services, Vest-in-Villages equips low-income and vulnerable households with tools to become more resilient to emergencies and income shocks. This is achieved through financial literacy, business planning, debt tracking, and the strengthening of formal savings. They also help in building credit histories, enabling low-cost underwriting and loan processing.

Kaleidofin, a Chennai-headquartered fintech platform, tailors financial solutions to underbanked customers, with a specific focus on women. Since 2017, Kaleidofin has amassed over 3 million users, 97 per cent of whom are women, including a million small-time entrepreneurs. The organisation provides savings, credit, and insurance solutions. Initially, they connected women-led small businesses with large financial service providers like banks and insurance companies. Now, they even offer products like the Ki Score, an AI/ML-based credit and financial health score to aid lenders in credit decisions. Vest-in-Villages also tags each household they impact with a green, amber or red flag, denoting their financial health.

Yubi (CredAvenue) facilitates credit access for women-led enterprises by offering features and structures tailored to the needs of women business owners, such as zero collateral needs and flexible tenures. The organisation also encourages female entrepreneurs, offering various schemes in collaboration with banks and financial institutions such as the Cent Kalyani Scheme, Mudra Loan under PMMY, Self Help Group-Bank Linkage Programme, Mahila Udyam Nidhi Scheme, Stand-Up India, Shakti Scheme from Bank of Baroda, and KBL Mahila Udyog Loan from Karnataka Bank. These schemes are aimed to address the problem of exclusion of women from formal finance due to their common challenges of limited assets in their name for collateral, limited savings and income, and in many cases, lack of support from their community for growth and advancement.

All the companies we have spoken to address the need for special steps to mitigate the gender bias that currently plagues access and usage of financial products and services. There is a need for improved outreach and alternative data collection, to make these highly excluded segments more visible to formal institutions.



This note was developed in collaboration with LEAD at Krea University.

About LEAD at Krea University

LEAD at Krea University is an action-oriented research centre dedicated to enhancing the socio-economic prosperity of vulnerable and marginalised individuals, households, and enterprises. We create 'knowledge for impact' by leveraging the power of data, aspiration, innovation, and co-creation to tackle complex development challenges. Some of the sectors we specialise in include financial well-being and social protection, MSME growth and development, technology and data for good, women's economic empowerment, and improving health system design and healthcare delivery. Through our capacity building and immersive learning initiatives, LEAD also equips aspiring researchers, policy makers and potential leaders with the tools to solve problems analytically and create lasting socio-economic impact.

Housed at the IFMR Society (a not-for-profit organization), which is also the sponsoring body of Krea University, LEAD benefits from the rich legacy and cross-disciplinary expertise of the IFMR/Krea ecosystem, which has over 50 years of history in research and innovation. Since 2005, LEAD has conducted over 300 research studies and evaluations in collaboration with partners across the globe. LEAD is also a part of the IITMRP fintech ecosystem, which seeks to elevate India as a leader in 'Fintech for Inclusion' by 2030.

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