DVARA Research

AGRICULTURE FINANCE IN INDIA: A LANDSCAPE REVIEW OF CHALLENGES & OPPORTUNITIES

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August 2024

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ACKNOWLEDGEMENTS

The author is grateful for the valuable conversations with Mr Amit Arora, Mr Ajay Tannirkulam, Mr N. Srinivasan, and Mr Venky Ramachandran during the writing of this review paper. Special thanks to Mr Venky Ramachandran for reviewing the paper and providing his insightful comments and suggestions.

SUMMARY

Palavudamai Vaazhiya Vaazhka Uzhavudaimai Selvam Sezhikka Seyal
- Thirukkural

Let there be prosperity in abundance!
For agriculture, when practiced, can make wealth flourish.

Agriculture in a country like India plays multiple roles, all critical. It ensures food security for the most populous nation-state in the world. It employs millions of workers productively and provides a source of livelihood and identity for them. Furthermore, India's unique and incomplete structural transformation that leapfrogged from agriculture to services while only partially expanding its manufacturing sector has subdued labour movement out of agriculture. This, apart from straining the sector, also has implications for how fast India can graduate its citizens from poverty. Despite this crucial place agriculture occupies in the cultural, social and economic canvas of the country, there is a pressing need for first-principles-based research that tries to understand the sector through its people, their lives and occupations, and the systemic architecture that supports it. This paper is an attempt to set the stage for such enquiry with a specific focus on finance.

In the introductory section of the paper, we delve into the enterprise of a typical small-holder farmer in India, the operational considerations, market challenges, and systemic gaps that this farmer will have to contend with to make a living from farming. While there is nothing groundbreaking in covering these aspects that get talked about quite extensively in agriculture policy spheres, the intent here is to highlight the constraints in order to delineate the space available to such farmers for optimising their enterprise. After ascertaining this relatively narrow space of influence available to farmers, we then attempt to understand the cultural and social milieu that makes living and working with these constraints possible. This is a relatively newer ground for agriculture finance. The intent here is to develop an appreciation for the varied ways in which agricultural households manage their enterprise and finances, make meaning out of life, and highlight intrinsic features about their lives that modern economics (and, therefore, finance) usually brushes aside.

The second section seeks to paint a picture of the landscape of agriculture finance in India, albeit with a broad brush. A brief history is first presented to understand the socio-political path that has led agriculture finance to its current framework. We then touch upon the various sources of finance available to examine their scope and utility for the agricultural enterprises and households that we had described earlier in the first section of the paper. This juxtaposing of agriculture finance with its context expectedly leads to newer kinds of questions about making finance relevant, suitable and meaningful for agricultural households.

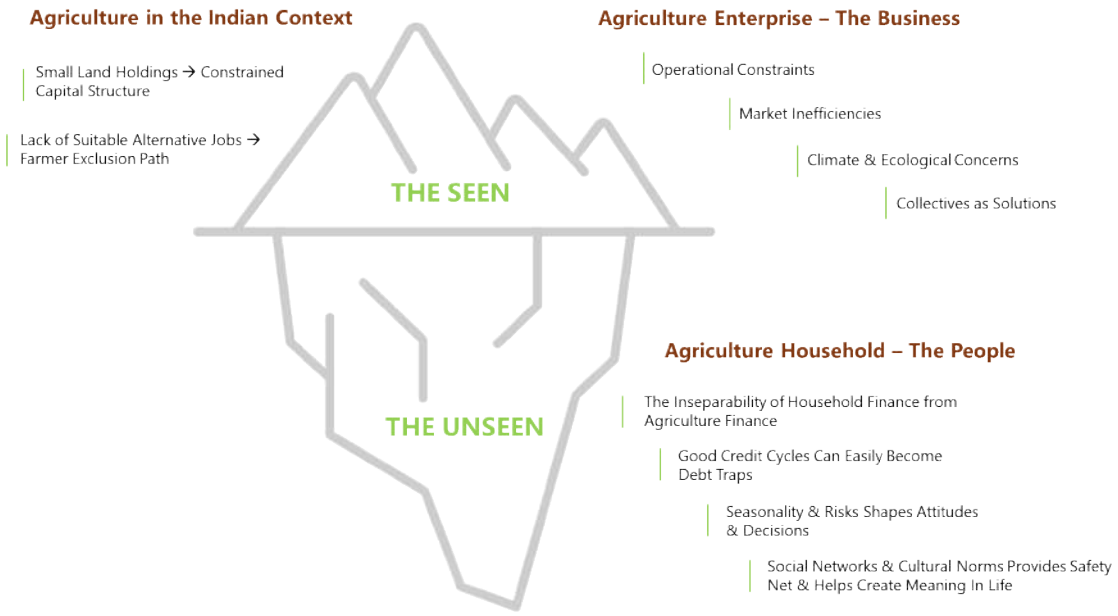
The third section of the paper identifies four themes under agriculture finance that warrant further exploration. It lays out the significance of each of those research themes in understanding the role that finance can play in this sector. Some preliminary research ideas of interest are listed under each theme to showcase some context-informed questions that are yet to be answered and have much scope for rigorous and actionable research.

The final concluding section seeks to set the larger vision for what finance can do for agriculture and identify its particular role.The paper shies away from making any policy recommendations but calls attention to its central premise that agriculture finance in India needs to be studied from varied perspectives to undertake the slow, steady, but difficult task of incremental policy tinkering. It also offers a lens and a framework to embark on such an undertaking.

Importantly, the paper does not call itself a primer for sustainable agriculture finance despite its vision for impactful finance to make agriculture sustainable and planet-friendly. Instead, the paper seeks to review the landscape of agriculture finance in India from an implicit sustainability standpoint to pose the pivotal question – **How can finance be designed and structured for agriculture, farmers, agricultural households, agrarian communities and the larger economy so as to ensure economic equity, social well-being, and environmental sustainability?**

1. Introduction

This introductory section sets the context for what it looks like to pursue agriculture in India, i.e., some of the common challenges (and rare opportunities) that a typical Indian farmer faces. While this paper primarily seeks to review the landscape of agri-finance in India, it is often the case that the characteristics of the real sector tend to influence finance, more so in the case of a markedly informal sector like agriculture.It would, therefore, help to lay out some of the systemic features, geographical diversities, sectoral constraints, and cultural and behavioural practices so as to understand farming and farmers in India better. This would, in turn, help delineate the scope for finance to serve this sector meaningfully and effectively.



1.1 Agriculture in the Indian context

India is still substantially agricultural, with 65% of the Indian population living in rural areas and 47% of its population dependent on agriculture[1]. Further, 54% of rural households are found to be agricultural[2]. For these households, land is the primary capital on which their livelihoods depend. However, the average landholding in India is small and is still on a declining trend due to population expansion and the resultant ownership fragmentation. 70% of landholding in India is marginal[3], i.e., less than 1 hectare, with only around 0.2% of holdings considered to be large[4]. The average operated area per holding in India is 0.92 hectares, with wide inter-state variations—from 0.36 hectares in West Bengal to 1.58 hectares in Rajasthan.[5]

This fragmented land holding creates a constrained capital structure that poses unique challenges for pursuing farming in India and imposes limits on how much an agricultural family can earn from farming.

Particularly, income from just cropping on a small farm is often incapable of supporting a typical agrarian family in all their needs and aspirations.

65%
Population living in rural areas

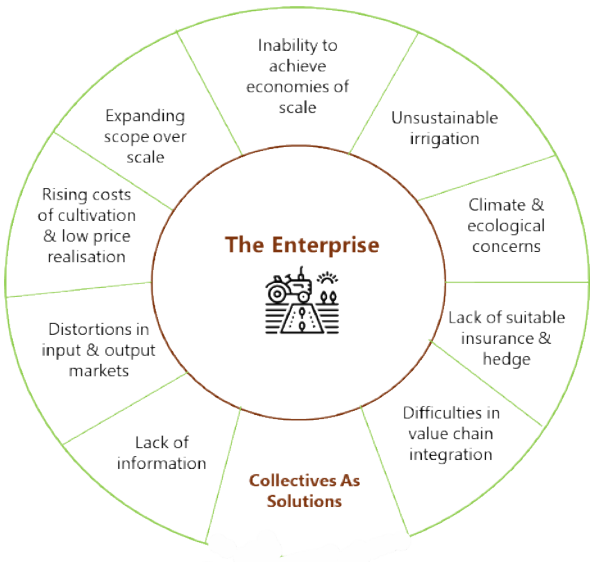
47%
Population dependent on agriculture

From a macroeconomic perspective, the structural transformation expected by the Lewis Model[6], in which labour and productivity shift from agriculture to other sectors has remained incomplete in India, with wide differences across states[7]. The model expects land parcels to consolidate over time, productivity to see an upward trend, and the secondary and tertiary sectors of the economy to boom and create jobs for those looking to move out of the agricultural sector. These inherent assumptions about land consolidation, rising productivity, and off-farm labour absorption have not panned out in India as expected, leading to doubts about the suitability of such a model for India.

Alternative models with different labour transformation paths[8] have been tested in the Indian context, and the findings suggest that most states in India are not on the expected positive Lewis Path. In the ideal positive Lewis Path, the gap between farm and non-farm incomes declines along with a decline in the active farmer population. Instead, most states are on two sub-optimal structural paths where the gap between farm and non-farm incomes is widening, but the labour force, nevertheless, is either increasing (Lewis Trap Path) or is pushed out of the sector for want of work rather than being absorbed by other sectors due to viable opportunities (Farmer Excluding Path)[9]. Only two North-Eastern states have been found to be on a positive structural path where labour productivity is increasing, and the number of farmers is also increasing (Farmer Developing Path). **This makes a large fraction of Indian landowners reluctant farmers and wary entrepreneurs who are trying to earn the best possible income out of their initial endowment of land capital and farming technology.**

1.2 Agricultural Enterprise – The Business

Agriculture in the small-holder context is markedly distinct from industrial or even large-scale non-industrial agriculture. Further, the diverse physical, socio-cultural, and climatic conditions in India give way to a varied array of agricultural practices that make farming very different in different parts of India. While there is no single narrative for agriculture that is applicable to the whole of India, we will now look at some of the common features applicable to any average small-holder farmer in India. Taking cognisance of these characteristics is important to identify the role finance can play in the enterprise of a smallholder farmer. **After all, it is crucial to understand the business one seeks to serve.**



1.2.1 Challenges In Realising Economies of Scale

Small farms have a productive efficiency advantage, i.e., they produce more per unit of land employed than do large farms. However, for an agricultural household, the small farm sizes restrict such households from achieving the economies of scale necessary to make farming remunerative[10]. Everything from input procurement, machinery use, and output sale is piecemeal, and each small farm expends time, energy, and higher cost per hectare for each of their requirements. This shoots up the costs of farming and drives down profits for the household[11].

The profits generated by small farms are often not sufficiently high for the household to direct some earnings back into their farm while also sustaining their own personal needs. Slim profit margins, therefore, disincentivise farmers from making capital investments in soil health, irrigation, or physical infrastructure in their farmland, which would lead to better yields and lower costs over the long run.

1.2.2 Scope Over Scale

Currently, crop farming contributes to around 68.9% of an agricultural household's income[12]. Due to insufficient income from cropping, households often resort to secondary sources of occupation, such as animal rearing or wage labour, to supplement earnings from farming. This inclusion of non-farm economic pursuits enlarges the scope of activities for the household and also provides diversification of income sources[13]. However, such diversification is often constrained by the household's current knowledge, manpower, fund availability and opportunities.

True expansion of scope in the form of multi-cropping, inter-cropping, high-value vegetable/fruit cultivation, farm ponds, etc., requires the building of farmers' capacities—technical, financial, and operational - to test, adopt, and leverage parallel farm-based economic opportunities. Given the constraints of scaling, diversifying the scope of activities, both farm and non-farm, has been common practice in India until the Green Revolution, and some pockets

still hold on to such scope diversification. While efforts are underway to engender such diversification systematically, the pace of dissemination is again constrained by the large number of landholdings, small sizes of such farms, and the resultant economics of farming.

1.2.3 Unsustainable and Irregular Irrigation

Around half of the cultivated land in India is unirrigated or rain-fed[14]. Water resource has a direct bearing on the kind of crops being adopted, as it should. However, unhindered and uncoordinated use of groundwater for irrigation is leading to environmental and societal stress among farming communities[15]. India is the largest user of groundwater in the world, and it meets more than 60% of India's irrigation requirements[16]. Interstate river water disputes and erratic monsoons have led to an unsustainable reliance on groundwater for irrigation. Further, the subsidisation of electricity for borewells has skewed the incentive structure for farmers in crop selection and water resource management. For instance, high-value cash crops like sugarcane that guzzle water are being cropped in water-stressed areas that are already facing groundwater depletion[17].

Groundwater exploitation has also disincentivised the collective management of local water bodies and other aquatic commons, which would make agriculture more ecologically sustainable, ensure optimal water usage, and enable the selection of agroecologically suitable crops[18].

1.2.4 Distortions in the inputs and outputs market

The inputs markets – for land, labour, fertilisers, pesticides, machinery, etc. – suffer from many kinds of distortions. For instance, lack of well-functioning land lease/rental contracts leads to sub-optimal land reallocation[19]. Labour shortages in different parts of the country lead to choice of unsuitable crops for cultivation or cost overruns for farmers[20]. The dearth of quality seeds at affordable prices leads to low yields and high input costs[21]. Importantly, the lack of suitable credit pushes farmers towards unsustainably costly informal loans from local input retailers or output aggregators[22].

The output market is dominated by the Agricultural Produce Marketing Committee (APMC) mandis (markets). These mandis are far too few, sparsely located, and poorly structured to cater to the needs of millions of smallholder farmers in India[23]. Suboptimal marketing infrastructure erodes the market's ability to discover prices, transmit market information, and allocate commensurate value to all stakeholders involved. Broadly, it also limits farmers' ability to realise the true value of their productivity and stifles productivity gains, if any[24]. The mandi infrastructure is also not conducive to supporting a wide variety of produce. This creates hurdles in market access for farmers who wish to diversify to high-value crops like vegetables and fruits[25] in line with the changing food basket of the Indian masses[26].

Further, given that smallholder farmers do not produce sufficiently high quantities of crops to transport and market their produce by themselves (or enter into direct procurement contracts with large buyers), local traders work with multiple farmers to aggregate, sort, and market their produce.While the services rendered by these traders are very important to the market as it is currently structured[27], they also cause value and income leakage for the farmers, especially given the power and information asymmetry between farmers and traders in these mandis.

Further, the government announces a Minimum Support Price for public procurement of certain agri-commodities. While the evidence about their distortionary effect on market prices is inconclusive[28], there is some evidence that MSPs incentivise the choice of certain crops over others and reallocate resources to such crops[29]. Moreover, the government announces prohibitions or quotas for exports of various agri-commodities from time to time, considering domestic objectives. This often restricts farmers in India from benefitting from higher international prices and the resultant price transmission domestically[30].

Overall, institutional, social-political and market constraints contribute to allocative and technical inefficiencies in agriculture such that a typical farmer's goal of profit maximisation gives way to a model of constrained optimisation, i.e., working within extraneous constraints that are beyond the farmers' control to do the best possible with his/her endowment of physical and intangible capital[31].

1.2.5 Rising Cost of Cultivation and Low Price Realisation

The cost of cultivation has steadily increased in the last two decades, mainly driven by rising labour costs in recent years[32].Farmgate prices have not kept pace with the rising costs, thereby shrinking profits. Further, price realisation by farmers is a considerably

small fraction of consumer prices,[33] i.e., farmers only receive a fraction of what the customers pay at retail as their price. A survey by RBI found that the price realised by farmers varies between 33% and 70% of the consumer price[34]. This double whammy of rising costs and poor price realisation has led to low morale and disillusionment among farmers[35,36].

1.2.6 Lack of Information

While small-holder farmers are price-takers in what is essentially a buyers' market, dynamic market information on price movements of various crops could help farmers plan their sales, hold on to their produce for better prices, or just prepare for lower-than-anticipated prices for their produce[37]. However, Indian farmers are seen to rely on price information from previous seasons to make cropping decisions for upcoming seasons[38] and rarely have dynamic market information on price movements (aided by a robust price discovery process) to make their choices[39]. Traders and other middlemen with access to market price information end up accruing a disproportionate share of value in the supply chain[40] owing to this information asymmetry.

Apart from market price information, climate information has the potential to aid farmers in making optimal sowing, watering, and harvesting decisions to leverage good weather conditions or avert the fallout of adverse weather events. However, reliable and actionable weather updates are often unavailable at the desired hyper-local level[41].

1.2.7 Difficulties in Value Chain Integration

Farmers remain primary producers and struggle to vertically integrate into the value chain by processing and packaging their own produce for retail distribution. The already slim margins and resultant low incomes from previous seasons do not encourage investment in processing facilities, and suitable investment and working capital loans are often unavailable locally to propel such investments. Further, the quantity of produce from small farms is often too small, such that it becomes economically uncompetitive to process it locally at the farm. This stifles farmers from effective value chain integration, and they remain saddled at the bottom with little to no prospect of building and growing their agri-enterprise[42].

1.2.8 Climate and Ecological Concerns

Agriculture contributes to and is a victim of climate change. It accounts for about 18% of global greenhouse gas (GHG) emissions. On the other hand, it is also significantly exposed to the adverse effects of climate change. India, for instance, has been identified as one of the most vulnerable regions for food security due to uncertain weather[43].

Agricultural policies determined at the national level shift the priorities and preferences of farmers in various regions, sometimes leading to inappropriate and unsuitable cropping practices that are inconsistent with the ecological limits of those agro-climatic zones[44]. Further, inappropriate land use, overapplication of fertilisers, indiscriminate use of weedicides and pesticides, and unsustainable water use have led to wide-ranging environmental problems[45]—contamination of water bodies, land degradation, toxic load in food produce, disruptions of local ecological balance, and loss of indigenous varieties of seeds, trees, and insects[46]. There is a call for a systemic shift towards agroecologically sustainable modes of cultivation[47] that balances the need for food security with natural resource conservation (land, water, seeds, species). This effort is gaining momentum with the support of various civil society actors[48,49].

1.2.9 Lack of Suitable Insurance and Hedge

While India has a long history of crop insurance[50], penetration and take-up have remained low due to a variety of reasons – lack of awareness, lack of trust, reliance on relief payments, inability to adhere to insurance processes and practices, lacunae in crop insurance products or processes, delays in claim settlements, etc[51]. The two most important insurance schemes available to Indian farmers, viz, the Pradhan Mantri Fasal Bima Yojana and the Restructured Weather-Index Based Crop Insurance Scheme, have made some commendable contributions[52] to insure farming households. They are, however, riddled with low coverage, operational inefficiencies, and an inability to engender trust and confidence among farmers[53]. This leaves a substantial segment of the farming population vulnerable to crop and weather risk[54].

Indian agriculture is also subject to high volatility in market prices, and a hedge contract is a well-tested solution for managing such volatility. Commodity Futures (CFs)[55] offer a medium to hedge against price volatility in various agri-commodities. However, its usage in India has been hampered by

misgivings about its effect on food prices. The agricultural market, like any market, is prone to speculation. However, the effect of such speculation in the futures market on actual prices in spot markets and on commodity inflation thereof is not well-established. Successive studies[56,57] have found no link between future and spot prices. However, the government, with an intent to control inflation in agri-commodities, mandates a ban on futures trading in different commodities from time to time, which stifles price discovery[58] and hedging effectiveness for farmers[59,60].

Middlemen at the hyperlocal level often provide principal risk cover since they themselves provide principal in the form of credit that they get repaid in the form of produce. But without better hedging mechanisms, farmers as well as these middlemen remain exposed to market price volatility.

1.2.10 Collectives and Cooperatives as Solutions

A substantial number of constraints listed above stem from the fact that Indian farms are largely small or marginal, making scaling, diversification, investments, and marketing difficult, cumbersome, and somewhat chaotic. Hence, it is logical that the collectivisation of farmers has come to be viewed as a solution to many of the ills of being a smallholder farmer in India[61]. It is envisioned that farmers can collectively produce a crop by cooperating on procuring seeds, fertilisers, pesticides, credit, and other such inputs and processing and selling the output so produced. This way, they will be able to garner better prices and terms than each farmer individually would[62]. Further, the hope is that such collective cooperation would engender solidarity, knowledge transmission and positive synergy in the agrarian community and help stabilise the declining sector.

Collectivisation, however, does not necessarily guarantee cooperation. Hence, the currently pursued framework for farmer collectives is that of a demutualised cooperative where cooperation and stewardship is not taken for granted. Rather, the collective is handed over to professional management to bring about cooperation and ensure operational efficiently and profitably. However, context and composition are seen to significantly matter in the functioning of even professionally managed collectives like Farmer-Producer Organisations (FPOs). Nevertheless, the choice of the right functionaries, timely and adequate finance, and cohesive participation of member farmers can realise the potential envisaged for FPOs[63]. By invoking cooperation in service of competition, FPOs with the right internal and external support mechanisms can bring systemic transformation to the agricultural ecosystem in India[64].Innovative, practical, and localised experiments around collectivisation, risk sharing, and cooperation that harness the region's unique capabilities and collective will could pave the pathway for m aking agriculture not just economically remunerative but ecologically sustainable.

Cooperation is a state subject in the Indian constitution but with the formation of a dedicated Ministry of Cooperation in 2021[65], attempts are being made to centralise cooperation and cooperatives. The complex political, economic, and social canvass of India makes sweeping top-down reforms very difficult to implement, as witnessed in the repeal of the Farm Laws[66]. Nevertheless, collectives and cooperatives would most likely remain cornerstones to any solution space imagined for revitalising Indian agriculture.

1.3 Agricultural Household – The People

As per the National Sample Survey's Situational Assessment Survey of Agricultural Households Report (2019), the number of agricultural households[67] in India is estimated to be 93.094 million[68]. This has increased from 90.2 million households in 2013[69]. Of these 93 million agricultural households, 45.8% belong to the OBC community, 15.9% to the SC community, 14.2% to the ST community and 24.1% to other forward caste communities. The average monthly income of an agricultural household is around Rs. 10,000, of which 39.8% comes from wages and leasing out of land, 37.2% comes from crop production, 15.5% comes from livestock farming, and 6.3% comes from other non-farm household business. Around 50% of agricultural households have some outstanding loans, with the average outstanding amount at around Rs. 74,000. Here, 69.6% of loans are from institutional sources, while 20.5% were from professional but informal agricultural money lenders.

These stylised facts paint a fair picture of a typical agricultural household in India. However, the nature of the occupation, its socio-cultural history and the tectonic shifts accompanying the structural realignment of the agricultural sector with the rest of the Indian economy make agricultural households in India extremely diverse, deeply complex, and precariously vulnerable. **Understanding the dynamics underpinning the functioning of agricultural households is**

therefore important to demarcate the role of finance in serving these families meaningfully.

1.3.1 Agriculture as A Household Enterprise

Agriculture in India is a household enterprise. There is a clear familial and cultural division of labour and responsibility among household members in pursuing cultivation as a family enterprise[70].

Women contribute significantly to farm labour and pursue diversification through horticulture and animal husbandry[71]. In households that have an outmigration of men, women step in to take care of cropping. In fact, with the rising trend of village to city and state to state migration by rural men, India is witnessing the slow and steady feminisation of agriculture where women are seen to be expending the most time and effort to agriculture in the family[72]. Further, apart from the labour and time spent by different members directly in agriculture, the social capital of the entire household – its monetary, religious, informational, and relational networks - is leveraged to undertake farming. For instance, women resort to self-help groups and joint liability groups to secure loans, youngsters help access government benefits and market information, and male farmers tap into friends and family networks for making cropping and sale decisions. The household, therefore, collectively undertakes cropping and allied activities, making agriculture a household enterprise[73].

1.3.2 Inseparability of Agriculture and Household Finance

Finance is shaped by the people who use it. In the context of resource-poor agricultural families, most financial decisions attempt to balance the priorities and goals of the entire household[74]. Hence, financial decisions linked to farming cannot be studied in isolation from how the household lives overall. All kinds of decisions about cropping – from the type of crop grown, seeds used, and credit availed to the point of sale – are intrinsically linked to and motivated by the quotidian lives of the agricultural household.

Households are also shaped by their social networks, and relational ties play a critical role in helping them manage their finances and deal with unexpected shocks[75]. Furthermore, incomes for agricultural households are often lumpy, and they have unique ways of investing in friends, family and the community in an effort to turn their lumps of variable and seasonal incomes into flows of smaller amounts that could meet their regular and discretionary expenses as and when needed[76]. Hence different families, agricultural and non-agricultural, are intrinsically linked in a dense financial web that is animated by blood ties, friendship, cultural obligations and relational entitlements.

While informal finance mostly understands this interconnectedness, formal finance that seeks to provide agriculture loans assumes clear demarcations between agriculture finance and household finance or glosses over the deep significance of this interconnectedness[77]. The call for life-cycle based finance tries to reconcile the boxed frameworks of financial products with the lived realities of rural masses[78]. While this is a welcome shift in thinking, the term finance is often coming to be used interchangeably with credit. Rather, finance has to encompass a diverse suit of products – savings, insurance, investments, pensions – that are offered in individual capacities as well as in group offerings to suit the varied and complex needs of agricultural households.

1.3.3 Seasonality and Risk

Agriculture, especially rainfed agriculture, which is exposed to the vagaries of the monsoons, is a risky business. But apart from nature-induced risk, there are other risks, such as the market price at the time of sale, yield, perishability, etc[79] that make agricultural income unstable. Further, there is a long period of money outflow over the sowing and

cropping season before income flows in after a successful harvest. This makes agricultural income very seasonal.

This instability and seasonality of incomes call for active and varied money management practices to ensure consumption smoothing[80]. Households try to match the timing and quantum of their routine and discretionary expenses with their seasonal income through various ways - savings in livestock, gold, community participation, etc., at times of surplus and dissaving or borrowing in times of need[81].

Further, the various risks inherent to farming make the financial trajectory of the agriculture household unreliable and unforeseeable.The sum total of these risks is not amenable to a mathematical probabilistic calculation but presents itself as radical uncertainty that agricultural households have to contend with while making their farming and other decisions[82]. Dealing with the multiple contingencies that come their way (think pest attack, untimely rains, sickness in livestock, unfavourable market prices, unavailability of labour, disappointingly low seed quality, etc.) calls for psychological tools[83] that make such farmers very different from the rational economic man[84] of most economic textbook models.

1.3.4 Credit Cycles and Debt Traps

Agriculture, like any enterprise, needs capital. Given the low surplus generated by smallholder farms, farmers are usually in need of credit at the start of the cropping season (Kharif/Rabi/Zaid. This credit need is met by banks, cooperative credit societies, money lenders, etc., either as working capital loans (mostly or long-term investment loans. When the going is good, such credit (particularly long-term credit helps agricultural households work their lands optimally.

However, given the instability and highly seasonal nature of agricultural incomes, any adverse contingency that befalls such households has the capacity to significantly dent their finances[85]. A drought, crop failure, pest attack, flood, or health shock can eat into the meagre surplus of such agricultural households, making their credit repayments difficult and impacting investments in subsequent crop cycles. When such adverse shocks manifest for an agricultural household, it faces a precarious situation where its hitherto useful credit cycles could turn into a debt trap[86].

1.3.5 Social Networks and Cultural Norms

Humans are intrinsically social beings, and hence, households need to be identified within the unique social context in which they reside[87]. This is particularly important given the highly informal nature of the agricultural enterprise where households rely on family and friends for various kinds of support – information about inputs, market prices, etc., support and cooperation in market access and transport, financial assistance in emergencies and informal insurance in case of adverse shocks. While the market (viz. financial service providers, ag-techs, ag-fin-techs, and crop insurers is trying to solve the multitude of challenges facing the smallholder Indian farmer, one must realise that the society and its members form a safety net for such agricultural families[88].

Social networks are harnessed by agricultural communities in different ways to manage their finances[89]. However, modern ways of living - characterised by birth, school-based education, market-based occupation, parenthood and its financial responsibilities, and a preference for independent retirement – places financial liabilities on households that manifests itself like clockwork (think education expenses, regular medication, house rent, etc.). This is sometimes at odds with the cultural and social practices of agricultural communities that is somewhat time-blind and follow a seasons/event based calendar (for instance, you give or get gifts at ceremonies). This has the potential to cause deep fissures in the socio-cultural fabric of agricultural households and bring about changes in how they shape their finances with their communities at this crossroad[90].

While society influences households, society is, in turn, characterised or animated by its culture. Cultural norms around mutual reciprocity, upkeep of natural commons[91], season-based lifestyle and rituals, caste-based hierarchies, etc., influence the financial and non-financial decisions of the household. Further, the role ascribed to farming and farmers in the cultural narrative of the country also influences these households. The social standing and pride accorded to agriculture in the years leading up to independence and for a few decades after could be traced back to the nature of the Indian freedom movement that was squarely situated within the agrarian ecosystem in its anti-feudal and anti-imperialist leanings[92]. These idyllic and almost romantic notions about farming and the poor yet dignified farmer have slowly changed to one of victimisation, where farming has come to be considered an unjustifiably poorly remunerated occupation, and farmers, victims of forces beyond their control[93]. This shift in external

perception[94] and internalised identities by the farming community[95] can be witnessed in the numerous farmer movements of the last couple of decades and the public sentiments around them[96].

Hence, force-fitting ideas, products, and processes that are at odds with the prevalent culture of the region can be unsuccessful or even counterproductive. This is particularly relevant for a country like India, which has wide geographical and cultural diversity and, hence, wide cultural distances between its different parts[97].

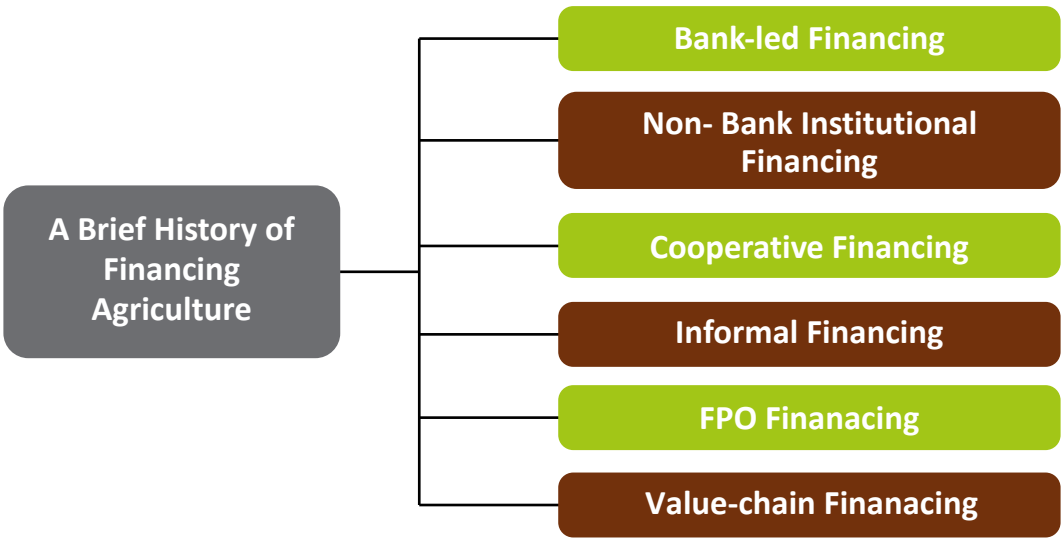
1.3.6 The Community and Its Knowledge as Opportunities

Indigenous knowledge in the agrarian sphere covers knowledge about cropping, seed breeding, land management, water management, animal husbandry, etc. Such localised, practical, and time-tested knowledge could help grow more adaptable seeds, counter nutrient loss and soil erosion, recharge the water table and rear animals ethically and sustainably[98]. Despite globalisation, the green revolution and the marketisation of Indian agriculture, certain pockets in various parts of the country have held onto indigenous practices and processes that present potential models to re-experiment and validate for sustainable use in the future[99].

Apart from studying and improving upon existing knowledge, streamlining the generation of new knowledge in crop, soil, seed and water technology, its rigorous documentation, and wide dissemination could contribute to making Indian agriculture more adaptable and resilient[100]. India currently spends only 0.37% of its agriculture GDP on research and development (R&D) as opposed to the recommended 1%[101]. Encouraging public and private sector investment in agriculture research[102], framing appropriate mechanisms for enforcing Intellectual Property Rights (IPRs) and leveraging the strength of the community in disseminating relevant information appropriately can help agricultural households use the best possible methods, technology, and inputs to farm viably and sustainably.

2. Landscape of Agriculture Finance in India

Having looked at some of the defining features of Indian agriculture, this section shifts attention to its financing. It seeks to provide a summary of the driving principles and operational modalities through which finance is made available to this segment. The intent here is to build a framework to appreciate the significance of finance in agriculture, its potential for impact and its limitations given other contextual and systemic factors. This review would also help identify gaps in our understanding, the scope for enquiry and the themes for further exploration.



2.1 A Brief History of Agriculture Finance in India2.1 A Brief History of Agriculture Finance in India

India was largely an agrarian economy at independence, with a substantial proportion of the population dependent on agriculture and allied activities. Policymakers realised the importance of investing in the sector, and agriculture featured significantly in almost all the five-year plans formulated by the erstwhile Planning Commission until 2014 and in subsequent government agendas thereafter[103]. The government priorities in the initial years were understandably focused on increasing production, ensuring food security, and lowering dependence on food aid. With its success in these goals, the attention shifted from food to the farmer itself. Most subsequent government investments in the rural and agricultural sector– from subsidy schemes, interest subvention schemes and loan waivers to FPO promotion - have focused on making farming remunerative for farmers.

The government, in its early years, focused heavily on Community Development Programs (CDP irrigation schemes. (CDP, National Extension Services (NES, and micro and macro irrigation schemes.

This extension services network was crucial to building a channel of engagement between the government and the rural masses in the newly formed republic[104]. It engendered trust and formed the foundation for many government rural development programs in subsequent decades[105]. With the advent of the Green Revolution, the emphasis shifted to High Yielding Varieties (HYV of seeds, fertiliser usage, manufacturing and agricultural machinery production[106]. Extension services again played a key role here in disseminating knowledge, technology, and advisories[107]. The Green Revolution brought out a need for credit among farmers since intensive modes of agriculture entailed substantial pre-season investments in various market-based inputs. This called to attention the need for appropriate credit, and different arms and agencies of the government – central and state governments, the Reserve Bank of India, National Bank for Agriculture and Rural Development, Nationalised Banks, etc. – were leveraged to make such credit available to farmers.

Some of the high points in the financing of Indian agriculture have been listed in the table below[108,109].

1788

Taccavi loans to farmers by the Board of Revenue established by the British in recognition of farmers' liquidity needs.

1871

Creation of Central Department of Revenue, Agriculture and Commerce following Mayo's Despatch that called for large-scale improvements in Indian agriculture.

1879

Taccavi Act to streamline recovery of advances made to landholders.

1884

The Agriculturists Loans Act made changes to the Taccavi Act.

1904

Co-operative Credit Societies Act facilitated institutionalised finance in rural areas and enabled Raiffeisen model[110] credit cooperatives.

1912

Cooperative Societies Act enabled the formation of non-credit cooperatives.

1914

Committee on Cooperation under Sir Edward Maclagan created the three-tier cooperative structure.

1910

Agriculturists Loan Rules prescribed limits on loans that could be given for different purposes like seeds, cattle, etc.

1934

Agricultural Credit Department under RBI to provide refinancing to co-operative credit structures.

1951

The Rural Banking Enquiry Committee made suggestions for sound well-knit cooperative credit structures that could be supported by the RBI.

1954

All-India Rural Credit Survey and A.D. Gorewala committee suggested that cooperatives alone might not be able to meet the credit needs of rural India and recommended the formation of State Bank of India.

1955

Establishment of State Bank of India and some efforts to open bank branches in rural areas.

1969

All India Rural Credit Committee recommendations to enrol commercial banks for rural credit provisioning through the Lead Bank Scheme (LBS) & first bank nationalisation.

1972

Concessional interest rate for those below poverty line.

1974

Priority Sector Lending (PSL) norms were introduced to enable the flow of credit to nationally important sectors like agriculture.

1975

Narasimhan Committee on Rural Credit recommended the setting up of Regional Rural Banks.

1976

Regional Rural Banks (RRBs) are set up to enable regulated financial intermediation in rural areas.

1980

Second bank nationalization.

1979

Committee to Review Arrangements for Institutional Credit for Agriculture and Rural Development recommended the setting up of NABARD.

1982

National Bank for Agriculture and Rural Development (NABARD) was established to promote investments in agriculture and rural development.

1989

RBI introduces Service Area Approach (SAA) and Annual Credit Plan (ACP) to reach rural areas.

1990

First largest loan waiver.

1992

NABARD introduces Self Help Group (SHG) model.

1994-95

Special Agriculture Credit Plan with quarterly targets for Public Sector Banks (PSBs). Extended to all Scheduled Commercial Banks in 2005-06.

1995

NABARD sets up Rural Development Infrastructure Fund (RDIF).

1998

Kisan Credit Card (KCC) scheme launched by GoI. A One-Man High Level Committee on Agricultural Credit (R.V. Gupta) recommended product and process simplification and liberalization of service area for bank branches.

1999

Task Force to study the functions of the Cooperative Credit System and to suggest measures for its strengthening recommended Model Cooperative Act.

2001

Expert Committee on Rural Credit recommended good functioning of Primary Agricultural Credit Societies (PACS).

2003

Ground Level Credit (GLC) policy announced by GoI.

2004

Scheme for doubling agricultural credit by 2007 launched.

2006-07

Interest Subvention Scheme (ISS) launched for short-term credit. Business Correspondents and Business Facilitators (BCs & BFs) introduced by RBI. Joint Liability Group (JLG) introduced by NABARD.

2008

Agricultural Debt Waiver and Debt Relief Scheme (ADWDRS) by GoI entailed write off of around Rs. 525.16 billion to provide relief to persistent farmer indebtedness.

2009-10

Prompt Repayment Incentive (PRI) of 3% under ISS to inculcate good repayment habits.

2011

Swabhiman Scheme to enable financial inclusion in remote rural areas.

2012

PSL guidelines revised: Distinction between direct and indirect agricultural credit dispensed, sub-target introduced for small and marginal farmers and focus shifted from credit in agriculture to credit for agriculture.

2014

Pradhan Mantri Jan Dhan Yojana to enhance accessibility and affordability of banking services

2018

Committee on Doubling Farmer Incomes.

2019

PM-KISAN income support scheme for small and marginal farmers

These measures have helped increase agri-credit outstanding as a percentage of agri-GDP from .6% in 1950-51, 9.81% in 1971-72, 13.34% in 1998-99, 39.55% in 2006-07 to 51.56% in 2017-18[111]. Whie the credit intensity of agriculture has indeed increased over the past decades, it has not been accompanied by a commensurate increase in agri-GDP, calling into question the effectiveness of credit provisioning in stimulating agricultural growth[112]. The positive influence of credit is seen to be determined by other enabling institutional factors that improve technical and allocative efficiency[113]. Further, given that the distinction between direct and indirect agriculture credit has been removed since 2012, credit on books does not necessarily mean credit in the hands of farmers[114]. This makes it difficult to come to conclusions about the real potential for suitable credit in engendering growth and productivity in the current regulatory reporting context.

2.2 Financing Agriculture in India

Having reviewed the history of agriculture finance in India, the focus now shifts to the current landscape of how agriculture is financed in India. Agriculture in India is a complex and difficult undertaking, especially given the radical uncertainty[115] that is deeply embedded in this sector. This makes agriculture finance complex and risky, particularly given the multiple social, environmental, political, and cultural factors that are pulling the sector in different directions.

2.2.1 Bank-Led Financing

Scheduled Commercial Banks (SCBs) and Regional Rural Banks (RRBs) together account for 84% of total outstanding formal institutional credit to agriculture[116]. This establishes the role played by banks in making credit available to agriculture. Of course, there are inter-state variations. Jharkhand has nearly 100% bank financing while neighbouring Odisha has only 50% of its credit disbursed by banks. Maharashtra has almost no RRB financing while neighbouring Telangana has a substantially high level of financing from RRBs. Such clear inter-state variations point to the significance of local context, socio-cultural histories, and agricultural characteristics in determining the choice of finance and its use. Most credit from banks is directed to the short-term cropping needs or medium-term investment needs of farmers. Long-term investments, especially by small and marginal farmers, are largely made from their own funds[117]. Further, there is excessive focus on just crop loans, which narrows the scope for credit in engendering productivity in allied yet important sectors like livestock farming, non-farm allied businesses, horticulture, and fisheries[118]. In 2016, the share of credit to crop farming was over 93%, while its share in Gross Value of Output (GVO) hovered around 58%[119].

Bank credit is also seen to have a bias against small and marginal farmers and landless farmers[120]. For instance, the largest agricultural loan scheme in India, the Kisan Credit Card scheme, has 2.82 Crore operative accounts with an outstanding of Rs. 5.18 Lakh Crore[121]. The scheme, which was envisioned as a source of working capital for all categories of farmers - particularly landless, small, and marginal farmers - is predominantly issued to farmers with greater than 2 hectares of land[122].

Priority Sector Lending (PSL) norms stipulate lending 40% of Adjusted Net Bank Credit (ANBC) to priority sectors with a specific target of 18% for agriculture and a sub-target of 8% for marginal and small farmers. PSL norms have, therefore, made lending to agriculture mandatory for banks. Any shortfalls in the mandate are compensated by investing in Priority Sector Lending Certificates[123] or contributions to NABARD's Rural Infrastructure Development Fund (RIDF)[124].

However, the indirect lending norms make it possible for banks to lend to Non-Banking Finance Companies (NBFCs) for on-lending that could be counted towards their PSL achievement[125]. Hence, loans to SHGs/JLGs could be counted as loans to small and marginal farmers. Hence, end-use verification or scale of finance[126]-based provisioning of adequate credit does not necessarily pan out on the ground. Experts have acknowledged that while the indirect financing pathway has released the pressure on banks for direct lending to farmers, it has nevertheless affected the volume of direct institutional lending to farmers[127]. Further, the total agri-credit outstanding with SCBs as a percentage of State Agri-GDP is over 170% for states like Kerala and Tamil Nadu, while it is around 20% in states like West Bengal. This abnormally high percentage points to the possibility of credit diversion for non-agricultural purposes in some states[128].

Regional Rural Banks[129] and Small Finance Banks[130] seem to be doing better than larger banks in making credit available to small and marginal farmers. A common reason given for large banks' reluctance to directly lend to small farmers is the small ticket size, the inability to ascertain end use, the inherent risk, and the nature of branch-led

banking, which makes monitoring and follow-up with farmers difficult and cumbersome[131]. In fact, it was in recognition of SCBs' inability to underwrite direct credit to farmers[132] that the revised PSL norms discarded the distinction between direct and indirect credit, and PSL lending to institutions like microfinance companies gained considerable momentum. Nevertheless, the PSL norms have ensured that banks remain crucial players in agriculture finance, whoever the end-lender and whatever the end-use of such loans might be.

2.2.2 Non-Bank Institutional Financing

Non-Bank Financial Companies (NBFCs have emerged as significant players in agriculture finance with the modified regulations on PSL. SCBs lend to NBFCs, who in turn are mandated to lend to the low-income segment[133]. In particular, NBFC-MFIs (Micro Finance Institutions) have steadily made strides in their share of contribution to agriculture. Between 2015 and 2022, RBI regulation on microfinance loans stipulated a minimum of 50% of MFI loans to be deployed to income-generating activities. Agriculture and animal husbandry garnered around 52% of income-generating loans given by MFIs in March 2017[134]. The end-use mandate enabled the flow of credit to agriculture, notwithstanding doubts about adequacy, suitability and actual end-use. With RBI's revised microfinance regulations[135] doing away with end-use mandates, on-lending to the agricultural sector may undergo a change.

The MFI model for agriculture lending has some strengths and weaknesses. Group lending enables community-based appraisal of loans, and the MFI field staff structure helps with monitoring and follow-up post-loan disbursal[136]. However, due to the high operating cost of enabling near-door-step delivery of finance, the MFI model could be costly for farmers. Also, the current structure of JLGs only allows for small-ticket working capital agri-loans and not investment loans. Even for working capital loans, MFI staff are not well versed in agriculture lending, and most underwriting happens on the basis of the ability to repay as opposed to farming costs based on the scale of finance. This affects the effective use of such funds for agriculture. Further, the JLG model exposes MFIs to co-variant risks like weather that impacts all its members. The seasonality of inflows also makes the regular repayment model of a JLG inconsistent with the lumpy income streams of agricultural households[137]. Innovations based on the accessible and high-touch MFI model that also expands or differentiates its services specifically for the agriculture sector could enable better provisioning of agri-credit to small and medium farmers[138].

Non-MFI NBFCs in India that cater to the agriculture sector have evolved into significant players who are mostly specialising in some specific segments of the agricultural value chain and sometimes offering credit-plus solutions[139]. These NBFCs offer differentiated credit and often target larger farmers, agri-processors, aggregators and AgTechs.

2.2.3 Cooperative Financing

Cooperatives contribute to 15% of loans to agriculture in India[140] but its share in agricultural credit has been steadily decreasing since the 1990s, from around 40% in 2000 to around 12% in 2021[141]. There are wide interstate variations in the share of cooperatives to total agricultural credit, with states like Odisha, Chhattisgarh, Madhya Pradesh and Maharashtra having higher than average credit share from cooperatives, while states like Jharkhand, Jammu & Kashmir (united), and Tamil Nadu have a very minimal share of cooperative credit[142].

Cooperatives are usually run on the three-tier system (Primary, Intermediate, and Apex) or two-tier systems without the intermediate body. In the case of agriculture credit, these are Primary Agricultural Credit Societies (PACS), District Cooperative Banks, and State Cooperative Banks. PACS predominantly provide short-term crop loans and have become a major issuer of Kisan Credit Cards (KCC) to small and marginal farmers. However, they face trouble ensuring prompt repayment, with almost 45% of their loans not being paid on time[143]. Despite multiple measures by the government to understand the reasons for the suboptimal performance of PACS and different revival packages, PACS remain open to political meddling and co-optation by local powers[144]. There are wide variations in the performance of PACS due to various subjective and contextual factors. Participation, accountability, and transparency, therefore, become key to the effective functioning of PACS[145].

The long-term counterparts of PACS, viz., State Cooperative Agriculture and Rural Development Banks (SCARDBs) and Primary Cooperative Agriculture and Rural Development Banks (PCARDBs), were conceived as land banks that would provide long-term loans for land improvement, minor irrigation, etc. They have, however, made no headway into lending long-term for agriculture development and have been losing their already few members consistently[146].

The cooperative credit movement, which started with much idealism and collective will in Pre-Independence India, was against the backdrop of colonial rule, the zamindari system of agricultural management and the lack of palatable alternatives like banks or MFIs. It remains to be seen if cooperatives will continue to stay relevant in the changing agricultural ecosystem or if differentiated models and enabling socio-technological architecture like AgTechs and AgFinTechs could reinvent cooperatives for today.

2.2.4 Informal Financing

Non-institutional sources of credit account for a considerable 30% of agriculture credit[147] in India. This is not surprising given the features of smallholder farming in India, where a high level of localisation and familiarity would be conducive to credit decisions. Hence, local professional agricultural money lenders who have visibility on family context, land quality, end-use, and harvesting incomes of loanee farmers are better placed to provide agriculture credit to small and marginal farmers[148]. However, the exorbitant rates of interest and illegal and unethical recovery practices[149] by such money lenders make these loans mostly unsustainable and non-remunerative. Further, informal loans from traders, input suppliers, output aggregators, etc., can impact repayment of formal loans due to the high farming costs and lower output price realisation usually seen in such trade-credit nexus[150]. Underfinancing by formal sources leads to partial reliance on such informal sources that could potentially hamper the farmer from reaping the benefits of formal credit.

It is, however, to be noted that for the financial context of poor agrarian families, banks, microfinance institutions, and money lenders are not perfect substitutes for each other[151]. Rather, all three perform very different functions and complement each other in meeting the needs of these households. Further, the lending practices (rates, duration, etc.) of indigenous money lenders are not amenable to a good translation into Western neo-classical notions of interest rates. People from the developing world are seen to perceive time (and thereby the time value of money) very differently as compared to those from WEIRD (Western Educated Industrialised Rich Democratic) nations[152]. Therefore, the role of moneylenders is largely context-based, and it would call for deep shifts in agrarian communities, markets, and economy for moneylenders to be fully replaced by institutional lenders. In the meantime, they offer lessons in (and motivation for) building suitable, relevant, and dynamic loan products and underwriting processes that would meet the oftentimes urgent and complex financial needs of agricultural households.

2.2.5 FPO Financing

Farmer Producer Organisations (FPOs) help both Financial Service Providers (FSPs) and farmers work at scale. They offer FSPs a viable means of serving farmers' needs through the intermediation of FPOs. This reduces time and cost for FSPs and offers some solace regarding potential marketing and price risk. The government has been at the forefront of encouraging the starting up and financing of FPOs[153] and views FPOs as a possible solution for the myriad of challenges facing smallholder farmers in India[154]. Formation and incubation of FPOs by Cluster Based Business Organisations (CBBOs) and Producer Organisations Promoting Institutes (POPIs) are well-funded, the management costs in the initial years subsidized, equity investments by member farmers augmented by matching equity grants and a credit guarantee facility established to fuel the flow of credit to FPOs. Further, partner organisations have been identified to provide technical support and advisory to FPOs thus formed[155]. While such governmental support has enabled the formation of more than 7000 FPOs across India[156], credit remains a key challenge for these FPOs[157]. The credit need is estimated to be around Rs. 10 lakhs for a small FPO, around Rs. 50 lakhs for a mid-range FPO and around Rs. 2 Crore for large FPOs[158]. Ensuring the flow of timely and adequate long-term investment capital and regular working capital would enable FPOs to seize opportunities while also running their usual business[159]. This, in turn, would help build the scale and scope of the FPOs over time[160].

2.2.6 Value Chain Financing

While the agricultural value chain extends from farmland to retail stores and looks very different for different agri-commodities[161], the focus of agriculture finance has for a long time restricted itself to long-term investment finance and short-term working capital finance for farmers. On the other hand, value chain financing looks at each link of the agriculture supply chain, not in isolation but as part of the entire chain and seeks to provide finance that propels the links forward in tandem with each other[162].The ideal expected here is that all actors in the value chain receive the capital they need in order to produce/add value and supply onwards to the next link in the chain. This way each link is able to function to its optimal and efficient capacity. This is particularly difficult in a country like India, with deep distortions

in the input and output markets that make value addition across the value chain fuzzy and inconsistent. Value chains in India are, therefore, highly fragmented, with the need for intermediation (mostly informal) between different parts of the chain[163].

Value chain financing has the potential to bring about financial deepening[164] in the supply chain and is touted as a tool to discipline, expand and formalize the agriculture value chain. Good value chain development can lower intermediation costs through better market access and reduce food loss through better storage and other infrastructure[165]. New NBFCs and AgTech startups are experimenting with value chain financing with a focus on improving credit decisioning, technology adoption and market integration for the farmer or agri-entrepreneur. However, value chain finance works best in commodities where precise quality standards are achievable and attestable. In such commodities, there is existing infrastructure that enables not just sorting and grading but commensurate price discovery as well. Such enabling conditions are currently not available for all commodities.

Further, there are also reasons to be cautious in hailing value chain financing as a solution to the structural inefficiencies in Indian agriculture. Credit at each point of the value chain comes with interest cost which would compel the agri-entrepreneur to add enough value (over and above the initial investment and credit interest) at his/her part of the chain in order to remain profitable and viable. Doing this at each link of the chain calls for significant value addition over the entire chain that might not be reasonably possible for many agricultural commodities without steep price inflation. Currently, agricultural value chain financing in India is functioning reasonably well for mostly cash crops like sugarcane or high-value produce like fruits. Juxtaposing similar mechanisms for all crops might not be possible or even desirable[166]. For a sector that is struggling to add value with currently available credit; building in growth obligation indiscriminately at each link of the value chain might well add more strain to an already struggling sector.

3. Thematic Areas for Research

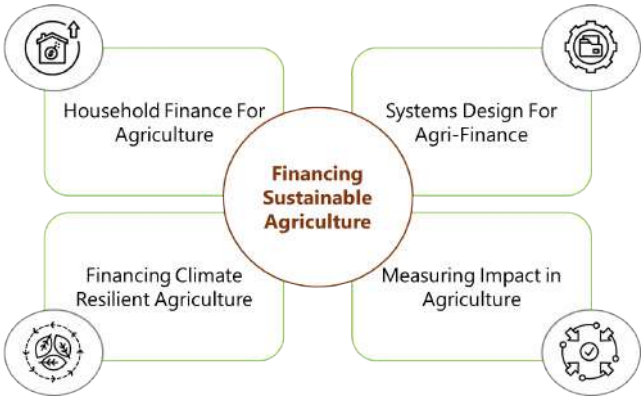
Good policies, products, and processes result from good understanding. In the context of Indian agriculture, a myriad of economic and non-economic factors discussed in Section 1 make isolated and focused research in agriculture finance hard. Precisely so, it is all the more necessary and essential to synthesise the enquiry about agriculture finance with its context.

Finance is just a means to some end; a tool for some purpose. The constraints of agri-enterprises and the characteristics of agri-households laid out in the Section 1 is the substratum on which the types of agricultural finance laid out in Section 2 operate on. Research that seeks to direct the tool to its purpose effectively, need to first understand, acknowledge and accept the purpose – in this case the lived financial lives of agricultural households and the struggles and aspirations with farming in India.

Importantly, being context-neutral can lead to obvious and easy solutions but those solutions can in fact do more harm than good. Addressing proximate causes of any malfunctioning in the agriculture ecosystem without deciphering the ultimate cause can only provide a superficial bandage letting the root cause of the issue fester and create more problems. Therefore, generating better data, insights, and conceptual frameworks that help us better understand this segment through its people and the systems would inform and aid the sector to implement meaningful, necessary and appropriate reforms to truly serve farming households in India.

Hence, studying agriculture financing as a theme of interest set amidst the social, economic, and cultural landscape of farming in India could lead to newer and deeper insights. Taking a systems-thinking lens to study Indian agricultural finance is particularly relevant given the rising interest in agriculture market solutions and agricultural technology solutions and the amount of impact capital that is being directed to these ventures[167].

To this end, agri-finance research could be (and need to be) examined from different vantage points —households, governments, markets, climate and impact investors, etc. The following sections elaborate on the themes of enquiry from these different viewpoints, their value addition to our understanding of agri-finance, and the scope for policy implications stemming from such enquiry.



3.1 Household Finance for Agriculture

This theme of research would seek to build a unique body of work that would -provide much-needed customer insights for all stakeholders in the agricultural ecosystem, with farming households being customers of finance here. This would fill in gaps in our understanding of the financing need of farmers and act as a counterpoint to current policy making that is disproportionately skewed towards the top-down model.

Much research has already studied some of the key themes underpinning agricultural households in the developing world. For instance, unified models have been developed integrating agricultural household consumption and production to estimate household surplus, demand for non-agricultural products, etc[168]. The seasonality of income flows and the financial products accessed by agricultural households have been studied in detail[169]. More recently, the factors influencing the take-up and usage of formal financial products among agricultural households have been studied to some extent[170].

Delving deeper, both qualitatively and quantitatively, to understand the forces shaping the choices (and fortunes) of agricultural households could generate actionable policy and product insights in a complex sector like agriculture. Apart from studying "the what and the how", the intent should be to answer "why" things are the way they are. This would involve deploying a variety of tools - primary and secondary data analysis, quantitative and qualitative studies, and behavioural and psychometric assessments – to bring out theoretical and practical insights that could inform both policymakers and market actors.

- Factors influencing the choice of credit for farming, animal rearing, etc., among agricultural

households.

- Study the scope for theoretical expansion of the concept of scale of finance and modalities for improving its quantitative accuracy and qualitative breadth.

- Studying the adequacy of formal loans for agriculture and enquiring into risks of under or over-financing.

- Study the interconnectedness of family finances with agriculture finances and how consumptive credit can be redesigned as livelihood credit that supplements and supports agricultural activity.

- Factors influencing the take-up of crop insurance among agricultural households.

- Study the usage and impact of schemes like KCC and PM-Kisan to understand their impact on farming households' finances.

- Sentiment analysis around different actors delivering finance to the agriculture sector – the government, formal financial institutions, output aggregators, input suppliers, etc.

- Study the possibility of new MFI-based agri-credit models, experimenting with repayment terms, duration, and end-use openness.

- Study the challenges in credit access for women and contract farmers without their own land titles.

- Periodic semi-standardized analysis of new sources of data from NABARD, RBI, MoSPI, etc., that could act as a ready reference and a pulse check.

- Study the scope for cashflow-based lending in an agricultural household context.

- Study the impact of participation in cooperatives like FPOs on farm incomes.

- Study the possibility of value chain financing in ensuring good incomes for farmers.

- Study the need for products apart from credit (like savings) that would help agricultural households to smooth consumption, convert their lumpy incomes into reliable flows, and invest back into their agri-enterprise.

3.2 Systems Design for Agri-Finance

This theme would take a policy architecture lens to study the design and implementation of agriculture finance policy with the view to understand lacunae, if any, and showcase successful process/policy designs. This theme would seam the understanding of agricultural households into effective policy making insights and act as a bridge between end-users (farmers) and policy designers.

Policy measures in agriculture garner public attention and interest due to the size and nature of the population it seeks to serve. A substantial portion of the Union and State budget deals with agriculture and allied activities, and several schemes and programs are put in place to assist farmers in making a reasonable living out of this risky but important occupation. Notwithstanding the good intentions behind the design of most of these schemes, there is a lack of actionable evidence of their effectiveness and impact. Of the many critiques published in news media, only some are data-backed, and most are based on anecdotes. Academic research fills in gaps in understanding, but they are reported with quite some lag and are often unilateral in their research objective.

There is a pressing need to approach such schemes scientifically – to study the robustness of their design to the various influences of ground realities, to evaluate how these schemes touch the lives of agri-households, and to identify the low-hanging fruits that could be leveraged for better outcomes and impact. This requires the study of non-market interventions carried out by government and non-governmental organisations to make finance available to the agricultural sector.

- Study the implementation of schemes like PMFBY, KCC, PSL, interest subvention schemes, grants to FPOs, access to subsidies, etc. in various contexts and geographies to generate actionable insights.

- Multidimensional research into the contours of Digital Public Infrastructure (DPI) for agriculture and Agri-Stack to make them inclusive, suitable, and efficient. The intent would be to highlight the various factors that need design consideration at the outset and the features that need to be optimised and seamed into the framework to make DPI for agriculture an effective and efficient tool in the hands of policymakers.

- Study modalities for improving crop insurance and weather insurance for farmers.

- Theoretical frameworks to identify links in the value chain where credit is most productive and where bootstrapping[171] would ensure optimal returns for all stakeholders involved.

- Study the role played by input subsidies in making farming remunerative for farmers and delineate the scope for alternate measures that could serve the same end.

- Study the design, delivery and impact of various price support and income support schemes.

- Study various non-credit financing options like equity, seed funding, etc., available to agri-entrepreneurs and identify optimisation and standardization pathways for decision-making and scaling of such finance.

- Study the role of impact capital in supporting and revitalising the agriculture sector through subsidised and innovative product solutions.

- Study the financing needs of local communities, municipalities, etc. in restoring and maintaining common natural resources and the modalities for delivering such finance.

3.3 Financing Climate Resilient Agriculture

Agriculture in India is essential not just for the livelihoods it supports but also for the food security of the entire subcontinent. Climate change is anticipated to strain the Indian peninsula's monsoon-dependent agriculture further. Against this backdrop, climate finance mechanisms are being designed and developed to aid adaptation and mitigation in developing and vulnerable countries like India. However, for these interventions to be successful in the smallholder Indian context, we require a more granular understanding of the financing needs of Indian farmers.

If the research themes under household finance for agriculture and systems design for agri-finance looked to understand agri-households and the financial system they inhabit as they currently are, this theme of climate finance for agriculture seeks to apply those learnings to reimagine and test what could be. It envisions a deeply significant role for agriculture in helping humanity transition to sustainable modes of living and looks to investigate the role for finance in laying that pathway.

Currently, the purpose underlying the climate finance being directed to agriculture is twofold - (i) to shift agricultural practices to be more climate-friendly and thereby reduce the negative fall-outs of agriculture, and (ii) to support the livelihoods of farmers who are going to be affected by the adverse impact of climate change and to help them adapt to a changing agricultural environment. A multitude of modalities are used to direct funds to agriculture, such as credit guarantees, matching grants, research grants, etc., with various stipulations around the adaptation of climate-smart agricultural practices. There is, however, a real need for better insights into how this finance is impacting farming households and communities on the ground.

This research would entail working at the intersection of farming households and climate action organisations to understand the possibilities and challenges in this space from both perspectives and to offer insights for better coordination and targeting of climate finance. This would be a rather unique exercise that would provide better and more realistic insights to optimize climate finance spending and help inform climate action in India's unique agricultural landscape.

- Understand the financing gaps at the household level to transition to the most recommended climate-smart agricultural practices. Evaluate the socio-cultural enablers (and barriers) and financial costs of modifying agricultural practices, policies, and financing mechanisms in various agroclimatic zones of India.

- Study different financial mechanisms, such as green credits, carbon credits, etc., available to Indian farmers to aid the smooth transition to ecologically sustainable practices.

- Study the various financing options currently available (green bonds, climate assistance funds, agroecology development funds, etc.) for climate-smart agriculture to highlight successes, identify gaps and evaluate the scope for alternate measures.

- Study the financing models used to direct climate finance to end-users and evaluate them in their ability to engender climate resilience.

- Study the financing architecture needed to help households and communities deal with catastrophic risk due to climate change.

3.4 Measuring Impact in Agricultural Interventions and Solutions

With the advent of new technology-backed financial service providers and market-linkage providers in Indian agriculture, impact evaluation becomes critical to capture their positive or negative impacts for the markets, regulators, and customers to understand and act upon. This is particularly important given the vulnerable nature of the population these new enterprises seek to serve and the volume of impact investments being made into such entities. A good impact framework serves as a bulwark in ensuring that such effort and capital are directed in the most appropriate and meaningful manner.

Any change in processes, introduction of new institutional models, and techno-social interventions would have a gamut of intended and unintended consequences. This theme of research would build a well-rounded impact framework for agriculture finance that can capture impact across multiple dimensions. It would identify and define the salient metrics in their order of priority within a well-defined theory of change and specifically design mind maps for delineating impact from effect.

This effort would help differentiate wheat from chaff and help focus attention, energy and money to the most important and impactful interventions, products and services.

- Monitoring and evaluation of agricultural finance innovations to study its impact on farming households' financial well-being.
- Evaluating the outcomes from participating in FPOs and other modes of cooperative farming.
- Studying the economic and non-economic impact of climate finance interventions on individuals, families and communities.

4. Conclusion

Indian agriculture needs thoughtful policy interventions, product designs, and institutional innovations to help the sector meet the challenges of a changing biophysical and economic environment. This is vital for the livelihoods of farmers relying on agriculture, the food and nutritional security of India's vast population, and the significant ecological and climatic impacts agriculture entails. Insightful and actionable research that helps delineate the most important levers of change, provides context to take appropriate action, and ascertains validity to inform and strengthen conviction is crucial yet largely missing in the agricultural sector.

A focused and dynamic body of research that provides qualitative insights, alternative modes of thinking, use cases, and data evidence can generate useful resource material that might help the different stakeholders in the agriculture ecosystem make more informed choices, decisions, and actions.

dhāraṇād dharma ityāhuḥ. dharmo dhārayate prajāḥ. |
ya syād dhāraṇa samyuktaḥ. sa dharma iti niścayaḥ. ||

The word Ďharma comes from the word “dhāraṇā” which refers to sustenance, maintenance, and retention of the collective (samyuktah.) well-being and balance in nature.

For finance to be truly good for agriculture, it must help sustain and enliven the sector, the people and the natural ecosystem that are connected to and dependent on it. Suitable finance can play a catalytic role in making that possible. Research that helps find the dharmic compass for finance in this complex ecosystem is not only desirable but necessary to make Indian agriculture resilient for people and sustainable for the planet.

ENDNOTES

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