

# Path Dependency In Indian Agriculture: How Conventional Farming Practices Impede The Adoption Of Organic Farming

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## ABSTRACT

India's agricultural system was significantly impacted by the Green Revolution, which encouraged monoculture and chemical-intensive farming. Although this change improved national food security, it also created enduring structural dependencies that still affect farmers' choices today. The adoption of organic farming in India remains uneven and limited, despite growing policy support, rising consumer demand for organic products, and increased environmental awareness. Using path dependency theory, this study examines this paradox and argues that the shift to organic systems is hampered by self-reinforcing technological, institutional, market, and sociocultural lock-ins created by past agricultural practices. Using a mixed-methods approach that includes policy analysis and comparative case studies of Indian states, the study identifies key barriers, including subsidies favouring conventional inputs, procurement biases, extension systems aligned with chemical agriculture, and deeply ingrained farmer norms. Path dependency is not irreversible, as shown by the divergent experiences of Sikkim and the Green Revolution states of Punjab and Haryana. Long-standing feedback loops can be broken and space created for new models through coordinated institutional reforms and consistent policy frameworks. Sustainable agricultural transformation in India requires long-term systemic reforms that prioritise incentive restructuring, institutional reform, and strengthened social learning over isolated policy interventions.

**Keywords:** Path dependency; Organic farming; Indian agriculture; Green Revolution; Sustainable agriculture

## 1. Introduction

The Green Revolution has had an indelible influence on agricultural development over the last 60 years in India, by encouraging the adoption of high-yielding varieties, increased fertiliser and pesticide application, and expansion of irrigation-based agriculture- namely increasing national cereal production, but at the cost of creating structural overdependence in technology, institutions and the market (Frontiers, 2019). These systemically ingrained decisions generated what historians call a locked-in agricultural regime: extension services, lines of credit, input supply chains, and agricultural expectations were all structured around chemical-intensive, monocultural production, so alternative structures are relatively expensive and risky to implement (MANAGE, 2019).

In recent years, organic farming has been encouraged in India as an environmentally sustainable and health-beneficial alternative, a focus of centrally funded programmes such as Paramparagat Krishi Vikas Yojana (PKVY), and it has been driven by increasing market demand for organic foods. Nevertheless, nationwide implementation rates remain low, even when policy efforts and local success stories are excluded (IIMA, 2019). Empirical studies of farmers' adoption choices indicate that adoption is multifactorial: education, access to extension services, credit, perceived yields during the conversion period, and market connections significantly affect their willingness to switch to organic practices (systematic review, 2015-2019).

Path dependency offers a productive theoretical perspective on why organic change in India is slow, despite theoretical and market incentives. Increasing returns, sunk costs, and institutional complements are

associated with path dependency: once a technological-institutional pathway (a traditional, in this case, form of farming) develops a polarity, it creates economic, informational, and social obstacles to change (Frontiers, 2019). Subsidies on fertilisers and electricity, purchase and price incentives for specific cereal crops, and extension curricula (with a high-input package focus) generate structural incentives towards continuity rather than change in India (MANAGE, 2019; IIMA, 2019).

In addition to institutions, farmers' perceptions of risk and socially accepted norms strengthen path dependency. The first conversion process from conventional farming to organic production is often characterised by reduced yields and increased labour-intensive activities, namely short-term costs, which are especially burdensome for small and marginal farmers who lack buffer capital (The Times of India, 2019). In addition, uncertainty aggravated by market and certification friction (disjointed value chains, expensive certification programs, and underperforming domestic organic marketplaces) minimises the expected returns to switching, aggravating the conventional practices (systematic review, 2015-2019).

The paper's central analytical frame is path dependency, which it uses to explain how the diffusion of organic agriculture in India is hindered by historically accumulated technologies, policies, institutions, and social practices. The partnership between critical analysis of policy pathways and program evaluation and adoption research data aims to identify key mechanisms of reinforcement during lock-in and to propose institutional and market interventions to reduce obstacles. The findings imply that one should design transition pathways that are sensitive to the heterogeneity of farmers and the structure of the agrarian economy in India.

## 2. Conceptual and Theoretical Framework

### 2.1 Path Dependency Theory

Path dependency theory in economics and institutional analysis is the product of research into why superior ones do not replace inefficient technologies or institutions. The problem, according to modern literature, is that results depend not only on present-day efficacy but also on past decisions that shape sustainable paths and enduring directions (Arthur, 2018; David, 2015). Path dependency in institutional theory emphasises the stabilisation of rules, norms and organisational routines through repetition and legitimacy, and implies that deviation becomes increasingly expensive (Mahoney & Thelen, 2015).

Three fundamental mechanisms explain path-dependent processes. Increasing returns are those in which the reward from using a specific practice or technology increases with repetition, thereby stimulating additional commitments (Arthur, 2018). Lock-in effects occur when the opportunity cost of switching to alternatives is economically or socially inefficient due to lock-in effects (sunk costs, specialised skills and complementary infrastructures) (Seto et al., 2016). Self-reinforcing feedback loops operate when initial decisions are reinforced by future incentives, information, and expectations, thereby replicating the same pathway over time (Pierson, 2015).

Path dependency is particularly associated with agriculture and technology adoption, since farming systems involve long-term investments and a learning process that develops strong institutional structures. The choices of seeds, inputs, irrigation, and cropping patterns have accumulated over decades, making swift transitions challenging, even when there are environmental or financial arguments for change (Vanloqueren & Baret, 2019).

### 2.2 Path Dependency applied to Agricultural Systems

Socio-technical regimes that are historically embedded exist in agricultural practices, unlike some technical decisions. Their formation results from the interplay among the ecological context, policy incentives, market structures, and cultural norms (Lamine et al., 2018). An extension service, research agendas, and farmer training institutions are used to normalise once a dominant model of production is established, e.g., chemical-intensive monocropping.

One of the key areas in strengthening agricultural tracks is in the institutions. Structural incentives are created through input subsidies, price maintenance, credit mechanisms, and procurement policies that favour continuity over experimentation (Pingali et al., 2019). Specific combinations of crop inputs are further fixed by infrastructure such as irrigation canals, storage systems, and processing units. Persistence in farming communities can also be driven by social norms and peer learning, which may view a break from conventional methods as dangerous or invalid (Dessart et al., 2019).

In Europe and North America, agroecological transitions are found to be blocked by conventional agri-food regimes rather than by agroecological ones, regardless of sustainability concerns, due to alliances between research institutions and industry (Lamine et al., 2018; Seto et al., 2016). These two instances show that path dependency is a systemic phenomenon rather than an anomaly.

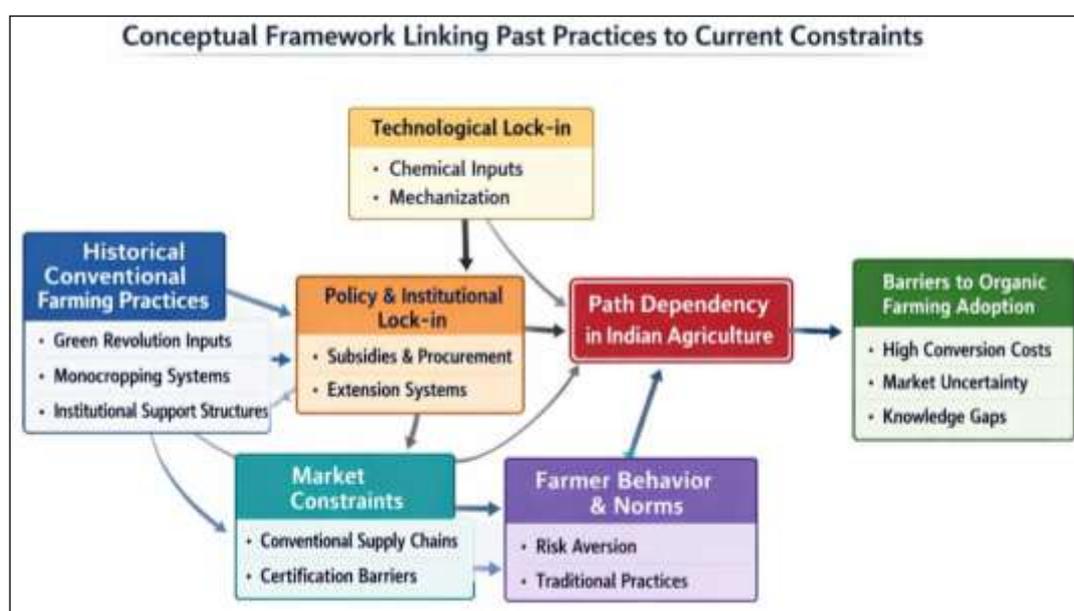
### 2.3 Study Conceptual Framework

Building on this literature, the conceptualisation of Indian agriculture in this study is based on a path-dependent system in which past experiences of conventional farming pose barriers to adopting organic agriculture. The framework traces associations among past policy decisions, technological investment, institutional design, and their current manifestation in farmers' behaviour and market outputs. The dynamics among technology (chemical inputs, machinery), policy (subsidies, extension priorities), markets

(procurement, certification), and farmers' choices to pursue organic transitions increase costs and uncertainties associated with switching to organic, thereby continually reproducing conventional patterns of interaction.

**Table 1. Path Dependency Mechanisms in Indian Agriculture**

Mechanism	Description	Implication for Organic Farming
Increasing returns	Benefits rise with continued use of conventional inputs	Preference for familiar high-input practices
Lock-in effects	Sunk costs and infrastructure tied to conventional farming	High switching costs during the organic transition
Self-reinforcing loops	Policies and norms reward existing practices	Marginalisation of organic alternatives



**Figure 1. Conceptual Framework Linking Past Practices to Current Constraints**

### 3. Traditional History of Conventional Agriculture in India

#### 3.1 Agriculture Before the Green Revolution

Pre-Green Revolution Indian agriculture was typified by region-specific, low-input, and diversified agricultural systems. The traditional and indigenous systems focused more on mixed cropping, crop rotation, organic manure, and the use of domestic seed varieties, enabling farmers to cope with changes in climatic conditions and soil fertility through ecological processes rather than imported inputs (Pretty et al., 2018). Those were knowledge-intensive systems anchored in local socio-cultural settings, grounded in intergenerational learning and community standards. Even though the yield was relatively low, these systems preserved the ecological and agrobiodiversity, especially in rainfed areas (FAO, 2018). The agrarian system during the pre-Green Revolution period was therefore representative of a comparatively adaptive and flexible system of agriculture with minimum reliance on bought inputs or institutionalised institutions.

#### 3.2 Green Revolution and Structural Transformation

It was a structural change in Indian agriculture brought about by the introduction of the Green Revolution in the mid-1960s. Coupled with the use of chemical fertilisers and synthetic pesticides, and the expansion of irrigation systems, the production of foodgrains increased dramatically through the widespread adoption of high-yielding varieties (HYVs) of wheat and rice, which ensured the nation's food security (Pingali, 2015). The state provided fertiliser and power subsidies, minimum support prices (MSPs), public procurement, and institutional credit to help farmers embrace input-intensive forms of production in this technological transformation (Reddy & Mishra, 2019).

Nevertheless, the spatial distribution of the Green Revolution led to the regional concentration of states such as Punjab, Haryana, and western Uttar Pradesh. It cemented the advantage of specialisation in cropping,

especially rice and wheat (Chand et al., 2018). These trends created ecological stress – soil erosion, loss of groundwater, resistance of COPD to pests, and so on –but the economic and institutional rewards of standard practices promoted their further adoption (Pingali, 2015).

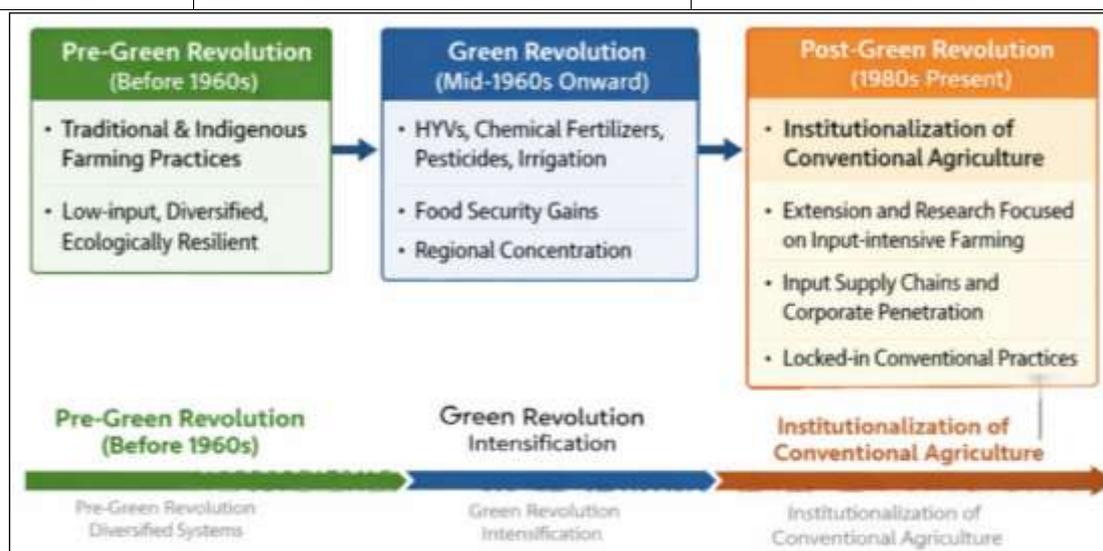
### 3.3 Institutionalisation of Traditional Agriculture

In the following decades, traditional farming conditions were firmly institutionalised in the Indian agricultural system. The public agricultural extension service focused on uniform input packages, with a strong emphasis on chemical fertilisers and pesticides, while organic and indigenous knowledge systems received little formal support (Vanloqueren & Baret, 2019). EDS institutions, with a strong emphasis on agricultural research, also paid attention to yield and varietal progress and modernised in line with high-input regimes, thereby strengthening a short-term technology path (Lamine et al., 2018).

At the same time, the growth of input supply chains and corporate intrusion into seeds, agrochemicals, and farm machinery did not stop conventional agricultural practices. Farmer decisions were influenced by private actors, in collaboration with public institutions, through credit-based input provision and advisory services, which made other practices, such as organic farming, look risky and unprofitable (Reddy & Mishra, 2019). All these developments transformed traditional farming from a policy option into a self-rewarding regime and laid the basis for modern path dependency in Indian agriculture.

**Table 2. Evolution of Farming Systems in India**

Period	Dominant Characteristics	Implications
Pre-Green Revolution	Low-input, diversified, indigenous practices	Ecological resilience, low external dependence
Green Revolution	HYVs, chemical inputs, and irrigation	Productivity gains, regional imbalance
Post-Green Revolution	Institutionalised conventional farming	Lock-in to input-intensive systems



**Figure 2. Historical Trajectory of Conventional Farming in India**

## 4. Status and Potential of Organic Farming in India

### 4.1 Idea and Principle of Organic Agriculture

Organic is a holistic production system that maintains the well-being of soils, ecosystems, and people by relying on ecological processes, natural cycles, and biodiversity rather than synthetic inputs (FAO, 2018). Organic farming in India is legally governed by the National Programme for Organic Production (NPOP), which establishes standards for crop production, processing, labelling, and certification in accordance with international standards (APEDA, 2019). The certification can be done either by third-party agencies or by the participatory guarantee systems (PGS), which are chiefly applicable to small and marginal farmers.

Organic farming offers environmental benefits, including improved soil organic carbon, increased biodiversity, reduced chemical leaching, and greater resilience to climate change (Pretty et al., 2018). Organically, a farm can be socio-economically advantageous in that it reduces expensive external inputs, increases farm revenue through higher prices, and generates labour-intensive production, providing employment (Eyhorn et al., 2019). Most of these benefits, however, are achieved in the medium to long term, which means the transition period is very difficult for farmers in traditional systems.

### 4.2 Organic Farming Growth in India

The country has become one of the world's leading producers of organic products, even though the proportion of total farmland covered by organic methods is low. Recent estimates show that the organic-certified and in-conversion areas account for a small yet steadily increasing share of India's net sown area (APEDA, 2019). Major organic crops will include oilseeds, pulses, spices, tea, coffee, cotton, and basmati rice, as these are both agroecologically suitable and exportable.

Organic farming is also geographically clustered, with such states as Madhya Pradesh, Rajasthan, Maharashtra, Gujarat, and Karnataka having a high percentage of organic area, and Sikkim is the first fully organic state (Government of Sikkim, 2016). The market is dualistic: export markets such as cereals (spice) and cotton are relatively developed, while domestic organic markets are fragmented and urban-centric, which restricts access for small producers (Reddy & Mishra, 2019).

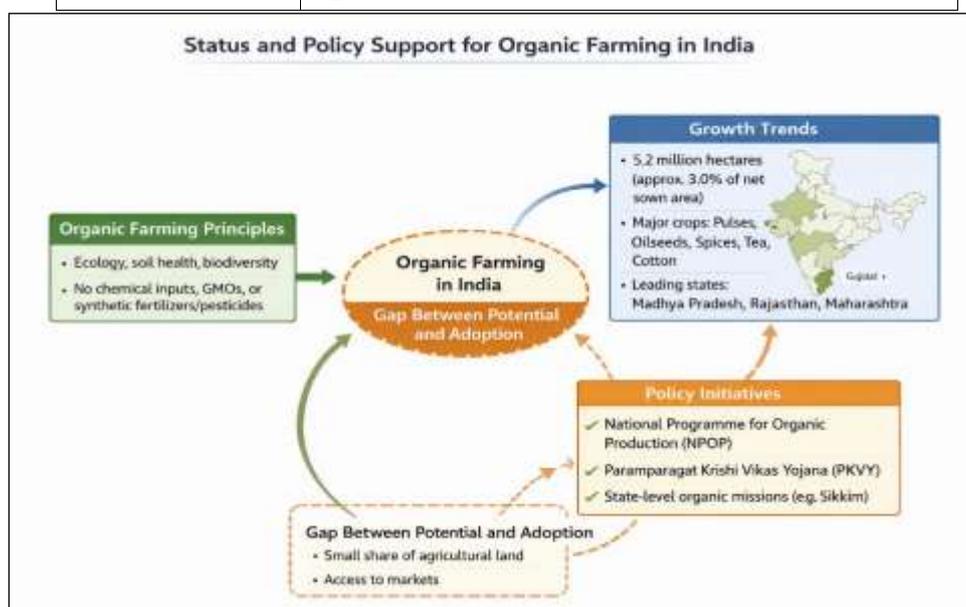
### 4.3 Policy Programs that encourage Organic Agriculture

The Government of India has implemented various policy measures to encourage organic farming. NPOP provides a regulatory framework and export standards that allow Indian organic products to enter foreign markets (APEDA, 2019). In addition, the Paramparagat Krishi Vikas Yojana (PKVY) focuses on cluster-based organic agriculture and provides financial support for input preparation, certification, and capacity building (MANAGE, 2019).

Special organic missions have also been initiated in several states. The total transformation of Sikkim, enabled by the prohibition of chemical inputs and state-imposed extension and facilitation of the market, demonstrates that concerted policy intervention can partially eliminate structural barriers (Government of Sikkim, 2016). However, the scale of adoption overall indicates that policy assistance has not been sufficient to offset the traditional benefits of conventional agriculture, which is why a path-dependent perspective is important.

**Table 3. Status of Organic Farming in India**

Dimension	Key Features
Certification	NPOP, PGS-India
Major crops	Pulses, oilseeds, spices, tea, cotton
Leading states	MP, Rajasthan, Maharashtra, Sikkim
Market focus	Export-oriented with limited domestic reach



**Figure 3. Status and Policy Support for Organic Farming in India**

## 5. Path Dependency Mechanisms Blocking the Initiation of Organic Farming

### 5.1 Technological Lock-in

One of the key processes that keeps traditional farming practices alive in India is technological lock-in. Years of using chemical fertilisers, pesticides, and mechanised inputs have led to high dependency on the uniformity of input packages and technologies (Pingali, 2015). Farmers' expectations about their yields are shaped by standards set in high-input organisations, where productivity is measured in short-term output

rather than ecosystem sustainability. The period of temporary yield loss is also seen as a failure during organic conversion, further solidifying the unwillingness to make changes (Eyhorn et al., 2019). The costs of switching are also higher due to investments in machinery, irrigation, and input-specific skills, which increase technological inertia.

### 5.2 Institutional and Policy Lock-in

The institutional structure of Indian agriculture gives a great preference to conventional agriculture. Input subsidies are more common, especially surrounding fertilisers, electricity, and irrigation. The cost of chemical-based agriculture is subsidised to the townspeople by the government. The same incentive can be given for using organic inputs, albeit on a smaller scale and in a disorganised manner (Reddy & Mishra, 2019). Cereal-intensive and input-intensive cropping systems are largely sustained by rice and wheat production, which are supported by public procurement systems and minimum support prices (Chand et al., 2018).

Moreover, although organic certification is necessary to gain market credibility, it is often hindered by complex procedures, compliance costs, and lengthy conversion times. These regulatory barriers are not an enabling factor but rather a disincentive for small and marginal farmers and a source of institutional lock-in to traditional systems (APEDA, 2019).

### 5.3 Pathways in Knowledge and Extension

The agricultural extension services in India have traditionally been skewed toward promoting chemical-based technologies and standardised production methods. Consequently, knowledge about organic farming is marginal within formal advisory systems (Vanloqueren & Baret, 2019). Indigenous and traditional ecological knowledge that was once at the centre stage in low-input agriculture has been sidelined in research and training programs.

Such knowledge asymmetries shape farmers' perceptions of risk. Access to reliable information on organic practices is limited, and uncertainty about yields and the market hinders learning and experimentation. The processes of social learning, which are essential in the adoption of complex practices, are also poor in the case of organic farming (Dessart et al., 2019).

### 5.4 Supply Chain and Market Constraints

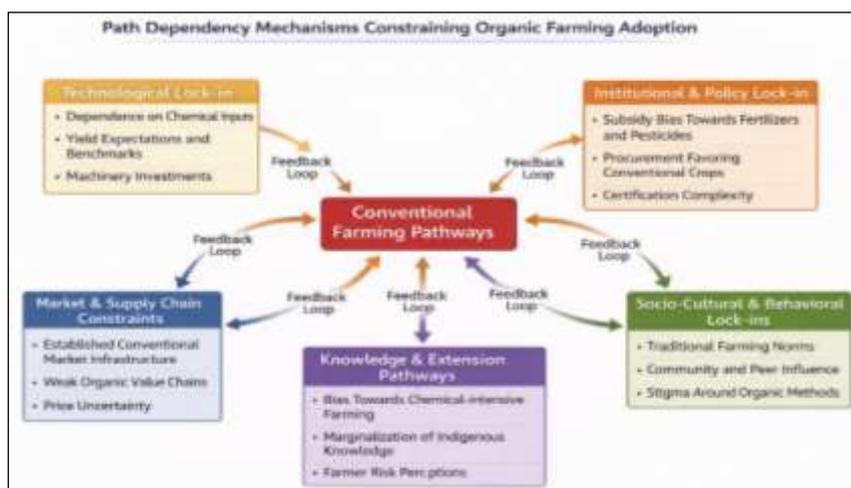
Well-developed procurement systems, warehouses, and delivery channels characterise traditional farming. Organic value chains, in turn, are disjointed and unevenly developed, resulting in price volatility and difficulties accessing the market (Reddy & Mishra, 2019). Despite the relatively high profitability of export markets for organic products, these markets usually have strict quality and certification standards that exclude smallholders and consolidate inequality within the organic industry (APEDA, 2019).

### 5.5 Socio-Cultural and Behavioural Lock-ins

Beyond economic and institutional terms and conditions, socio-cultural dynamics contribute to path dependency. The approach to farming is intergenerational, meaning that it generates how farming should be done. Villages tend to discourage unconventional practices due to peer pressure, and organic farming has been viewed as dangerous, non-scientific, and suitable only for small-scale farmers (Dessart et al., 2019). Such behavioural lock-ins facilitate resistance to change among individuals, despite policy support.

**Table 4. Path Dependency Mechanisms and Barriers to Organic Adoption**

Mechanism	Key Features	Impact
Technological lock-in	Chemical inputs, yield benchmarks	High switching costs
Institutional lock-in	Subsidies, procurement bias	Policy disincentives
Knowledge pathways	Extension bias, risk perception	Learning barriers
Market constraints	Weak value chains	Price uncertainty
Socio-cultural lock-in	Norms and peer influence	Resistance to change



**Figure 4. Path Dependency Mechanisms Constraining Organic Farming Adoption**

## 6. Case Studies and Empirical Evidence

### 6.1 Methodology

This study uses a mixed-methods approach to investigate the influence of path dependency on the adoption of organic farming in India. The mixed-methods approach is suitable because it accounts for path-dependent processes that involve both measurable structural variables (such as subsidies, market access, and farm size) and qualitative aspects (such as perceptions, norms, and institutional practices) (Creswell & Plano Clark, 2018). Primary data will be based on surveys of farmers, and semi-structured interviews in selected areas, and secondary data will be drawn from government reports, policy documents, and empirical research published between 2015 and 2019.

Farmer surveys are used to collect data on input use, yield expectations, access to extension services, and market participation. In contrast, interviews with farmers, extension officials, and local cooperatives involve speculation about institutional and socio-cultural processes. The analytical framework combines path dependency theory with comparative case analysis, focusing on technological, institutional, market, and behavioural lock-in mechanisms (Mahoney & Thelen, 2015). Thematic analysis and descriptive-comparative analysis are used to analyse qualitative and quantitative data, respectively.

### 6.2 Case Studies of Indian States/Regions

The two opposite regional cases are analysed to show the different trajectories of agriculture. A partial example occurs in Sikkim, where the state cooperates with farmers to achieve 100% organic production. The policy, which included bans on chemical inputs, state-led extension services, and institutional-level certification and marketing support, disrupted traditional feedback loops and reduced switching costs for farmers (Government of Sikkim, 2016; Eyhorn et al., 2019). Things may still not be perfect, especially regarding market access, but the Sikkim case has shown that strategic institutional restructuring can undermine path dependency.

Conversely, Punjab and Haryana are classic examples of path-dependent traditional systems shaped by the legacies of the Green Revolution. Monocropping and reliance on chemicals embolden reliance on subsidised fertilisers, guaranteed acquisition of rice and wheat, and an established irrigation infrastructure (Pingali, 2015; Chand et al., 2018). Efforts to pursue organic or diversified agriculture in those states are peripheral, constrained by yield realisations, policy support, and societal customs that favour the traditional measure of success in agriculture.

A closer comparison shows that the level of institutional coordination and the whole policy coherence are the defining factors of a historical trajectory and its success in terms of perpetuation or partial derailment.

### 6.3 Findings and Analysis

The evidence shows strong lock-in effects across several channels. Large and medium farms with substantial sunk costs are most likely to be characterised by technological and policy lock-ins, as well as by smallholder, market, and knowledge effects. Regional variation means that path dependency varies with state policies, agroecological conditions, and market orientation (Reddy & Mishra, 2019; Dessart et al., 2019).

**Table 5. Comparative Empirical Insights from Case Studies**

Dimension	Sikkim	Punjab/Haryana
Dominant farming system	Organic	Conventional
Policy orientation	Path-breaking	Path-reinforcing

Market structure	Emerging organic markets	Assured MSP procurement
Lock-in intensity	Moderate	High

## 7. Breaking the Path: Transition Strategies

### 7.1 Policy Interventions

It takes active policy responses to reform path dependency in Indian agriculture, which involves changes in incentive arrangements inherent in the existing form of agriculture. The cost disadvantage experienced by organic farmers can be minimised by reorienting subsidies toward organic inputs, including biofertilisers, compost units, and nutrient recycling on farms (Reddy & Mishra, 2019). It is also important that transitory assistance is provided during the period of organic conversion, when yields are lowest, and the risk of reduced income is greatest. Organic transition programs indicate that programs aimed at stabilising income, such as direct benefit transfers and risk-sharing policies, should be implemented to encourage farmers to adopt organic practices (Eyhorn et al., 2019). Devoid of such special interventions, current subsidy regimes still support traditional channels and discourage experimentation.

### 7.2 Institutional Reforms

The process of reforming institutions is central to undermining deep-seated feedback loops. Agricultural extension systems should be transformed to shift toward non-standardised, chemical-intensive packages rather than context-oriented agroecological advisory services. These involve retraining extension personnel to deliver organic and natural farming courses in community-based extension programs (Vanloqueren & Baret, 2019). Knowledge asymmetries can be resolved by incorporating organic farming and agricultural practices into university, training, and vocational programs (Lamine et al., 2018). Such reforms will be essential for reversing perceptions of farmers and restoring confidence in non-conventional farming methods.

### 7.3 Infrastructure and Market Development

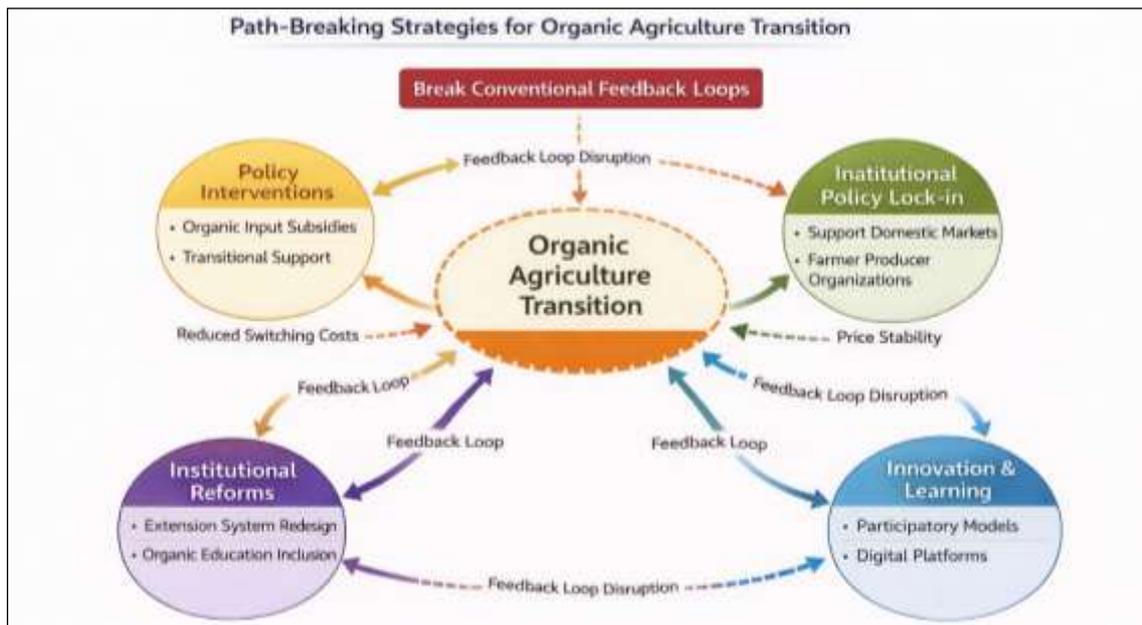
Market development plays a decisive role in facilitating the transition. The reliance on fluctuating export markets can be minimised by strengthening domestic organic markets through developing specific retail channels, implementing pilot projects in government procurement, and conducting consumer education (Reddy & Mishra, 2019). Collective certification systems, including participatory guarantee systems (PGS), reduce compliance costs and enhance accessibility for small and marginal farmers (APEDA, 2019). Farmer-Producer Organisations (FPOs) may also add to their otherwise weak bargaining power by aggregating and investing in storage and processing facilities to overcome scale and coordination issues in organic value chains.

### 7.4 Importance of Innovation and Social Learning

Behavioural and cognitive lock-ins can be overcome through innovation and social learning mechanisms, including participatory learning models such as farmer field schools and demonstration plots, experiential learning, and reduced perceived risks associated with organic practices (Dessart et al., 2019). These effects can be further enhanced through digital platforms and peer-to-peer knowledge-sharing networks that scale the localised success stories, advisory services, and market information. Research has shown that socially integrated learning systems greatly contribute to the uptake of Multifaceted agricultural interventions, such as Organic farming (Pretty et al., 2018).

**Table 6. Strategies for Breaking Path Dependency in Indian Agriculture**

Strategy Domain	Key Interventions	Expected Outcomes
Policy	Organic input subsidies, transition support	Reduced switching costs
Institutions	Extension and education reform	Knowledge diffusion
Markets	FPOs, domestic market development	Price stability
Social learning	Participatory and digital platforms	Behavioral change



**Figure 5. Path-Breaking Strategies for Organic Agriculture Transition**

## 8. Discussion

The results of this paper highlight the informational importance of path dependency theory for understanding why the uptake of organic farming in India has not yet increased despite nascent policy focus and market demand. Through this prism, Indian agriculture can be viewed as a self-reinforcing feedback loop of technology, institutions, market, and social norms that constitute a socio-technical system. Previous policy decisions related to the Green Revolution established increasingly strong returns to chemical-intensive agriculture, thereby making them economically risky and institutionally unsupported (Pingali, 2015; Mahoney & Thelen, 2015). The Punjab and Haryana examples from the empirical investigation of classic lock-in effects demonstrate that irrigation, machine, and crop specialisation-sunk investments are intertwined with procurement policies to sustain the traditional course.

However, the Sikkim case makes it clear that path dependency is not fixed. Institutional interventions that were organised through bans on chemical inputs, reoriented extension services, and market facilitation partly destabilised existing feedback mechanisms, thereby enabling the transition to organic farming (Eyhorn et al., 2019). This reinforces the theoretical claims that path-breaking involves systemic change within the scope of incremental change, especially in sectors where investment cycles are drawn, and organisational structures are relatively and essentially institutionally complementary (Seto et al., 2016).

On that note, the experience in India reflects the trends in other parts of the world, notably in Europe and North America, in which traditional agri-food regimes show tendencies of resistance to the agroecological transition shaped by established research agendas, subsidy systems, and concentration in the market (Lamine et al., 2018). Nevertheless, there is no socio-economic mobility as in many other high-income nations, and small and marginal farmers constitute the majority of Indian agriculturalists, which increases the social and distributive impact of lock-in. At the international level, organic and agroecological initiatives lack structural incentives, which means they may remain niche or export-based rather than transformative (Pretty et al., 2018).

From a sustainability transition perspective, the results indicate that environmental rationales alone are insufficient to drive change. The change process requires compatibility between ecological objectives and the security of farmers' livelihoods. The theory of path dependency helps explain why, in many instances, well-intended organic policies fail to work: they are introduced into regimes that do not eliminate the institutional and economic underpinnings of traditional farming (Vanloqueren & Baret, 2019). So, ensuring a sustainable agricultural transition in India has to be understood as a matter of politics and institutional change, rather than technological replacements.

## 9. Policy Implications

The research has significant policy implications for reconsidering models of agricultural development in India. To start, it questions the continued use of the input- and yield-centric paradigm as the primary indicator of agricultural success. A shift to sustainability will require rebuilding performance metrics to include soil health, biodiversity, resilience, and farmers' well-being (Pretty et al., 2018).

Second, it is important to align sustainability objectives with farmers' incentives. Organic farming will be structurally disadvantaged as long as fertiliser subsidies, electricity prices and complex procurement systems continue to prioritise conventional crops (Reddy & Mishra, 2019). By refocusing some of these incentives on

organic inputs, ecosystem services, and transition support, the cost of switching can be made lower and a long-term commitment to the policy can be ensured.

Lastly, the results suggest that long-term structural reforms are more efficient than short-term, project-based interventions. Although the schemes like PKVY are significant to offer, their effects are limited when integrated into an unaltered traditional government. The firm persistence of transition pathways presupposes reform of extension systems, agricultural education, market infrastructure, and procurement policies, with coordination occurring at different levels of governance (Lamine et al., 2018). In the absence of such coherence, organic farming will remain marginal rather than radical.

## 10. Conclusion

The paper has discussed how path dependency in Indian agriculture hinders the adoption of organic farming. Historical accounts of practices prior to the Green Revolution and the institutionalisation of traditional farming show that technological, policy, market, and socio-cultural lock-ins have supported these systems. Empirical case studies revealed sharp regional differences: although path dependency could be strongly rooted, it could be partially interrupted by coordinated institutional action.

The research paper contributes to the body of literature on agriculture and institutional change by applying path dependency theory to transitions to organic farming in developing countries. It is, however, constrained by its reliance on selected regional cases and secondary data, which may fail to capture all local variation. Further studies should examine transitions longitudinally and at the micro level, how farmers cope with them over time, and how new hybrid forms of sustainable farming arise. These would contribute to the further development of strategies to enable inclusive and resilient agricultural transitions in India.

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