FROM PILOTING TO POLICY: A COMPARATIVE CASE STUDY OF RISK MANAGEMENT EXPERIMENTS IN INDIAN AGRICULTURE

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NATIONAL UNIVERSITY OF SINGAPORE

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DECLARATION

I hereby declare that the thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously.

Sreeja Nair

September 2016

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Summary

Designing policy pilots is an important form of experimentation undertaken by policymakers allowing major government policies and programmes to be pre-tested before launching these fully, and at a wider scale. Effective policy pilots could be expanded and scaled-up into full policies. In theory, policy piloting is suggested as a promising means to innovate and introduce variation in policy responses under conditions of risk and uncertainty in the policy environment. The literature however remains rather inconclusive on the role of these pilots in policy formulation and change and the underlying processes of their scaling-up in practice. Using a model of policy change this thesis investigates whether "*design characteristics of policy pilots can explain variations in their scaling-up and overall policy change*"?

To investigate the research question a case-study approach is followed to compare key design features of fourteen agriculture policy pilots launched to address risks and uncertainties to agriculture production in India. Following a framework of policy mixes set out by Cashore and Howlett (2007), changes brought by pilots to the ends (goals) and means (instruments) of an incumbent policy regime are studied as causal conditions for scaling-up of the pilots.

Globally, India ranks among the lowest in terms of yields from rainfed agriculture despite having the largest land area under rainfed agriculture. The Indian agricultural policy landscape has been interspersed with pilots to address risks to agriculture production, especially in rainfed areas. A combination of Qualitative Comparative Analysis (QCA) and Process Tracing was deployed as part of the research design. QCA was conducted to identify combinations of design features of the pilots that were found to link to scaling

up as an outcome, while Process Tracing revealed the underlying causal mechanisms related to typical and deviant cases of scaling-up.

The study and case analysis has several implications for the design of policy pilots and their scaling-up under conditions of risk and uncertainty. Firstly, multiple pathways to scaling-up were observed. Secondly, the combination of changes at the policy ends and means level associated with successful pilots were found to be rather conservative, characterized by incremental adjustments to the current policy regime. Thirdly, between failed pilots and institutionalization was policy bundling, where majority of the pilots were found to culminate. Thus, the study in context revealed that despite the theoretical acknowledgment as an approach that can enable risk- taking and experiment with policy alternatives under uncertainty, in practice the operational contribution of pilots were found to be limited to acting as avenues for periodically updating existing policies and programmes through marginal changes to their current scope.

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Chapter 1 Introduction

1.1 Policy piloting and experimentation under risk and uncertainty

Policies are continually being designed for current and future conditions about which policymakers often have incomplete or no information at all or the policy issues are 'wicked' i.e. there are no easy one-size-fits-all solutions (Walker, 2001; Peters 1998). One way of addressing policy uncertainty and complexity is to consider policy initiatives as experiments and to plan them incrementally and adaptively (Rondinelli, 2003). Experimentation can also be a mode of exploring policy alternatives to increase the chances of achieving effective outcomes under uncertainty (Swanson and Bhadwal, 2009).

Pilots form a special form of policy experimentation and involve the "phased introduction of major government policies or programmes, allowing them to be tested, evaluated and adjusted before being rolled out nationally" (Cabinet Office, 2003, p. 3). In terms of policy process, pilots can be placed between policy formulation and policy implementation. As part of policy formulation, pilots enable evidence gathering to inform policy or validate assumptions. Additionally, they form part of policy implementation as piloting does implement something, albeit limited in spatial and temporal scope (Ettelt et al, 2013; Ettelt et al, 2015).

In some cases there is a clear intent to experiment and to learn from it, while in others there is an attempt to get it right the first time and maintain the program if it is right, or atleast good enough (Peters, 1998). Designing well-planned pilots to be operational alongside a fully-functioning policy can help to test a policy's performance along with identification of emerging issues and make necessary policy adjustments (Swanson and Bhadwal, 2009). A pilot in this sense forms an important first step of regular policy monitoring and evaluation (Cabinet Office, 2003).

A policy design consists of specific arrangements of policy instruments that are combined in a principled manner into policy portfolios in an attempt to achieve the intended policy goals and aims (Howlett and Rayner, 2013). Following a framework of policy mixes set out by Cashore and Howlett (2007), different elements characterizing a policy can be assumed to change. These form the aspects of the policy which may be subject to policy piloting, and are considered as causal conditions in the model in this thesis. Such changes however may or may not bring about increased or enhanced match between policy ends (goals) and means (instruments).

Policies typically emerge as 'bundles' or ‘mixes’ of policy tools through processes of policy change, with addition and subtraction of elements over time (Howlett and Rayner, 2013). A policy mix comprises of some abstract or conceptual goals, specific program content or objectives and operational settings or calibrations (Hall, 1993; Cashore and Howlett, 2007; Howlett and Cashore, 2009). A key challenge while designing policies and policy pilots for the future is that they are launched to operate and interact in a space where there are pre-existing policy mixes that have developed over time (Howlett and Rayner, 2013).

Howlett and Rayner (2007) argue that the degree of coherency between policy goals and degree of consistency between policy means should be studied on a case-by-case basis. Typically, policy goals are considered to be coherent if they logically relate to the same overall policy aims and objectives and can be achieved simultaneously without any significant trade-offs. Policy goals are considered to be incoherent if they contradict the previous goal. Policy tools are considered to be consistent when they complement each other and work in combination towards meeting a policy goal, and inconsistent when they work at cross-purposes (Kern and Howlett, 2009).

The policy literature remains rather inconclusive on whether under conditions of uncertainty, policymakers prefer to pilot (test) incremental changes to existing policies or use it as an opportunity to innovate and undertake major policy changes. This study argues that scaling-up of policy pilots is an outcome dependent on the changes to policy elements of an incumbent policy regime brought about by a pilot.

1.1.1 Scaling-up of policy pilots: the policy problem context

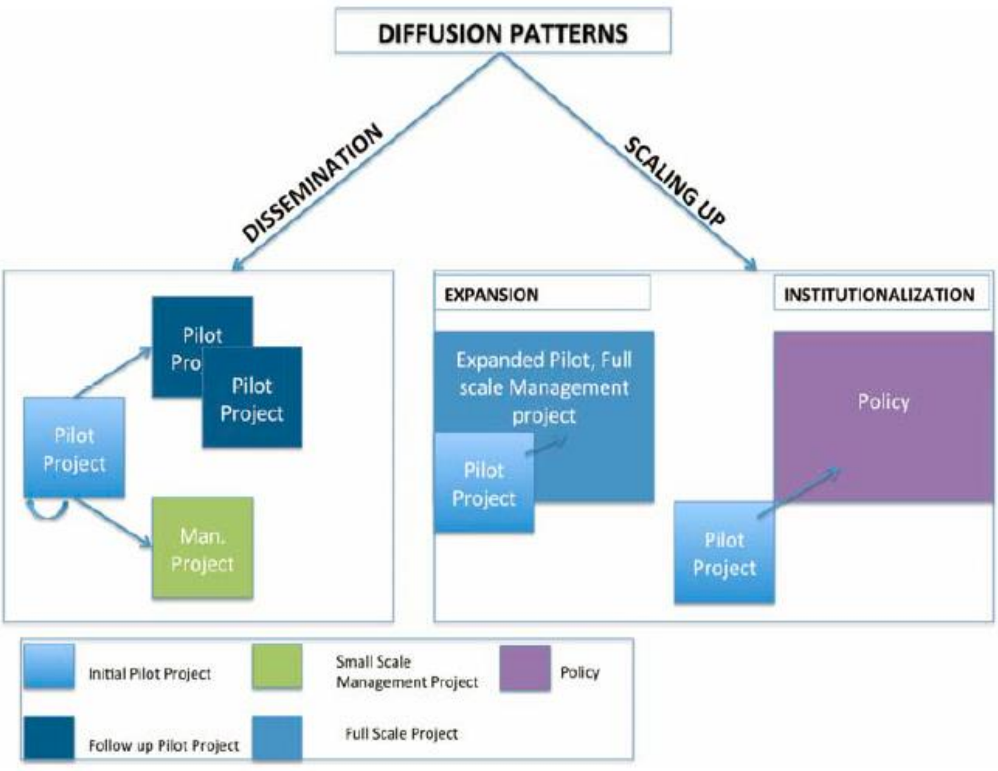
Scaling up is defined in several ways, most commonly in terms of its geographical expansion to reach more number of beneficiaries (Gillespie, 2004; Hartmann and Linn, 2007). In the words of a retired senior civil servant, Government of India scaling-up of pilots essentially reflects how these pilots get mainstreamed into policy as a permanent feature. The following definitions are used in the context of this study:

- Policy pilots are defined as time-and –space bound policy initiatives by Government and Government -affiliated agencies to help reduce production risks and uncertainties in the agriculture sector in India.
- Scaling-up is defined as a process whereby there is an increase in the scale dimension of the pilot project and the qualitative and quantitative nature of the problem changes. More actors, policy components and

administrative layers are added as pilots scale-up, increasing the scope and thereby complexity of the pilot (Vreugdenhil et al, 2012).

When pilots are found to be successful these can be continued or expanded in various forms (Figure 1.1); however there is little empirical analysis on the factors leading to their diffusion, the process of diffusion as well as their actual contribution to altering the policy mix (Vreugdenhil et al, 2009; 2012). For example, apart from the technical strengths of pilots, sometimes these may be scaled up for political reasons including their degree of compliance with status quo (Spicer et al, 2014).

Figure 1.1: Diffusion and scaling-up of policy pilots (Vreugdenhil et al, 2009)



While scaling up and diffusion of pilot initiatives by NGOs and developmental agencies have been well-researched, for Governments these studies have been limited to evaluation of outcomes of the initiatives and not the process factors and mechanisms of scaling-up itself. While NGOs and developmental agencies aim at scaling-up of initiatives from the micro level to other similar contexts (Appadurai et al, 2015; Farrington and Lobo, 1997; Simmons et al, 2007), Governments face a similar challenge albeit larger in scope in terms of reaching maximum number of beneficiaries at a national scale despite wide variations in the socio-economic and biophysical contexts in which these operate (Wellstead et al, 2015).

1.1.2 Risk management in Indian agriculture: the case context

The agriculture sector in India is the mainstay of a large part of the population. The sector is prone to production risks because two-thirds of the cultivated area is largely rainfed and capacities of farming communities to deal with conditions of risk are rather limited. Hence agriculture becomes a sector of high policy significance and also a sector where policymaking is both difficult and complex. Providing employment to more than 54per cent of the population and contributing nearly 13.9 per cent to India’s Gross Domestic Product, the agriculture sector occupies a significant position in the Indian economy (MoA, 2015).

India has the largest land area under rainfed agriculture in the world, however ranks among the lowest in terms of yields from rainfed agriculture (GoI, 2011). Agriculture in rainfed areas in India faces production risks associated with the changes in the amount and timing of rainfall, temperature and extreme events such as droughts. Furthermore rainfed agriculture also suffers from decreasing soil productivity, poor socio-economic status of the farmers, and land fragmentation (GoI, 2011).

This study focuses on policy formulation in response to current and anticipated risks and uncertainties related to crop production. Small and marginal farmers form a major part of the farming population in India and are highly risk-prone because of their high dependence on rain-fed agriculture and lack of proper assets and resource base for investments in agriculture, including irrigation facilities and mechanization and because of low capacities to recover from conditions of weather and market stress[1].

Communities dependent on rainfed agriculture for livelihoods are often poor and marginal and thus form a key target group for both developmental and sectoral policy interventions in India. A focus on both natural resources management and rainfed area development is imperative to meet the growing foodgrain demands of the country (GoI, 2014). About 85 per cent of the total land holdings in India fall in the small (1-2 hectare[2]) and marginal (<1 hectare) categories. The small land-holding sizes also constrain the ability of farmers to undertake large and risky investments towards improving crop production and land productivity.

The Ministry of Agriculture (MoA) is the central agency for agriculture policy making in India and since the beginning of the country's first Five Year Plan, the MoA has implemented several programmes and schemes, including pilots to address risks to agriculture production. These

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[1] Agricultural Livelihoods and Crop Insurance in India Situation Analysis & Assessment, 2013. Published by: Deutsche Gesellschaft fürInternationale Zusammenarbeit (GIZ) GmbH.

[2] 1 hectare=2.47 acres

pilots can be considered to be forms of experimentation with existing policy mixes, comprising of various policy ends and means for agriculture risk management. From an implementation perspective, the Ministry of Agriculture, Government of India programmes and schemes are designed for nation-wide implementation and for specific areas/ crops or districts. For each national level pilot schemes the MoA issues Operational guidelines within the allocated funds with qualifying criteria for allocating funding to target areas and beneficiaries. The State Governments select farmers as per these Guidelines and disburse financial assistance to target beneficiaries.

The cases considered in this study are policy pilots (not full policies) implemented by the MoA, Government of India as examples of experiments undergoing an iterative process to address diverse risks to rainfed agriculture production (owing to presence of diverse biophysical, socio-economic and institutional conditions across the country).

1.2 Research question

The key research question guiding this thesis is: *Can design characteristics of policy pilots explain variations in their scaling-up and overall policy change?* The following two sub-questions were developed within the overall research question:

- What are the necessary and sufficient factors for scaling-up of policy pilots? Investigating the first sub-question, detailed case narratives are developed using the logic of a Qualitative Comparative Analysis (Chapter 5) to detect combinations/ configurations of causal conditions that produce the observed outcome i.e. scaling-up.

- Are the mechanisms of scaling-up similar for policy pilots that share similar characteristics? A Process Tracing of selected typical and deviant cases based on combinations of causal conditions identified from the QCA is conducted (Chapter 6) to investigate the second sub-question.

These research questions are best answered with a case-study approach as the design features of individual cases need to be studied in detailed and compared.

1.3 Theoretical framework

The theoretical framework for studying policy dynamics and scaling up of policy pilots has been adapted from elements of a policy mix (Table 1.1) identified by Cashore and Howlett (2007). The framework is applied to study the changes brought by policy pilots to an existing policy regime.

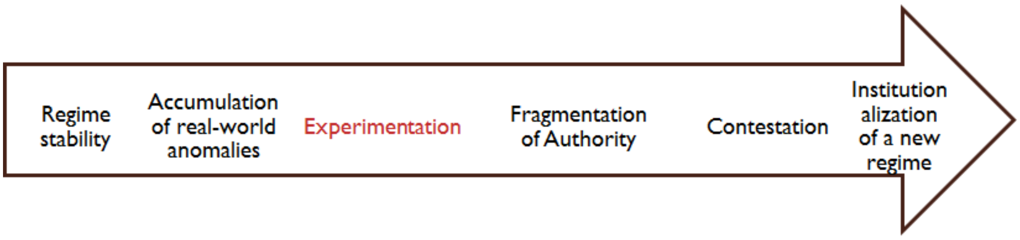
Six elements characterizing a policy can be assumed to change. These form the aspects of the policy which may be subject to policy piloting, and are considered as causal conditions in this study. Such changes however may or may not bring about increased or enhanced coherence of policy elements. This framework is used to study fourteen cases of agricultural policy pilots.

Table 1.1: Components of a policy mix as an arrangement of policy ends and means (Cashore and Howlett, 2007)

		Policy content		
Policy focus		***High level abstraction***	***Programme level operationalization***	***Specific on-the-ground measures***
		Goals	**Objectives**	**Settings**
	Ends	What general types of ideas govern policy development? e.g. environmental protection, economic development	What does policy formally aim to address? e.g. saving species habitat	What are the specific on-the-ground requirements of the policy? e.g. consideration of sustainable levels of harvesting
		Instrument logic	**Instrument type**	**Calibration**
	Means	What general norms guide implementation preferences? e.g. preference for use of coercive instruments	What specific types of instruments are utilized? e.g. use of different tools such as tax incentives or public enterprises	What are the specific ways in which the instrument is used? e.g. designation of higher levels of subsidies,

The policy mixes framework is used to tease out components of an ongoing policy regime and mark the fit of specific design characteristics of the pilot with an existing regime. In addition, policy piloting itself is further considered as being situated within a larger policy change process which suggests that when anomalies are observed in an existing policy regime, policy experimentation (of which piloting is a special form) can be done and this may or may not lead to substantial and lasting policy change (Figure 1.2). This general theory of policy change (Hall, 1993; Oliver and Pemberton, 2004; de Vries, 2005) is presented in Figure 1.2.

Figure 1.2: A general model of the punctuated equilibrium model of policy regime changes: stage characteristics (based on Hall (1993); de Vries (2005)); Oliver and Pemberton (2004); Howlett et al, 2009)



As per the theory of policy change put forth by this general model (Figure 1.2), a stable regime is characterised by institutionalization of the 'reigning orthodoxy'. Any adjustments to a stable regime are primarily made by a closed group of actors within the policy subsystem. Over time, there may be departures from what the current regime intends to achieve and its actual achievements on-ground, creating anomalies (Wilder and Howlett, 2014). When anomalies accumulate and are not able to be anticipated or corrected by the current regime, experimentation is undertaken to accommodate and address these anomalies within the current regime. If this effort fails, the regime becomes exposed to criticism by new actors challenging the current regime and policy actors face the pressure to adequately address the anomalies (fragmentation of authority).

When this debate enters the public arena and involves the larger political process, contestation happens. After a period of time Institutionalization of a new regime can occur when proponents of a new regime secure positions of authority and alter existing organizational and decision-making arrangements in order to institutionalize the new subsystem, paradigm and regime. As discussed earlier however, compared to Hall's (1993) model of paradigmatic change, Oliver and Pemberton's (2004) model suggests that the processes leading to paradigm change following third order anomalies are neither linear nor deterministic, but can be dependent on the political battle to institutionalize ideas. This indicates that policy change in such cases may be less dramatic than originally imagined and instead may be more gradual.

1.3.1 Propositions

The propositions are set such as to use policy pilots (as cases of policy experimentation with ends and means) to study the relationships between selected causal conditions and observed outcome. The policy pilots studied and compared in this study form the cases in which specific outcomes, level of scaling-up and the conditions which led to them (or not) are traced. The following propositions are set to guide the overall study:

Proposition 1: Scaling up is a political process

Proposition 2: Changes at the policy ends (goals) level are more deterministic for overall policy change than changes at the means level

Sub-proposition 2.1: Paradigmatic changes in goals lead to overall paradigmatic change in outcome

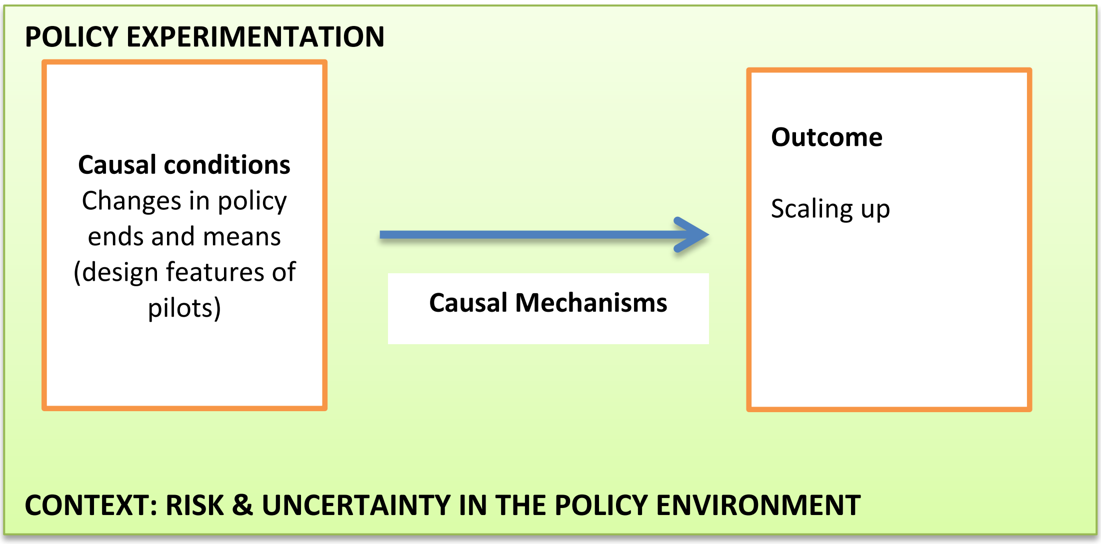
Sub-proposition 2.2: Incremental changes in goals lead to overall incremental change in outcome

To investigate these propositions, a combination of Qualitative Comparative Analysis (QCA) and Process Tracing is used. QCA helps identify if specific causal conditions such as changes at the goals level or means level can independently lead to the outcome i.e. scaling up, or whether these operate in combination with other conditions. Secondly, Process Tracing helps in studying in detail the causal mechanisms underlying the process of policy change brought about by the pilot.

1.3.2 Conceptual framework

Based on the policy mixes framework and policy change model and the research questions under investigation, the following conceptual framework (Figure 1.3) has been developed to structure and guide this study. The context in which the study is set is that of risk and uncertainty in the policy environment, i.e. agriculture production in India.

Figure 1.3: Conceptual framework for the study



1.3.3 Relevance and Contribution to literature

Hall's (2003) work on policy dynamics and policy change based on the three-order model, remains the most quoted piece of literature on studying policy change. However policy scholars in the last decade have also drawn attention to the perils of studying policy change as an aggregate variable limited to these three orders. The key argument is that such aggregation can lead to a rather myopic view of the more complex and granular processes of policy change that may go beyond the incremental change vs. paradigmatic change classification (Howlett and Cashore, 2009).

It is the argument of this study that investigating the diffusion pathways of pilots can help uncover mechanisms that can advance the study of policy dynamics and change. Using selected cases of policy pilots for risk management in the agriculture sector in India this study will help contribute to the theory on policy design under uncertainty. Here, the policy pilots are being considered as a blueprint for the future and as a proxy indicator and an early assessment of how the policy is likely to function in the future. Given the importance of policy pilots in adaptive management and transition management, this thesis also aims to advance literature on adaptive policy design under uncertainty.

Experimental processes of policy formulation can allow for unexpected and unusual combinations of means- and end-related components to occur and lead to mechanisms such as policy layering, conversion and drift that may either happen rapidly or gradually over time (Thelen 2004, Hacker 2005, Beland 2007). Furthermore, means-related changes may occur in the absence of corresponding shifts to policy aims and conversely ends may change without any alterations to means of achieving them (Kern and Howlett, 2009). When such novel policy configurations emerge, these can often be unexpected, deviant from standard practice or even sub-optimal (Wilder and Howlett, 2014).

This study draws attention to the design aspects of policies. Linder and Peters (1988) argued that much of the efforts for designing better policies focus on facilitating the actual selection of policy options as opposed to facilitating policymakers to better understand the assumptions under which they characterize the policy problem and the relevant solution. They argued that the policy design perspective bundles ideas and the implementation aspects together and suggested that if the design itself is faulty, neither the rigor of the idea nor its effective implementation will matter.

This thesis aims to advance current literature on policy formulation and change under uncertainty by 1) testing a model of policy change and providing empirical evidence on the influence of design characteristics of policy pilots on policy change, and 2) on the causal mechanisms of pilots related to specific scaling-up outcomes.

1.4 Thesis structure

This chapter presented the background to policy piloting as a form of experimentation, the key research question, the theoretical and conceptual framework and the rationale and relevance of this study. The remainder of the thesis has been structured as follows. Chapter 2 presents a Literature Review of the theoretical foundations to the research problem. Chapter 3 describes the methodology and research design that was followed to meet the research objectives and test the key propositions. Chapter 4 provides an overview of the landscape of agriculture policymaking in India in which policy piloting was situated and studied. Chapter 5 presents the detailed case narratives and Qualitative Comparative Analysis of the policy pilots. Chapter 6 presents Process Tracing of selected policy pilots. Chapter 7 presents the Discussion and Conclusions.

Chapter 2 Literature Review

This literature review situates policy piloting as a form of experimentation within the broader domain of policy formulation and change under conditions of risk and uncertainty in the policy context. The review has been guided by the following questions: why and how are policy experiments designed to deal with uncertainty in the policy context, what pathways do these follow as they develop and what policy outcomes do they lead to. The literature review has been structured under four broad themes: 1) Characterizing risk and uncertainty in policy design and formulation, 2) Policy experimentation and piloting under risk and uncertainty, 3) Experimentation and policy change and 4) Causal mechanisms and pathways to scaling-up of pilots.

2.1 Characterizing risk and uncertainty in policy design and formulation

The concept of uncertainty has been widely interpreted and studied in diverse disciplines that influence public policy. The theoretical basis, historical context, relevance, and tools and methods for addressing uncertainty are thus often grounded within specific discourses originating in different disciplines (Walker et al, 2012). The uncertain future can be distinguished into that which is reasonably quantifiable and represented by probability distributions (risk) and that which cannot, as their distributions are unknown (uncertainty) (Knight, 1921).

Until recently, a major challenge in designing strategies to deal effectively with uncertainty has been the inadequacy of various schemes and models used to classify different levels and types of uncertainty and assess their impacts. Morgan and Henrion (1990) underscored the importance of classifying the types and sources of uncertainty in policymaking so that these can be addressed well. They argued that the classification of uncertainty as that whose probability is unknown makes it difficult to proceed with ‘real-world decision-making’.

While uncertainty often arises due to imperfect information, which includes wrong information or complete lack of any information to base the decision, the available information is also prone to multiple interpretations and diverse perspectives i.e. ambiguous (Jones and Baumgartner, 2005). Especially for environmental issues, uncertainties surrounding the choice of policy options, their consequences, confidence on available information and values of multiple stakeholders including decision-makers are not well characterized (Hansson, 1996).

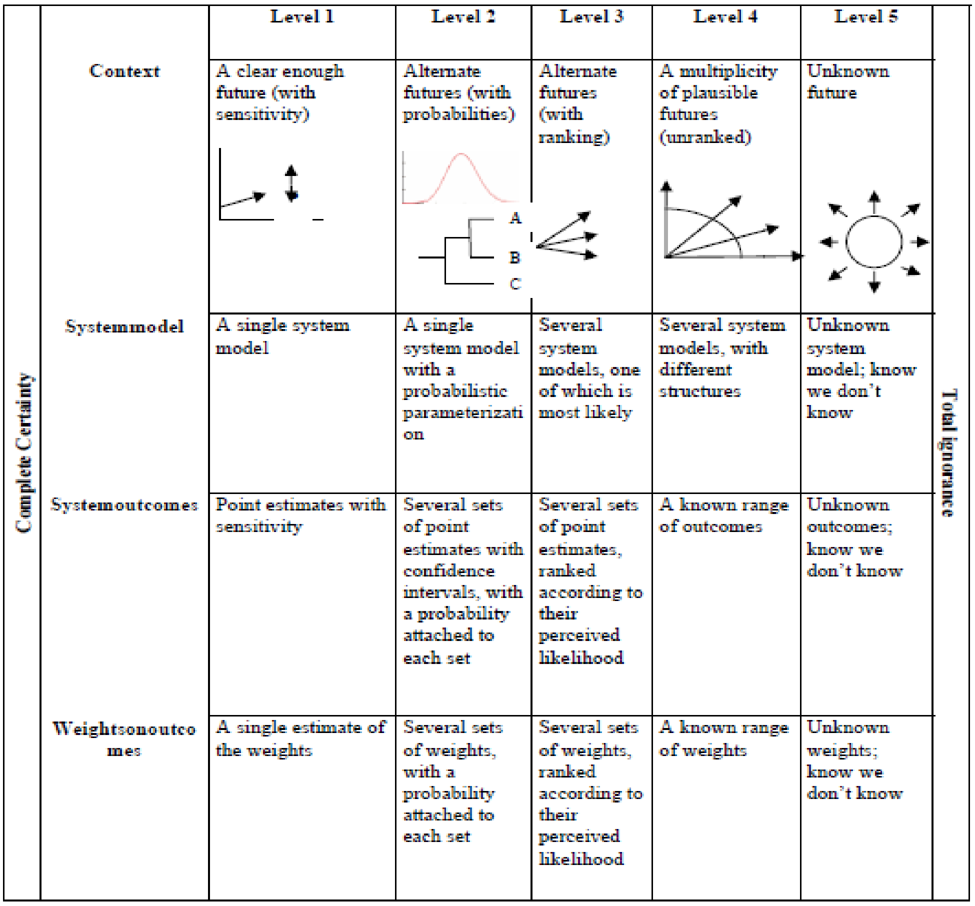
While Morgan and Henrion’s classification focused on uncertainty in quantitative policy analysis, Koppenjan and Klijn (2004) presented a classification of uncertainty focused on the interaction among actors and knowledge (or information)-related uncertainty for solving complex policy problems. Some of these uncertainties overlap with the empirical quantities identified by Morgan and Henrion, for example decision variables and value parameters and related uncertainties, and includes: 1) Substantive uncertainty that relates to lack of relevant information related to the nature of the complex problem, and the different interpretations of information arising from different ‘frames of reference’ of the social actors; 2) Strategic uncertainty that arises due to unpredictability of strategies deployed by different actors based on their perception of the problem and strategies likely to be deployed by other actors, and 3) Institutional uncertainty that arises owing to the complexity of interaction of different actors guided by institutional frameworks i.e. rules and procedures of the organizations they represent.

Even when causal relationships and future scenarios are relatively well known, there is always some uncertainty with respect to policy predictions due to statistical and uncertainties in data and estimates of the coefficients attached to expected relationships between policy interventions and target behaviour. Historically students of policy problems such as Churchman (1967), Rittel and Webber (1973) and Simon (1973) thought about uncertainty in a purely 'objective' sense i.e. whether the problem causes and solutions were known or unknown.

Bivariate concepts of 'wicked' and 'tame' or well 'structured' and 'ill-structured' problem contexts introduced by these authors have dominated thinking in the area. However, uncertainty affects policymaking at both the level of 'objective' knowledge of problems as well as the relative nature of decision-makers' knowledge of that 'knowledge-base'. Brugnach et al (2008) presented uncertainty as a relation that involves an object(s) of perception or knowledge, various actors including the decision-maker and the relationships that bind the object(s) and the actors.

Moving beyond these epistemological and ontologically-derived models Walker et al (2010) identified five policy-relevant levels of uncertainty. These include the "Level I" uncertainties where alternative states of a system within specific probabilities are well known and thus are likely to be resolved by standard treatments. These can be distinguished from "Level II" uncertainty where a limited number of plausible alternatives with probabilities exist within a scenario. Level III situations are where different scenarios exist without probabilities but can still be ranked in terms of their likelihood. Level IV uncertainty represents a more complex situation in which there can be multiple plausible alternative scenarios without being able to rank the alternatives in terms of their perceived likelihood. “Level V” (deep uncertainty) poses challenges for policy formulation as there is an inability to present or agree upon a full range of possible alternative scenarios and the possibility of surprise cannot be overlooked (Walker et al, 2013; Figure 2.1).

Figure 2.1: Different Levels and Orders of Uncertainty (Walker et al, 2013)



Complete Certainty		Level 1	Level 2	Level 3	Level 4	Level 5	Total ignorance
	Context	A clear enough future (with sensitivity)	Alternate futures (with probabilities)	Alternate futures (with ranking)	A multiplicity of plausible futures (unranked)	Unknown future	
	Systemmodel	A single system model	A single system model with a probabilistic parameterizati on	Several system models, one of which is most likely	Several system models, with different structures	Unknown system model; know we don't know	
	Systemoutcomes	Point estimates with sensitivity	Several sets of point estimates with confidence intervals, with a probability attached to each set	Several sets of point estimates, ranked according to their perceived likelihood	A known range of outcomes	Unknown outcomes; know we don't know	
	Weightsonoutcomes	A single estimate of the weights	Several sets of weights, with a probability attached to each set	Several sets of weights, ranked according to their perceived likelihood	A known range of weights	Unknown weights; know we don't know	

While Level I and II uncertainty can be factored into predictions of future events and trajectories, Level III problems are more complex as different alternative scenarios are possible and accurately forecasting changes over time becomes rather difficult (Taeihagh et al 2013). Addressing Levels IV and V uncertainty are most challenging as these are well beyond calculations of risk and uncertainty and involve a much higher ratio of ignorance and ambiguity, requiring a very different type of policy response and design (Stirling, 2010). While the role of risk management and scenario planning as part of traditional decision-theories and policymaking is prominent in the literature, empirical evidence of how governments can address 'deep uncertainty' is limited, even though failure to address it can hamper the effectiveness of long-term policymaking (Lempert, 2003).

Maxim and van der Sluijs (2011) noted that most policy typologies are focused on the producer of information and ignore uncertainty related to process and communication between producer and the end-user i.e. the decision-maker. These uncertainties can relate to the knowledge base or the degree of agreement upon or the absolute size of the evidentiary support for models, or the 'value-ladenness' of policy choices, which includes the perspectives of different actors on the value of the knowledge and information being utilized for decision-making and preferred policy alternatives and pathways (Mathijssen et al, 2008). In tracing how uncertainty has been considered by policy scholars moving from the modern to post-modern era in the context of policy analysis and application, Bredenhoff-Bijlsma (2010) highlighted that while modernism focused on the 'positivist' notion of using objective knowledge for policy analysis, post-modernism drew a focus on social construction of scientific knowledge emphasizing on actor interactions.

Becker and Brownsen (1964) argued that even when knowledge is available on a subject, policy-makers may not be aware of it and thus undertake decision-making on the basis of uniformed ignorance rather than informed awareness. This becomes more complex as collective or absolute knowledge of a subject or phenomenon is lacking. Decision-makers may be aware of this gap and function with an attitude of prudent awareness or, when they are unaware of their ignorance, with a hubristic attitude or over-confidence (Table 2.1).

Table 2.1: Policy-Maker’s Knowledge and Comprehension Matrix (Becker and Brownsen, 1964)

		Nature of Existing Collective Knowledge of a Phenomenon	
		Aspects of a problem and possible solutions are Known	Aspects are Unknown
Nature of Decision-Makers Awareness of Existing Knowledge of a Phenomenon	Aware	**Known-Known:** Key Policy Actors are aware of the known aspects of a phenomena (INFORMED AWARENESS)	**Known-Unknown:** Key Policy Actors are aware that certain aspects of the phenomenon are unknown (PRUDENT AWARENESS)
	Ignorant	**Unknown-Known:** Key Policy Actors are unaware of known aspects of a phenomenon (UNINFORMED IGNORANCE)	**Unknown-Unknown:** Key Policy actors are unaware that certain aspects of the phenomenon are unknown (IMPRUDENT IGNORANCE)

Policy formulation under uncertainty involves identifying and assessing diverse possible solutions or available courses of action for addressing a policy problem. While some of the solutions proposed may be completely new, marking a drastic shift from status quo, others might only involve minor adjustments to the existing policies and programs (Howlett et al, 2009). Uncertainty can impact policy formulation and design in a variety of direct and indirect ways. Well-calibrated and judged range of uncertainty (using decision-analytic techniques) form the basis of much of the long-term policies based on forecasts, but are only a subset of the full range of uncertainty (Schneider and Kuntz-Duriseti, 2002).

In their theory of "disproportionate policy processing", Jones and Baumgartner (2005) argued that "political systems process information disproportionately", i.e. disproportionate policy response to informational inputs. Ambiguity and uncertainty is a major cause of "disproportionate information-processing" i.e. distortion of the policy information signal in a way that makes it difficult to connect it to the policy response. In the midst of multiple policy issues, some might receive policy attention only after they cross critical thresholds. Furthermore a bias to maintain status-quo and bounded rationality often affect the choice of policy problems that receive policy attention, their interpretation and the course of action.

From a policy design perspective, policy approaches under conditions of uncertainty can be classified based on the nature of the decisions being made (one-time/ static or dynamic) and the type of actions being taken to address uncertainty (Augusdinata, 2008). This broad classification can generate five policy approach categories, viz.

1. Do-nothing: There is no policy until the impending uncertainty is resolved.
2. Delay policy: Maintain status quo while efforts are made to reduce or better characterize uncertainty by gaining more knowledge.

3. ‘Optimal’ policy approach: Policymakers use ‘best estimate’ models to choose an ‘optimal’ policy.
4. Static robust policy approach: A robust policy or one that performs ‘reasonably well’ across most likely plausible future scenarios is chosen.
5. Adaptive policy approach: involves adapting the policy over time as conditions change and learning takes place.

Given the uncertainty in the long-term and the likelihood of errors in policy design that are realized in the implementation stage, policy makers need to operate as “continuous policy-fixers” (Ingraham, 1987). The key task of the policymakers in this context is to appropriately adjust the policies in response to changing conditions over time (Swanson and Bhadwal, 2009). Under dynamic conditions in the policy environment, one of the important ways in which Governments can do so is by continually monitor policies and learning from policy experimentation (Moynihan et al, 2012).

2.2 Policy piloting as experimentation under risk and uncertainty

Policy experimentation is defined as a localized iterative process of “testing, piloting or demonstrating” specific policy designs to gauge their potential as solutions to specific policy problems (Van der Heijden, 2015). The process is subject to constant monitoring and adaptation to conditions, learning about effectiveness and efficiency of the design and collaboration between those who design, implement and benefit from the experiment. In some cases there is a clear intent to experiment and to learn from it, while in others there is an attempt to get it right the first time and maintain the program if it is right, or atleast ‘good enough’ (Peters, 1998).

Heilmann (2008) differentiated between trial and error activities and experimentation; with the latter being a conscious activity to try different methods and processes to identify innovative solutions to pre-defined policy problems or those that emerge during the experimental period. Experimentation here is consciously targeted towards developing new policy options with the intention of introducing these to official policymaking, replicating and scaling-up to the national level.

Through successful experimentation, a preferred policy change track can become apparent, which is then open for consideration by governments and the public without completely putting the authority and reputation of the government at stake (Peters, 1998).Policy experimentation is different from a scientific experiment because often the political practices of governments involved in these experiments cannot be equated to the usual components of an experiment, such as having a hypothesis that can be tested through repeated trials, control groups and randomization. Instead, the experimental aspect of such initiatives lies in the uncertainty of their applicability to the policy problem and context on implementation (Anderson, 1975). Thus, in such cases knowledge-generation alone is not the primary intended objective of policy experimentation (but may be a by-product of the process) that often might be the only outcome of scientific experimentation. Rather it is the demonstration of applicability of a certain policy solution or superiority of policy alternatives under uncertainty in addressing a policy problem (Gardner, 1995).

Experiments also serve as a source of evidence for policy-making in several sectors including education, healthcare, environment, social welfare among others (Bennion, 2011) and as useful tools for generating new knowledge for research and practice (Cloutier, 2014; Schot and Geels 2008; Seyfang and Smith 2007; Hoffmann 2011). China's economic transformation, for example, has been marked by policy experiments wherein the national government encourages local governments to explore innovative models of problem-solving with the objective of providing insights and guidance for national policy formulation (Heilmann, 2008).

Policy experimentation allows policymakers to better understand the effects of a policy intervention ex-ante (McFadgen 2012). For long-term policies such as for environmental issues, policymakers grapple with uncertainties in the policy formulation stage owing to a lack of complete understanding of the biophysical and social systems affecting and being affected, which may consequently lead to over-or under-estimation of the policy problem and thereby solutions that are ineffective or even counter-productive (Deyle, 1994). Environmental degradation and change could also lead to certain thresholds being crossed, limiting the effectiveness of current policy responses in the long-term (Kwadijk et al 2010). Hence piloting with new and alternative strategies or changes can prove useful.

Policy experimentation can facilitate social learning, which is required for coping with novel situations. Policy experiments can promote learning and adaptive policy response based on experience gained over time (Swanson et al 2010). Policy experimentation also forms a key tenet of adaptive management and is essential to decrease the ecological, social, and economic costs of learning (Carpenter et al, 2006). Experiments form a useful policy instrument to generate learning outcomes and policy-relevant information to help decrease uncertainty and manage system complexity (McFadgen, 2013).

While the concept of designing policies to be adaptive is considered desirable in principle, there are challenges in operationalizing adaptive policymaking. Van der Pas et al (2012) draw attention to the institutional challenges in implementing adaptive policies, primarily owing to their increased costs, complexity and time-intensiveness compared to conventional static policy approaches, making it difficult for policy practitioners to justify them in the present date, even though the benefits might offset the costs in the long-run. Additionally, changes suggested to the original policies and plans in the process of being robust and adaptive might require the original policy design to be altered significantly in some cases, which may not be politically or socially desirable.

Experiments have also been conducted at different levels. These have included those initiated at the community level. For example, in the context of climate change Hoffmann (2011) defines climate experiments as alternative governance initiatives that help communities respond to climate change, irrespective of jurisdictional boundaries and not bound by national regulatory measures or the international Kyoto protocol regime. In this case the experimental aspect is that these are alternative governance arrangements with new sets of actors and rules to bring about a bottom-up change to address climate change. Bos and Brown (2012) studied local to regional governance experimentation in the urban water sector and identified six factors that facilitated the socio-technical transitions. This includes presence of champions, networks, space, reputation, science and bridging organizations.

Under uncertainty, policy experiments including pilots can play an important role in generating policy-relevant knowledge such as evaluation of impacts of new initiatives such as subsidies and incentive programmes (Stromsdorfer, 1985). For governments, ‘what matters is what works’. Pilot projects can be a key source for evidence-based policy (Martin and Sanderson, 2000; Bevir, 2008).

Policy piloting can be considered as an ex-ante evaluation mode deployed by the government, to pre-test future programmes and policies for their likely impacts, process of implementation and stakeholder acceptability prior to launching these fully or on a large–scale (Nair and Vreugdenhil, 2015). Pilot projects are instrumental for experimenting with new programs at a “controlled small-scale” before introducing full-scale programs (Swanson and Bhadwal, 2009; Weiss, 1975). Pilots are being seen as useful in providing insights for dealing with complex policy issues and high uncertainty (Vreugdenhil et al, 2010). Piloting can also be done for purposes of being an early implementer or pioneer, for demonstration of best practices and for learning to operationalize policy (LSHTM, 2013).

Unlike impact assessments and other ex-ante evaluative methods that are formally mandated in many countries before projects can be undertaken or policies formulated, pilot projects are characterized by their large degree of freedom both in terms of who uses them and for which purposes. Pilot projects can be used for multiple purposes by one actor. Alternatively, different actors can use the same pilot differently (Ettelt et al, 2013). Compared to routine projects where proven concepts are used, little knowledge is developed and focus is on ‘production’ i.e. realization of pre-set targets, pilot projects are more creative and content-driven and learning through interaction with other actors is usually more important than ‘production’ (Nair and Vreugdenhil, 2015).

Broadly, pilots can be categorized into three types based on their purpose (Vreugdenhil et al, 2010):

1) Research Pilots aim to improve the supply of scientific information to decision-makers (Simon, 1977; Misor and Quade, 1985) and provide learning platforms (Pahl-Wostl, 2006). Research pilots focus on knowledge development, which can occur both through exploration and evaluation. Explorative pilot projects are used to test and refine innovations in a certain context. These pilots are generally used at an early stage of the innovation in a research environment, rather than a policy environment. Evaluative pilot projects are used to evaluate policies that are already in development at an early stage. Results of such pilots are used to inform policy-making and refine the policy (Weiss, 1975).
2) Management Pilots are used for triggering dialogue and communication between actors and encourage social learning, for problem mitigation to resolve existing problems in a particular context and where standard tools are lacking, for policy implementation to translate policy into practice by increasing acceptance and creating favorable conditions, and as insurance by reducing risks of failure and dealing with uncertainties by limiting the scale and hence the impacts.
3) Political-Entrepreneurial Pilots are used to influence a policy process for personal or strategic reasons. These pilots can be used for playing a political game, i.e. situations when the real intentions are masked and

> personal interests are served. In such cases the pilots can be used as a tactic for deliberately ‘guiding’ political attention, delaying decision-making or making a symbolic gesture (that ‘something has been done’). These pilots can also be used for providing an incentive to individuals or organizations to build experience and encourage innovations and for advocacy purposes when the pilot project is specifically used to convince others of a solution.

In the late 1990s research on policy design remained rather stagnant as it was assumed that changes in policy design “predetermined policy specifications”. In recent years, however the policy design field has revived its role and ability in consciously exploring improved designs depending on the policy context through the greater use of experimentation, flexibility in design and policy mixes inter alia (Howlett, 2014).

2.3 Experimentation and policy change

Hall’s (2003) work on policy dynamics and policy change based on the three-order model, remains the most quoted piece of literature on studying policy change. However policy scholars in the last decade have also drawn attention to the perils of studying policy change as an aggregate variable limited to these three orders. These scholars have argued that such aggregation can lead to a rather myopic view of the more complex and granular processes of policy change that may go beyond the incremental change vs. paradigmatic change classification (Howlett and Cashore, 2009).

Following the framework of policy mixes (Figure 2.2) set out by Cashore and Howlett (2007), six elements characterizing a policy can be assumed to change. These elements include changes in policy ends and changes in policy means. Changes in policy ends further included change in policy goals (general ideas that govern policy development), change in policy objectives that it formally aims to address and change in policy settings (on the ground requirements of the policy). Changes in policy means include change in instrument logic i.e. norms guiding implementation preferences, change in mechanisms i.e. types of instruments that are being utilized and change in calibrations i.e. the specific ways in which the instrument is used. Such changes however may or may not bring about increased or enhanced coherence of policy elements.

Figure 2.2: Components of a policy mix as an arrangement of policy ends and means (Cashore and Howlett, 2007)

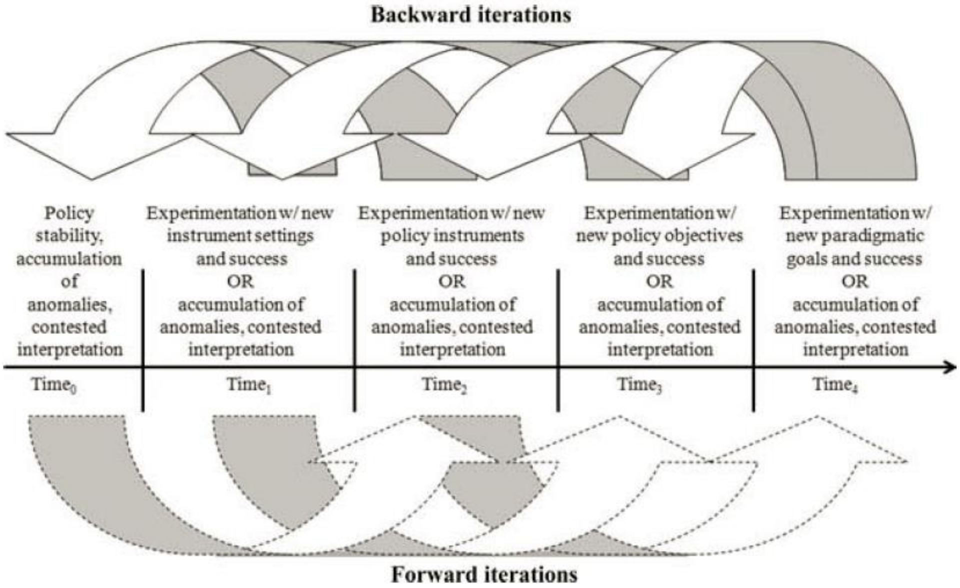
		Policy Content		
		High Level Abstraction	Programme Level Operationalization	Specific On-the-Ground Measures
Policy Focus	Policy Ends or Aims	**Goals** What General Types of Ideas Govern Policy Development? (e.g. environmental protection, economic development)	**Objectives** What Does Policy Formally Aim to Address? (e.g. saving wilderness or species habitat, increasing harvesting levels to create processing jobs)	**Settings** What are the Specific On-the-ground Requirements of Policy (e.g. considerations about the optimal size of designated stream-bed riparian zones, or sustainable levels of harvesting)
	Policy Means or Tools	**Instrument Logic** What General Norms Guide Implementation Preferences? (e.g. preferences for the use of coercive instruments, or moral suasion)	**Mechanisms** What Specific Types of Instruments are Utilized? (e.g. the use of different tools such as tax incentives, or public enterprises)	**Calibrations** What are the Specific Ways in Which the Instrument is used? (e.g. designations of higher levels of subsidies, the use of mandatory vs. voluntary regulatory guidelines or standards)

Ettelt et al (2015) examined policy experiments in health and social care in England, and reflected on the role of experiments in policy making in England. They argued that policy experiments were aimed at demonstrating the effectiveness of policies rather than investigating whether they ‘worked’. This coincides with Campbell’s (1969) idea that policymakers have a stake in a particular policy direction, even while experimenting, given the investment of political capital that goes with an experiment, as with any full policy.

Policy-makers generally want to be safe from any accusations of error of judgement, thereby despite uncertainty about the effectiveness of a programme, this cannot be openly acknowledged and policy experiments can rarely (if at all) be seen as a failure (Howlett, 2012). There can be multiple purposes of policy experimentation under conditions of future risk and uncertainty in the policy environment, including being an early indicator of the efficiency of alternative solution models for current and/or expected changes in the policy problem context (Nair and Vreugdenhil, 2016).

Even after the launch of an experiment, corrective back iterations into the experimental design can continuously occur, especially when the experiment was a failure in practice or was not completely institutionalized (Wilder and Howlett, 2014, Figure 2.3). Lack of institutionalization implies that the experiment or pilot has not been mainstreamed as a policy option during the policy formulation process (Vreugdenhil et al, 2012).

Figure 2.3:Taxonomy of possible processes towards paradigmatic change (Wilder and Howlett, 2014)



Sometimes policy change is brought about even before the results of the experiment emerge. In such cases, the experiments act as alternative routes for policy change and reforms to occur (Rogers-Dillon, 2004). The development sector has often conducted experiments to evaluate alternative strategies in order to allocate resources to those that emerge as most feasible (Rondinelli, 1993). Alternative solutions to existing policy problems can also fall under the category of innovations. For example in the urban context Broto and Bulkeley (2012) define climate change experiments as purposive and strategic innovations towards adaptation and mitigation and how these work in practice in new and different contexts. Broto and Bulkeley analyze 627 urban climate change experiments in a sample of 100 global cities. Experiments reflected attempts to develop technological innovations (designs, technologies, materials), social innovations (policy tools, financial mechanisms, changes to cultural norms) or both.

Policy experimentation can be understood in terms of the extent to which the mark a deviation from a status quo policy regime. While some experiments might lead to dramatic policy change, others may be rather incremental, calling for only marginal adjustments to existing policies and programs (Majone, 1991). Developing new policy designs or building on earlier designs can also be aided by policy experiments and pilots. The scaling up of policy experiments however depends on their outcomes which are an indicator of their “fit to practice” if these were to be converted to policies (Howlett and Rayner, 2013).

Policy formulation under uncertainty often aims to either reduce uncertainty where possible, or in other cases, assess the range of uncertainty and accordingly identify policy measures that are expected to be ‘robust’ within this range (Bredenhoff-Bijlsma, 2010). For example, determining ‘how much adaptation is enough’ to match the scale of change in the climate and associated impacts given future climate uncertainty is an ongoing challenge (Hall et al, 2012). Under uncertainty while delaying action or maintaining status quo might seem logical, there could be substantial costs associated with decision delays in the future, including the opportunity costs of not being early adopters of relevant adaptation strategies. Furthermore, inaction or delayed actions can also ‘lock in’ long-term risks, which may be costlier and more difficult or impossible to correct in the future (Ranger, 2013).

Shifts from the status quo may occur not only with respect to the future changes in the policy environment but also the response of the social-ecological systems affected by these changes, and any further feedback effect on the policy environment. While the possibility of these changes are acknowledged there have not been any attempts to quantify what determines proportionality of policy responses to change in the policy environment and factors that influence proportionality. Under uncertainty policies and programmes often focus on accommodating change rather than actively exploring policy alternatives in an anticipatory manner (O'Brien et al, 2012).

The essence of the search for solutions to a policy problem entails discovering not only which actions are considered to be technically capable of addressing or correcting a problem but also which among these is considered to be politically acceptable and administratively feasible (Howlett et al, 2009). The search for a policy solution will usually be contentious and subject to many conflicting pressures and alternative perspectives and approaches, frustrating efforts to systematically consider policy options in a rational or maximising manner. Positioning of actors for example plays a key role. Understanding the ideas and experiences that these actors bring to policy formulation and the contexts within which they operate can help explain why some options gain considerable attention while others are ignored.

The policy literature remains rather inconclusive on whether under conditions of uncertainty, policymakers prefer to make incremental changes to existing strategies or it provides an opportunity to innovate. Heazle et al (2013) argued that under conditions of high complexity and uncertainty incremental approaches i.e. adjusting along the margins of business-as-usual strategies are better able to address political conflict and deploy policy responses to adapt to the problems "we know we have now" and can control while "factoring in a margin for them becoming worse".

Given the high costs of some of policy transitions and transformations, uncertainties of risks and benefits enabling social contexts including leadership and availability of acceptable options and resources for actions are critical. The switch to transitions and transformations can be facilitated by incorporating these into the suite of risk management strategies early on, which can also help incorporate the long lead-times on associated policy decisions and actions (Howden et al, 2010; Park et al, 2012).

In what is probably the most well-known approach to the subject, Lindblom (1959), for example, argued that “successive limited comparison” resulting in incremental change is a realistic and fruitful method of policy analysis in circumstances of ‘bounded rationality’ or when policy-makers encountered difficulties identifying and assessing future policy challenges and pitfalls.

Incrementalism however has been criticized for lacking a clear goal orientation and being inherently conservative to large-scale change or innovation, following undemocratic decision-making (confined to senior policy actors), promoting short-sighted solutions due to lack of systematic analysis and mostly applicable in stable environments (Hayes, 2013). Under conditions when the policy problem is a politically sensitive subject, and there is uncertainty about the nature of the policy problem and the potential effects of certain policy decisions, policymakers tend to ‘grope along’ or “prefer innovation along the way, after little if any initial planning and analysis”. In such cases policy ‘corrections’ or changes occur in the implementation stage (Deyle, 1994).

Moreover, incremental strategies may not always be able to deal with large non-linear changes or conditions of policy ‘surprise’ (Roggema et al, 2012). When the degree of external change becomes high, a large change in response or transformative change in policy response may be required (Kates et al, 2012; Vermeulen et al, 2013).

The concept of reflexive (Voss et al, 2005) and adaptive policymaking (policies adapt over time as conditions change and learning takes place) has received much attention in the past decade as a useful approach for to policy-making under dynamic and uncertain conditions. Adaptive policymaking is based on learning over time, operating on available best scientific information till new knowledge comes up, or active i.e. consciously experimenting with policy alternatives to identify better strategies as new conditions emerge (Walter, 1992; Swanson et al, 2010).

Transformation can be undertaken as a deliberate process with the intent of achieving a specific goal(s) and it can also occur as an “unexpected or unintended outcome of a process or event” (Nelson et al., 2007) or when faced with ‘surprise’ (Lindenmayer et al, 2010; Wardekker et al 2010). Incremental responses, on the other hand, largely remain in step with existing systems and are therefore better suited to circumstances in which changes in both the environment and technology of policy is minimal (Kates et al, 2012).

A key barrier to transformations however is that these challenge existing beliefs, norms and regimes through technological innovations, institutional reforms, behavioural and cultural changes among others. There are also uncertainties related to for example, how the climate, socio-economic and political environment unfolds in the future, costs of transformation and of any unintended impacts (Rickards and Howden, 2012; Kates et al, 2012), possibility of maladaptation, ‘over-adapting’ and building capacities to transform. Learning and leadership play a major role in overcoming barriers to transformation (Heifetz et al., 2009; Tschakert and Dietrich, 2010).

Between these two extremes two other types of policy processes are possible. Firstly, coping processes that are deployed rather quickly under conditions of high change in the policy environment, with the main objective of reducing or spreading the risk to cope with change. These actions and activities are more likely to evolve at the micro level as compared to adaptive strategies that involve long-term change in behavioural patterns and more likely to evolve at larger spatial scales (Adger, 1996).

Secondly, the concept of transitions management, that has gained prominence in the last decade to explore “a range of possible pathways for change” (Farrelly and Brown, 2011; Meadowcroft, 2005). Transitions can be defined as ‘a gradual, continuous process of structural change within a society or culture’ and are complex, spread over long timeframes, involve multiple actors and occur across multiple levels (Rotmans et al., 2001). The concept of experimentation is linked with enabling transitions in socio-economic regimes (Geels et al, 2002, 2005).

Experimentation is important in enabling social learning to overcome system lock-in and facilitate restructuring of existing social–technical systems for changes in norms, values, goals, processes and actors (O’Brien et al, 2012). Management of transitions involves experimentation with alternative means of transitions towards possible futures that are linked to long-term sustainability goals for the society. These experiments can have the ability to overturn existing policy regimes, when the opportunity so arises. However how the transition to new regimes occurs has been an area that has not been studied in detail (Bettini et al, 2014). Transitions require a process of “system innovations” by different participants and fundamentally change both system structure and the relation among the participants but are not high on the axis of uncertainty (Loorbach and Rotmans, 2006; 2010; Van der Brugge and Rotmans, 2007).

2.4 Causal mechanisms and pathways to scaling-up of pilots

A key challenge while designing policies for the future is to operate in a space where there are pre-existing policy mixes that have developed over time, often through a series of incremental changes such as ‘layering’, ‘drift’, ‘conversion’ or reformulation such as ‘redesign’ (Thelen, 2004; Streeck and Thelen, 2005; Van der Heijden, 2011; Howlett and Rayner, 2013). Any change in policy response will typically be faced with resistance by stakeholders, particularly those with vested interests. This makes it difficult to introduce any radical changes in the policy mix even if new policy objectives are put forth (Kern and Howlett, 2009). Innovations for example would need to compete with existing technologies that have already been imbibed into the socio-economic context and attempt to fit through processes of “learning, coercion and negotiation” (Rip and Kemp, 1998; Christiansen et al, 2011).

For governments it may not be very appealing to appear in a mode of active and ‘constant experimentation’ for certain policy issues as it runs the risk of the public not taking the specific program seriously or trying to influence the outcomes to suit their interests, especially if it calls for investments (Peters, 1998). If policy change involves significant costs it is likely to deter policymakers from undertaking the change and thus increase policy ‘stickiness’ (Callander, 2011). Policymakers can also be challenged on account of overriding equity and fairness concerns by investing resources only on certain sections of the society as part of an experiment (Stoker, 2010).

For such reasons, policymakers might often be hesitant towards experimentation and piloting, especially as there is always a risk of failure associated (Howlett, 2012) despite promising results demonstrated through pilots. Sometimes pilot projects may represent tools for conflict avoidance (Jann and Wegrich, 2007). Majumdar and Mukand (2004) modeled the impact of electoral liabilities on a government's decision to learn through policy experimentation and argued that new governments may either tend to openly experiment with new policies or be conservative by not altering the status quo. In either case however, over time most governments are conscious of their reputation via performance of policies attributable to their tenure and thus exercise caution in experimentation that is likely to bring change to the status quo.

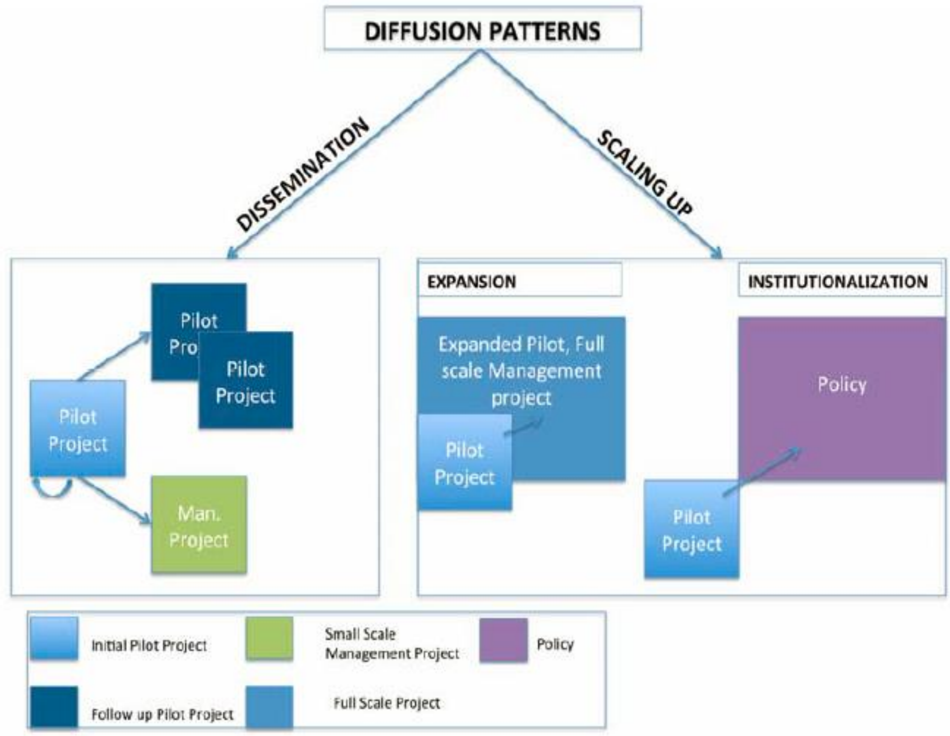
In a similar attempt Callander and Hummul (2014) modeled why long-term policy preferences of policymakers are often contrary to rational expectations. They found that though political power is held by policymakers temporarily, they can extend their policy influence for a long-time through pre-emptive policy experimentation to alter the “informational environment” of their successors to seek longevity for their preferred policy choices.

Policy pilots usually operate for short time periods with one-time evaluations to measure success (Stoker and John, 2009). The factors leading to success of a pilot and links between expansion of the pilot and any policy change or transition are thus not well established, theoretically or empirically, and often remain limited to 'learning from failure' (Vreugdenhil et al, 2009).

Spicer et al (2014) argue that "scaling up is a craft not a science" alluding to the predominant political nature of the activity compared to its technical aspects. Continuation and expansion of policy pilots can also be stalled in case there is widespread opposition from key stakeholders (Vreugdenhil, 2010). For example, policy pilots across many countries were intensely scrutinized during the late 1980s and 1990s and accused of being 'donor-driven', dependent on external aid and rather myopic to local priorities and engagement. Also, the resource support provided for pilots at a smaller scale seemed to run out when replication at a larger scale was planned. Some pilots may also be launched to provide policymakers with an excuse to delay critical large-scale policy reforms (PHR, 2004). On the other hand, political pressure can sometimes also hasten the process of evaluation of pilots in a bid to obtain 'evidential support' for implementation of certain decisions (Sanderson, 2002).

When policy pilots are found to be effective they could be "diffused" i.e. continued or expanded via replication of the pilot into other or similar pilots and 'scaling up' into policies or bigger pilots (Figure 2.4). The empirical evidence on the characteristics of such pilots and the process of their expansion and scaling-up is however lacking (Vreugdenhil et al, 2009; Vreugdenhil et al, 2012).

Figure 2.4: Diffusion and scaling-up pathways of policy pilots (Vreugdenhil et al, 2012)



Hartmann and Linn (2007, p 2) define scaling up as "expanding, replicating, adapting and sustaining successful policies, programs or projects in geographic space and over time to reach a greater number of people". While the value of pilots and policy experiments in general is acknowledged, the issue of scaling up of these pilots and experiments to benefit national-scale programmes is rarely addressed (Simmons et al, 2007). Often when pilots are scaled, they always face the risk of becoming less appropriate for the contexts and populations to which these are applied.

Public opinion also plays a role in affecting policy outcomes. Knowledge of uncertainty and the risks in turn play an important role in forming public opinion (Eckles and Schaffner, 2011). Based on a model for uncertainty management, Herian et al (2012) observed that the use of public participation by a local government increases perceptions of ‘procedural fairness’ among the public, which in turn can enhance public support for the government and its decisions under uncertainty.

Integration of new knowledge to adapt policies and prepare institutions for long-term changes through ‘continuous anticipation and learning’ is often lacking (Volkery and Ribiero, 2009). Peters (1998) argues that governments learn through experimentation in a trial and error fashion with little knowledge cumulation followed by policy improvement, often attributable to the constant movement of senior policymakers across administrations with changes in parties in power.

The scaling-up of policy experiments and their translation to full policies faces several challenges (Stoker 2010), especially in cases that the findings of these experiments do not re-affirm a preferred policy direction of the Government (LSHTM, 2013). Strong control from the central government on the content and process of experimentation at the local level acts can sometimes act as an impediment for innovative solutions to emerge via active experimentation and thus may remain limited to being a form of “intentional policy design” (Mei and Liu, 2013).

More recent literature on experimentation has shifted its focus to the process of experimental policy design, including the role of various stakeholders compared to the earlier works that focused more on the content of the experiments itself (Van der Heijdin, 2013). This new wave includes a focus on “experimentalist governance” as an iterative process of “provisional goal setting” with the intention of revising the goals based on the learning derived from trying out alternate modes of goal achievement in different contexts (Sabel and Zeitlin, 2012).

Hoffmann (2011) argued that rather than a piece-meal approach, it is more valuable to look at experiments collective and thus their combined impacts. Hoffmann collated 58 independent initiatives for action against climate change ('climate governance experiments') – that included initiatives by cities, provinces and states, citizen groups, and corporations globally. Hoffmann argued that system-level characteristics are 'emergent' in nature and cannot be predicted by simply examining individual efforts and that despite the 'novelty' element expected in an experiment, they also in many ways build on what is known, drawing on existing resources and ideas.

Successful scaling up should ensure that the key features of the pilot are not lost in the process of expansion as a failure to do so could impact the replication of the positive results obtained from the small-scale pilots (Simmons et al, 2007). Scaling up occur when a program increases in size, its geographical spread or budget (quantitative); increases in its range of activities and interaction with related programs (functional); increases in political power and engagement with wider political processes (political) or increases in organizational capacities and processes (organizational) (Gillespie, 2004). Hartmann and Lin (2007) identify seven elements critical for scaling up of developmental interventions. These include, (i) applying leadership, vision and values; (ii) managing political constituencies; (iii) ensuring supportive policies; (iv) developing institutional capacity; (v) creating incentives and accountability; (vi) practicing evaluation, learning and feedback; and (vii) planning for success.

Diffusion of pilots can be blocked in case a diffusion management strategy is entirely absent, poor or there is widespread opposition from critical stakeholders. Initiators of pilots might sometimes keep a “wait and watch” approach assuming diffusion to happen autonomously. Initiators might also lack incentives to go beyond the pilot stage, capacities may be lacking as resources have not been envisioned to undertake diffusion. Also, the quality of diffusion might be poor if monitoring and evaluation, documentation of results and sharing, engagement of current and future stakeholders and proper timing of diffusion management is lacking (Vreugdenhil, 2010).

The impact of pilots and evaluation is affected by context (LSHTM, 2013) thus attribution of causality of observed outcomes to pilots needs to be studied in different contexts and scales to identify generic as well as specific factors that influence diffusion of the pilots. In addition, the combined effect of these factors needs to be studied. Scholars and practitioners need to recognize that lessons might be the biggest contribution of failed pilots (Mattingly, 2008) and thus studying failed pilots are equally important as the successful ones. Some scholars have suggested that ‘how pilots work’ signifies a more useful investigation rather than ‘whether it works’, especially when these are considered as ‘prototypes’ for future policies (Chitty, 2000).

Many factors influence the pilot dynamics, including the pilot design and the context. These can include factors such as, the interests of stakeholders involved, that further influences the availability of knowledge and resources for scaling-up of the pilot, choice of the initial sites of piloting, the mode of governance that influences the nature of stakeholder engagement and learning, the level of innovativeness of the pilot and how it converges or diverges from the current policy context, flexibility to make changes to reflect local conditions and very importantly, the timing of pilot expansion and scaling-up (Vreugdenhil et al, 2009; 2012).

2.5 Summary

Uncertainty and complexity in policymaking can be addressed by designing policy initiatives as experiments. The experimental aspect relates to uncertainty of their applicability to the policy problem and context on implementation and its superiority among other policy alternatives. While the importance of policy experiments for policy formulation and change under uncertainty and complexity is acknowledged in theory, systematic evidence of how they scale up (factors and processes) and influence policy in practice is lacking.

Piloting, an important form of policy experimentation, is suggested as a promising means to allow government programmes and policies to be pre-tested before launching them fully, address policy complexity and uncertainty, launch new programs at a controlled scale, introduce variation in policy responses, evidence-based policymaking, learning and to explore improved policy designs and mixes. A key factor influencing scaling-up is found to be the fit of the pilot with an existing policy regime.

Table 2.2 summarizes key gaps in the current literature on pilot design and implementation and the motivation and rationale behind the research design that is chosen for this thesis.

Table 2.2 Summary of gaps in literature and rationale for current study

Characteristic	Gaps in literature	Rationale for thesis research design
Governance Level	Current studies on pilots are largely driven by governments at sub-national levels (e.g. state/provincial/city level)	The current study focuses on national level policy piloting
Influencing factors	Current literature on pilots identifies several influencing factors for scaling-up, in a rather fragmented manner, limiting the generalizability of the findings. These factors include convergence with current policies/ preferred policy direction, evidence of effectiveness, flexibility to local context, stakeholder support, resource availability, leadership, institutional capacities. In addition, there is a lack of analysis of comparative influence and interaction effects between multiple factors that may be relevant to scaling-up.	This study conducts a detailed analysis of a key factor influencing scaling-up i.e. fit of a pilot with an existing policy regime, segregated further into components (variables)
Sectors	Studies on pilots have largely focused on social policy sectors (especially health) and less in social-ecological settings facing high risk and uncertainty in their policymaking context.	Policymaking in the agriculture sector faces high risk and uncertainty and influences, and is influenced by changes in social and ecological settings. This thesis focuses on piloting in the agriculture sector.
Time period	Studies on pilots have mostly been ‘one-off evaluations’ of individual pilots. Long-term studies to observe piloting features within a government or ministry are rare.	This thesis covered a time period of fifteen years, following the design and implementation of pilots by a central level ministry of agriculture to capture the evolution of the pilot over time and space.
Comparative analysis	There has been a lack of comparative case analysis of similar pilots	This thesis conducts a comparative analysis of 14 pilot cases

Characteristic	Gaps in literature	Rationale for thesis research design
Location	Theoretical and empirical studies including pilot evaluations have largely been limited to North America and Europe	By focusing on piloting in Indian agriculture, this thesis expands the theoretical application and empirical database of the literature on piloting.

Chapter 3 Methodology

This chapter presents the philosophical assumptions underpinning this research, and introduces the research strategy and techniques applied for data analysis. The chapter defines the scope and limitations of the research design, and situates the research amongst existing research traditions in policy design.

This chapter is divided into three sections. In the first section, the interpretive stance in the field of policy design is examined. The next section is about case selection. Section three covers data sources, data collection and analysis, followed by validity and reliability issues.

3.1 Ontology and epistemology

The key research question guiding this thesis is: *Can design characteristics of policy pilots explain variations in their scaling-up and overall policy change?* Two sub-questions were set to investigate the overall research question:

- Which are the necessary and sufficient factors for scaling-up of policy pilots?
- Are the mechanisms of scale-up similar for policy pilots that share similar characteristics?

These research questions are best answered with a case-study approach as the design features of individual cases need to be studied in detailed and compared. In addition, the concept of pilot scaling-up is very context-specific and has been studied in a variety of sectoral and geographical settings. The design features of pilots further need to be conceptualized drawing from policy design literature. This study takes a subjective ontology (because the phenomenon of interest i.e. scaling up is being conceptualized and studied subjectively). Scaling-up can be defined and measured in several ways based on the theoretical interpretation of the concept. This study thus follows an interpretivist epistemology to understand why and how scaling-up is happening (Merriam, 1998).

The following propositions are set to guide the overall study:

1. Scaling-up is a political process
2. Changes at the policy ends (goals) level are more deterministic for overall policy change than changes at the means level
    2.1. Paradigmatic changes in goals lead to overall paradigmatic change in outcome
    2.2. Incremental changes in goals lead to overall incremental change in outcome

The propositions are set such as to use policy pilots (as cases of policy experimentation with ends and means) to study the relationships between selected causal conditions and observed outcome. The policy pilots studied and compared in this thesis form the cases in which specific outcomes i.e. level of scaling-up and the conditions which led to them (or not) are traced.

To investigate these propositions, a combination of case narratives, Qualitative Comparative Analysis (QCA) and Process Tracing is used. QCA helps identify if specific causal conditions such as changes at the ends level or means level can independently lead to the outcome i.e. scaling up, or whether these operate in combination with other conditions. Secondly, Process Tracing helps in studying in detail the overall process of policy change brought about by the pilot.

3.2 Case Selection

The cases being studied are policy initiatives including schemes, projects, programmes that operated in a pilot mode (not full policies) and were implemented by the Government of India. These cases are examples of policy experiments undergoing an iterative process to address diverse risks and uncertainties to agriculture production owing to current and expected diverse biophysical, socio-economic and institutional changes. In the context of the current study policy pilots are defined as time-and-space bound initiatives by various Government and Government -affiliated agencies to help reduce production risks and uncertainties in the agriculture sector in India.

The design of policy schemes and programmes, including pilots and their continuation by the Government of India primarily follows the Five-year developmental planning process for the country. That is, in every Five Year Plan, the ongoing schemes are revisited and evaluated for their progress and thereby considered for continuation with changes, if any. Additionally, there are annual progress reports generated by the Planning Commission of India[3] that present a review of these schemes.

The search for policy pilots was conducted from year 1990 to 2015. This time-frame covers five planning periods, eighth to the current i.e. Twelfth plan period (2012-2017). 1990 is selected because it witnessed the start of liberalization of the Indian economy, along with opening of agriculture

[3] Dismantled since 1st January 2015 following elections and changes in the ruling party, and converted into a new planning body called *Niti Ayog*.

markets for exports and permitting the entry of private players. Secondly, this period saw the beginning of the decentralization process in the country whereby there was devolution of powers to the state and local levels providing them more autonomy in terms of implementation of central policy schemes and programmes (Adiseshiah et al, 1994; Bohra, 2000; Deshpande and Chakravarty, 2011). The entrance of new actors and ideas can pave the way for changes in goals and policy instruments (Howlett et al, 2009). The post-reform period can help capture any differences in scaling-up attributable to differential acceptance or state and sub-state level factors.

As piloting does not feature as a periodic regularly-timed activity within the Government of India, the selection of pilots followed a systematic process of identification through consultations with key officials in the Central and selected state Governments, policy researchers and review of planning documents since 1990. A group of fourteen pilots were selected for the analysis based on a set of criteria discussed in the next section.

3.2.1 Shortlisting of cases

Given that two-thirds of the cultivated area in India is rainfed, the case identification was initiated by reviewing the agriculture sector of all Five Year Plan documents and Annual Reports of the Ministry of Agriculture since 1990. In addition, consultations were conducted with Members of the Working Group Management of Natural Resources and Rainfed Farming constituted by the Planning Commission of India in 2011 to deliberate and make recommendations for the agriculture sector for India's 12th Five Year Plan period (2012-2017). The objective of following a three-step process of consultation with Government officials and agriculture experts, policy document search and literature review was to capture the major policy pilots that have been launched to address risk management in Indian agriculture.

The following criteria were set to select the pilots. These criteria have been based on an understanding of the Indian agriculture context as well as characteristics of policy pilots and experiments that emerge from the literature.

- The initiatives should be aimed at increasing crop productivity (food grains only) in the country and reducing production risks to agriculture, and launched by the Central Government of India (Ministry of Agriculture) directly, in partnership with State Government (s) and/or with external funding support,
- These should be time-delimited, i.e. at the outset these were designed to run for a limited number of years
- These should be spatially limited with the explicit intention of testing out at a small scale first before expanding further.
- Initiatives with the explicitly stated intent (goal) of aiming at scaling-up beyond the initial identified scope (to ensure that the scaling-up was indeed one of the intended objectives of the initiative).
- Should be identified as being in a test phase aiming at policy development through testing of untried components for reform of existing policies/programmes.
- Should have been subject to periodic monitoring and should have completed at least one round of formal monitoring and evaluation
- Policy experiments especially pilots are rarely reported. So the selected initiatives should have enough documentation and access to

government officials who are willing to talk about it so that it can be analysed.

- These should have finished the pilot phase so that the outcome can be clearly studied.

Along with criteria for cases, it was important to set conditions for filtering out the non-cases from the wide number of schemes and programmes launched by the Government of India to address different aspects of agriculture production. The following initiatives were not considered:-

- Those that were being continued from earlier plans. It was a conscious decision to choose year 1990 onwards to internalize any policy impact the decentralization and devolution of powers brought about.
- Those that did not have experimental components and were regular initiatives with a pre-defined scaling up strategy, and whatever changes happened were incidental in nature. For example regular food production programmes through demonstration of varieties and technologies aimed at gradual expansion as opposed to other initiatives that were consciously launched to test risk management models over a limited trial period and spatial coverage.
- Those that were not directly related to addressing crop production risks (i.e. other parts of the value chain)
- Those that were not being designed and monitored directly by the Central government Ministry of Agriculture.
- Crop-specific programmes focusing only on a specific region were considered to be limited in their replicability potential at the national

level and thus were not considered (e.g. Accelerated Maize Development Project).

- Several externally aided projects which were focused on state-specific issues only and thus had limited replicability potential at the national scale were not considered e.g. Uttar Pradesh (northern state in India) sodic reclamation project.

The broad question that guided the inductive approach for identification of policy pilots was: What are the initiatives that are helping policymakers in India deal with risks and uncertainties in agricultural production in rainfed areas? There are several formal and informal risk management strategies in agriculture, which can further be classified as ex-ante and ex-post (Figure 3.1, World Bank 2002).

Figure 3.1: Ex-ante and ex-post strategies risk management in agriculture (GoI, 2007)

		Informal Mechanisms	*Formal Mechanisms*	
			Market based	*Publicly provided*
Ex-Ante Strategies	*On-farm*	• Avoiding exposure to risk • Crop diversification and inter-cropping • Plot diversification • Mixed farming • Diversification of income source • Buffer stock accumulation of crops or liquid assets • Adoption of advanced cropping techniques (fertilization, irrigation, resistant varieties)		• Agricultural extension • Supply of quality seeds, inputs, etc • Pest management systems • Infrastructures (roads, dams, irrigation systems)
	Sharing risk with others	• Crop sharing • Sharing of agricultural equipment, irrigation sources, etc • Informal risk pool	• Contract marketing • futures contracts • Insurance	
Ex-Post Strategies	*Coping with shocks*	• Reduced consumption patterns • Deferred / low key social & family functions • Sale of assets • Migration • Reallocation of labor • Mutual aid	• Credit	• Social assistance (calamity relief, food-for-work, etc) • Rescheduling loans • Agricultural insurance • Relaxations in grain procurement procedures • Supply of fodder • Cash transfer

Many schemes have been launched by the Government of India for the benefit of rainfed areas. Some of these are area development programmes, while others are directly intended to address risks to agriculture productivity in rainfed regions. While many risk management strategies can be undertaken by farmers and farmer groups at the individual or community level informally, this study focused on policy pilots that are publicly-provided mechanisms launched by the central Ministry of Agriculture towards risk management in the sector.

As identified in Figure 3.1, these can broadly be categorized under initiatives that cover agriculture extension, supply of quality seeds and inputs, pest management, infrastructure provision, social assistance especially during disasters, loan assistance and access to credit and insurance, relaxation in grain procurement procedures, supply of fodder and cash transfer. The focus of this study is only on pilots that were launched at the national level because it provided a wider canvas to study scaling-up across the federal governance structure in India.

3.3 Data collection

Data is collected through consultations, interviews and analysis of policy documents relevant to the pilots. Interviews with officials and researchers who were involved with the design, implementation and/or evaluation of the pilot as well as official documentation of the same was considered to be able to comprehensively cover all information about the pilot, in order to answer the overall research question.

3.3.1 Consultations and interviews

Interviews that elicit information about how events unfolded or who was involved in decision-making and what their goals were are often primary data sources for qualitative research (Mosley, 2013). A total number of 16 preliminary consultations and 69 interviews were conducted for the study in three phases (Table 3.1).

Between May to August 2014 an initial set of consultations were done to explore the landscape of agriculture policy pilots since 1990 and select pilots for analysis, explore data availability issues, and develop a preliminary classification for the identified causal set of conditions and outcome (scaling up) to ensure there is enough variation in conditions and outcomes to be studied.

Sixteen consultations were conducted in this phase with members of the Working Group on Natural Resource Management and Rainfed Agriculture, Planning Commission, Government of India, and other agriculture experts and members from international donor agencies working with the central and state governments in India on agriculture risk management.

Table 3.1: Phases of interviews conducted

Phase	Number of interviews
I: Preliminary Consultations to understand the landscape of policy pilots in India to address risks and uncertainties in the agriculture sector [conducted between May- August 2014]	16 consultations 8: Central and state government officials 8: International donor agencies, agriculture experts, researchers
II: Interviews conducted for selected 14 pilots to study their design, implementation, progress and evaluation [conducted between January- December 2015]	55 interviews 34: Central and state Government officials 11: Government research agencies 10: NGOs, research institutes and consultants
III: Interviews conducted for Process Tracing of specific pilots [conducted between August- December 2015]	14 open-ended interviews 4 (2 Central Government implementation and 2 agri-extension agencies) 2 (1 Central Government and 1 National agri-insurance company) 3 (1 Central government, 2 national agri-research institute) 3 (Central Government) 2 (1 Central Government, 1 Insurance agency)
	16 consultations, 55 semi-structured interviews, 14 open-ended interviews

Following the preliminary consultations, the pilots for the study were identified, the questionnaire was prepared and contact was established with the interviewees (details in Appendix I-III). The interviews were conducted in two rounds. The first round of interviews was conducted between January-December 2015. Fifty five interviews were done in this phase. A purposive sampling was done to identify government officials who were directly involved in the design and implementation of the pilot. To avoid any bias, independent researchers and consultants, research institutes and officials involved in the evaluation of the pilots were included where possible. The independent researchers and consultants were often not involved in the design or implementation but had conducted intensive research on the pilot.

The number of interviews per pilot was decided as per the rule of saturation of information about a pilot. In some cases, for example for the National e-governance Plan for Agriculture (NeGPA) and the National Project on Organic Farming only two interviews each were conducted. Here, only the senior-most government officials were authorized to share or issue any official statement or discussion about the pilot. Where possible, all the interviews were supplemented by a variety of documentation about the pilot to collect as much information as possible and to rule out any biases in the information provided during the interview, especially in cases when only few officials were authorized to respond to interview requests.

The interviewees were identified through initial discussion with experts. In some cases, the government officials who designed and implemented the pilots had completed their tenure and retired from the Government. Their details were obtained from the current staff in their former departments and interviews were conducted with the retired Government officials. Additional interviewees for each pilot were identified via snowballing.

Pilots are rarely reported in detail hence triangulation of the data from several sources had to be done. For each pilot, this included central and state government officials, officials from other non-governmental and research agencies who were involved in the design and implementation of the pilot as well as consultants or officials involved in internal or external third party evaluation of the pilots. In some cases, few senior government officials were engaged in more than one of the selected pilots that had been operational during their tenure in the department.

Semi-structured questions relating to the research questions under exploration were identified. The interview guide allowed me to set an agenda to guide the interview. An introductory email was first sent to all respondents along with a brief note of the project and an official departmental letter from the Lee Kuan Yew School of Public Policy endorsing the study. An interview lasted for 60-75 minutes in total. All interviews were conducted in person and were audio-recorded. In cases when senior Government officials were not comfortable being audio-recorded, hand notes were taken instead. In such cases, the interviews were transcribed the same day.

The questionnaire was designed to capture the research questions and included questions relevant to the purpose of the pilot, design features of the pilot, the changes it brought about to the current policy regime, scaling-up process and monitoring and evaluation. The questionnaire consisted of the following five parts: 1) Content of the pilot, 2) Stakeholder arrangements, 3) Implementation and Diffusion, 4) Evaluation and 5) Learning.

Follow-up interviews were done over phone, email and in some cases in-person meetings were conducted again for obtaining additional information or clarifications about individual cases. When the participants showed willingness to review the interview transcripts, these were sent back to them.

3.3.2 Document analysis

Analysis of key policy documents can serve multiple research purposes. Firstly, they can provide reference information about an initiative prior to conducting interviews. Secondly, they can validate or even contradict observational and interview data and allow the researcher an opportunity to triangulate data as well as explore reasons for any contradictory statements and information (Yanow, 2007).

The documents reviewed for obtaining general information for case selection as well as specific details about the selected pilot initiatives include:

- Policy planning documents from the websites of line ministries including the Ministry of Agriculture, Ministry of Rural Development, Ministry of Land Resources, Ministry of Water Resources and Ministry of Environment and Forests, Government of India.
- Policy documents, minutes of meetings, guidelines, statistics and press releases specific to the pilot project
- Official media reporting related to the pilot project
- Evaluation reports and policy documentation, including progress reports pertaining to the pilot implementation
- Review of publications and blogs of key developmental aid agencies in India including The World Bank, German development bank (GIZ), Swiss Development and Cooperation (SDC), United Nations Development Programme (UNDP), and Food and Agriculture Organization (FAO).
- Research reports and documents relevant to the pilot by NGOs and research institutes working on agriculture risk management in India.

3.3.3 Coding process and logic

The choice of coding strategy can be based on the theoretical framework, methodological considerations and key research questions (Saldana, 2009). For this study, descriptive coding was followed to study aspects of design and scaling-up of the policy experiments. Descriptive Coding leads to a categorized inventory or index of the data's contents. In this study descriptive coding helps identify sections that relate to characteristics of the change in an existing policy regime brought about by the pilot in terms of policy ends and means at the three levels (goals, objectives and settings), as well as the outcome of interest i.e. scaling up.

After completing the data collection, a content analysis of the raw interview data and documents was done using qualitative data analysis software Atlas.ti. Codes were generated to (presented in Table 3.2) to capture the characteristics of all fourteen pilot cases and changes these brought to an existing policy regime. The case-wise coding of information was obtained by coding the pilot-specific interview transcripts and documents providing information on each of the cases. These included the policy documents, official announcement of the pilot/initiative, progress reports and government documents with revised guidelines or other amendments in the original pilot design and implementation, Monitoring and Evaluation reports and Research papers related to the pilot.

Table 3.2 Coding categories and sub-categories using Atlas.ti

S. No.	**Category**	**Sub-category**
1	Content of the pilot	• Changes at goals level • Changes at objectives level • Changes at settings level • Stages of the pilot (time-line)

S. No.	Category	Sub-category
2	Stakeholder arrangements	• Key stakeholders • Perspectives of each stakeholder group
3	Implementation and diffusion	• Changes in instrument logic • Changes in instrument type • Changes in instrument calibration • Scaling-up of the pilot • Factors influencing scaling-up of the pilot
4	Evaluation	• Impacts and Outcomes of the pilot
5	Learning	• Implications for pilot design • Implications for pilot implementation

After the descriptive coding, the data was ready to be converted into fuzzy scores and to start the Qualitative Comparative Analysis. For each code i.e. change in policy component, the data from all cases was reviewed to ascertain if there was sufficient information for analysis and sufficient variation across all cases. Next, for each cases all the information was reviewed together to identify any contradictory statements or information.

3.4 Ethics review

The National University of Singapore has a format for obtaining informed consent document for all interviews and for providing the interviewees with an Information Sheet providing an overview of the project and purpose of the interview (Participant Information Sheet and Consent Form in Appendix). Approval was taken from the University's Institutional Review Board (IRB) prior to visiting the field. Using an IRB approved informed consent document, formal written consent was obtained from the respondents prior to conducting the interviews. Some senior government officials were not authorized to sign on any forms issued outside the Government. In these cases a verbal consent was obtained.

3.5 Data analysis Techniques

For this study a combination of two methods was used in a sequential manner. Schneider and Rohfling (2013) are followed to combine Qualitative Comparative Analysis (QCA) and process tracing as a multi-method research technique. QCA is used to observe overall patterns in the dataset of fourteen pilot cases, while Process Tracing helps in more detailed analysis of selected unique case combinations that are identified from the QCA analysis.

3.5.1 Qualitative Comparative Analysis

For purposes of this study, a set-theoretical approach was found to be useful to study the relation between causal conditions studied as sets of change brought by a pilot to a current policy mix (characteristics of the pilot design) and scaling-up of the pilot (outcome of interest).

Note on choice of causal conditions:

As identified in the summary of the literature review chapter, though several factors have been identified as conditions that can influence scaling-up, these have been found to be relevant at a sub-national level. The central methodological assumption of this thesis is that scaling-up at the national level can be studied using the concept of 'goodness of fit' or how well a pilot fits with an existing policy regime. This factor is identified as being critical to scaling-up, both in literature as well as through initial round of consultations in

India. In addition, in the Indian agriculture policymaking context, many of these factors such as stakeholder engagement, resources, choice of pilot sites etc. can be subsumed within the policy mix framework chosen for the study.

Set-theoretic methods can be deployed for a study if the phenomenon or concept of interest is best studied in terms of set relations (Schneider and Wagemann, 2012). As evident from the literature, scaling-up as a phenomenon is understood to be a result of a combination of factors (Vreugdenhil et al, 2012; Gillespie, 2004; Simmons et al, 2007; Hartmann and Lin, 2007). The motivation of applying multi-method research for this study was to investigate whether and how changes in means and ends combined to produce variations in outcome.

One of the most formalized technique for set-relational research (Schneider and Rohfling, 2013), Qualitative Comparative Analysis has several variants and the choice depends on the nature of the sets formed by the hypothesized causal conditions and the outcome of interest (Thiem, 2014). Qualitative Comparative Analysis (QCA) has been designed by Prof. Charles C. Ragin and colleagues at the University of Arizona, United States and is an analytical technique based on Boolean algebra[4]. The variables in QCA are either presented as Crisp sets i.e. binary sets that denote presence or absence (1 or 0 respectively) of membership in a specific category, for e.g. presence of a particular form of government. A fuzzy set splits this all-or-none categorization into further categories using scores from 0 to 1 (Ragin, 2006).

[4] "Fuzzy Set Qualitative Comparative Analysis", accessed 20 December 2015 http://www.u.arizona.edu/~cragin/fsQCA/index.shtml

The objective of QCA is to enable causal interpretation in addition to detailed qualitative information that is obtained from case studies, in order to understand the different combination of plausible factors that could lead to a specific outcome (Ragin, 2007; 2008).

Fuzzy set Qualitative Comparative Analysis (fsQCA) helps assign scores between 0-1 to characterize these sets. fsQCA is “a program that uses combinatorial logic, fuzzy set theory and Boolean minimisation to work out what combinations of case characteristics may be necessary or sufficient to produce an outcome” (Kent, 2008, p 1). fsQCA is particularly helpful in instances where there is a proposition/hypothesis regarding the underlying causal conditions affecting the outcome being studied (scaling up in this case), when different combinations of these plausible conditions could give rise to the outcome and conditions are sufficient only when they are in combination, when results need to be interpreted as necessary and sufficient conditions and when the number of cases is very low for conventional quantitative methods to be applied (Ragin, 2008).

In a QCA, cases are marked in terms of their membership in sets that measure causal conditions and in the outcome. By measuring concepts as conditions and assigning membership values, QCA helps in bringing to fore any key challenges in conceptualizing social and political phenomenon such as scaling up and policy change. Additionally, by aiding in the identification of patterns within a comparable dataset, QCA helps in bringing a level of abstraction to study of concepts and phenomenon that are otherwise dependent on highly context-driven single case analysis studies (Legewie, 2013).

QCA and interpretation of its results are based on the following principles (Schneider and Rohfling, 2013):

- Combinations of Causal conditions that are found to be associated with variations in outcomes are expressed as configurations
- Different configurations can give rise to the same outcome, a principle called equifinality.
- Causation is Asymmetric i.e. the presence and absence of the same condition, could combine in different ways to give rise to the same outcome.

As opposed to statistical methods that identify correlations between independent and the dependent variable, set-theoretic methods such as QCA seek to capture 'asymmetric' relations between conditions and the outcome. The asymmetric relations are interpreted in terms of the necessity and sufficiency of causal combinations in leading to the outcome (Ragin 1987; Schneider and Rohfling, 2013). QCA as an approach is theory-driven, i.e. the choice of causal conditions should be informed by theory. Though this choice can be substantiated by empirical observations, it should not be driven by the case observations in the first place (Thiem, 2014). Similar logic holds true for calibration of the causal conditions and the outcome[5].

Launched between 1990 and 2015, fourteen pilots were identified for analysis in the pre-QCA phase. Cases are considered as empirical units that are complex. QCA aims at decreasing this complexity and breaking causal relations down to simpler configurations (Rihoux and Lobe, 2009).

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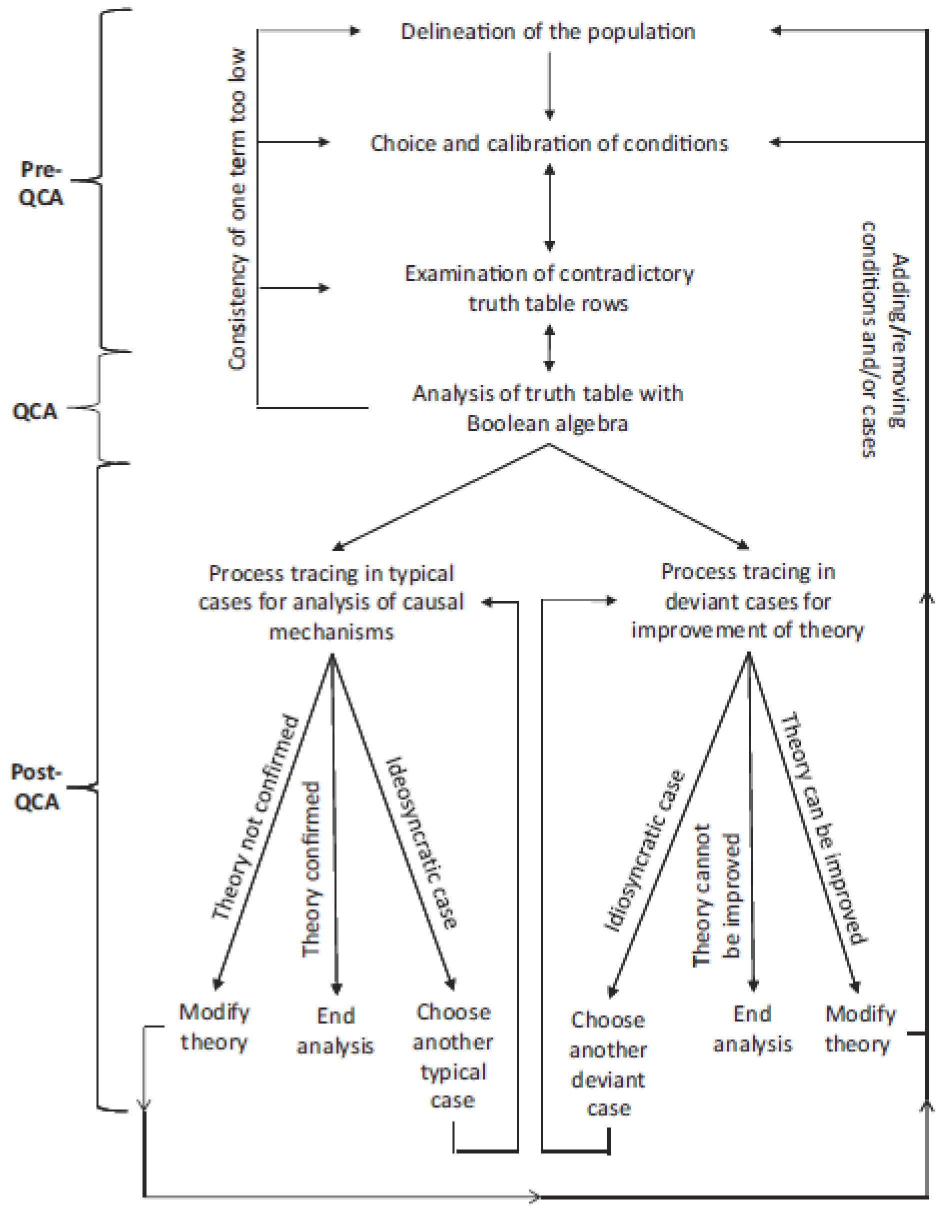
[5] "Qualitative Comparative Analysis", accessed 20 December 2015, http://betterevaluation.org/evaluation-options/qualitative_comparative_analysis

Schneider and Rohfling (2013) present a framework for multi-method set relational research consisting of a pre-QCA and a post-QCA phase (Figure 3.2). The pre-QCA stage intends to conduct an analysis of all cases and calibrate conditions to be included in the analysis (Berg-Schlosser and De Meur 2009), and remove any contradictory case combinations/ configurations leading to the outcome (Ragin 1987).

Detailed case-studies followed a cross-case analysis using QCA can help strengthen the "causal quality of the solution and its constitutive terms" and identify the underlying causal mechanisms and any causal conditions that may have been omitted in the initial model (Schneider and Rohlfing, 2014).

The main purpose of post-QCA process tracing is to improve the theory underlying the QCA model. By studying typical cases, existing propositions on causal mechanisms can be tested or new ones developed. Through process tracing of deviant cases, omitted conditions could be discerned (Rohfling and Schneider, 2013).

Figure 3.2: Pre-QCA and post-QCA case studies (Schneider and Rohlfing, 2013)



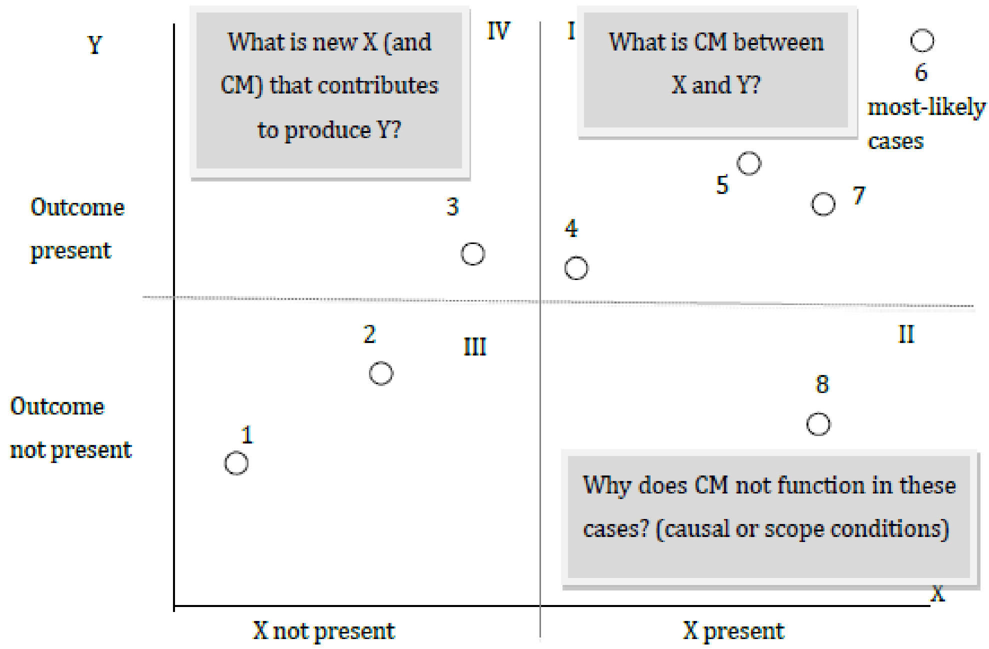
3.5.2 Theory-testing Process Tracing

Process Tracing is mostly applied to small-n situations, where comparisons of few cases may lead to a narrowing down of the "conditions of occurrence" for exploratory purposes, in order to identify some factors that could lead to the observed outcome (Otner, 2010). Cases with unique combinations of outcomes based on the model are selected for detailed process tracing. Here PT is used in combination with QCA to strengthen its power for proposition testing.

PT is a useful technique deployed in social and political sciences to study causal mechanisms linking selected causal condition(s) (X) with the outcome of interest (Y). Compared to other methods of comparative case analysis such as small-n methods, PT "…attempts to identify the intervening causal process – the causal chain and causal mechanism" (George and Bennett, 2005). PT can help combine pre-existing generalizations from theory with specific observations from within a single case in order to make causal inferences about that case.

Process Tracing is used to inductively explore how X (causal condition) contributes to produce Y (outcome) through the operation of a causal mechanism (Figure 3.3). Process tracing can help establish a causal chain between an independent and a dependent variable (George and Bennett 2005; Goldstone, 1991), i.e., to highlight causal linkages between events over time.

Figure 3.3: Process Tracing of cases (Beach and Pederson, 2013)

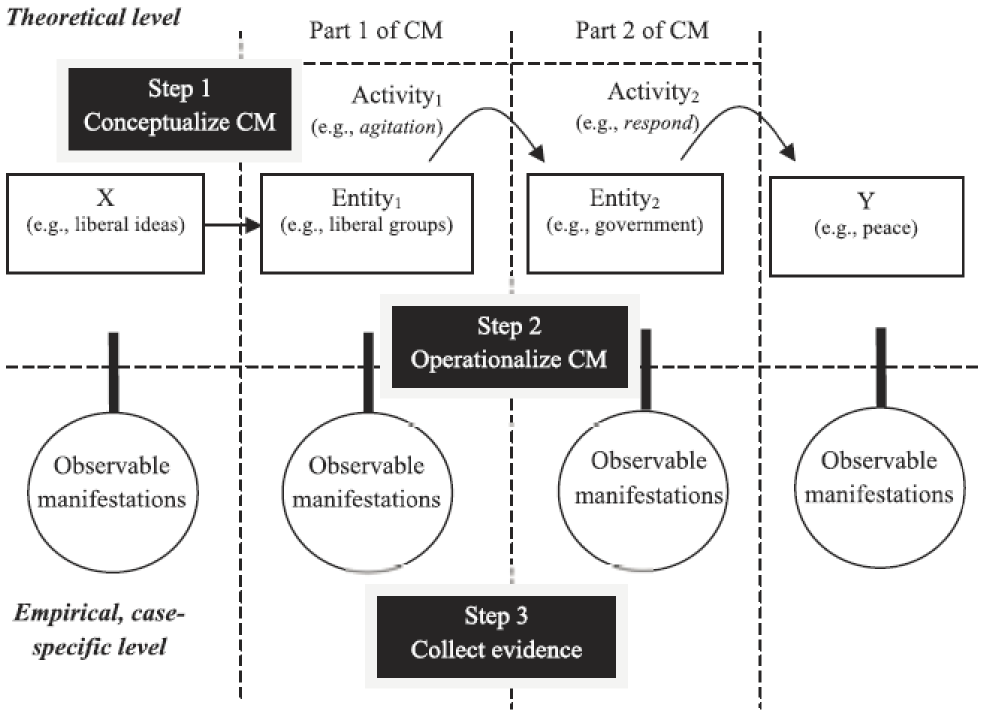


Legend: CM= Causal mechanism; X= Causal conditions

PT complements QCA to detect causal mechanisms behind observed 'set-relational pattern (s)' and can contribute to the theory of policy change and the QCA model by providing insights for the pre-QCA stage and the QCA process itself. Based on the QCA results, typical and deviant cases are identified to conduct detailed within-case and cross-case analysis using Theory-Testing PT (Schneider and Rohfling, 2013).

Figure 3.4 illustrates the basic framework of a theory-testing PT. Causal Mechanisms are conceptualised as having several components or parts, further composed of entities (for example, people, organisations, systems) that engage in activities (for example, protesting, researching) (Beach and Pedersen, 2013).

Figure 3.4: Steps in a Theory-Testing Process Tracing (Beach and Pederson, 2013)



In a theory-testing PT, X is the combination of causal conditions that leads to Y (outcome i.e. scaling-up) via specific causal mechanisms. A theory-testing PT is used when: 1) A relationship between X and Y has been found but we are unsure of causality and when (2) A well-developed theory of change exists but we are unsure whether there is empirical support for the same (Beach and Pederson, 2013).

3.6 Validity and reliability issues

Construct validity: This study draws from policy change theory to conceptualize the causal conditions driving scaling-up and policy change. The outcome of interest being studied is scaling-up, which has been interpreted in several ways. The definition used in this study has been clearly described and operationalized in this study (Introduction chapter).

Endogeneity: The six policy components identified in the model capture all aspects of policy change brought about by a pilot. Hence maximum care has been taken to avoid the issue of omitted variables that may influence the outcome within the model considered. Interviews with key informants on the pilot design, implementation and outcome also helped in capturing all aspects relevant to the scaling up of the pilot within this model, to avoid endogeneity issues.

Internal validity: Both QCA and PT together help to get deeper insights of the cases and allow consideration of nearly all explanatory factors in the analysis. These studies therefore provide high internal validity and can help check alternative theories and generate new hypotheses.

External validity: Scaling-up studies are highly localized and context-specific, hence addressing external validity issues remains a limitation. The objective of conducting a QCA on all the cases is to combine different policy pilots and then identify common characteristics that could have led to similar or dissimilar outcomes and in the process help alleviate external validity concerns.

Chapter 4 Agriculture policymaking in India

This chapter provides an overview of the case context i.e. agriculture policymaking in India, federal structure of agriculture governance, evolution of agriculture planning in the country and institutional structure of agriculture policymaking within which policy piloting is situated and being studied.

4.1 Introduction

Providing employment to more than 54 per cent of the population and contributing nearly 13.9per cent to India's Gross Domestic Product (GDP), the agriculture sector occupies a significant position in the Indian economy (MoA, 2015). The GDP of Agriculture and Allied Sectors and its share in total GDP of the country has however been declining gradually over the past decade[6]. Nearly two-thirds of the cultivated area in India is rainfed. Rainfed agriculture in India accounts for about 40per cent of the total food production and has a large share of cultivated area under rice (42 per cent), pulses (77 per cent), oilseeds (66 per cent) and coarse cereals (85 per cent). In addition, farming incomes are supported by livestock rearing in rainfed areas housing nearly 78per cent of cattle, 64 per cent of sheep and 75 per cent of goats in the country (GoI, 2011).

Of the total geographical area 328.7 million hectares (Mha) about 140.8 Mha 42.8 per cent is the net sown area and about 195.2Mha (59.3per cent) is gross cropped area. The gross irrigated area is 91.5 Mha while the net irrigated area is 65.3Mha with a cropping intensity of 138.7 per cent (TERI,

[6] At 2004-05 prices. Annual Report 2014-15, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, accessed 1 July 2015, http://agricoop.nic.in/Annualreport2014-15/EnglishAR2732015.pdf

2015). Increasing pressures on agriculture land have led to conversion of agricultural land for other land uses such as industrial development, urbanization and housing, indicating a decline in net sown area from 143 million hectares in 1990- 91 to 140 million hectares in 2009-10. The gross cropped area on the other hand has increased by 6 million hectare, from 186 to 192 million hectare during the same period due to increase in the cropping intensity over the available cultivable land area[7].

The agriculture accounts for nearly 80 percent of the fresh water resources utilization in the country. Declining groundwater resources due to unsustainable groundwater pumping practices challenge the sustainability of agriculture (GoI, 2011). Agriculture growth in India is constantly affected by the declining quality of the natural resource base. Over 120 Mha of land area has been marked as degraded or problem soils, along with large-scale and continuous loss of organic matter and carbon in previously rich cultivable areas. Decline in soil organic matter is a major cause of deteriorating soil health and productivity across cultivable parts of India (Sharda et al, 2010)

There are three major cropping seasons in India viz., *Kharif (*summer /monsoons), *Rabi* (winter) and *Zaid*. *Kharif* crops are sown in May at the beginning of the south-west monsoon, and harvested by September/October. Main *kharif* food crops are rice, millets, maize, groundnut, sugarcane and cotton. *Kharif* crops are water-intensive in nature and are thus affected by changes in rainfall patterns and irrigation availability. *Rabi* Crops require cooler climate during their growth period and warmer climate during

[7] "Agriculture", accessed 12 December 2015, http://mospi.nic.in/Mospi_New/upload/SYB2014/CH-8-AGRICULTURE/Agriculture%20writeup.pdf

germination and maturity. Main *rabi* crops are wheat, barley, mustard, sesame and peas. These crops are sown from October to December and harvesting between February and April. *Zaid* crops are cultivated throughout the year using artificial irrigation systems[8]. These include watermelon, bitter gourd, cucumber and musk melon.

4.2 Risks and uncertainties related to agriculture production in India

Rainfed agriculture faces many risks and uncertainties, and these challenge policy formulation for these regions. Many of the policy initiatives need to be adaptive considering current and future changes in the policy environment. The different types of risks and uncertainties faced by rainfed agriculture in India relate to: 1) Production (due to weather, pests, diseases etc.), 2) Price/ market (input and output price volatility), 3) Finance and credit (cash flow problems, limited access to credit and finance), 4) Institutions- changes in regulations that influences farmer's activities, 5) technology (risk associated with new technology adoption) and 6) personal risk to life and assets of the farmer (GoI, 2007).

India has the largest land area under rainfed agriculture in the world, however ranks among the last in terms of yields from rainfed agriculture (GoI, 2011). This study focuses on policy design and formulation in response to current and anticipated risks and uncertainties related to crop production, an issue of high policy importance in India. Small and marginal farmers are most risk-prone because they are highly dependent on rain-fed agriculture and lack

[8] "Kharif-Rabi Agricultural Output in 2012-13: Climate change taking a toll"? Accessed 15 December 2015, http://agropedia.iitk.ac.in/content/kharif-rabi-agricultural-output-2012-13-climate-change-taking-toll

proper assets and resource base for investments in agriculture and capacities to recover from conditions of weather and market stress (GIZ, 2013).

Both natural resources management and rainfed area development is imperative to meet the growing foodgrain demands of the country (GoI, 2014). About 85 per cent of the total land holdings in India fall in the small (1-2 hectare[9]) and marginal (<1 hectare) categories. Rainfed farming systems are found to be more diverse compared to irrigated systems (nearly 34 crops annually compared to 4-5 in irrigated areas). In addition, owing to the risks and uncertainties affecting production in rainfed systems, communities practice crop diversification and also rear livestock.

Changes in rainfall patterns during south-west monsoon are the major factor contributing to instability in *kharif* crops production. Additionally, the distribution of rainfall is shifting with less number of rainy days, with high intensity causing more soil erosion. Changes in the climate are likely to affect rainfed agriculture directly and indirectly through impacts on crop yields as well as pest occurrence (GoI, 2011).

4.3 Federal structure of agriculture governance in India

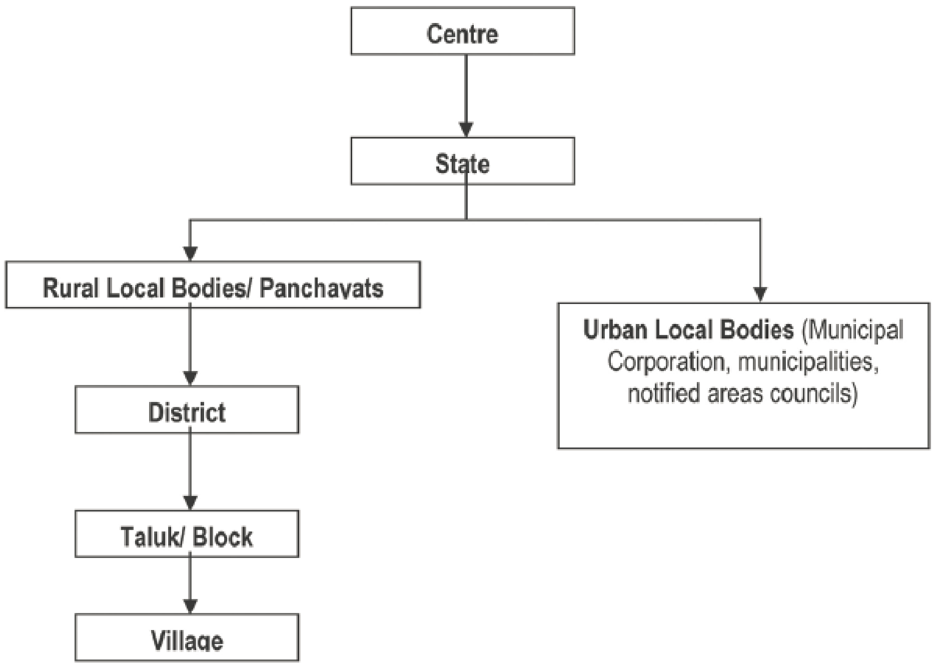
Agricultural is a state subject in India. The Central Ministry of Agriculture (MoA) through its various schemes and programmes addresses agricultural development in the country. The Schemes launched by the Ministry of Agriculture can be Central, State specific or a Joint collaboration between the Centre and the States. These schemes and programmes broadly fall into five categories viz., agriculture development, education, research, extension and training in the agricultural sector. The Ministry of Agriculture comprises of

[9] 1 hectare=2.47 acres

three Departments, the Department of Agriculture and Cooperation, Department of Agricultural Research and Education and Department of Animal Husbandry, Dairying and Fisheries (GoI, 2012).

Till 1992, the Indian federal structure of governance was two-tiered, with powers divided between the central and the state level. Local government units at the community level existed as informal structures. The 73rd and 74th Amendments to the Constitution in 1992 gave the local governments a proper constitutional status. In many states, a three-tier structure of local government was formed with Panchayats being established at the village, block and district level (Rao 2000; Figure 4.1).

Figure 4.1: Structure of multi-level government in India (Rao, 2000)



At the national level, under the central Ministry of Agriculture, the Department of Agriculture, Cooperation and Farmer’s Welfare (DAC) is responsible for formulation and implementation of agriculture policies, programmes and schemes to promote agricultural growth in India. The DAC operates via 27 Divisions for coordination with state level agencies and implementation of Central Sector Schemes. These Divisions include, Agricultural Marketing, Agriculture Census , Budget, Cooperation, Credit, Crops and National Food Security Mission, Drought Management, Economic Administration, Extension, General Administration, General Coordination, Horticulture, Information Technology, Integrated Nutrient Management, International Cooperation, Mechanization and Technology, Natural Resource Management, Official Language, Oilseeds Divisions, Plan Coordination, Plant Protection, Policy, Rainfed Farming System, Rashtriya Krishi Vikas Yojana, Seeds and Trade[10].

The research arm of the Ministry of Agriculture, the Department of Agricultural Research and Education (DARE) is responsible for promoting agricultural research and education in India. DARE provides the government linkages for the Indian Council of Agricultural Research (ICAR), the apex research organisation with a national network of 49 Institutes and 45 Agriculture Universities spread throughout India. While promoting technology development and adoption for enhancing agricultural productivity, the ICAR has also developed a frontline agriculture extension system in the form of *Krishi Vigyan Kendras (KVK)*. There are 630 KVKs in the country today and the first KVK was started in Pondicherry in 1974. The KVKs are supported by different organizations such as the State Agriculture Universities, Central Agriculture Universities, ICAR Institutes, Deemed Universities, State Governments, Public Sector Undertaking and NGOs and aim at the

[10] Divisions, Ministry of Agriculture. Accessed 20 December 2015, http://agricoop.nic.in/Divisions.aspx

development and adoption of agriculture technologies and products, including on-farm demonstrations, training and capacity building of farmers. The KVKs thus act as a link between agricultural research and extension system in India (Kokate, 2014).

The third department under the Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries oversees livestock production and well-being, dairy development and fishing and fisheries in the country.

4.4 Agriculture development and landscape of policy experiments and pilots in India

Development of agriculture in India have been witnessed several policy experiments and pilots to address risks and uncertainties to crop production. During the first phase of agriculture planning in the country following India's Independence (1947 to mid-1960s) there were major agrarian reforms focusing on irrigation infrastructure development, strengthening of credit institutions and provision of land titles to cultivators. The second phase (mid-1960s to 1980) witnessed the Green revolution and large-scale adoption of high-yielding crop varieties, modernization of farm practices and spread of irrigation. During the third phase (1980 to 1991) agriculture diversification led to growth in non-foodgrain products such as milk, fisheries, poultry, vegetables and fruits which registered an increase in agricultural GDP (Tripathi and Prasad, 2009).

The fourth phase was marked by the beginning of economic liberalization in the country in 1991. The agriculture sector was affected due to opening up of domestic markets to international trade and World Trade Organization regulations. In 2000, a New Agricultural Policy was launched to attain output growth rate of 4 percent per annum in agriculture sector (Tripathi and Prasad, 2009; Birthal et al, 2014).

Since the end of Seventh Five Year Plan, research reports and planning documents by the Government of India have acknowledged the appropriateness of an agro-climatic or agro-ecological approach towards agriculture policy planning and development in India. Such an approach can help in policy planning for smaller homogenous land units while considering the natural resource base and socio-economic conditions in these regions (Rao et al, 2015).

An Agro-climatic zone is a land unit in terms of major climates, suitable for specific crops and different cultivable varieties. An agro-ecological zone falls within an agro-climatic zone and is based on the length of growing period of crops, superimposing climatic as well as geographical boundaries of a unit, say a district. The Planning Commission divided India into 15 broad agro-climatic zones based on physiography, soil types, geology, climate, cropping patterns, irrigation status and mineral resources[11].

Three major umbrella schemes were launched during the 2000s by the Ministry of Agriculture to give a boost to agriculture production in the country. This includes the *Rashtriya Krishi Vikas Yojana*, the National Food Security Mission and the National Mission on Sustainable Agriculture.

The *Rashtriya Krishi Vikas Yojana* (RKVY) is a national-level scheme for agriculture development and marked a move towards decentralization of development schemes and provides flexibility to the states to draw their district level agricultural development plans based on local needs and

[11] http://vikaspedia.in/agriculture/crop-production/weather-information/agro-climatic-zones-in-india

priorities. The RKVY model has received wide acceptance from the States. The importance of the scheme can be understood considering that for the Twelfth Plan period, nearly 50per cent of the total allocation of Department of Agriculture (Rs. 63246 crores[12]) has been allocated to RKVY (GoI, 2011).

The National Food Security Mission (NFSM) was launched in 2007[13] and is under implementation in 482 Districts of 19 States of the country. NFSM was launched with the objective of boosting the production of rice, wheat, pulses and coarse cereals through area expansion and productivity enhancement, improving soil health, strengthening livelihoods and farm-level economy (GoI, 2011).

The National Mission on Sustainable Agriculture (NMSA) was launched as one of the eight missions under the National Action Plan on Climate Change (NAPCC) in 2010, with the objective of promoting sustainable agriculture through several adaptation measures focusing on ten key dimensions. These dimensions included Improved crop seeds, livestock and fish cultures, Water Use Efficiency, Pest Management, Improved Farm Practices, Nutrient Management, Agricultural insurance, Credit support, Markets, Access to Information and Livelihood diversification. During XII Five Year developmental Plan for India (2012-17), these measures are being mainstreamed onto ongoing/proposed Missions/ Progammes/ Schemes of the DAC through a process of restructuring and convergence. The architecture of NMSA has been designed by converging, consolidating and subsuming all ongoing as well as newly proposed activities/programmes related to sustainable agriculture with a special emphasis on soil and water conservation,

[12] 1 crore= 10 million
[13] National Food Security Mission, accessed 20 December 2015, http://nfsm.gov.in/

water use efficiency, soil health management and rainfed area development (GoI, 2014).

Apart from Central and State government initiatives, the importance of striking partnerships with NGOs, community-based organizations and informal community networks has been acknowledged and encouraged by several state governments as a complementary mechanism to the state efforts to boost agriculture growth in the country (GoI, 2011).

4.4.1 Role of actors and politics in policy piloting

Many of the policy pilots in India are politically motivated and consciously geared towards near universal-application pan India. Owing to the unpredictable nature of power politics between those at the centre, and centre-state relations national government has to take notice of the "one size fits all problem", as programs that are not designed to fit to regional context will most likely not be implemented. In addition, the increased power of Indian state governments since 1989 means that experiments at the national level, especially for state subjects such as agriculture are vetted by state governments. Depending on the state's perspective on the program, these may be altered, renamed or not taken up at all (Manor, 2009).

The political economy of piloting in the agriculture sector in India is rather complicated. Communities dependent on rainfed agriculture for livelihoods are often poor and marginal and thus form a key target group for both developmental and sectoral policy interventions in India. The small land-holding sizes constrain the ability of farmers to undertake large and risky investments towards improving crop production and land productivity. Pilot schemes in the agriculture sector can thus have larger implications for the country in terms of setting up of agriculture commodity and value chains, establishment of markets for agriculture produce, long-term changes in cropping patterns, and rural livelihood choices among others. Furthermore, since a large population in India resides in rural areas and dependent on agriculture, these communities and regions are also major vote banks.

From an implementation perspective, schemes from the MoA are designed for nation-wide implementation and sometimes for specific regions/ crops or districts. For each national level pilot the MoA issues Operational guidelines within the allocated funds with qualifying criteria for funding and beneficiaries. State Governments select farmers as per these Guidelines and disburse financial assistance to selected beneficiaries.

There are several pilots launched at the state level separately, including those being implemented in partnership between the state governments, NGOs, private sector, research institutes and development agencies. However these vary along several dimensions and are often tightly controlled by State budgets and earmarked for time-bound themes, making their comparison rather difficult.

Pyle (1980) pointed out that pilot projects have existed in plenty in the developmental sector in India without integration into the official policy planning. Policy pilots in India sometimes tend to be launched fully formed without a proper prior testing for their impacts. In such cases, it becomes rather difficult to fine-tune initiatives that are working well and dismantle those not working well.

4.4.2 Overview of selected policy pilots in Indian agriculture

The cases being studied in this thesis are pilot schemes, projects and programmes (not full policies) implemented by the Government of India. These pilots are studied as examples of policy experiments undergoing an iterative process to address diverse risks to rainfed agriculture production owing to presence of diverse biophysical, socio-economic and institutional conditions.

The landscape of policy pilots considered as a special form of policy experimentation in this thesis can broadly be classified into four categories:

- *Area Development Programmes* including watershed programmes: National Watershed Development Project for Rainfed Areas (NWDPRA), externally-aided projects for watershed development (Indo-German Watershed Development Project and Sujala watershed development project), Rainfed Area Development Programme (RADP)
- *Credit and Insurance*: Weather Based Crop Insurance Scheme (WBCIS), Modified National Agriculture Insurance Scheme (mNAIS), Farm Income Insurance Scheme (FIIS), Experimental Crop Insurance Scheme (ECIS)
- *Agriculture Extension*, including technological demonstration: National Agriculture Innovation Project (NAIP), National Initiative on Climate Resilient Agriculture (NICRA), National e-Governance Plan of Action (NeGPA), National Agriculture Technology Project (NATP)
- *Farm-inputs Provision*: National Project on Organic Farming (NPOF), Accelerated Fodder Development Programme (AFDP)

These cases can all be considered as models operational over a limited geographical scale and intending to scale-up to the national level, aiming at increasing crop productivity. These pilots underwent several changes during their test period before being institutionalized (or not). The differences between them are in terms of what is being scaled up, i.e. in some cases this includes package of practices, while other terms it is specific technologies, crop-specific practices, insurance models etc.

An overview of these pilots is presented in Table 4.1.

Table 4.1: Overview of policy pilots selected as cases for the study

S. No.	**Name**	**Goal**	**Duration of pilot**	**Initial Unit of piloting**	**Outcome**
1	Experimental Crop Insurance Scheme	Bringing more farmers under insurance cover	One season (1997/98)	14 districts in 5 states	Terminated within one season
2	Farm Income Insurance Scheme	Risk transfer mechanism for farmers	One season (2003/04)	15 districts, 8 states	Expanded to 19 districts but terminated within one season
3	Weather Based Crop Insurance Scheme	Risk transfer mechanism for farmers	2007-2013	70 hoblis (cluster of villages) in Karnataka state	Merged with two pilots into a National Crop Insurance Programme
4	Modified National Agriculture Insurance Scheme	Risk transfer mechanism for farmers	2010-2013	32 districts in 12 states	Merged with two pilots into a National Crop Insurance Programme
5	Restructured National Watershed Development Project for Rainfed areas	Integrated watershed management and sustainable farming	1990-1995	99 districts in 16 states	Continued to expand to additional states following revised watershed guidelines
6	Indo-German Watershed Development Programme	Regulation of natural resources and soil and water	1992-1999	One district of Maharashtra state	1992-1999. A Watershed Development Fund created to replicate

S. No.	Name	Goal	Duration of pilot	Initial Unit of piloting	Outcome
		conservation			this model and sustain its activities; expanded to 4 additional states
7	Sujala watershed development project	Poverty alleviation, increase in agricultural productivity	2001-2009	Watersheds in five drought-prone districts of Karnataka state	Expanded to additional pilots and management programmes at the state level; guided national watershed policy development
8	National Project on Organic Farming	Soil health improvement	2004-2014	Multiple projects launched at the state level	Subsumed under National Mission on Sustainable Agriculture
9	Rainfed Area Development Programme	Ensure agricultural growth in rainfed areas	2011-2014	District level in 10 states	Subsumed as a key component under National Mission on Sustainable Agriculture
10	National Agriculture Innovation Project	Increase agricultural productivity and growth	2006-2014	Multiple projects launched country-wide	NAIP initiated changes in institutional structure and function of the Indian Council for Agriculture Research.
11	National Initiative for Climate Resilient Agriculture	Ensure climate resilience of Indian agriculture	2011-2014	100 climatically vulnerable villages chosen across different states	While NICRA is undergoing expansion via replication, its experience has already been incorporated within the National Mission on Sustainable Agriculture
12	NeGPA	Increase farm productivity	2011-2015	7 states	The pilot was scaled up to all states and bundled with a new e-kranti or Digital India initiative aiming at digitizing relevant services for the citizens for better governance

S. No.	Name	Goal	Duration of pilot	Initial Unit of piloting	Outcome
					and public service delivery
13	National Agriculture Technology Project	Initiate research and extension reforms	1998-2005	28 districts in 7 states	NATP model extended to all districts in the country and a new Centrally Sponsored Scheme on Support to State Extension Programmes for Extension Reforms was initiated
14	Accelerated Fodder Development Programme	Facilitate additional production of fodder in the country	2011-2015	Twelve states	Subsumed under National Food Security Mission

4.5 Summary

Policymaking in the agriculture sector in India is important and complex, because it is the mainstay of a large part of the population, the sector is prone to risks being largely rainfed and capacities of farming communities to deal with conditions of stress are low. Declining soil health, fragmentation of land holding size, climate change and lack of access to irrigation are some of the factors that affect agriculture productivity in rainfed areas.

Agriculture is a State subject in India. While policies for national scale implementation are formulated by the Central Ministry of Agriculture, these are implemented at the state and district levels. At the national level, the Ministry of Agriculture, Cooperation and Farmer's Welfare formulates and implements major agriculture policies with the State governments. The research wing of the Ministry of Agriculture, the Department of Agriculture Research and Education has played a major role in agriculture technology development and research in the country, along with extension activities to reach maximum number of target beneficiaries.

Agriculture policy planning in India has undergone several reform periods since the country's Independence in 1947. From major land reforms involving land titles to cultivators, the mid-1960s to 80s witnessed the Green revolution and introduction of high-yielding crop varieties. The 1980s saw major improvements in agriculture GDP levels through agriculture diversification into high-value crops. 1990s was a period of economic liberalization in the country, which opened up the domestic agriculture markets to international trade and regulations. This period also saw devolution of powers to sub-state level in India.

Many of the current initiatives of the Government of India towards boosting agriculture productivity fall under major umbrella schemes, which while being coordinated at the national level, also offer sufficient flexibility to the states to suggest programmes and activities as per the state priorities and needs. Several policy pilots have been conducted in the agriculture sector in India to address risks and uncertainties to crop production. Fourteen such pilots have been identified for analysis in this study and are classified under four types: Area Development programmes, Credit and Insurance, Agriculture Extension including technological demonstration and schemes/programmes related to Farm-Input Provision for boosting crop productivity.

Chapter 5 Case narratives of agriculture policy pilots and Qualitative Comparative Analysis

Investigating the first sub-question, this chapter presents detailed case narratives of the selected cases of agriculture policy pilots using the logic of a set-relational method, Qualitative Comparative Analysis. QCA is conducted to detect conjunctions of causal conditions that are hypothesized to generate the theoretical phenomenon. The aim of this chapter is to evaluate which design features of pilots contribute to their scaling up. The research question driving the analysis of this chapter is: *What are the necessary and sufficient conditions that can explain variation in diffusion of pilots?*

5.1 Introduction to set-relational theory and QCA

Sets are concepts that are defined in terms of "boundaries that define zones of inclusion and exclusion" (Mahoney, 2010). Whether a case belongs to a concept or a set or not is determined by assigning set memberships (a process of calibration or standardization) based on both, theoretical and empirical evidence (Ragin, 2000). The process of assigning set memberships should be made transparent in any set-relational study so that the set has high content validity for the concept being studied. It is advisable thus to have a calibration criteria that is not based on the data itself, in order to avoid bias (Schneider and Wagemann, 2012). In this study, the calibration of cases was done based on theoretical knowledge, discussion with agriculture scientists and preliminary information on the cases obtained from the field.

Schneider and Wagemann (2012) define set-theoretic methods as approaches towards understanding social phenomenon as set relations wherein the data consists of set membership scores and causal complexity is understood in terms of sufficient and necessary conditions. Scaling-up is the phenomenon of interest in this study and studied as an outcome of changes to existing policy mixes (combination of policy ends and means) to give rise to more robust policy designs (Kern and Howlett, 2009). The cases are examined by observing if and to what extent new policy goals and means are added to existing policy mixes pertaining to agriculture risk management and these changes are assumed to influence the level of scaling-up (acting in isolation or in combination, and through specific causal mechanisms).

QCA has been used to study diverse social and political phenomenon related to environment policy and management. This includes the study of necessary and sufficient factors that can explain the influence of multi-level institutional linkages on local autonomy and collective action for resource sustainability (Basurto, 2013), organizational factors leading to effectiveness of international fisheries regime (Bodin and Osterblom, 2013), necessary and sufficient conditions for successfully managing common pool resources such as irrigation canal maintenance (Hamidov et al, 2015), factors influencing energy sustainability transitions, scaling-up of pilots in water resources management (Nair and Howlett, 2015), role of government in influencing the outcomes of voluntary environmental programs (Van der Heijden, 2015), influence of policy design features of experiments developed to improve environmental sustainability of buildings (Van der Heijden, 2013), conditions leading to violent conflict over scarce renewable resources (Tobias, 2015), factors influencing recycling efficiency of water utilities (Kunz et al, 2015), factors explaining opposition to Pipeline Projects in the developing world

(McAdam et al, 2010), factors that influence community movements in response to environmental risk (Wright and Boudet, 2012), governance factors leading to high adaptation performance across water governance systems (Pahl-Wostl et al, 2014) and conditions under which interstate river conflicts are resolved by states (Schlager and Heikkila, 2009), among others.

5.1.1 Description of the QCA software

The software fsQCA 2.5 is used to conduct Qualitative Comparative Analysis (QCA) for this study (Ragin and Davey, 2014). QCA is a set-theoretical approach and analytical technique developed by Prof. Charles C. Ragin and colleagues at the University of Arizona, United States based on Boolean algebra to allow for comparison of qualitative cases that are often large enough to do in-depth qualitative analysis and small to do variable-oriented quantitative analysis. The variables in QCA are either presented as Crisp sets i.e. binary sets that denote presence or absence (1 or 0 respectively) of membership in a specific category, for e.g. presence of a particular form of government. A fuzzy set splits this all-or-none categorization into further categories using scores from 0 to 1 (Ragin, 2006). QCA seeks to aid causal interpretation to supplement the qualitative information being derived from the cases, to identify different combination of factors that could produce a specific outcome (Ragin, 2008).

QCA as an approach and technique aims at reducing complexity that is embedded in a case or group of cases and studying the interaction of causal conditions. There are three principles central to QCA. First is the concept of multiple conjunctural causation i.e., the outcome of interest can be produced as a result of a combination of several causal conditions. Secondly, the concept of equifinality, i.e. different pathways or combinations of causal conditions may lead to the same outcome. Thirdly, the concept of asymmetry, i.e. causality cannot be assumed to be symmetric; the presence and the absence of the outcome may need different explanations, and not to be assumed to be a result of reversing the conditions which lead to the outcome for example (Ragin, 1987; Rihoux and Lobe, 2009; Berg-Schlosser et al, 2009).

While causality in QCA is dependent on the case context, the objective of conducting the QCA is to ascertain the type of different causal models that can explain the observed outcome, in a comparative case analysis (Ragin 1987). Thus QCA looks for “causal regularities” that can be associated with the outcome and expressed with the simplest possible combination of conditions from the whole set of hypothesized causal set of conditions assumed in the model (Rihoux and Lobe, 2009).

Fuzzy set Qualitative Comparative Analysis (fsQCA) “uses combinatorial logic, fuzzy set theory and Boolean minimisation to work out what combinations of case characteristics may be necessary or sufficient to produce an outcome” (Kent, 2008, p 1). There are specific cases where fsQCA is particularly helpful. This includes instances where there is an hypothesis regarding the underlying causal factors affecting the outcome being studied (scaling up in this case), different combinations of these factors could give rise to the outcome and conditions are sufficient only when they are in combination, results need to be interpreted as necessary and sufficient conditions and the number of cases is very low for conventional quantitative methods to be applied (Ragin, 2008).

When there are changes in the current or expected policy context, policymakers can decide to conduct pilot initiatives by altering the status quo policy structure via changes in policy goals and/or means to reach them. This leads to different patterns (configurations and pathways) to overall policy change. Through a comparative study of selected policy pilots and experiments, spread across four planning periods in India since liberalization and decentralization reforms in 1990, this study attempts to uncover mechanisms behind observed patterns of policy change. The objective is to investigate the necessary and sufficient conditions that can explain scaling up of the pilots. The steps followed as part of fuzzy-set QCA to meet this objective are presented in the next section.

5.2 Steps for the fuzzy-set QCA

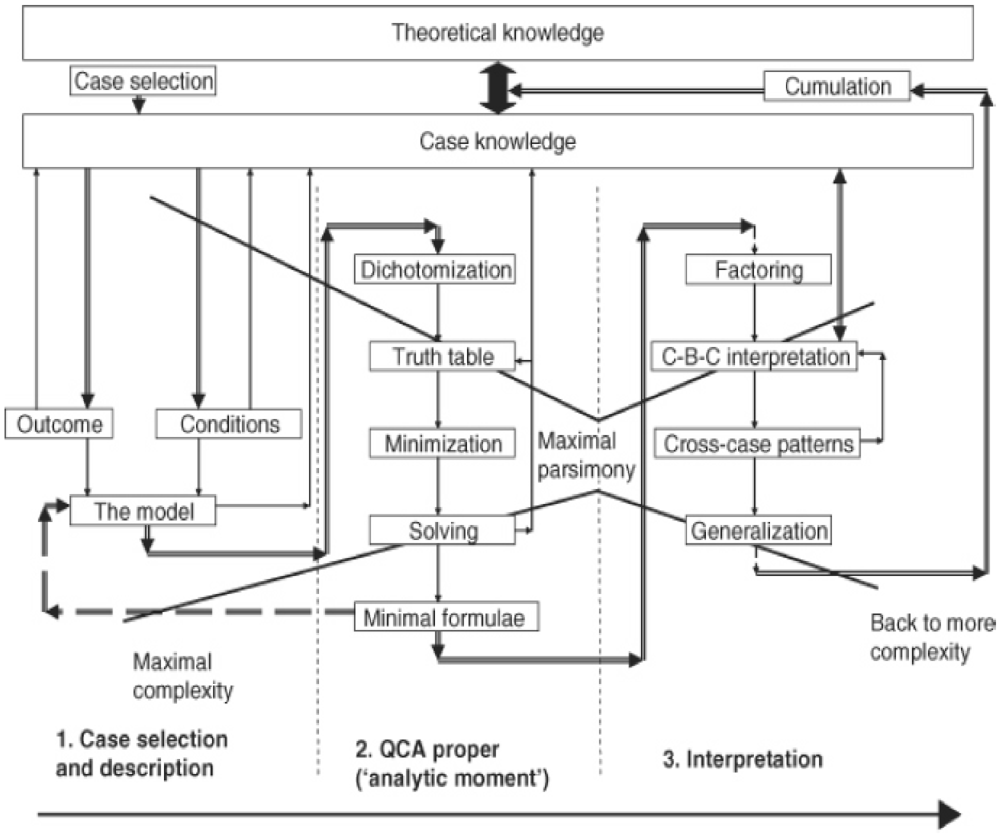
In a QCA at every step there is a close dialogue between theory and case-based evidence (Rihoux and Lobe, 2009) aiming to simultaneously reach two almost opposite goals, understanding case-diversity while simultaneously aiming to draw theoretical generalizations that could apply for a similar set of cases (Ragin 1987; Rihoux and Lobe, 2009).

As shown in Figure 5.1, there are three main phases in a QCA, 1) Case selection, 2) QCA and 3) interpretation. These phases are spread along a continuum that oscillates between complexity on both ends and parsimony.

1. In the first phase, all the cases are considered together and a detailed case description is developed. The complexity is maximal in this phase as it contains extensive information about the cases but no clear patterns can be observed within the case at this point.

2. The second phase involves conducting the QCA with the aim of reducing the complexity of the cases and identification of broad patterns in the data. These patterns are presented in the form of solutions or formulae consisting of specific combinations of causal conditions giving rise to outcomes.
3. In the third phase, the different combinations of conditions leading to the outcome are interpreted. The objective is to return to the cases and reinterpret these as being representative of these combinations, thereby increasing the level of complexity again (Rihoux and Lobe, 2009).

Figure 5.1: QCA and the funnel of complexity (Rihoux and Lobe, 2009)



In the following section, the steps in the QCA process are outlined based on Basurto and Speer (2012) and Rihoux and Lobe (2009).

5.2.1 Comparative research design and case selection

As discussed in Chapter 3 and detailed in Chapter 4, the period from 1990 to 2015 is chosen for identification of these cases because it witnessed major national-level policy reforms in the country. In a QCA, cases are represented by configurations of their membership in causal conditions and outcome of interest, with the objective of deriving a minimum explanation of the outcome (Rihoux and Ragin, 2008). QCA also aims at studying cross-case diversity (Ragin 2006), implying that each causal path is potentially meaningful irrespective of the cases it covers. Thus with QCA there is, a priori, no ‘deviant’ or ‘outlier’ case (Rihoux and Lobe, 2009).

The cases for a QCA are selected purposefully (Ragin 2000, Ragin and Rihoux, 2004, Berg-Schlosser and De Meur, 2009, Byrne and Ragin, 2009). The cases selected for a QCA display some common characteristics with variation on some aspects which in turn reflect the variables in the model, i.e. causal conditions and outcome of interest in this study. For doing the same it is essential to start with obtaining detailed within-case knowledge (Byrne and Ragin, 2009). The model and hence the choice of cases and the constant and variable characteristics as well as the outcomes under study should emerge from the research question and theoretical framework.

In a small to intermediate N research design, demarking the population of comparable cases can be challenging sometimes, especially with relation to choosing from the nebulous ‘borderline cases’. In such cases the researcher has to make an informed decision on whether the case is in or out of the population (Bryne and Ragin, 2009).

In this study, there was no ready set of pilots that could be directly drawn for analysis. The cases essentially needed to be identified and filtered from the large number of schemes and programmes that the Ministry of Agriculture would have undertaken over the 15 years considered for the study. Additionally, there was no specific periodicity to the launch of the pilots as they seem to be designed as per changes in the policy formulation environment and subsequent policy change needs, and/or any political changes that emerge in the normal course of policymaking. A initial round of policy document analysis using keywords ‘policy experiment’, ‘pilot’, ‘agriculture’, ‘risk management’, ‘scaling-up’, ‘India’ helped identify a set of pilots. This was followed up by the initial round of consultations (conducted between May to August 2014) to reconfirm the selection of these pilots and identification of other pilots that have been undertaken by the Ministry (these included pilots that did not have much documentation online).

The first round of consultations helped in understanding how policy piloting is being conducted within the Ministry of Agriculture, Government of India. Consultations were conducted with members from the rainfed committee, key agriculture research institute officials and international agencies and government officials from the Ministry of Agriculture and the ICAR, Department of Agriculture Research and Education (discussed in Chapter 3; details in Appendix).

Interestingly, it was noted that while piloting was considered to be a accepted term used in the Government, the term ‘policy experimentation’ was not as comfortable a term for the policymakers as it indicated that these schemes or programmes (often with large resource investments) are in a constant test mode, ready to be dismantled if needed in the future.

Furthermore, even though in theory pilots are considered to be in a test mode indeed, in the Ministry of Agriculture much more importance was accorded to these pilots in terms of allocation of financial as well as human and technical resources operating with the intention of full scaling-up. This was an important early observation from the consultations and interviews as this indicated that each pilot is indeed being undertaken with the objective of scaling-up. While some of the projects, schemes and programmes were clearly launched as pilots there were other initiatives which were mid-way between being a full policy or a pilot. In such cases the decision on including or excluding them was made based on discussion with government officials who were involved in its design and implementation and also depending on information availability regarding the case.

Overall, the following common characteristics were used to shortlist the final set of fourteen pilots considered for this study:

- The initiatives should be aimed at increasing crop productivity (food grains only) in the country and reducing production risks to agriculture, and launched by the Central Government of India (Ministry of Agriculture) directly, in partnership with state government (s) and/or with external funding support,
- These should be time-delimited, i.e. at the outset these were designed to run for a limited number of years
- These should be spatially limited with the explicit intention of testing out at a small scale first before expanding further.

- Initiatives with the explicitly stated intent (goal) of aiming at scaling-up beyond the initial identified scope (to ensure that the scaling-up was indeed one of the intended objectives of the initiative).
- Should be identified as being in a test phase aiming at policy development through testing of untried components for reform of existing policies/programmes.
- Should have been subject to periodic monitoring and should have completed at least one round of formal monitoring and evaluation
- Policy experiments especially pilots are rarely reported. So the selected initiatives should have enough documentation and access to government officials who are willing to talk about it so that it can be analysed.
- These should have finished the pilot phase so that the outcome can be clearly studied.

A total of fourteen cases were selected for QCA. These cases included a mix of restructured periods of policies as well as completely new pilots that covered incremental changes, coping, innovations and radical reforms. These cases represented models of change that were being tested with the intention of guiding policy development at the national level.

5.2.2 Gaining case knowledge

Semi-structured interviews were conducted to gain knowledge from key informants about the case. To triangulate, multiple other sources of data and evidence were used. This includes official statistical data, documentation on the pilot (from policy reports and documents, research reports, newspapers). A detailed analysis of the cases based on the primary and secondary data collected was conducted to generate codes and fuzzy-set scores for the model.

5.2.3 Defining outcome of interest

Defining the outcome should be based on a combination of theory, research questions and case informed at the same time. This study follows the definition of scaling-up by Vreugdenhil et al (2012) that refers to increasing the scale dimension of the pilot project, whereby the qualitative and quantitative nature of the problem changes. More actors, policy components and administrative layers are added as pilots scale-up, increasing the scope and thereby complexity of the pilot.

The outcome was found to show enough variation between the cases to warrant a closer analysis using the QCA model. The scoring of the variations in the outcome and its relation to potential causal conditions can be achieved by developing an in-depth case knowledge (Rihoux and Lobe, 2009).

5.2.4 Model specification: selection of conditions

Following the model of policy change (Hall, 2003; Cashore and Howlett, 2007) six components of policy that are assumed to change form the causal conditions hypothesized to lead to variations in scaling-up. Policy anomalies can be addressed by experimenting changes to the incumbent regime (Wilder and Howlett, 2014). Details of the incumbent policy regime and changes brought to the same via policy pilots were recorded during the interviewees.

Cashore and Howlett (2007) argue that the degree of coherence between new and old policy goals and degree of consistency between new and old means should be studied on a case-by-case basis. Typically, policy goals are considered to be coherent if they logically relate to the same overall policy aims and objectives and can be achieved simultaneously without any significant trade-offs. Policy goals are considered to be incoherent if they contradict the previous goal, thus making the simultaneous achievement of all policy objectives difficult if not impossible.

On the other hand, policy tools are considered to be consistent when they complement each other and work in combination towards meeting a policy goal. Policy tools are considered to be inconsistent when they work at cross-purposes. Different combinations of changes in goals (coherent or not) and means (consistent or not) lead to a simple model that can be used to draw propositions about expected outcomes of any given policy development process. In addition to highlighting the coherence and consistency between the goals and means respectively, the model can also shed light on the congruence between goals and means itself and if this has any relation with the observed policy outcome (Kern and Howlett, 2009).

To explore whether the implementation of a new pilot led to a policy mix with coherent goals and consistent means, the goals and instruments of each pilot and changes brought over during the pilot phase to an incumbent regime were traced through the use of semi-structured interviews with key informants and document analysis (similar to Kern and Howlett, 2009). These design features based on the model of policy dynamics and change are used to measure the change in goals and means at the three levels that the initiatives undergo in their experimental stage.

Even though this model has been typically applied to long-term policies, however this study argues that pilots are launched as small-scale policies introducing changes in policy components over a short time-period. Thus pilots are likely to also face similar policy cycle as do full policies albeit over a shorter time period.

The fourteen pilots selected for this study range from 1 -10 years in terms of their duration of operation. All these pilots have undergone atleast one evaluation cycle hence are eligible to be studied for their design features. All changes are considered in terms of their movement away from status quo (identified through specific change in policy components).

5.2.5 Threshold setting and scoring

Threshold-setting for setting the QCA scores should rely on the researcher's judgement informed by theory to a large extent and also knowledge of the cases in context. While fuzzy-set scoring for a condition or outcome can move from a scale of three to over six divisions between the values of 0 to 1 (Ragin 2006; 2008), a four point scale (i.e. 0, 0.33, 0.67 and 1) is adopted for this study. This is because between the two extremes of no scaling up and complete scaling-up it is possible to delineate two additional forms in which pilots can exist (to indicate moderate and substantial scaling up). This scoring logic is based on theory (Rondinelli, 2003; Vreugdenhil et al 2012; Vreugdenhil and Slinger, 2012) as well as substantiated with empirical evidence from the field interviews and documentation.

Data was collected for each condition using semi-structured interviews and document analysis. Anchor points for each fuzzy set were developed.

Anchor points are the main thresholds that structure a fuzzy set: 1 (threshold for full membership), 0.5 (cross-over point), and 0 (threshold for non-membership) (Ragin 2000). Anchor points help a researcher clarify how to distinguish a case that is more in the set from a case that is less in the set. The setting of anchor points is based on theoretical knowledge relevant to the concepts being measured as well as case information (Basurto and Speer, 2012).

The anchor points themselves are different from the four scores being assigned to the conditions and outcomes. The purpose of the 0.5 anchor point is to demarcate the positioning of each variable to fall below or above 0.5, i.e. 0.33 or 0.67 respectively. Developing anchor points prior to interviews is essential to ascertain whether an interviewee's answer is detailed enough for measuring the fuzzy-set values of the cases as per the scoring logic.

Table 5.1 presents a list with anchor points for all measures of the conditions and the outcome.

Table 5.1: Anchor points to set cross-over thresholds

Measure	**Anchor points**
Coherence in policy goals	Maintenance of old goals but first sign of entry of new, sometimes conflicting goals
Coherence in policy objectives	Maintenance of old objectives but first sign of entry of new, sometimes conflicting objectives
Coherence in on-ground measures (settings)	Maintenance of old settings but first sign of entry of new, sometimes conflicting settings
Consistency in instrument logic	Maintenance of old instrument logic but first sign of entry of new, sometimes conflicting instrument logic
Consistency in instrument type	Maintenance of old instrument type but first sign of entry of new conflicting mechanisms
Consistency in calibration of policy instrument	Maintenance of old instrument calibration but first sign of entry of new conflicting on ground ways of use of instrument
Outcome= Scaling-up	When the scale changes

Scoring scheme for Outcome

Goertz (2006) is followed to study the outcome in this study, i.e. scaling up as a continuum moving from termination of pilot in the same form (0) to full institutionalization (1). On one extreme is no policy integration (score 0) and on the other extreme is full institutionalization in the form of reforms (score 1) i.e. national new policies initiated based on the pilot.

The fuzzy area in between the two extremes of the continuum is then theorized. Following Vreugdenhil and Slinger (2012), Vreugdenhil et al (2012) and Rondinelli (2003) these are scored as:

- 0.33= expansion into multiple pilots via demonstration in different contexts but at the same scale. This can be done to exhibit the effectiveness of the pilot and increase the acceptability of its components (Rondinelli, 2003) and
- 0.67=expansion of the pilot with replication and scale changes, more administrative layers added and bundling of the pilot in ongoing schemes as a different scale.

This scheme was also validated against observations in all the cases and their transition forms during scaling-up. Full membership in the outcome represents institutionalization of the pilot. Full non-membership represents termination of the pilot in the same form. The two fuzzy forms in between non-membership and full membership represent a phase where the pilot is developing and replicated but does not go further in scope or shape and a phase of expansion of the pilot and partial institutionalization, respectively (Table 5.2).

Table 5.2: Scoring scheme for outcome (scaling-up)

Score	Outcome	Criteria for scoring	Implications
0	No scaling up	Termination of pilot without replication, expansion or institutionalization	Pilot has not been scaled up at all; it finishes its term in the same form or has an early termination.
0.33	Limited scaling-up	Generation of multiple comparable pilots in other locations and over time	The pilot model in the same form is being replicated in multiple similar contexts (similar in scale, complexity and policy issue addressed)
0.67	Substantial scaling-up	Expansion of the pilot itself, lessons drawn from the pilot to initiate new management project (s) (Vreugdenhil et al, 2012) or bundling of the pilot with ongoing programmes/ policies	Scope of the pilot expands in terms of its scale including its structure and functions, implementation context, stakeholder groups and administrative layers through direct expansion, bundling or development of new management projects.
1	Full scaling up	Full institutionalization or development of new national/ regional policies based on the pilot	The knowledge generated through the pilot becomes part of the standard operating procedure in specific government policies

The semi-structured interview helps elicit responses for each condition and measure. Data from the interviews was combined with detailed document analysis. For example, change in policy statement was an aspect that interviewees may not be able to exactly refer to, especially when these occurred several years prior to the current date. In such cases analysis of policy documents, mission and guidelines helped substantiate the interviewee statements.

Starting with an open initial eliciting question helped in leading the interviewees into the topic. The sub-questions elicit targeted information about the measures. This was found to be useful when a respondent would not answer in enough detail to determine the fuzzy-set value of a measure of a condition or outcome (Basurto and Speer, 2012).

Scoring of causal conditions

A scoring scheme is developed to classify and study the changes in the four causal conditions, based on Cashore and Howlett (2007) and Hall (2003). The extremes for the three conditions at the goal level move between 0=no coherence i.e. conflict between the multiple goals in the new policy mix and 1=Completely coherent i.e. multiple goals co-exist which can be a case of say, when the pilot was more towards testing alternative means to reach the same goal. In between is the fuzzy area where there is little conflict or high conflict between these two extremes.

The extremes for the three conditions at the means level move between 0=no consistency i.e. multiple instruments in the new policy mix undermine each other and 1=Completely consistent i.e. multiple instruments in the new policy mix reinforce rather than undermine each other. In between is the fuzzy area where there is little conflict or high conflict between these two extremes.

Table 5.3 presents an overview of each of the six conditions, their description and how these are measured. Tables 5.4- 5.8 then detail out the scoring logic of each condition.

Table 5.3: Six conditions that capture changes in policy ends and means

Condition	Description	Measure
Capturing changes in actual policy requirements		
Coherence in policy goals	Is the general idea(s) that govern the pilot coherent with existing policy regime?	What is the type of change brought by the pilot to abstract goals of an existing policy mix?
Coherence in policy objectives	Is the formal aim(s) of the pilot coherent with existing policy regime? This measure also captures increasingly complexity of the pilot	What is the type of change brought by the pilot to objectives of an existing policy mix?
Coherence in on-ground measures	Is the specific on-the-ground requirement (s) of the pilot coherent with that of the existing policy regime?	What is the type of change brought by the pilot to on-ground settings of an existing policy mix?
Capturing changes in means to meet the policy requirements		
Consistency in instrument logic	Is the norm guiding implementation preferences consistent with that of the existing policy regime?	What is the type of change brought by the pilot to instrument logic of an existing policy mix?
Consistency in instrument type	Is/ are types of instruments that are utilized in the pilot consistent with that of the existing policy regime?	What is the type of change brought by the pilot to instrument types used in an existing policy mix?
Consistency in calibration of policy instruments	Is the specific way(s) in which the instrument(s) is/are used in the pilot consistent with that of the existing policy regime?	What is the type of change brought by the pilot to specific ways in which instruments are used in an existing policy mix?

The scoring logic specific to each of the six components of the pilot is provided in detail ahead.

Scoring of changes in Goals

Full membership in the condition represents completely new policy goals being pursued by the pilot, changing the previous goals. Full non-membership represents that the pilot does not suggest any change to the current policy goals. More 'in the set' than out represents cases where old goals are maintained but new ones are also announced which conflict with old ones. More out than in represents incremental additions to old goals.

Table 5.4: Logic for scoring changes in abstract goals

Score	**Meaning**	**Details**
0	No change	The pilot does not suggest any change to the current policy goals
0.33	Classic incremental	The pilot brings an incremental addition to the same goals (same direction, no conflict)
0.67	Contested incremental	Completely new goals are added to old ones, sometimes leading to conflict
1	Paradigmatic change	Completely new goals are introduced dismantling the previous ones

Scoring of changes in objectives

Changes in the objectives or formal aim(s) of the pilot can capture increasing or decreasing complexity of the initiative, changing priorities and increase or decrease of scope. Full membership in the condition represents completely new objectives being pursued by the pilot, dismantling old objectives. Full non-membership represents that the pilot does not suggest any change to the current objectives. Being more in than out in the set represents cases where old objectives are maintained but new ones are also announced which conflict with old ones. More out than in represents incremental additions to old objectives.

Table 5.5: Logic for scoring changes in objectives

Score	Meaning	Details
0	No change	The pilot does not suggest any change to the current policy objectives
0.33	Classic incremental	The pilot brings an incremental addition to the same objectives (same direction, no conflict)
0.67	Contested incremental	Completely new objectives are added to old ones, sometimes leading to conflict
1	Paradigmatic change	Completely new objectives are introduced dismantling the previous ones

Scoring of changes in Settings

Change in on -the-ground requirement (s) or settings of the pilot can reflect the changing demands and preferences at the sub-national levels. Agriculture being a state subject, changes at this level should be acknowledged. Full membership in the condition represents completely new on-ground policy requirements for the pilot, dismantling old settings. Full non-membership represents that the pilot does not suggest any change to the current settings. More ‘in the set’ than out represents cases where old settings are maintained but new ones are also announced which conflict with old ones. More out than in represents incremental additions to old settings (Table 5.6).

Table 5.6: Logic for scoring change in settings of the policy

Score	Meaning	Details
0	No change	The pilot does not suggest any change in on-ground requirements to meet the objectives
0.33	Progressive incremental	The pilot brings an incremental addition to the same on-ground requirements of the policy/ program(same direction, no conflict)
0.67	Contested incremental	Completely new on-ground policy requirements are introduced, moving the program towards a new equilibrium, some of which might be in conflict with existing ones
1	Paradigmatic change	The pilot puts forth completely new settings to operationalize objectives dismantling old ones

Scoring of changes in Instrument Logic

Moving to means level, the logic of deploying a certain type of instrument (implementation preferences) indicates government preferences for a certain category of instruments in relation to the policy problem context. Full membership in the condition represents new instrument preferences, completing changing earlier instrument preferences. Full non-membership represents that the pilot continues with earlier choice of instruments to achieve the abstract goals. More ‘in the set’ than out represents cases when there is a conflict of instrument preferences between old and new. More out than in represents incremental changes to initial instrument preferences (Table 5.7).

Table 5.7: Logic for scoring changes in instrument logic

Score	**Meaning**	**Details**
0	No change	The pilot works with the same instrument logic as in the previous policy/program
0.33	Progressive incremental	The pilot adds to the current instrument logic as an incremental addition to the earlier instrument logic
0.67	Contested incremental	Maintaining old instrument logic while adding new instrument logic but some of these might conflict with existing ones
1	Paradigmatic change	The pilot puts forth completely new instrument logic

Scoring of changes in Instrument Type

Specific types of instruments may be preferred or considered convenient and might lead to success of the pilot. Following Hood’s (1986) NATO framework there can be four broad categories of policy instruments deployed by governments to solve policy problems. This includes 1) Nodality policy instruments that involved the use of information by the governments, 2) Authority policy instruments, wherein governments exerted legal control, 3)

Treasure policy instruments, wherein governments used their money and 4) Organization policy instruments wherein governments used the available formal organizations within their ambit for problem solving.

Full membership in the condition represents completely new instruments being deployed to achieve the objectives. Full non-membership represents that the pilot continues using the same instruments. More 'in the set' than out represents cases where old instruments are maintained along with new ones with a conflict. More out than in represents incremental changes to the type of instruments being used (Table 5.8).

Table 5.8: Logic for scoring changes in the choice (type) of instruments

Score	**Meaning**	**Details**
0	No change	The pilot works with same instruments
0.33	Progressive incremental	The pilot adds new instruments that are an incremental addition to the current type of instruments (moving in same direction, no conflict, more instruments of the same type)
0.67	Contested incremental	Maintaining old instrument types while adding new but some of these are conflict with existing ones
1	Paradigmatic change	The pilot puts forth completely new instruments while removing old ones

Scoring for changes in Instrument Calibration

Sometimes there is improvisation in the specific way(s) in which the instrument(s) is/are used in the pilot. This is captured within the calibration changes. Full membership in the condition represents completely new ways in which the instruments are being utilized. Full non-membership represents that the pilot does not bring any change in the way instruments are being utilized at the ground level. More 'in the set' than out represents cases where new ways of instrument utilization are introduced while maintaining old ones, and there is a conflict. More out than in represents incremental changes to the way in which instruments are being utilized (Table 5.9).

Table 5.9: Logic for scoring changes in instrument calibrations

Score	Meaning	Details
0	No change	The instruments are utilized in the same manner as the earlier policy/program
0.33	Progressive incremental	The pilot brings incremental changes to the same way in which instruments are utilized (same direction, no conflict)
0.67	Contested incremental	The old instrument settings are maintained while new are added, some of these settings might conflict with existing ones
1	Paradigmatic change	The pilot puts forth completely new instrument settings while dismantling old ones

After collecting data on all conditions and outcome, some may be dropped from the model based on the information gained while studying the cases. Based on the field experience new aspects about each measure may become apparent and thus adjustments need to be made accordingly (Basurto and Speer, 2012).

Note:

Based on the data collection, two changes were made to the model. Firstly, none of the pilots sought to change the overall abstract goals of an incumbent policy or programme, hence it was 0 throughout for all the cases. Thus, the variable ‘Change in Goals’ was dropped from the model. Secondly, the variable/ condition Instrument Logic was found to be guiding the type of instrument that was to be used. Thus the scores on both completely matched across all the cases, hence both Instrument Logic and Type was combined to represent one variable called Change in Instrument Type. Thus, finally the model proceeded for analysis with a total of four causal conditions, from an initial set of six conditions.

5.2.6 Truth table analysis

The truth table was constructed marking ‘scaling up’ as the 'outcome' that the study assesses based on membership scores of conditions that may potentially be necessary or sufficient for the outcome to happen. The truth table considers each case as a combination of the conditions selected. 2^k combinations are possible (where k is the number of conditions being studied).

Normally, four kinds of result can be expected in the truth table:

- Combination of specific characteristics lead to positive outcomes,
- Combination of specific characteristics lead to negative outcomes,
- There are contradictory cases i.e. a specific combination leads to positive outcomes in some cases and negative in others, and
- No cases for specific combinations: This is likely for small-n studies, wherein there will be many combinations of characteristics that are possible but not observed in any of the cases hence it is also not possible to say whether the outcome occurred or not (termed ‘remainders’ in fsQCA).

5.2.7 Conducting the fsQCA

The results of a QCA are interpreted through the following key concepts (Ragin, 2006; Ragin, 2008):

- Necessary condition: A causal condition (X) is considered necessary for outcome (Y), if Y cannot occur without X, i.e. Y (outcome) is a subset of X (cause). This entails that the membership score on the outcome is consistently lower than the membership score of the causal factor under consideration.

- Sufficient condition: If a causal condition (X) is sufficient for outcome (Y) then, if Y is present X must be present too. However there may be other factors too leading to Y, not only X. Here X (cause) is a subset of Y (outcome). This entails that the membership score on the outcome is consistently higher than the membership score of the causal combination.
- Consistency assesses the degree to which the cases sharing a given combination agree in displaying the outcome.
- Coverage assesses the degree to which a cause or causal combination accounts for instances of an outcome.
- Solution coverage measures the proportion of memberships in the outcome that is explained by the complete solution (A*B + A*C etc.).
- Raw coverage measures the proportion of memberships in the outcome explained by each term of the solution (A*B).
- Unique coverage measures the proportion of memberships in the outcome explained solely by an individual solution term (memberships not covered by other solution terms).

5.3 Case narratives and fuzzy-set scoring

The case narratives cover how the pilots were introduced and subsequently, the changes in policy ends and means that they brought about (changes to the incumbent policy regime). The logic for fuzzy scoring based on the criteria discussed in Section 5.2 is discussed in detail for each component and case. The case description and fuzzy- score allocation are based on coding of information and data obtained from case-specific interviews and review of pilot-specific policy and research documentation.

5.3.1 Experimental Crop Insurance Scheme

In 1985, a Comprehensive Crop Insurance Scheme (CCIS) was launched in India for the first time. The CCIS aimed at providing financial support to farmers when faced with crop failure due to natural calamities and help restore the 'credit-eligibility' for the subsequent cropping season and support food grain production in India. Under the CCIS, the sum insured was equal to the disbursed crop loan with a cap of Rs. 10,000 per farmer. The premium was chargeable at 2 per cent of the sum insured for wheat, paddy and millets and 1per cent for oilseeds and pulses. For small and marginal farmers, 50per cent of the premium was subsidized jointly by the central and respective state governments on 50-50 basis for all states (full subsidy borne by the Central Government for Union Territories)[14].

In the Rabi season of 1997/98 while the CCIS was continuing, an Experimental Crop Insurance scheme (ECIS) was launched by the Government of India. ECIS was introduced as a pilot in 14 districts of five states of India viz. Andhra Pradesh, Assam, Karnataka, Orissa and Tamil Nadu (MoA, 1998). The overall goal of ECIS was to act as a risk transfer and management mechanism for the farming community.

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[14] "Modified Comprehensive Crop Insurance Scheme", accessed 10 January 2016, http://pib.nic.in/focus/foyr98/fo1098/fo2910981.html

Changes in policy goals

Changes at Objectives level

The specific objective of the ECIS was to bring more farmers under the coverage of crop insurance, beyond what CCIS was covering. The change in objective is considered to be incremental in nature as it is an expansion of the earlier objective of CCIS, and hence a score of 0.33 is given.

Change at Settings level

Certain constraints were evident during the implementation of CCIS. Owing to its voluntary nature, states like Punjab, Haryana and Uttar Pradesh that had low risk cropping system because of type of crops grown and access to irrigation did not see merit in joining a crop insurance programme. In response to this feedback from the states, the ECIS aimed at increasing the coverage of the scheme by including non-loanee farmers and lowering the size of unit area of insurance for a more realistic representation of losses in crop yield.

At the ground-level, this was a change in the scope of the insurance scheme to include a different group (non-loanee). A score of 0.67 is given for this change in settings, as this expansion is not an incremental addition of more number of loanee farmers; instead, the type of beneficiaries covered itself has changed.

Changes in policy means

Changes in Instrument logic and type

The instrument logic and type still remained that of risk management through a financial instrument i.e. insurance hence a score of 0 is given.

<u>Changes in instrument calibration</u>

The instrument moved from being loan-based compensation for crop loss (as in the case of CCIS) to a flat pay-out to all small and marginal farmers (with a cap amount) in the case of crop loss. The instrument no longer remained a true loan and subsidy, and thus a score of 1 is given for this paradigmatic change. 100 per cent subsidy was provided in premium. The central and state governments shared the premium, subsidy and claims in 4:1 ratio.

Outcome

The scheme was discontinued after one season (in *Rabi* 1997/98) due to administrative and financial difficulties (GoI, 2014a). A score of 0 is given for the outcome as the pilot terminated without undergoing any replication, expansion or change in scope. The scheme covered 454555 farmers. The indemnity was Rs. 37.80 crore against the premium receipt of Rs. 2.80 crore. The sum insured was Rs.168.11 crores and claims paid Rs.37.80 crores against premium of Rs.2.84 crores (Singh, 2010).

Table 5.10: Overview of the policy components of the ECIS

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Risk transfer and management mechanism for farmers	Bring more farmers under the coverage of crop insurance	Scope of the insurance expanded to include non-loanee small and marginal farmers
		Instrument logic	**Instrument type**	**Calibration**
	Means	Risk transfer instrument	Insurance	Loan-based compensation to flat pay-out for agriculture losses

5.3.2 Farm Income Insurance Scheme

The overall goal of the Farm Income Insurance Scheme (FIIS) was to operate as a risk transfer mechanism. The FIIS was introduced on a pilot basis during *Rabi* 2003-04 in 15 districts of 8 States for wheat and 3 districts of 3 States for rice. The scheme was based on a 'homogeneous area' approach[15] and the unit of insurance was administratively fixed, such as a village panchayat, revenue circle, block, taluka or district. The scheme was compulsory for loanee farmers and voluntary for non-loanee farmers (AFC, 2011).

Changes in policy goals

<u>Changes at Objectives level</u>

The income of a farmer depends both on crop yield and its market price. The objective of FIIS was to stabilize farmer incomes. The focus on farmer incomes was a major shift from earlier crop insurance schemes that focused only on crop loss compensation, hence a score of 1 was given.

<u>Changes at Settings level</u>

As farmer incomes are a factor of crop yield as well as market price, the FIIS aimed at securing revenue derived from specific crops, covering both changes in crop yields as well as market prices (MoA, 2014b). A score of 1 was given because the scope changed completely, as crop-based revenue was being insured instead of crop yields and only for two major crops, rice and wheat (AFC, 2011).

[15] Risk and pay-out determined for a homogenous area comprising of a number of farmers instead of individual risk and loss based pay-out for each farmer

Changes in policy means

Changes in Instrument logic and type

The instrument logic and type still remained that of risk management through a financial instrument i.e. insurance, hence a score of 0 was given.

Changes in instrument calibration

The FIIS acted as a revenue-based insurance scheme (insuring revenue instead of crop loss) using the interaction between yield risk and price risk. This marked a complete shift from the earlier schemes (where compensation was only based on yield loss) so a score of 1 was given. The loanee farmers are insured for a minimum guaranteed income. If the actual income (current yield*current market price) is less than the guaranteed income ((average yield of 7 years*level of indemnity)*Minimum Support Price), then the insured farmer would be compensated for the shortfall.

The premium rates were actuarial and determined for each state at the district level (Clarke et al, 2012). The Government of India subsidized the 75 per cent of the premium for small and marginal loanee farmers and 50 per cent for other farmers. Two levels of indemnity, i.e. 90 percent for low-risk areas and 80 percent for high-risk areas were fixed. The operating market prices were calculated using the weighted average of all the markets in the district[16] (AFC, 2011).

[16] Using daily modal price of 8 weeks from the first arrival of the grain in the market

Outcome

FIIS was terminated within one season[17] . In covering the market risks, the FIIS had a similar logic to the prevailing Market Support Price (MSP) scheme of the Government of India where farmer incomes for specific crops are secured at a minimum procurement price fixed for these crops, irrespective of the market fluctuations. The Government procurement at MSP was suspended in the FIIS pilot districts for the covered crops. The prevailing National Agriculture Insurance Scheme (NAIS) was also suspended for the selected districts/crops where the pilot FIIS was being implemented (AFC, 2011).

During its limited term however, FIIS expanded to 19 districts in four States for rice crop during *Kharif* season 2004, before its termination, hence a score of 0.33 is given. Farmer opposed FIIS as the scheme sought for removal of MSP and there was also a high premium rate. FIIS also lead to a project proposal for a similar National Crop Income Insurance Scheme, which however was not approved[18].

Table 5.11: Overview of the policy components of the FIIS

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Risk transfer mechanism for farmers	Stabilize farmer incomes	Insure farm-based incomes instead of crop yields
		Instrument logic	**Instrument type**	**Calibration**
	Means	Risk transfer instrument	Insurance	Revenue-based insurance scheme

17 “Farm Income Insurance Scheme withdrawn”, accessed 15 January 2016, http://www.thehindubusinessline.com/2004/06/11/stories/2004061101191900.htm

18 *Interview with Mr. H P Verma, Ministry of Agriculture*

5.3.3 Weather Based Crop Insurance Scheme

A Weather Based Crop Insurance Scheme (WBCIS) was piloted in India in 2007 to provide states an alternative to ongoing crop insurance schemes. The Comprehensive Crop Insurance Scheme launched in 1985 was replaced by the National Agricultural Insurance Scheme (NAIS) in 1999 to overcome operational issues in CCIS. In NAIS the premiums were low and bulk of it was borne by the Central Government. The NAIS was in fact considered to be laden with the characteristics of a 'social-welfare scheme' rather than being a market-based insurance one (Mahul and Verma, 2011).

NAIS was made available to both loanee (mandatory) and non-loanee farmers across all land-holding sizes. NAIS covers all the food crops (cereals, millets and pulses), oilseeds and annual commercial/horticultural crops. The premiums ranged from 1.5per cent to 3.5per cent of the sum insured for food and oilseed crops. A 10per cent premium subsidy was provided for small and marginal farmers joining the NAIS. Claims over and above 100per cent of the premiums collected for food crops and oilseeds, bank service charges, and 20 per cent of the administrative expenses were borne equally by the Central and State governments (GoI, 2015).

WBCIS was initiated in 70 *hoblis*[19] of the rainfed Southern state of Karnataka for 8 rain-fed crops. By 2010–11 WBCIS was being implemented in 17 States and covered more than 67 lakh farmers growing crops on 95 lakh hectares spread over 1,010 blocks in 118 districts (GoI, 2013).

[19] Cluster of villages considered as one unit for administrative reasons purposes such as taxes and land tenure in the southern states of Karnataka and Andhra Pradesh, India.

The WBCIS was launched to take advantage of an innovation by the Indian Meteorological Department (IMD) in the Eleventh Five Year Plan and their experience with Automatic Weather Stations. An Integrated Agro-Meteorological Advisory Service (IAAS) was launched by IMD to issue regular weekly Agro-Met Advisory Bulletins up to the district level on field crops, horticulture and livestock[20]. State Agricultural universities were involved in collecting and organizing soil, crop, pest and disease information and integrating it with weather forecasts to assist farmers in their farm-level decisions (AFC, 2011).

Changes in policy goals

Changes at Objectives level

The objective of WBCIS was to provide insurance protection against losses in crop yield resulting from adverse weather incidences. WBCIS provides pay out against extremes of rainfall (both deficit and excess) during *Kharif* and adverse changes in weather parameters like frost, heat, relative humidity and un-seasonal rains during *Rabi* season (AFC, 2011). A score of 0.67 is given because the scope of the insurance changed from generic crop insurance (as in NAIS) to insurance for weather-based events only (Singh, 2010).

Changes at Settings level

In terms of on-ground requirements to meet the objective, WBCIS follows an area approach, i.e. compensation is provided to a homogenous 'Reference Unit Area (RUA)'. The RUA is notified before the start of the cropping (*Kharif*)

[20] Interview with Dr. K. K. Singh, Indian Meteorological Department

season by the State Government and all the insured cultivators of a particular insured crop in that area are deemed at on par in the assessment of claims. Though WBCIS also had an area-based approach similar to NAIS, the area was determined on the basis of its coverage under a Reference Weather Station (RWS). This would further form the basis on which current weather data and the claims would be processed[21]. A score of 1 is given as the coverage scope changed from being crop-yield based area coverage to weather-based area coverage.

Changes in policy means

Changes in Instrument logic and type

The instrument logic and type still remained that of risk management through a financial instrument i.e. insurance, hence a score of 0 was given.

Changes in calibration

In terms of calibration, the sum insured in WBCIS is the cost of inputs expected in raising the crop (pre-declared per unit area by the Agriculture Insurance Company before the start of each crop season in consultation with state Governments). The input costs may vary from crop to crop in different RUAs. The sum insured is further distributed under key weather parameters used in the insurance in proportion to the relative importance of the weather parameters. The claim settlement is automatic, based on weather readings at

[21] "Weather Based Crop Insurance Scheme: Frequently Asked Questions", accessed 20 January 2016, http://www.aicofindia.com/AICEng/General_Documents/Product_Profiles/WBCIS_FAQ.pdf

the RWS. Weather insurance pay-outs are assured within 45 days from the end of insurance period.

This is a complete shift from traditional crop insurances where pay-out is linked to yield estimates. Here the sum insured is the expected cost of inputs using weather parameters (used as a proxy for actual crop yields), hence it is a complete shift again from traditional crop insurance, hence a score of 1 is given.

Instead of deviations from historical yield estimates, claims are based on weather-triggers[22]. Adverse weather incidences during the season entitle the insured a pay-out, subject to the weather triggers defined in the 'Pay-out Structure'. Claims arise when there is a certain adverse deviation in actual weather parameter incidence in RUA as per the weather data measured at RWS. For a loanee the sum insured per crop is calculated by multiplying per unit area value of inputs with crop specific acreage declared in the loan application form by the loanee cultivator for the purpose of maximum borrowing limit fixed for him by the lending bank.

For the non-loanee the acreage figure is the expected area sown / planted under the particular crop as declared in the insurance proposal form. The actual losses incurred may be more or less than compared to what has been specified in the Benefit Table leading to crop losses. Irrespective of the actual crop loss, all the insured cultivators under a particular crop in a RUA and under the same RWS are deemed to have suffered the same adverse

[22] "Weather Based Crop Insurance Scheme: Frequently Asked Questions", accessed 20 January 2016, http://www.aicofindia.com/AICEng/General_Documents/Product_Profiles/WBCIS_FAQ.pdf

deviation and thus become eligible for claim subject to terms and conditions of the scheme.

Outcome

In 2013, the WBCIS was bundled along with a modified form of NAIS crop insurance scheme (mNAIS) and a Coconut Palm Insurance Scheme and brought under the purview of a National Crop Insurance Programme[23]. The states however have the flexibility to choose to follow whichever scheme they want to follow under the NCIP or continue with NAIS. A score of 0.67 is thus given, because there is a change in scale but only partial institutionalization.

Table 5.12: Overview of the policy components of the WBCIS

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Risk transfer and management mechanism for farmers	Insurance protection against crop loss due to adverse weather	Compensation provided to a homogenous area covered under a weather station
		Instrument logic	**Instrument type**	**Calibration**
	Means	Risk transfer instrument	Insurance	Claims settled based on cost of inputs expected in raising a crop under average weather. Payout occurs when there are changes in weather conditions

[23] "Implementation of National Crop Insurance Programme during XII Plan: issue of administrative instructions", accessed 10 January 2016, http://agricoop.nic.in/imagedefault1/ncipletter.pdf

5.3.4 Modified National Agriculture Insurance Scheme (mNAIS)

The National Agriculture Insurance Scheme (NAIS) was modified and launched as a pilot titled modified NAIS (mNAIS) in 50 districts in 12 states from *Rabi* of 2010–11, to be operational alongside the NAIS.

Changes in policy goals

<u>Changes at Objectives level</u>

The objective of the mNAIS was to pilot a modified form of the ongoing National Agriculture Insurance Scheme (NAIS) in selected states and UTs to make it more farmer friendly by increasing its scope[24]. It was an incremental expansion hence a score of 0.33 is given.

<u>Changes at settings level</u>

In addition to payment of claims for yield loss on area approach basis (as under NAIS), the unit area of insurance was reduced to village/village panchayat level for major crops. Additional risks such as post-harvest losses due to cyclones and prevented sowing/planting risk were covered[25]. The scope of coverage of the insurance was increased to include new dimensions and hence a score of 0.67 is given.

[24] Modified National Agriculture Insurance Scheme. Accessed 5 January 2016, http://agricoop.nic.in/Admin_Agricoop/Uploaded_File/Modifiedper cent20Nationalper cent20Agriculturalper cent20Insuranceper cent20Scheme.pdf

[25] Agriculture Insurance Company of India. Frequently Asked Questions on mNAIS, accessed 10 January 2016, http://www.aicofindia.com/aiceng/general_documents/product_profiles/mnais_faq_it.pdf

Changes in policy means

<u>Changes in Instrument logic and type</u>

The instrument logic and type still remained that of risk management through a financial instrument i.e. insurance. Hence a score of 0 was given.

<u>Changes in instrument calibration</u>

There were few improvements of mNAIS over NAIS. These were in the form of incremental changes to indemnity levels, premium subsidy rates and threshold yield calculations hence a score of 0.33 is given.

A higher minimum indemnity level of 70per cent (increased from 60per cent in NAIS) was provided instead of 60per cent in NAIS. Indemnity levels were set based on threshold yield and premium subsidy. To limit the liability to the Government, the premiums under mNAIS were capped[26.]

The premium rates under mNAIS were set on an actuarial basis and thus the financial liability lay with the Insurance Company. Subsidy in premium was up to 75per cent to all farmers. Premium subsidy was also given upfront by State and Central Governments to facilitate quick settlement of claims (Clarke et al, 2012).

Premium subsidy was available to loanee farmers up to the amount of loan sanctioned/advanced or value of Threshold Yield (TY), whichever is higher. For non loanee farmers, subsidy is available up to the value of TY. TY was based on average yield of the preceding 7 years excluding up to 2 calamity years declared by concerned State / UT government/authority. No premium subsidy was available on sum insured above the value of TY. The

[26] Interview with Mr. H. P. Verma, Government of India

Government provided only upfront premium subsidy ranging up to 75per cent to all farmers and this amount was shared by the Central and State Government on 50: 50 basis. All claim liability was to be borne by the concerned insurance companies. Whereas, under NAIS the financial liabilities towards claims beyond 100per cent of premium in case of Food Crops & Oilseeds and 150per cent of premium in case of annual horticultural/ commercial crops along with 10per cent premium subsidy to small and marginal farmers were on the governments (GoI, 2015)[27].

Outcome

In 2013, the mNAIS was bundled along with WBCIS and a Coconut Palm Insurance Scheme (CPIS) and brought under the purview of a National Crop Insurance Programme[28]. The states however have the flexibility to choose to follow whichever scheme they want to under the NCIP or the ongoing NAIS (GoI, 2014c). A score of 0.67 is thus given, because there is a change in scale but only partial institutionalization.

The National Crop Insurance Programme was launched during *Rabi* of 2013-14, integrating the WBCIS, mNAIS and CPIS as three components of the NCIP. The reference unit for settlement of claims for the mNAIS component of NCIP was crop yield in a Notified Area, and for the WBCIS component is weather data of a notified Reference Automatic Weather Station. NCIP is mandatory for loanee farmers. The coverage of farmers under NCIP by the end of the XII Five year plan of India (2017) has been projected to be

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[27] Interview with Dr. Raghvendra Singh, Insurance Consultant

[28] "Implementation of National Crop Insurance Programme during XII Plan: issue of administrative instructions", accessed 10 January 2016, http://agricoop.nic.in/imagedefault1/ncipletter.pdf

50per cent. Even though the premiums paid under NCIP were higher than the NAIS and claim liability as present was on the insurance company, the NCIP provided upfront subsidy up to 75per cent in the case of MNAIS and up to 50per cent under WBCIS[29].

Table 5.13: Overview of the policy components of the mNAIS

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Risk transfer and management mechanism for farmers	Pilot a modified form of NAIS by increasing its scope	Decrease in geographical unit of insurance, additional risks are covered
		Instrument logic	**Instrument type**	**Calibration**
	Means	Risk transfer instrument	Insurance	Changes to earlier indemnity levels and premium rates

5.3.5 National Watershed Development Project for Rainfed Areas

In 1986-87 a 'National Watershed Development Programme for Rainfed Areas (NWDPRA)' was launched for optimizing the production of important rainfed crops like pulses, oilseeds, coarse cereals, cotton, groundnut etc. The NWPDRA was restructured and launched in a pilot project mode for five years as National Watershed Development Project for Rainfed Areas (NWDPRA) in 1990-91 (GoI, 2006). The Scheme was implemented on the basis of Common Guidelines for Watershed Development Projects issued by the National Rainfed Area Authority, Government of India[30].

[29] "Private insurers may help farmers weather the storm", accessed 16 January 2015, http://www.financialexpress.com/article/markets/commodities/private-insurers-may-help-farmers-weather-the-storm/30555/

[30] National Watershed Development Project for Rainfed Areas. Retrieved from http://agricoop.nic.in/Admin_Agricoop/Uploaded_File/NWDPRA8410.pdf

The overall goal of NWDPRA was integrated watershed development and sustainable farming. The outlay was increased from about Rs. 100.00 crore of actual expenditure in the VII Plan (to cover only 99 districts in 16 states) to over Rs. 1000.00 crore in the VIII Plan to cover over 2500 blocks in all the states and UTs. The restructured NWDPRA followed the Watershed Areas' Rainfed Agriculture Systems Approach (WARASA) Guidelines during the VIII plan period and increasingly had a participatory and farmer-centric approach to watershed development (GoI, 2001).

Changes in policy goals

Changes at Objectives level

The restructured NWDPRA retained the objective of the earlier programme, which were to improve production and productivity in the vast rainfed areas and to restore ecological balance in these areas. The scope of NWPDRA however moved to social dimensions of watershed management, and thus increased focus on livelihood enhancement[31]. This was an incremental expansion towards strengthening the earlier objectives hence a score of 0.33 is given.

Changes at Settings level

At the ground level, the restructured scheme included conservation, development and sustainable management of natural resources, enhancement of agricultural production and productivity, restoration of ecological balance

[31] The restructured programme was moving towards integration of social aspects, similar to the watershed programmes of the Ministry of Rural Development, Government of India. Based on interviews with Dr. C P Reddy; Dr. Rita Sharma, Government of India.

in the degraded and fragile rainfed ecosystems by greening these areas through appropriate mix of trees, shrubs and grasses, reduction in regional disparity between irrigated and rainfed areas and creation of sustained employment opportunities for the rural community including the landless[32]. These improvements were incremental in nature and aimed at expanding the scope of earlier settings, so a score of 0.33 was given.

Changes in policy means

<u>Changes in Instrument logic and type</u>

To meet the overall goal and objectives, the restructured NWDPRA deployed participatory instruments such as partnerships with non-governmental organizations (Howlett et al, 2009) for soil and water conservation. This marked an addition to the earlier focus on direct provision of technological solutions for soil and water provision by the state and central governments. The instrument type was organization-based i.e. through use of the formal organizations available to the governments. A score of 0.33 was thus given.

NWDPRA emphasized on building upon local practices, knowledge and wisdom (GoI, 2001). Self-Help Groups such as *Mitra Krishak Mandals* were developed (Pande, 1998). Though NGOs were allowed to facilitate activities under the restructured pilot NWDPRA but their participation primarily served at increasing the level of engagement with the communities instead of becoming primary implementing agencies themselves. Such efforts enabled individual farmers to implement soil and water treatment activities on

[32] National Watershed Development Project for Rainfed Areas, accessed 20 February 2016, http://agricoop.nic.in/Admin_Agricoop/Uploaded_File/NWDPRA8410.pdf

privately-owned land and local village organizations and farmer groups to implement community works (GoI, 2001).

Changes in Instrument calibration

The restructured NWDPRA allowed a greater degree of flexibility in choice of technology, decentralization of procedures, provision for sustainability and reemphasizes active participation of the Watershed Community in the planning and execution of their watershed development projects (GoI, 2001). The activities and their operationalization varied from situation to situation and were based on the status of land degradation, prevailing farming system practices in the selected watershed and prioritization of activities set by the watershed community[33]. Thus a score of 0.33 is given as the technical and participatory instruments were deployed in an incremental manner building on prevailing farm practices.

Outcome

The NWDPRA continued to expand to different states and undergo changes to encourage higher community participation during the Eighth and Ninth Five Year Plan. In 2000, the NWDPRA was subsumed under Macro Management of Agriculture Scheme (GoI, 2006). The scheme was planned to be unfolded in three phases, preparatory, watershed development and consolidation (GoI, 2001), hence the score given for the outcome is 0.33.

[33] Operational instructions for adoption of the common guidelines for watershed development projects. 23 July 2008. Retrieved from http://agricoop.nic.in/Admin_Agricoop/Uploaded_File/NDPRAGUideline.pdf

Table 5.14: Overview of the policy components of NWDPRA

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Integrated watershed development and sustainable farming	Increase production and productivity in rainfed areas and restoration of ecological balance	Conservation, development and sustainable management of resources, enhance rural livelihoods
		Instrument logic	**Instrument type**	**Calibration**
	Means	Preference of participatory instruments	Partnerships with NGOs and communities for soil and water conservation	Higher flexibility to states in choice of technological, decentralized practices and participation of watershed committees in watershed development

5.3.6 Indo-German Watershed development project

The Indo-German Watershed Development Programme (IGWDP) was one of the Externally-Aided projects under the Ministry of Agriculture that was piloted in 1992. The overall goal of IGWDP was the regeneration of natural resources and soil and water conservation in selected dryland areas, an area of focus of several watershed programmes developed earlier as well. IGWDP was implemented by the National Bank for Agriculture and Rural Development (NABARD), Government of India, an Indian NGO Watershed Organization Trust (WOTR) and supported by the German Government through a German development bank KfW.

The IGWDP started in Ahmednagar district in the state of Maharashtra. By 1997 the project had been implemented in more than 300,000 hectares of drylands through 300 projects spread across the dryland areas of Maharashtra, Andhra Pradesh, Gujarat, and Rajasthan, with a total investment of more than 70 million euro[34]. Bilateral programmes such as IGWDP were instrumental in providing NGOs with the funding and flexibility to test emerging concepts and methodologies in participatory watershed development (Appadurai et al, 2015).

Changes in policy goals

Changes at Objectives level

To achieve the overall policy goal, the IGWDP had the specific objectives of integrating efforts towards rehabilitation of watersheds for the regeneration of natural resources. This was an incremental advancement to consolidate and strengthen experiences from successful small watershed efforts in selected states of India hence a score of 0.33 was given.

Changes at Settings level

In terms of the on-ground requirements, IGWDP developed micro-watersheds in a comprehensive manner in order to develop sustainable livelihood opportunities and economic development based on watershed development[35]. IGWDP thus focused on expansion of the scope of earlier watershed activities at the local level, so a score of 0.33 was given. Micro-watersheds were formed to create a people's movement for watershed development (Agrawal, 2007).

[34] "Indo-German Watershed Development Programmes (IGWDP)", accessed 5 January 2016, http://www.india.diplo.de/Vertretung/indien/en/12__Climate__Development__Cooperation/Environment__Climate/cooperation/IGWDP.html

[35] Interview with Dr. Crispino Lobo, Dr. Marcella D'souza, WOTR

Changes in policy means

Changes in Instrument logic and type

IGWDP emphasized on a collaborative approach compared to the pre-dominantly technical focus for watershed development in other projects and programmes. Similar to the NWDPRA case discussed earlier, IGWDP deployed organizational instruments to facilitate a participatory approach towards watershed development involving the watershed communities, NGOs and relevant technical resource persons[36]. IGWDP marked the advent of collaborative efforts between governments and NGOs and was a contrast to the earlier watershed development efforts done by both agencies separately. Even though this change in instrument type is similar to the case of NWDPRA, however in IGWDP, the NGOs were the lead implementation agencies (Farrington and Lobo, 1997; Agrawal, 2007). This was a major shift from the earlier watershed development efforts at the state level, involving the state governments. Hence a score of 0.67 was given.

IGWDP was a leading example of collaboration between governments and NGOs to scale up successes of micro-watersheds. Formation of village groups was also facilitated in order to mobilize communities towards rehabilitating their degraded environment through participatory self-help initiatives (Farrington and Lobo, 2007).

Changes in Instrument Calibration

Participation at the local level was realized through the creation of Village Watershed Committees nominated by the village communities along with the

[36] Indo-German Watershed Development Programme. Accessed 3 January 2016, https://www.nabard.org/english/Indo_German_wdp.aspx

NGO partners. Under IGWDP the lead NGO, WOTR developed a participatory approach developed called Participatory Net Planning that promoted engagement with community members on approaches for assessing their resource potential and plans for conservation measures (Appadurai et al, 2015).

IGWDP helped in organizing villagers and women into groups and committees, as well as inter village committees to plan, implement, monitor and manage the programme with support from local NGOs. Local governments i.e. Panchayati Raj Institutions had a major role to play in these efforts (Farrington and Lobo, 1997). These efforts strengthened the ways in which earlier technical and participatory policy instruments were being used for watershed development at the local level, hence a score of 0.33 was given.

Outcome

IGWDP resulted in the setting up of a national level Watershed Development Fund (WDF) housed in NABARD in 1999[37]. The demonstration and replication activities of the project continued till 2015[38]. Based on the success of the watershed development model in Maharashtra, the Government of India created the WDF under the Ministry of Agriculture to replicate the approach and concept of IGWDP. The WDF was intended to be utilized as a loan to the respective state governments (WOTR, 2014). IGWDP also helped re-orient the GoI supported National Watershed Development Programmes at the national level to include the Capacity Building Concept, a unique feature of IGWDP.

[37] Indo-German Watershed Development Programmes, accessed 10 January 2016, http://www.india.diplo.de/Vertretung/indien/en/12__Climate__Development__Cooperation/Environment__Climate/cooperation/IGWDP.html

[38] Interview with WOTR field staff, Pune

Additionally, IGWDP also influenced the common approach adopted by the Government of India in 2002 for Watershed Development in India[39] (Agrawal, 2007). Thus, even though the IGWDP pilot itself did not convert into a new policy, it led to formation of a larger watershed initiative (WDF) at the national scale and few features of the pilot itself were incorporated into national policies and programmes. Hence a score of 0.67 was given.

Table 5.15: Overview of the policy components of the IGWDP

		Policy content		
		Goals	**Objectives**	**Settings**
	Ends	Regeneration of natural resources	Integrated programme for rehabilitation of watersheds and create sustainable livelihoods	- Develop comprehensive microwatersheds - create a people's movement to save their environment
Policy focus		**Instrument logic**	**Instrument type**	**Calibration**
	Means	Preference for participatory instruments for watershed development	Participatory local level planning compared to earlier technical approach to watershed development	- create self-help initiatives - project management and decision-making by village committees

5.3.7 Sujala watershed development project

Another Externally-Aided project coordinated by the Ministry of Agriculture and implemented at the state level, was the Karnataka Watershed Development Project locally known as *Sujala.* The project was implemented with World Bank assistance in 754 watersheds distributed in 38 taluks spread

[39] Interviews with Dr. Crispino Lobo and NABARD officials

across five districts of the south-Indian state of Karnataka and covered an area of 4.27 lakh hectares[40].

Sujala was initiated as a community-driven participatory pilot programme from 2002- 2009 with an investment of $ 100 million (GoK, 2012). These districts were in the semi-arid zone and faced recurrent droughts, soil erosion, irregular rainfall and declining groundwater levels. The overall goal of *Sujala* was to alleviate poverty, increase agricultural productivity and improve management of the environment in these rainfed districts (GoK, 2012; World Bank, 2012).

Changes in policy goals

<u>Changes at Objectives level</u>

To meet the overall goal, *Sujala* had the specific objectives of improving the productive potential of selected watersheds, similar to other watershed programs in the state, supported by bilaterals and multi-laterals (Milne, 2007; World Bank, 2013). Hence a score of 0.33 was given. *Sujala* focused on soil and water conservation and sustainable resource use, and was implemented in collaboration with the Karnataka Government's Watershed Development Department (WDD), Department of Agriculture and 60 local NGOs[41].

[40] "Keynote address: Karnataka Watershed Development Project II", accessed 5 January 2016, http://watershed.kar.nic.in/homepgt_files/keynote.pdf
[41] "Monitoring the Sujala Watershed Management and Poverty Alleviation Project", accessed 10 January 2016, http://www.ggbp.org/case-studies/india/monitoring-sujala-watershed-management-and-poverty-alleviation-project

Changes at Settings level

The on-ground settings to meet the objectives were four-fold: 1) Participatory watershed development, 2) Intensification of the farming systems, 3) livelihood support for income generation and 4) Strengthening of institutions (Gowda and Sathish, 2011; Milne, 2007). Karnataka has been actively implementing watershed development programmes since 1984 and *Sujala* aimed to build on the earlier watershed activities at the local level. A score of 0.33 was thus given.

Changes in policy means

Changes in Instrument logic and type

Sujala integrated technical instruments for soil and moisture conservation with participatory implementation, marking an incremental addition of the same type of instruments. The instrument type was organization-based i.e. through use of the formal organizations available to the governments hence a score of 0.33 was given.

Changes in Instrument Calibration

Sujala combined participatory measures and technical expertise from research institutes such as International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and university of Agricultural Sciences and Indian Institute of Horticultural research (Gowda and Sathish, 2011). Specifically, IT tools including Remote Sensing and GIS were deployed for watershed development, planning and governance[42]. NGOs facilitated community-engagement in watershed development. These efforts strengthened the ways in which earlier technical and participatory policy instruments were being used for watershed development in Karnataka, hence a score of 0.33 was given.

Outcome

Sujala led to a follow-up pilot phase *Sujala* II in 2008. *Sujala* II was assisted by NABARD through the Rural Infrastructure Development Fund and implemented in 6 Districts between 2008 and 2014. *Sujala* also gave rise to more management pilots initiated by the Karnataka state government in partnership with the technical assistance of international research agencies such as ICRISAT. This includes *Bhoochetana* (2009) and a follow-up *Bhoochetana* plus (*Bhoosamrudhi*) focusing on improving agricultural productivity in dryland districts of Karnataka. In an evaluation of the *Sujala* project, the World Bank found that many of the approaches undertaken during the project have been incorporated into India's national watershed policy guidelines (World Bank, 2013). Since the pilot gave rise to more pilots and new management projects as well, it covered replication as well as scale change[43] a score of 0.67 was given for the outcome.

[42] "Keynote address: Karnataka Watershed Development Project II", accessed 5 January 2016, http://watershed.kar.nic.in/homepgt_files/keynote.pdf

[43] Interviews with Karnataka Watershed department and Agriculture department officials

Table 5.16: Overview of the policy components of the Sujala watershed development project

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Alleviate poverty, increase agricultural productivity and improve environmental management in rainfed districts	Improving the productive potential of selected watersheds	1)Participatory watershed development, 2) Intensification of the farming systems, 3) livelihood support for income generation and 4) Strengthening of institutions
		Instrument logic	**Instrument type**	**Calibration**
	Means	Combination of technical and participatory instruments	integrated technical instruments for soil and moisture conservation with participatory implementation	IT tools including Remote Sensing and GIS were deployed for watershed development, planning and governance

5.3.8 National Project on Organic Farming

Following the start of Green Revolution, the focus of India was to maximize crop yields and meet the growing food grain demands. Over the years however this led to excessive use of chemical fertilizers and decline in soil health. A National Project on Organic Farming (NPOF) was initiated as a pilot project in 2004 subsuming an ongoing National Project on Use and Development of Bio-fertilizers with the overall goal of improving soil health. NPOF is being implemented by National Centre of Organic Farming at Ghaziabad and its six

Regional Centres at Bangalore, Bhubaneshwar, Panchkula, Imphal, Jabalpur and Nagpur[44].

Changes in policy goals

<u>Changes at Objectives level</u>

The specific objective of NPOF was to promote organic farming by integrating modern technology with traditional farming practices like green manuring, biological pest control and weed management[45]. The Government of India had already been promoting organic farming in various parts of the country through various national schemes such as National Horticulture Mission, *Rashtriya Krishi Vikas Yojana* (RKVY), National Project on Management of Soil Health and Fertility and specific initiatives under the National Food Security Mission. As NPOF was an effort towards strengthening the current organic farming initiatives, a score of 0.33 was given.

<u>Changes at Settings level</u>

The on-ground settings of the NPOF focused on Country-wide promotion of organic farming through awareness creation, research and market development, maintenance of a culture bank of biofertilizers, biocontrol and decomposer organisms at national and regional levels and technical capacity building of all the stakeholders including human resource development, transfer of technology and production and promotion of quality organic and biological inputs. NPOF, through its centres also aimed at working as a nodal

[44] "National Project on Organic Farming", accessed 5 January 2016, http://ncof.dacnet.nic.in/aboutus.html

[45] "Organic farming in India", accessed 10 January 2016, http://pib.nic.in/newsite/efeatures.aspx?relid=72921

quality control laboratory for analysis of biofertilizers and organic fertilizers, including updation of quality standards and testing procedures for the organic inputs and development of a low cost certification system known as Participatory Guarantee System[41]. The development of a certification system was a new addition to the scope of earlier organic farming initiatives, hence a score of 0.67 was given.

NPOF provided financial assistance through Capital Investment Subsidy Scheme (CISS) for agro-waste compost production units, bio-fertilizers/bio-pesticides production units, development and implementation of quality control regime, human resource development etc.

Changes in policy means

<u>Changes in Instrument logic and type</u>

Similar to the earlier organic farming schemes in the country, NPOF also provided financial assistance for inputs. In addition, NPOF launched a farmers' group centric low-cost certification system called Participatory Guarantee System (PGS-India) an alternative of third party certification system during 2011-12[46]. Apart from financial instruments, an Authority-based instrument in the form of certification standards was included in NPOF hence a score of 0.67 was given.

PGS-India (Participatory Guarantee System of India) is a quality assurance initiative that is locally relevant, emphasize the participation of stakeholders, including producers and consumers and operate outside the

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[46] "Promoting Organic Farming through NPOF, NHM and RKVY", accessed 15 December 2015, http://pib.nic.in/newsite/PrintRelease.aspx?relid=92563. Press Information Bureau, Government of India, Ministry of Agriculture,

frame of third party certification[47]. Input production is assisted through development of large compost plants and bio-fertilizers. Instruments being used include certification, financial support, capacity building and extension, transfer of technology, and market development for organic farming.

Changes in Instrument Calibration

The Government of India is already providing financial assistance for organic farming under National Horticulture Mission for setting up of vermi-compost units. Funds are also provided @ 50per cent of the cost subject to maximum of Rs. 10,000/- per hectare for a maximum area of 4 hectare per beneficiary for adoption of organic farming. Assistance for promotion of organic farming on different components is also available under RKVY. Under NFSM on Pulses, including Accelerated Pulses Production Programme, assistance for popularizing Rhizobium culture/Phosphate Solubilising bacteria is provided to the farmers through village cluster demonstrations.

Under NPOF, assistance upto 25per cent and 33per cent of financial outlay capped at Rs. 40 lakhs and Rs. 60 lakhs respectively is provided as back ended subsidy through NABARD for establishment of production units for bio- pesticides/bio-fertilizers and agro waste compost respectively[48]. The changes in calibration occurred in terms of the financial instruments under NPOF being improvised in an incremental manner hence a score of 0.33 was given.

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[47] "Participatory Guarantee System of India", accessed 20 December 2015, http://pgsindia-ncof.gov.in/

[48] Organic Farming Being Promoted in A Big Way; India Exporting 1.6 Lakh Tonne Organic Products", Press Information Bureau, Government of India, Ministry of Agriculture. 21-February-2014, accessed 7 January 2016, http://pib.nic.in/newsite/PrintRelease.aspx?relid=104062.

Outcome

NPOF was subsumed under the National Mission on Sustainable Agriculture in 2014. A new scheme *Paramparagat Krishi Vikas Yojana* (PKVY)[49] was initiated in 2015 as a special component of Soil Health Management under the National Mission on Sustainable Agriculture. Under PKVY, Organic farming is promoted through adoption of village by Cluster Approach and Participatory Guarantee System (PGS) certification[50]. As NPOF has been bundled under an existing Mission and its features retained in a new Scheme, the outcome generated by NPOF was given a score of 0.67.

Table 5.17: Overview of the policy components of the NPOF

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Soil health improvement	Promote organic farming	Capacity building Certification Market development
		Instrument logic	**Instrument type**	**Calibration**
	Means	Subsidy instruments	Capital investment subsidy	Certification issues Price structure

5.3.9 Rainfed Area Development Programme

The Rainfed Area Development Programme (RADP) was launched as a pilot in the year 2011-12 with an outlay of Rs. 250 crore, as a sub-scheme under *Rashtriya Krishi Vikas Yojana* (discussed in Chapter 4). The overall goal of RADP was to ensure agriculture growth in the rainfed areas of India. RADP was launched in selected districts of ten states viz., Andhra Pradesh, Odisha,

[49] "Promoting Organic Farming". Press Information Bureau, Government of India, Ministry of Agriculture, accessed 7 January 2016, http://pib.nic.in/newsite/PrintRelease.aspx?relid=118622.
[50] Interview with Dr. Kishan Chandra, National Centre for Organic Farming

Tamil Nadu, Karnataka, Madhya Pradesh, Chhattisgarh, Maharashtra, Gujarat, Uttar Pradesh and Rajasthan (MoA, 2011).

Changes in policy goals

Changes at Objectives level

RADP aimed at improving the quality of life of small and marginal farmers in rainfed areas throughout the country by maximizing farm returns. This was an incremental effort seeking to expand current programmes broadly aiming at development of rainfed areas. Hence a score of 0.33 was given.

Changes at Settings level

The on-ground requirement of RADP was to develop a package of activities as part of an Integrated Farming System for enhancing agricultural productivity and minimizing risks associated with climatic variabilities[51]. As these activities already form part of regular agriculture development in rainfed areas, RADP's integration efforts were an incremental increase to these regular initiatives. Hence a score of 0.33 was given.

Changes in policy means

Changes in Instrument logic and type

RADP had convergence with many ongoing schemes and was able to leverage investments from schemes. Similar to an incremental change in the settings; at the instrument level as well RADP made an incremental improvement in the use of organizational instrument of institutional convergence to integrate

[51] Interview with Dr. Subrata Nath, Government of India

initiatives as part of ongoing area development programmes such as the Mahatma Gandhi National Rural Employee Guarantee Scheme, Integrated Watershed Management Programme, National Food Security Mission and Mission for Integrated Development of Horticulture[52].

Convergence is being attempted by the Ministry of Agriculture to improve efficiency in implementation of several related initiatives. Implementation of RADP offered an incremental change to ongoing convergence efforts at the instrument level for rainfed area development and a score of 0.33 was given.

<u>Changes in Instrument Calibration</u>

A cluster approach was followed under RADP to customize a Package of Practices for specific rainfed areas throughout the country. This was the first time a region-specific approach was taken towards rainfed area development, while building on earlier programmes. Hence a score of 0.67 was given. A cluster is an area covering one of more villages having a minimum area of 100 hectares. A cluster is selected based on the extent of rainfed area and socio-economic conditions of the farmers[47].

Outcome

RADP was subsumed under the National Mission on Sustainable Agriculture (NMSA) in 2014 and became one of the four key components of NMSA under Rainfed Area Development. A score of 0.67 was given.

[52] Interview with Ms. Manda Verma, Rainfed Farming Systems Division, Ministry of Agriculture, Government of India

Table 5.18: Overview of the policy components of the RADP

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Promote rainfed area agriculture	Improve the quality of life of small and marginal farmers in rainfed areas	Develop a package of activities as part of an Integrated Farming System for enhancing agricultural productivity and minimizing risks associated with climatic variabilities
		Instrument logic	**Instrument type**	**Calibration**
	Means	Organizational instruments	Institutional convergence to integrate initiatives as part of ongoing rainfed area development programmes	A cluster approach to customize a Package of Practices for specific rainfed areas throughout the country.

5.3.10 National Agricultural Innovation Project

The National Agricultural Innovation Project (NAIP) was initiated as a pilot project in 2006 and was completed in 2014, on a no-cost extension[53] for two years beyond its originally designated end year of 2012 (NAIP, 2014). The overall goal of NAIP was to promote agricultural Research and Development for improving agricultural productivity and increasing agricultural growth (Mudahar, 2012). The total budget for NAIP was US $ 250 million, of which the World Bank funded US $ 200 million as credit and US $ 50 million was covered by the Government of India.

[53] Interview with Dr. A P Srivastava, ICAR

Changes in policy goals

Changes at Objectives level

The specific objective of NAIP was to facilitate sustainable transformation of agriculture sector and foster collaborations between research institutes, private sector, farming communities and other stakeholders for the development and implementation of agricultural innovations (NAIP, 2014). This was an incremental increase in scope from the regular agriculture research and development activities by the Ministry of Agriculture and the Indian Council of Agriculture Research (ICAR) hence a score of 0.33 was given.

Changes at Settings level

The NAIP aimed at achieving the objective through four components: 1.Strengthening the role of ICAR for the Management of Change in the Indian National Agriculture Research System (NARS), 2. Research on Production to Consumption Systems, 3. Research on Sustainable Rural Livelihood Security and 4. Basic and Strategic Research in the Frontier Areas of Agricultural Sciences. The settings of NAIP were geared towards institutional strengthening of ICAR and its research. Hence a score of 0.33 was given.

Changes in policy means

Changes in Instrument logic and type

The NAIP incorporated lessons from the three similar previous projects on agriculture research (representing almost 25 years of experience), including the need to develop public-private partnerships, integrate technology development and transfer mechanisms, and finance research through competitive research grants[54]. This was the first time however that a project expanded partnerships to non-ICAR as well as non-academic stakeholders. The instrument types usually used in agriculture research were organizational, including partnerships and service provision but for the first time financial instruments in the form of competitive grants[55] were used hence a score of 0.67 is given.

Under the sponsored/competitive grants[56] component research proposals for 3 years, addressing critical gaps of national importance not covered under the strategic research component were funded. Proposals were invited from identified institutions or selected on a competitive basis from institutions/individuals both within and outside ICAR's National Agricultural Research System. This included any scientist or research institutes and civil society organizations based in India.

Changes in Instrument Calibration

The rules for procurement and implementation for agriculture research engaging non-ICAR agencies were developed for the first time. While consortium approach is not new, the way it is done was new hence a score of 0.67 was given.

Outcome

NAIP gave rise to changes in institutional structure and function of the Indian Council for Agriculture Research, the research arm of the Ministry of

[54] Interview with Dr. Mruthyunjaya Hegde
[55] National Agriculture Innovation Project, accessed 5 January 2016, http://www.icar.org.in/en/national-agricultural-innovation-project.htm
[56] Interview with Dr. A P Srivastava, ICAR

Agriculture. Specifically, some key features of NAIP such as multi-stakeholder partnerships and consortium approach were adopted in new management projects of ICAR and Ministry of Agriculture. Hence a score of 0.67 was given.

Table 5.19: Overview of the policy components of the NAIP

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Promote agricultural Research and Development for improving agricultural productivity and increasing agricultural growth	facilitate sustainable transformation of agriculture sector and foster collaborations between diverse stakeholders for the development and implementation of agricultural innovations	1.Strengthening the role of ICAR for the Management of Change in the Indian National Agriculture Research System (NARS), 2. Research on Production to Consumption Systems, 3. Research on Sustainable Rural Livelihood Security and 4. Basic and Strategic Research in the Frontier Areas of Agricultural Sciences.
		Instrument logic	**Instrument type**	**Calibration**
	Means	Partnerships between ICAR and non-ICAR entities	Develop public-private partnerships, integrate technology development and transfer mechanisms, and finance research through competitive research grants	Rules for procurement and implementation for agriculture research engaging non-ICAR agencies were developed for the first time

5.3.11 National Initiative for Climate Resilient Agriculture

The National Initiative on Climate Resilient Agriculture (NICRA) is a network project that was launched by the Indian Council of Agricultural Research in 2011 with a financial outlay of Rs. 350 cr. The overall goal of NICRA is to enhance resilience of Indian agriculture to climate variability and change[57]. NICRA is also the first pan-India pilot focusing exclusively on climate resilience.

Changes in policy goals

Changes at Objectives level

The objectives of NICRA are to combine research and technology demonstration to enhance climate resilience of Indian agriculture[58]. The genesis of NICRA was the Network Project on Climate Change (NPCC) that operated from 2004 to 2007 (CRIDA, 2014). This project focused on studying the impacts of climate change but the focus was on climate projections, modelling and related field-research and technological demonstrations were not a part of it[59]. NICRA builds on and extends the experience from NPCC hence in terms of change in objectives a score of 0.33 is given.

Changes at Settings level

NICRA has the following four components to achieve its objective: 1) Strategic research on adaptation and mitigation, 2) Demonstration of site-specific technologies on farmers' fields to address current climate variability,

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[57] "About NICRA", accessed 10 December 2015, http://www.nicra-icar.in/nicrarevised/index.php/home1
[58] Interview with Dr. Sreenivasa Rao, Dr. Y G Prasad, CRIDA
[59] Interview with Dr. Maheshwari, Principal Investigator, NICRA, CRIDA

3) Sponsored and competitive research grants in identified areas with research gap and 4) Capacity building of different stake holders in climate resilient agriculture research and its application. The NICRA extends the research done under NPCC and adds technology demonstration and implementation and capacity building on-ground, hence a score of 0.67 is given.

Changes in policy means

Changes in Instrument logic and type

The main instruments that were used in the NPCC were organizational by establishing partnerships between research institutes. NICRA similarly uses organizational instruments such as partnerships with research institutes as well as communities and local agencies, and direct service provision of technologies to farmers to enhance climate resilience (Venkateswarlu et al, 2012). The grant component is an additional financial instrument that has been made available to meet the objectives hence a score of 0.67 is given.

Changes in Instrument Calibration

The technologies demonstrated in 130 resilient model villages are being promoted through existing policy mechanisms such as the National Mission on Sustainable Agriculture, Rashtriya Krishi Vikas Yojana, National Rural Employment Guarantee Scheme, National Food Security Mission, among others. Under the technology demonstration component, integrated packages of already established technologies are demonstrated at the village level in each district for enabling resilience to climate variability[60]. There is thus only an incremental increase in terms of instrument calibration, as the activities on ground are only marginally different from previous ones aiming to address climate risks[61]. Thus a score of 0.33 is given.

Outcome

While NICRA is undergoing expansion via replication, its experience has already been incorporated within the National Mission on Sustainable Agriculture. Hence a score of 0.67 is given.

Table 5.20: Overview of the policy components of the NICRA

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Enhance resilience of Indian agriculture to climate variability and change	Combine research and technology demonstration to enhance climate resilience of Indian agriculture	1) Strategic research on adaptation and mitigation, 2) Demonstration of site-specific technologies on farmers' fields to address current climate variability, 3) Sponsored and competitive research grants in identified areas with research gap and 4) Capacity building of different stake holders in climate resilient agriculture research
		Instrument logic	**Instrument type**	**Calibration**
	Means	Research partnerships	establishing partnerships	Integrated packages of already

[60] "Technology demonstration", accessed 15 December 2015, http://www.nicra-icar.in/nicrarevised/index.php/technology-demonstration
[61] Interview with Dr. Y G Prasad, CRIDA

			between research institutes	established technologies are demonstrated at the village level

5.3.12 National e-Governance Plan for Agriculture

The National e-Governance Programme for Agriculture (NeGPA) is one of the 27 Mission Mode Projects (MMPs) under the National e-Governance Plan, approved by the Union Cabinet in May 2006. NeGPA covers agriculture and allied sectors and the overall goal of the project is to raise farm productivity and farm income (GoI, 2012).

Changes in policy goals

<u>Changes at Objectives level</u>

NeGPA aims at increasing farm productivity by integrating information pertaining to activities in the agriculture value chain and delivering it to farmers. By integrating relevant information, NeGPA seeks to extend the spread and impact of agriculture extension services and provide access to information useful throughout the crop cycle[62]. NeGPA builds on existing Information and Communication Technology (ICT) initiatives of the Central and State governments, thus a score of 0.33 was given.

In meeting the objectives, the NeGPA attempts to identify successful e-Governance practices throughout India and to upscale, strengthen and integrate these applications in a common national level platform with due

[62] Agriculture Mission Mode Project under NeGPA, accessed 20 December 2015, http://nisg.org/project/87

flexibility in these applications to be adapted as per the difference in the respective State contexts[63].

Changes at Settings level

The on-ground requirements of the project were to deliver a variety of agriculture-related services to all stakeholders down to the block level. This includes agricultural services from Government to Citizen / Farmer, Government to Business and Government to Government in an integrated manner through the Central Agriculture Portal (CAP) and State Agriculture Portals (SAPs). The CAP provides a platform for all stakeholders (including farmers, private sector, governments and research institutes) to access information, benefit from services and to share knowledge.

The SAP forms the interface of the Agricultural Departments of the States for providing information services to all stakeholders in the agriculture sector, especially farmers, livestock and fish-farmers (NIC, 2012). The CAP and SAPs developed under NeGPA aim at not only standardizing data and enabling its sharing within and outside the State-level but also at incorporating the best characteristics of applications that have already been implemented successfully in different parts of India[64].

The pilot settings aimed at expanding the current information and communications network for agriculture services in the country and hence a score of 0.33 was given.

[63] "Implementation of NeGPA in the States", accessed 20 December 2015, http://agricoop.nic.in/Admin_Agricoop/Uploaded_File/DOdated28.10.2015to05UTs.pdf
[64] "IT in agriculture, including NeGPA", accessed 15 December 2015, http://agricoop.nic.in/Admin_Agricoop/Uploaded_File/guide_new_IT.pdf

Changes in policy means

<u>Changes in Instrument logic and type</u>

The instruments that were deployed for operationalization of the objectives and settings included Nodality tools such as ICT to provide multiple channels of information (Government Offices, Internet Touch Screen Kiosks, Krishi Vigyan Kendras, Kisan Call Centres, Agri-Clinics, Common Service Centres and Mobile Phones), decrease the time lapse between generation and sharing of information and creating a common platform for dissemination of the information. Mobile-based services were used where possible, in the place of web-based services with the help of private sector and based on the presence of requisite infrastructure in the rural areas (NIC, 2012).

Authority tools in the form of providing personalized agro-advisory services and information on context-specific Package of Practices and Organizational Tools in the form of partnerships with the private sector to build the value chain and capacity building of different stakeholders for data digitization were deployed. Financial instruments were leveraged in the form of monetary assistance provided to States for procurement of requisite software and hardware, capacity building and training for data recording and maintenance, and development of integrated portals to host the information. For activities not directly covered under NeGPA, financial assistance to the states was leveraged from the Central Scheme on Strengthening /Promoting Agricultural Information System[58].

These tools already formed part of the IT-promotion initiatives in the agriculture sector being undertaken by the Central Ministry and State departments. NeGPA has provided further impetus to these activities by strengthening the support to current initiatives to benefit maximum number of farmers[65]. Hence a score of 0.33 was provided for this incremental change to the type of instruments being used.

Changes in Instrument Calibration

The information, financial and organizational tools were primarily used to provide a 'Cluster of Services' at the block level across the country. These clusters included common applications which can be adequately contextualized to the local requirements. 12 such clusters containing 23 services and a total of 75 components have been identified[66].

The 12 Cluster of Services covered information pertaining to Pesticides, Fertilizers and Seeds, Soil Health, crops, farm machinery, training and Good Agricultural Practices, weather forecasts and agro-met advisory, prices, arrivals, procurement points, and providing interaction platform, Electronic certification for exports & imports, marketing infrastructure, Monitoring the implementation and Evaluation of schemes and programs, fisheries, irrigation infrastructure, Drought Relief and Management and Livestock Management (NIC, 2012). All these services are already being provided by the Central and State governments but through NeGPA everything becomes centralized while allowing for state-level variations. A score of 0.33 was thus given.

[65] Interview with Shri. R K Tripathi
[66] "Agriculture Mission Mode Project", accessed 20 december 2015, http://dacnet.nic.in/AMMP/AMMP.htm

Outcome

The pilot was scaled up to all states and bundled with a new e-kranti or Digital India initiative aiming at digitizing relevant services for the citizens for better governance and public service delivery[67]. A score of 0.67 was thus given.

Table 5.21: Overview of the policy components of the NeGPA

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Raise farm productivity and farm income	extend the spread and impact of agriculture extension services and provide access to information useful throughout the crop cycle	deliver a variety of agriculture-related services to all stakeholders down to the block level
		Instrument logic	**Instrument type**	**Calibration**
	Means	Nodality tools	ICT to provide multiple channels of information	provide a 'Cluster of Services' at the block level across the country. These clusters include common applications which can be adequately contextualized to the local requirements

5.3.13 National Agriculture Technology Project

The National Agricultural Technology Project (NATP) was initiated in 1998 as a five-year pilot with the overall goal of introducing reforms in Agricultural Research and Extension systems of India. NATP was introduced as an alternative to the prevailing Training and Visit top-down, 'one-size fits all'

[67] "e-kranti, Electronic Delivery of Services", accessed 15 December 2015, http://www.digitalindia.gov.in/content/ekranti-electronic-delivery-services

mode of extension services (Raabe, 2008). NATP was initiated by the Ministry of Agriculture with the financial assistance of World Bank and implemented with the assistance of the National Institute of Agriculture Extension and Management (MANAGE) in 28 districts covering 7 states, viz. Andhra Pradesh, Bihar, Jharkhand, Himachal Pradesh, Maharashtra, Orissa and Punjab[68].

Changes in policy goals

Changes at Objectives level

The NATP focused on research and extension and development of an integrated system of extension delivery (Raabe, 2008). NATP field-tested institutional innovations and decentralized program planning within the agriculture extension system (Sharma, Swanson and Sadamate, 2001). The objectives of NATP indicated a clear shift in policy preference from the earlier top-down extension model hence a score of 0.67 was given.

Changes at Settings level

At the settings level, NATP sought to (1) improve the efficiency of the organization and management systems of the Indian Council of Agricultural Research (ICAR), (2) strengthen the effectiveness of research programs and the capacity of scientists to respond to the technological needs of farmers, and (3) increase the effectiveness and financial sustainability of the technology dissemination system with greater accountability to and participation by farming communities (MoA, 1999).

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[68] "Agriculture Technology Management Agency", accessed 10 December 2015, http://agritech.tnau.ac.in/atma/atma_intro.html

The settings focused on improving/reforming existing extension system for efficient and effective dissemination of available technologies suited to local condition and farmers’ requirements. Hence a score of 0.33 was given.

Changes in policy means

Changes in Instrument logic and type

The Innovations in Technology Dissemination component of NATP tested new approaches for technology transfer, organizational arrangements and operational procedures for integrating extension service delivery at the district level.

Organizational instruments were used to strengthening capacities of extension functionaries, restructuring public extension services, promoting NGOs and private sector participation in extension and imparting greater use of Information Technology (MoA, 1999). The same type of instruments deployed in earlier extension programmes i.e. organizational and nodality instruments were used but strengthened incrementally in NATP, hence a score of 0.33 was given.

Changes in Instrument Calibration

NATP led to a set of institutional reforms at the state, district, block and village levels. Hence a score of 0.67 was given.

There was a shift in the way the organizational instruments were utilized, moving towards more bottom-up planning, striking strong linkages between research and extension agencies. This includes strong cooperation between Indian Council of Agricultural Research institutions, State Agricultural Universities, State Department of Agriculture and other line departments, public research organizations, NGOs and private R&D organizations[69].

The institutional changes included the formation of Inter-Departmental Working Groups at the state level, Agricultural Technology Management Agency (ATMA) at the district level, Information Advisory Centers for Farmers at the block level consisting of Block Technology Team and Farmers Advisory Committee and Farmers Interest Groups and Farmers Organizations at the village level[70].

Development of ATMA was the most important institutional change that came by as a result of NATP. ATMA was introduced at the district level to integrate extension programs across the line departments, link research and extension activities within each district, and enable bottom-up and decentralized decision-making engaging the farmers in planning and implementing extension programs at the block and district-levels (Singh et al, 2009).

Outcome

Following the success of ATMA model, the Ministry of Agriculture started a new Centrally Sponsored Scheme on Support to State Extension Programmes for Extension Reforms, and announced the setting up of ATMAs in all 588

[69] “Monitoring and Evaluation Experience of Agricultural Projects in India: A comparative analysis of DASP and NATP in India”, accessed 15 December 2015, http://info.worldbank.org/etools/docs/library/51025/zipagextension1/ag_extension1/materials/may7session2/r.p.singh.pdf
[70] Constitution and working of ATMA. Retrieved from http://agritech.tnau.ac.in/atma/atma_constitutionworking.html

rural districts in India. A score of 1 was thus given as NATP was an example of institutionalization of the features of the pilot into a completely new scheme (Singh et al, 2009).

Table 5.22: Overview of the policy components of the NATP

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	introducing reforms in Agricultural Research and Extension systems of India	research and extension and development of an integrated system of extension delivery	(1) improve the efficiency of the organization and management systems of the Indian Council of Agricultural Research (ICAR), (2) strengthen the effectiveness of research programs and the capacity of scientists to respond to the technological needs of farmers, and (3) increase the effectiveness and financial sustainability of the technology dissemination system
		Instrument logic	**Instrument type**	**Calibration**
	Means	Organizational instruments	The Innovations in Technology Dissemination component of NATP tested new approaches for technology transfer, organizational arrangements and operational procedures for integrating extension service delivery at the district level.	There was a shift in the way the organizational instruments were utilized, moving towards more bottom-up planning, striking strong linkages between research and extension agencies

5.3.14 Accelerated Fodder Development Programme

Following the Union Budget of 2011-12 an Accelerated Fodder Development Programme (AFDP) was launched as a special scheme under Rashtriya Krishi Vikas Yojana (RKVY)[71].

The policy background against which AFDP was launched was that of competing demands on land where allocation of area for fodder crops as compared to food and commercial crops was a vexing task. Thus the AFDP initiative aimed at adopted a multi-pronged approach to ensure fodder availability as a buffer stock during times of climatic extremes, especially in dryland areas where livestock rearing forms an alternate source of livelihoods (MoA, 2011).

AFDP was launched as a pilot in twelve states with an initial annual outlay of Rs. 300 crores. The overall goal of AFDP was to increase fodder availability throughout the country through an integrated approach and provide additional financial assistance to supplement ongoing fodder development initiatives in the country[72]. 1405 cluster of villages, covering nearly 250 to 500 hectares of land area was selected to be brought under various dual purpose/ fodder crops as part of AFDP[73].

[71] "Accelerated Fodder Development Programme", accessed 12 December 2015, http://agricoop.nic.in/Admin_Agricoop/Uploaded_File/AFDP5913.pdf

[72] Coordinated by the Department of Dairy and Animal Husbandry, Ministry of Agriculture

[73] Interview with Mr. D P Malik, Mr. S. C. Ram, Department of Agriculture

Changes in policy goals

Changes at Objectives level

To meet the broad goal, the specific objectives of AFDP were to enhance the availability of green and dry fodder throughout the year and help in contingency planning to circumvent fodder shortage when agriculture is affected by natural calamities such as droughts and floods. The Government of India has already been addressing the issue of fodder availability through several schemes, thus AFDP provided an incremental enhancement and thus a score of 0.33 was given.

Changes at Settings level

To meet the objectives, AFDP had the following three ground-level settings: 1) Production of Quality Breeder and Foundation Seeds, 2) Enhancement of production of Fodder and 3) Adoption of appropriate technologies for Post-Harvest Management. These all contribute to enhance current efforts towards increasing fodder availability in the country (MoA, 2011). A score of 0.33 was given.

Changes in policy means

Changes in Instrument logic and type

The instruments used for operationalization of AFDP goals were organizational and financial. Organizational instruments involved partnerships with State Agriculture Universities, extension agencies and farmer groups for technical support.

Financial assistance was offered to the SAUs for production of breeder and foundation seeds and fodder kits were offered to the farmers free of cost. A score of 0.33 was given as the type of instruments being deployed was additional but the same type as other ongoing fodder and feed development schemes.

Changes in Instrument Calibration

The State Governments adopting the AFDP implemented the scheme on a location- specific basis following a cluster approach. Technical support from SAUs was related to the development and provision of quality seeds and fodder kits and organization of technology demonstrations for post-harvest management and forage equipment. The fodder kits comprised of essential inputs such as high-yielding fodder seed varieties, nutrients, plant protection measures, fertilizers and fungicides. The way these instruments were used at the local level was similar to other programme but only being done in an integrated manner with food and commercial crops to promote dual purpose crops that can provide fodder as well as cater to food security requirements. Hence a score of 0.33 was given.

Outcome

AFDP was scaled up throughout the country in 2015 and integrated under the National Food Security Mission. As AFDP moved from a special scheme to a component of a permanent Mission, a score of 0.67 was given.

Table 5.23: Overview of the policy components of the AFDP

		Policy content		
Policy focus		**Goals**	**Objectives**	**Settings**
	Ends	Increase fodder availability throughout the country	To enhance the availability of green and dry fodder throughout the year and help in contingency planning to circumvent fodder shortage	1) Production of Quality Breeder and Foundation Seeds, 2) Enhancement of production of Fodder and 3) Adoption of appropriate technologies for Post-Harvest Management
		Instrument logic	**Instrument type**	**Calibration**
	Means	Organizational and financial instruments	Partnerships with State Agriculture Universities (SAUs), extension agencies and farmer groups; financial assistance to the SAUs for production of breeder and foundation seeds and free fodder kits were offered to the farmers.	The State Governments adopting the AFDP implemented the scheme on a location- specific basis following a cluster approach.

Based on the discussion in the above section, Table 5.24 presents the data matrix for the fourteen case studies as rows and the four causal conditions to be tested as columns (obj, setting, itype, calibration), including an additional column called Outcome. This column marks whether scaling up has happened or not and to what extent.

Table 5.24: Data matrix for fuzzy-set QCA

Pilot	Outcome	Objectives	Setting	Instrument Type	Calibration
ECIS	0	0.33	0.67	0	1
FIIS	0.33	1	1	0	1
WBCIS	0.67	0.67	1	0	1
MNAIS	0.67	0.33	0.67	0	0.33
NWDPRA	0.33	0.33	0.33	0.33	0.33
IGWDP	0.67	0.33	0.33	0.67	0.33
SUJALA	0.67	0.33	0.33	0.33	0.33
NPOF	0.67	0.33	0.67	0.67	0.33
RADP	0.67	0.33	0.33	0.33	0.67
NAIP	0.67	0.33	0.33	0.67	0.67
NICRA	0.67	0.33	0.67	0.67	0.33
NeGPA	0.67	0.33	0.33	0.33	0.33
NATP	1	0.67	0.33	0.33	0.67
AFDP	0.67	0.33	0.33	0.33	0.33

5.4 Results

Results of a QCA can be analysed and interpreted in different ways, each providing an opportunity to engage in a dialogue between theory and empirical data. The case narratives and characterization of changes brought by the pilots to an existing policy mix using the logic of fsQCA indicates that largely incremental changes are brought about by bulk of the pilots that scaled up substantially. While fsQCA is affected by limited number of cases, it is a useful method to logically characterise, study and compare a group of seemingly different pilots within a common heuristic. While this limitation is acknowledged, the results of the QCA are indicative in identifying patterns in the piloting and policy change process in Indian agriculture. The method can benefit from additional cases that can be included in the analysis. QCA results are further complemented by Process Tracing

Major changes introduced over a short period of time have not found support at the political as well as community level, as was seen in the case of two crop insurance pilots (Experimental Crop Insurance Scheme and Farm Income Insurance Scheme) that brought substantial changes in three of the four policy components. Additionally, sometimes pilots can be launched at critical junctures when reforms are already being considered. This was observed for the only full scaling-up case in this study, the National Agriculture Technology Project that led to major extension reforms in the country.

Between these two extremes, a majority of the pilot cases studied lie in the mid-zone of 'policy bundling' wherein pilots merge with ongoing policies and programs to increase their scale and scope.

5.4.1 Descriptive statistics

The descriptive statistics functions in fs/QCA provide an overview of the data set (Table 5.25).

Table 5.25: Descriptive statistics for the fourteen cases

Variable	Mean	Standard deviation	Minimum value	Maximum value
Outcome	0.57	0.23	0	1
Objective	0.39	0.18	0	0.67
Setting	0.47	0.17	0.33	0.67
Instrument type	0.6	0.25	0.33	1
Calibration	0.56	0.20	0.33	1

In cases where the membership in the mean is high, it is likely that there are single conditions that are consistent with sufficiency criteria (outcome is a superset), but there will not be any necessary conditions to be found. Similarly, a condition with a very high mean membership score might be necessary and a condition with very low membership will often be sufficient.

From Table 5.25 it was evident that the membership in the outcome is only slightly more than half that means there is a mix of scaling-up and non-scaling up cases. None of the other conditions indicated an extreme value in the membership. If any extreme mean membership score was found this might indicate that the coding of a condition or an outcome does not capture relevant variation. Variation was found between the minimum and maximum score value for each condition.

5.4.2 Analysis of Necessary Conditions

For a condition to meet necessity requirements the consistency threshold should be high (> 0.9) and its coverage should not be too low (> 0.5) (Kent, 2008). As shown in Table 5.26, none of the conditions met that threshold, indicating towards the likelihood of multiple sufficient conditions in the final solution term.

Table 5.26: Analysis of necessary conditions

Conditions tested	**Consistency**	**Coverage**
Change in objectives level	0.594	0.832
Changes in setting level	0.676	0.772
Changes in instrument type	0.557	1
Changes in calibration	0.676	0.739

5.4.3 Truth table analysis

The unedited truth table is presented in Table 5.27.

Table 5.27: Unedited truth table

obj	setting	Itype	calibration	number
0	0	0	0	4
1	1	0	1	2
0	1	1	0	2
1	0	0	1	1
0	1	0	1	1
0	1	0	0	1
0	0	1	1	1
0	0	1	0	1
0	0	0	1	1
1	1	1	1	0
1	1	1	0	0
1	1	0	0	0
1	0	1	1	0
1	0	1	0	0
1	0	0	0	0
0	1	1	1	0

The purpose of a truth table is to provide a complete representation of patterns in the data. A first important step is to study the distribution of cases in specific configurations and assess the extent of limited diversity (Schneider and Wagemann, 2012). This is done by looking at the logical remainders.

There are seven logical remainders from a total of 16 (2^4) possible causal combinations leading to the outcome. Remainders are configurations for which there is no observable case. Of these seven remainder configurations, six involved paradigmatic changes at the objectives level and four involved paradigmatic changes to three of the four policy components. The configurations for which cases have been observed are rather conservative in terms of largely representing incremental rather than paradigmatic changes to policy components. Using the delete and code function, the outcome is set to 1 for rows with consistency more than 0.9. The remainders are not considered in this analysis. The edited truth table is presented in Table 5.28.

Table 5.28: Edited truth table

obj	setting	itype	calibration	number	outcome
0	0	1	0	1	1
0	0	1	1	1	1
0	1	0	0	1	1
0	1	1	0	2	1
0	0	0	0	4	1
0	0	0	1	1	1
1	0	0	1	1	1
0	1	0	1	1	0
1	1	0	1	2	0

The configuration with the maximum number of cases (4) is one with incremental changes in all policy components. The truth table thus provides some preliminary indications about the nature of the phenomenon under study (i.e. scaling-up).

The complex solution was considered for this study and is presented in Table 5.29. The raw coverage of each recipe indicates the extent to which each recipe can explain the outcome. The unique coverage indicates the proportion of cases that can be explained exclusively by that recipe. Solution consistency indicates the combined consistency of the causal recipes. Solution coverage indicates what proportion of membership in the outcome can be explained by membership in the causal recipes (Ragin, 2006; 2008; Legewie, 2013).

Table 5.29: Solution terms based on the fsQCA

	~obj*~calibration	~obj*~setting	~setting*~itype*calibration
Raw coverage	0.719	0.678	0.516
Unique coverage	0.122	0.04	0.04
Consistency	0.946	0.894	0.929
Covered cases*	MNAIS (0.67,0.67), NWDPRA (0.67,0.33), IGWDP (0.67,0.67), SUJALA (0.67,0.67), NPOF (0.67,0.67), NICRA (0.67,0.67), NeGPA (0.67,0.67), AFDP (0.67,0.67)	NWDPRA (0.67,0.33), IGWDP (0.67,0.67), SUJALA (0.67,0.67), RADP (0.67,0.67), NAIP (0.67,0.67), NeGPA (0.67,0.67), AFDP (0.67,0.67)	RADP (0.67,0.67), NATP (0.67,1)
Solution coverage	0.84		
Solution consistency	0.913		
Uncovered cases**	WBCIS		
Irrelevant cases***	ECIS, FIIS		

*Cases with membership in solution term >0.5

**Cases with membership in solution term <0.5 and outcome >0.5

**Cases with membership in solution term <0.5 and outcome <0.5

Table 5.29 can be interpreted as follows. The solution coverage (0.84) is high (Ragin, 2008), and it indicates that the solution relates favourably to the outcome observed (Schneider and Wagemann, 2012). 84 per cent of scaling-up can be explained by the solution term. The solution consistency (0.91) indicates that the solution is of relatively high empirical importance in reaching the outcome.

The lower a coverage score, the causal combination is able to explain fewer cases in which the outcome occurred. If a recipe has a higher raw coverage score than another, it indicates that the former covers more cases in the data set. From Table 5.29, it is evident that the causal combination [~obj*~calibration] shows the highest raw coverage (0.719) and thus is considered the main recipe accounting for the outcome.

The causal combination ~obj*~calibration indicates a situation where there is no change in objectives and no change in instrument calibration. This situation reflects that for the following cases, both at the political level (goals) as well as operationalization level (state and sub-state level) as long as there is no change, pilots are found to scale up. Additionally, major shifts in the policy objectives are not observed, and at the local level major shifts in the current way the instruments are being used to meet the on-ground requirements of the policy are not observed.

The causal combination [~obj*~calibration] also has the highest unique coverage among the three causal combinations. The unique coverage indicates the share of cases that are uniquely explained by a particular combination and the overlap. Often there is a high degree of overlap between the causal combinations. In such cases the unique coverage scores tend to be rather low (< 0.15), as is evident from Table 5.29 (Legewie, 2013).

The second sufficient causal combination ~obj*~setting indicates a situation where there is no change in objectives and no change in settings. It again hints towards the political nature of scaling-up. That is, as long as the objectives and settings remain the same, scaling-up will happen irrespective of small or major changes at the operationalization level.

The third sufficient causal combination ~setting*~itype*calibration is a bit more complex and indicates a situation of scaling-up where there is no change in settings and Instrument Type but substantial or paradigmatic change in Instrument Calibration. This combination however explains a lesser proportion of cases compared to the earlier two.

5.5 Summary

The case narratives indicate a conservative approach to piloting in the agriculture sector in India. While it is acknowledged that incremental changes over time can also lead to major policy changes, the study of pilots cannot adequately capture these gradual changes owing to their limited time-period of operation. The results indicate a preference for incremental changes in various policy components, especially at the goals level.

Overall the solution Scaling Up= [~obj*~calibration] + [~obj*~setting] + [~setting*~itype*calibration] indicates the existence of multiple pathways to scaling up but which are still conservative compared to paradigmatic changes. The only changes that might be happening are incremental changes at all levels. Changes in calibration can happen as long as there is no change in settings or instrument type.

In chapter 6, XY plots capturing the spread of the cases in terms of their membership in individual causal conditions (to test for necessity) and memberships in the three sufficient causal recipes are presented. The XY plot forms the link between the QCA results and further case selection for process tracing with comparisons between selected typical and deviant cases. The idea is to investigate if firstly, scaling-up can be attributed to common causal mechanisms in typical cases; secondly, verifying if these broke down in deviant cases. Thirdly, process tracing on deviant cases that show the outcome and no membership in either of the three causal recipes can shed light on the presence of alternate paths to scaling up.

The process tracing chapter draws from findings of the QCA to pick cases that can help shed light on the causal mechanisms that are likely to operate behind scaling-up. XY plots are useful in visualizing these results. The X-Y plot is an important graphical form of presentation of the QCA results (Schneider and Wagemann, 2012) and provides an overview of set relations between causal conditions (in isolation or in combination with other causal conditions) and the outcome. In case all cases fall above the main diagonal, this indicates a sufficient relation.

Studying XY plots helps identifying deviant cases in the data set and investigating what type of inconsistencies they might be: inconsistencies in degree or in kind (Schneider and Wagemann, 2012). Inconsistencies in degree mean that membership in the condition and outcome contradict necessity or sufficiency, but the membership scores lie on the same side of the crossover point; an inconsistency in kind means that a case lies on different sides of the crossover point for the condition and the outcome. The type of inconsistency a deviant case represents can reveal critical information about the causal patterns in a data set and refine the conceptualizations and model specification (Schneider and Grofman, 2006).

Chapter 6 Process tracing of policy pilots

Investigating the second research sub-question, this chapter covers Process Tracing (PT) of selected cases of pilots to investigate the causal mechanisms linking the causal set of conditions and scaling-up. A combination of QCA and PT is used in this study with the intent of drawing cross-case inferences that could be generalized to a larger population of cases to understand the phenomenon of scaling-up (Beach and Pederson, 2013). The sub-question guiding this Chapter is: *Are there common causal mechanisms that can explain the scaling--up of selected pilots?*

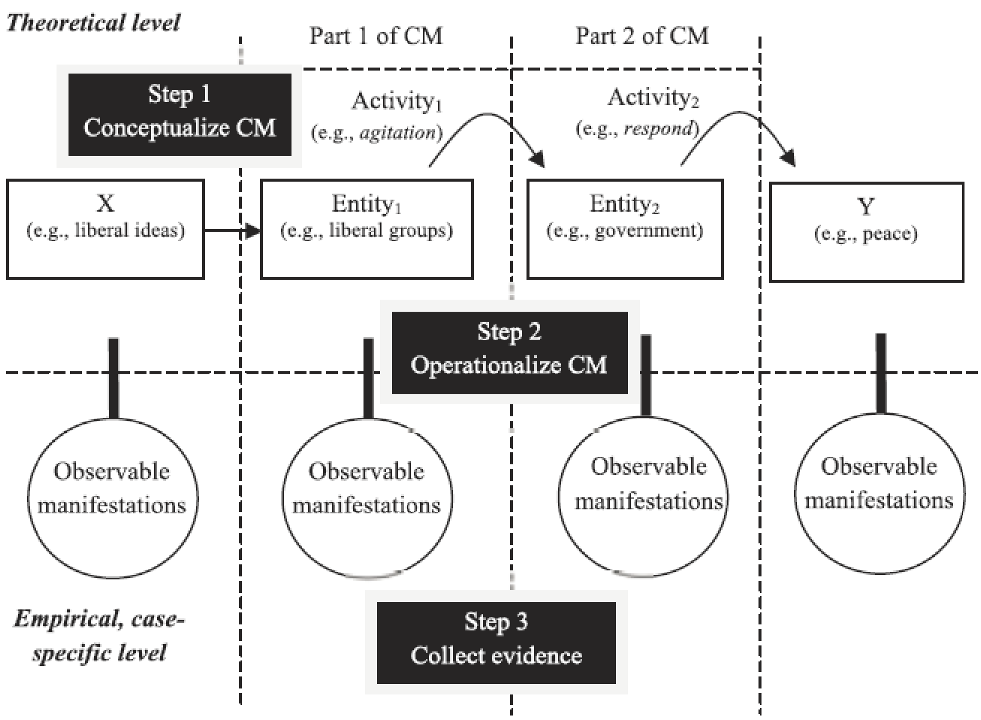
6.1 Introduction to Theory-Testing Process Tracing (PT)

PT complements QCA to detect causal mechanisms behind observed 'set-relational pattern (s)' and can contribute to the theory of policy change and the QCA model by providing insights for the pre-QCA stage and the QCA process itself. Based on the QCA results, typical and deviant cases are identified to conduct detailed within-case and cross-case analysis using Theory-Testing PT (Schneider and Rohfling, 2013).

In a theory-testing PT, X is the combination of causal conditions that leads to Y (outcome i.e. scaling-up) via specific causal mechanisms, that form the focus of this Chapter. A theory-testing PT is used when: 1) A relationship between X and Y has been found but we are unsure of causality and when (2) A well-developed theory of change exists but we are unsure whether there is empirical support for the same (Beach and Pederson, 2013). The theory of policy change that is being tested in this chapter is discussed in Section 6.2.

Figure 6.1 illustrates the basic framework of a theory-testing PT. Causal Mechanisms are conceptualised as having several components or parts, further composed of entities (for example, people, organisations, systems) that engage in activities (for example, protesting, researching) (Beach and Pedersen, 2013). The mechanism explains *how* an intervention (the three causal combinations in this study) leads to the outcome (Scaling-up).

Figure 6.1: Steps in theory-testing process tracing



Based on Beach and Pederson (2013) and Punton and Welle (2015) the following five steps are followed to conduct a Theory-building PT of selected cases of pilots. The steps include 1) Developing a hypothesized causal mechanism, 2) Inferring existence of a causal mechanism, 3) Collecting evidence, 4) Assessing the inferential weight of evidences, and 5) Conclusions of the PT exercise.

Step 1: Developing a hypothesized causal mechanism

This Step involves detailing the mechanism to be tested, which may involve changes to an existing theory of change (discussed in Section 6.2). For developing a hypothesised mechanism all the steps between the intervention and the outcome need to be specified. This involves identifying which entities (for e.g. individuals or groups) conduct which activities (for e.g. researching, campaigning), moving from the intervention to the outcome. These specifications can further act as hypothesis that can be tested.

Punton and Welle (2015) and Beach and Pederson identify some salient features that should be considered while developing a hypothesized causal mechanism. The mechanism to be tested should be broken down into the smallest feasible number of parts, which each directly and logically causes the next part, without abrupt shifts and missing links. Each part should be necessary for the mechanism to work and should be empirically measureable. The mechanism should be framed at a suitable level of abstraction from the specific case (hence more generalizable to other case contexts), depending on how important it is for the findings to be generalizable to other cases (Vennesson, 2008).

Step 2: Inferring existence of a causal mechanism

This step involves operationalizing the causal mechanism and inferring the specifics of how each part of the mechanism would manifest and evidence for causal links between one part of a mechanism and another. Such evidence can include 1) Account evidence from interviews, focus groups, observations, meeting minutes, oral accounts, 2) Trace evidence, whose existence is proof that a part of a hypothesised mechanism exists (for example, meeting minutes as a proof of an official meeting), 3) Pattern evidence – statistical evidence indicating observable patterns in data, and/or Sequence evidence indicating the chronology of events spread in time or space that may be specific to the operation of a mechanism (Punton and Welle, 2015).

Identifying evidence that a part of the mechanism happened because of the previous part, rather than for some other reason, requires eliminating plausible alternative explanations for each part of the mechanism (thus observable manifestations of these need to be identified as well).

Step 3: Collecting evidence

Once the intervention and outcome (X and Y respectively) are defined, Step 3 is to collect as much primary and secondary data about the case. This data forms clues in the form of empirical manifestations of an underlying causal mechanism linking the causal set of conditions and observed outcome (Beach and Pederson, 2013).

6.2 Testing a Theory of Policy Change

The QCA in Chapter 5 was based on a model of policy change to investigate whether observed variation in scaling-up can be attributed to the presence of specific causal conditions operating in isolation or in combination. Scholars studying the punctuated equilibrium pattern of policy change explain it as an atypical pattern of policy change owing to accumulation of anomalies between the policy regime and the actual policy operation leading to an imbalance within the existing regime and bringing into action several endogenous and exogenous factors and processes of change. When an existing policy paradigm breaks down, the regime change process is unstable owing to the emergence of conflicting ideas.

A general theory of policy change based on this punctuated equilibrium model (adapted from Hall (1993); de Vries (2005) was discussed in Chapters 1 and 2. A stable regime is characterised by institutionalization of the 'reigning orthodoxy'. Any adjustments to a stable regime are primarily made by a closed group of actors within the policy subsystem. Over time, there may be departures from what the current regime intends to achieve and its actual achievements on-ground, creating anomalies (Wilder and Howlett, 2014). When anomalies accumulate and are not able to be anticipated or corrected by the current regime, experimentation can be undertaken to adjust the current regime. When experimentation fails, there is fragmentation of authority, followed by contestation and institutionalization of a new regime when the advocates of a new regime secure positions of authority.

During policy piloting, as discussed in previous Chapters, following the model of policy change set out by Cashore and Howlett (2007), four elements characterizing a policy are found to change in the selected cases of pilots. These form the aspects of the policy which may be subject to policy piloting, and are considered as causal conditions in the model for this paper. These elements include:

- Changes in policy ends
    - Change in policy objectives that it formally aims to address
    - Change in policy settings (on the ground requirements of the policy)

- Change in policy means
    - Change in (instrument logic) norms guiding implementation preferences and types of instruments that are being utilized
    - Change in (calibrations) the specific ways in which the instrument is used

Such changes however may or may not bring about increased or enhanced coherence of policy elements.

6.3 Types of post-QCA comparisons for Process Tracing

The objective of a Process Tracing exercise following a QCA is to add theoretically to the empirical insights. Following a PT, if it can be established with reasonable confidence that a condition should be added (or dropped) on the basis of evidence and theoretical reasoning, the QCA model can be justified and the analysis repeated (Schneider and Rohfling, 2013). Following a QCA, two types of comparison can be done based on the outcomes observed (Table 6.1).

Cases showing similar and dissimilar outcomes can be compared in PT. With the assumption that typical cases showing similar outcomes (same membership scores) would have similar causal mechanisms that lead to these outcomes, one can compare two or more typical cases (more in number can add to the strength of the PT though this would be time and resource intensive). Furthermore, to establish that the causal mechanisms are the ones that are related to occurrence of the outcome and their breakdown transforms into the inability to reach the outcome, i.e. scaling-up. To establish this comparison between the best typical case and a deviant case is done. One would expect the causal mechanism that was found to be present in the typical case to breakdown in the case of the deviant case. Another comparison needs to be done with the deviant in coverage case, because it is likely that some other causal conditions and mechanisms are working in this case (Schneider and Rohfling, 2013).

Table 6.1: Types of comparisons in set-theoretic MMR (Schneider and Rohlfing, 2013)

	Necessity	Sufficiency
Similar-outcome comparison	*Typical case vs. typical case:* Building or testing hypothesis on causal mechanisms *Typical case vs. deviant case for consistency:* Finding condition omitted from term	*Typical case vs. typical case:* Building or testing hypothesis on causal mechanisms
Dissimilar-outcome comparison	*Typical case vs. IIR case:* Building or testing hypothesis on causal mechanisms	*Typical case vs. deviant case for consistency:* Finding condition omitted from term *Deviant case for coverage vs. IIR case:* Finding condition omitted from truth table row and specification of a new term

6.3.1 Using QCA results for Theory- testing PT

The X-Y plot is an important graphical form of presentation of the QCA results and provides an overview of set relations between the hypothesized causal conditions (operating in isolation or in combination with other causal conditions) and the outcome. Studying XY plots helps identifying deviant cases in the data set and investigating what type of inconsistencies or deviations there might be: inconsistencies in degree or in kind (Schneider and Wagemann, 2012).

Compared to the typical cases, inconsistency or deviation in degree mean that membership in the condition and outcome contradict necessity or sufficiency, but the membership scores lie on the same side of the crossover point; an inconsistency or deviation in kind means that a case lies on different sides of the crossover point for the condition and the outcome (see Figure 6.2, 6.3). Studying the mechanisms behind inconsistencies in deviant cases can reveal critical insights about the likely causal patterns in a data set and refine the conceptualizations and model specification (Schneider and Grofman, 2006).

Figure 6.2: Enhanced XY plot and types of cases in fsQCA of sufficiency (Schneider and Rohfling, 2013)

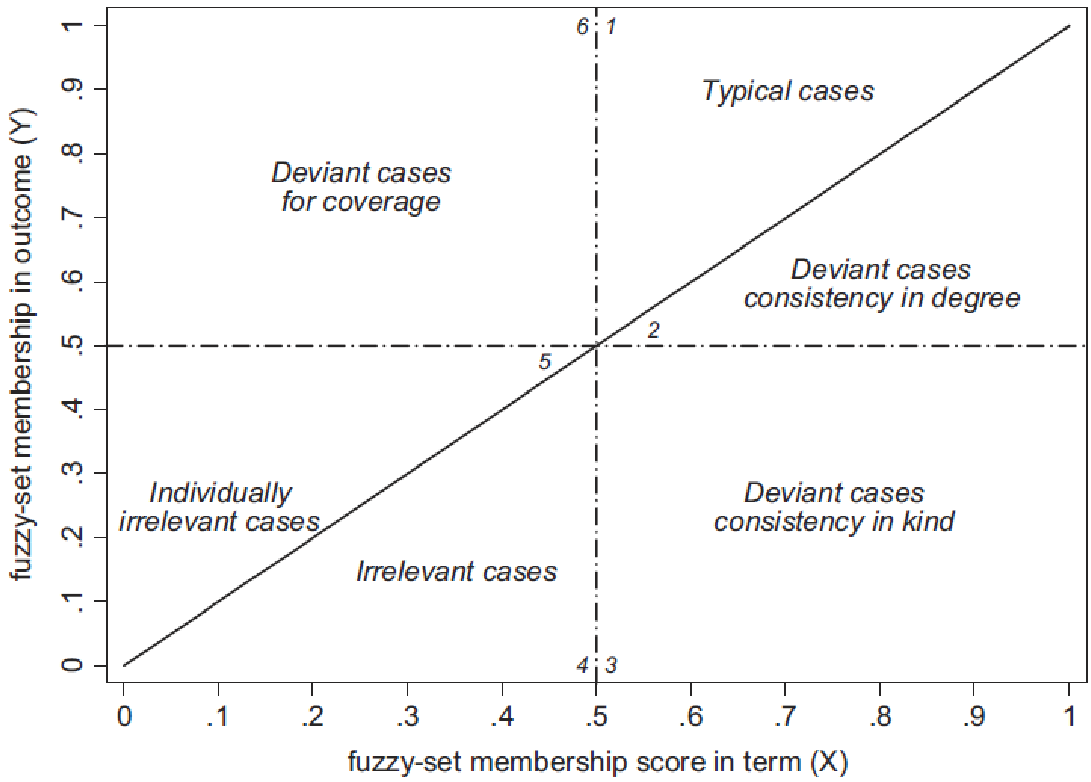
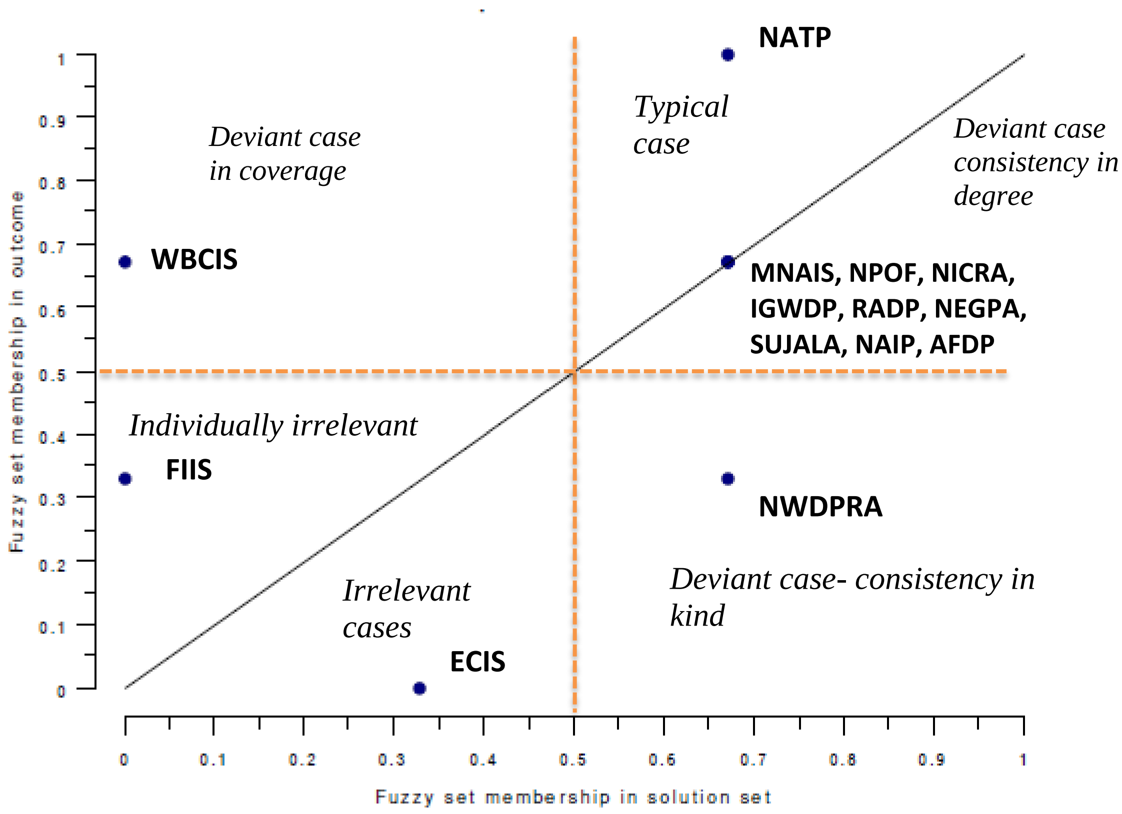


Figure 6.3: Enhanced XY plot for solution recipe [causal combination 1+2+3]



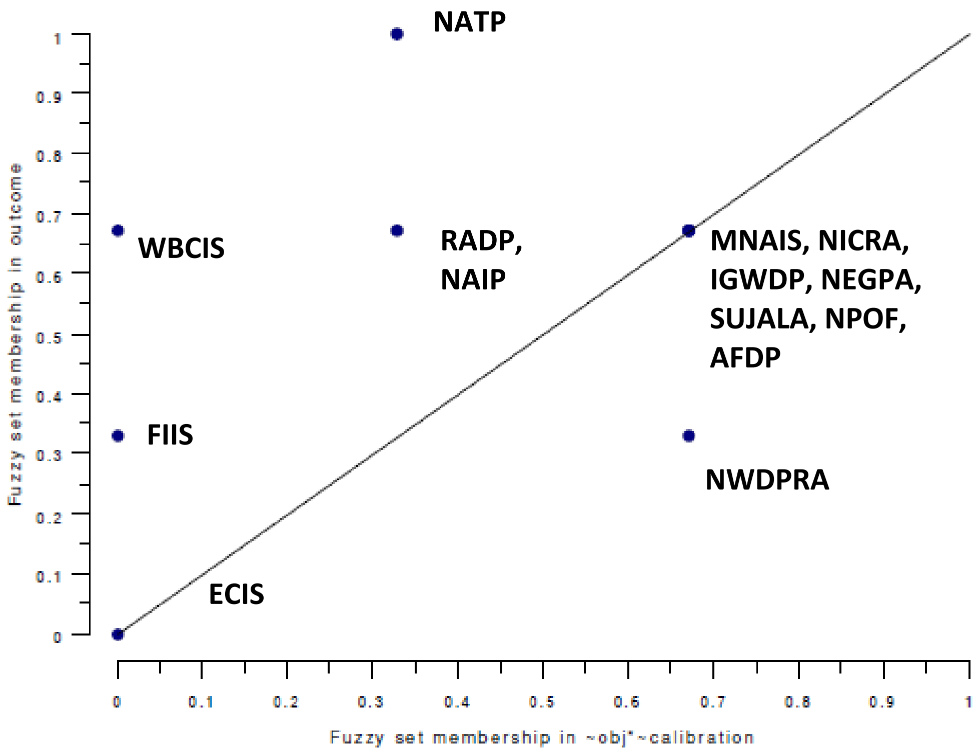
The combinations of sufficient causal conditions are considered clues for causal mechanisms that operate around these and lead to scaling-up. The idea is to look at as many clues as possible to build a strong case for the causal mechanism behind scaling-up and if this can be further generalized to a larger population of pilots in general. Section 6.3.2 discusses the characteristics of each of the three key causal combinations to which scaling-up can be attributed, and the cases covered under these.

6.3.2 Characteristics of the key causal combinations and cases covered

There are three pathways or combinations of causal conditions that are found to be sufficient to lead to scaling-up. The first causal combination covers eight cases, the second combination covers seven cases and the third combination only covers two cases, one of which forms a typical case.

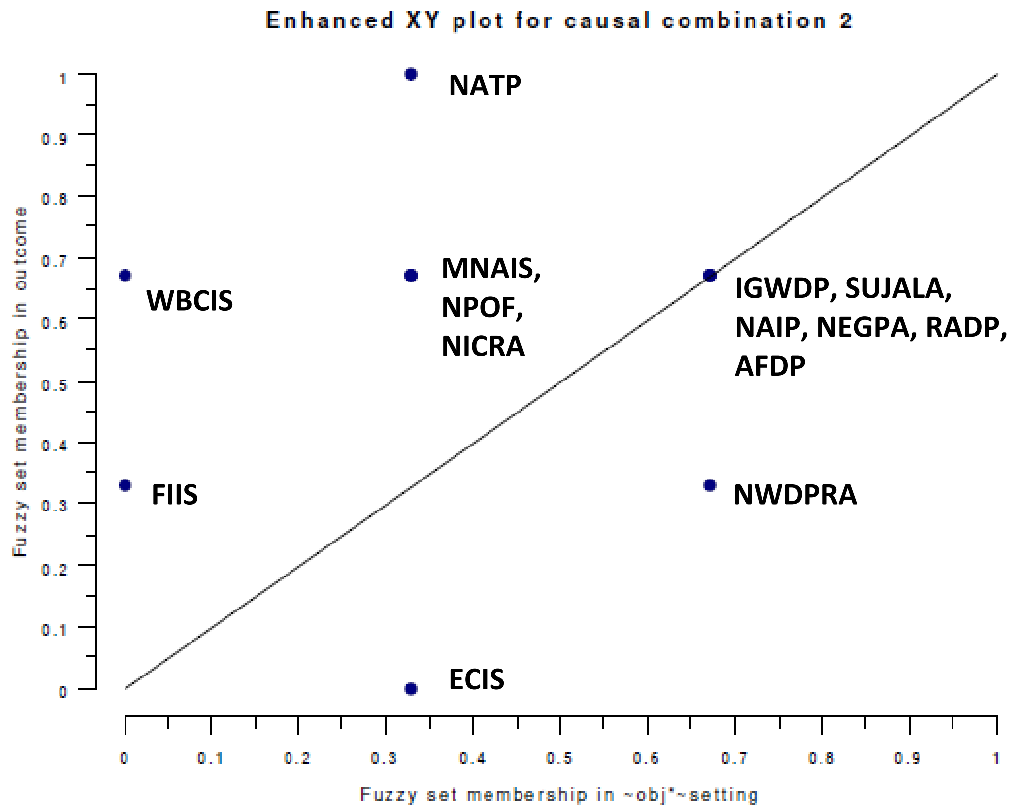
The first combination whereby scaling-up can be produced operates through no or incremental changes in the objectives and no changes at the local level. As Figure 6.4, illustrates, there is no typical case here but eight that have high membership in the causal recipe, of which seven have high membership in outcome as well. The review of the data matrix reveals that of these seven pilots; three viz. Modified National Agriculture Insurance Scheme (mNAIS), National Project on Organic Farming (NPOF) and National Initiative on Climate Resilient Agriculture (NICRA) have a high membership in Causal combination 1 only and low membership in the other two. Hence to study the features of this combination and the mechanism leading to scaling-up, these three pilots form good cases to conduct the PT. Of these three, maximal information is available for mNAIS hence a PT is done for the same.

Figure 6.4: Enhanced XY plot for causal combination 1



The second combination is one whereby scaling-up is found to occur in cases where there are no changes in objectives and no changes in settings. As Figure 6.5 illustrates there is no typical case for this causal combination but there are seven cases that have high membership in the causal recipe, of which six have high membership in outcome as well. The review of the data matrix reveals that of these seven pilots only one viz., National Agriculture Innovation Project (NAIP) has a high membership in Causal combination 2 only and low membership in the other two. Hence to study the features of this combination and the mechanism leading to scaling-up, NAIP is considered to form a good case to conduct the PT.

Figure 6.5: Enhanced XY plot for causal combination 2



The third combination is one whereby scaling-up can be produced when no changes in settings and instrument type but major change in calibration. As Figure 6.6 illustrates there are only two cases that have a high membership in the outcome as well as the causal combination, viz. National Agriculture Technology Project (NATP) and Rainfed Area Development Programme (RADP), of which NATP falls in the typical case zone. As the coverage of this combination is lower than the causal combinations 1 and 2, hence only one typical case PT (for NATP) is done for this combination.

Figure 6.6: Enhanced XY plot for causal combination 3

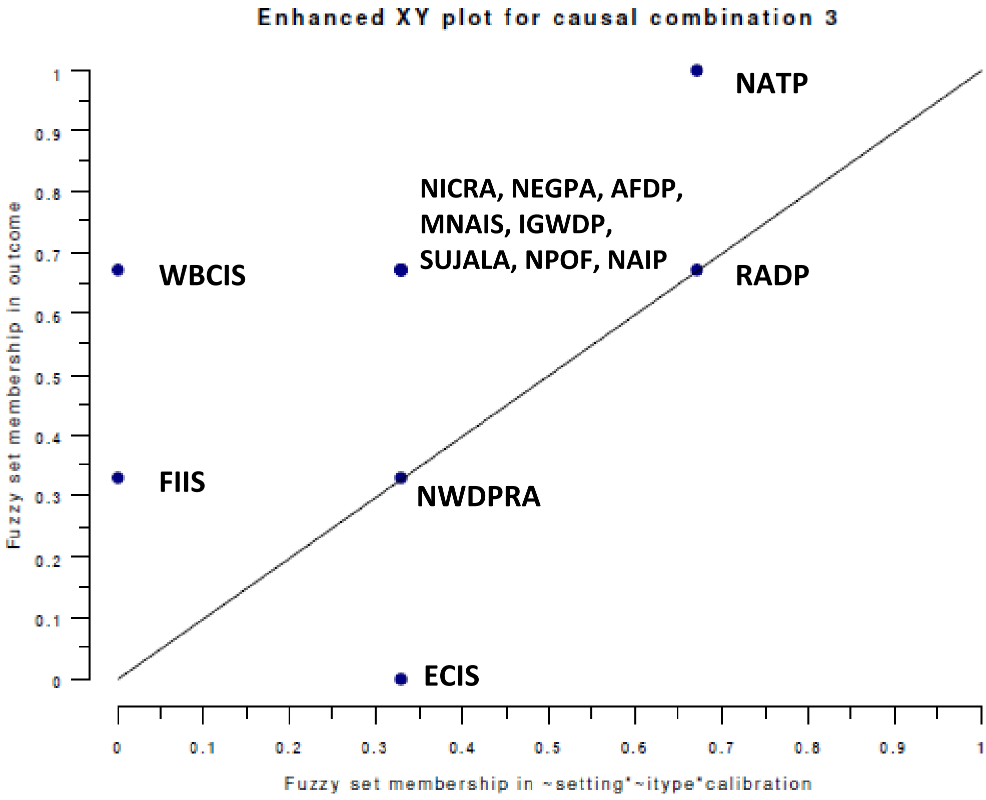


Table 6.2 presents a summary of the different causal pathways to scaling-up (derived in Chapter 5) and details of their coverage, consistency and cases covered.

Table 6.2: Different causal pathways to scaling-up

	~obj*~calibration	~obj*~setting	~setting*~itype*calibration
	Political and operationalization incremental	Classic incremental at the political level	Major changes are must at the local level
Raw coverage	0.719	0.678	0.516
Unique coverage	0.122	0.04	0.04
Consistency	0.946	0.894	0.929
Covered cases*	MNAIS (0.67,0.67), NWDPRA (0.67,0.33), IGWDP (0.67,0.67), SUJALA (0.67,0.67), NPOF (0.67,0.67), NICRA (0.67,0.67), NeGPA (0.67,0.67), AFDP (0.67,0.67)	NWDPRA (0.67,0.33), IGWDP (0.67,0.67), SUJALA (0.67,0.67), RADP (0.67,0.67), NAIP (0.67,0.67), NeGPA (0.67,0.67), AFDP (0.67,0.67)	RADP (0.67,0.67), NATP (0.67,1)
Solution coverage	0.84		
Solution consistency	0.913		
Uncovered cases**	WBCIS		
Irrelevant cases***	ECIS, FIIS		

*Cases with membership in solution term >0.5

**Cases with membership in solution term <0.5 and outcome >0.5

**Cases with membership in solution term <0.5 and outcome <0.5

For the two major combinations 1 and 2, only one deviant case in kind exists, viz. National Watershed Development Project for Rainfed Areas (NWDPRA). The pilot showed no substantial change in any of the four causal conditions and only went incremental expansion to its current scope. This case is thus studied separately to ascertain whether a part of the causal mechanism was missing in this case, or malfunctioned. This case is explored in detail in Section 6.5.4.

Only one case stood out as a deviant case for coverage for all the three causal combinations. This was the Weather Based Crop Insurance Scheme (WBCIS). A PT on this case is conducted to explore whether an alternate causal mechanism worked to enable scaling-up in this case.

There are two irrelevant cases common across all the three causal combinations. This includes the Farm Income Insurance Scheme (FIIS) and the Experimental Crop Insurance Scheme (ECIS). Both these cases do not lead to scaling-up and also fare low in terms of their membership in all of the sufficient three causal combinations. Hence FIIS and ECIS are not included in the PT exercise because even if these are studied the results would be more speculative in nature of what went wrong. Secondly, as both of these cases ended within a season there was not enough material to conduct a detailed PT on them.

Thus in total, a Process Tracing of five cases viz. mNAIS, NAIP, NATP, NWDPRA and WBCIS is conducted. Table 6.3 presents a summary of the types of comparison, cases selected and the logic of case selection for each of the three causal combinations based on fsQCA of sufficiency.

Table 6.3: Process tracing of similar and dissimilar outcome cases based on fsQCA of sufficiency (based on Schneider and Wagemann, 2013)

Outcomes	Causal combination	Logic of comparison	Cases compared
Similar outcome	Combination 1: ~objectives*~calibration	No typical case thus cases that are deviant in degree are compared. The deviant case (consistency in degree) has the same membership in the causal combination as the typical case however differs slightly on the outcome. It can be assumed that the causal mechanism found to work for the typical case is also present here, but possibly breaks down to some extent, causing the deviant case to fare lower on the outcome membership.	mNAIS
	Combination 2: ~objectives*~settings	-same as above-	NAIP
	Combination 3: ~settings*~itype *calibration	Typical case	NATP
Dissimilar outcome	Combinations 1 and 2	The membership scores between typical/ deviant in degree and deviant in kind in the solution term are similar and difference in membership in Y is maximal.	NWDPRA
	Combinations 1, 2 and 3	Deviant in coverage case. A deviant case for coverage is not covered by any path of the solution, yet displays the outcome. This indicates the existence of another causal recipe that is not a subset of any recipes included in the QCA solution (both are fundamentally different) (Schneider and Wagemann, 2013).	WBCIS

6.3.3 Data collection

The data was generated through a follow-up round of fourteen interviews, including those with elite interviewees i.e. senior government officials in this case (Tansey, 2007) were done (Table 6.4) to obtain detailed information about the cases for Process Tracing. The interviews were open-ended in nature and the respondents were asked to trace the evolution of the pilots in detail and the various changes these underwent since their inception to their termination/scaling-up. These senior officials were involved in the design and implementation of the pilots hence even though this is a small number it was considered to be sufficient for the PT. Data was collected from multiple sources to avoid any biased or erroneous reporting. Evidence was also collected in the form of secondary data about the pilot from policy documents, Government project reports, research articles and official press releases and newspaper reports.

6.4 Hypothesizing and operationalizing the causal mechanisms

This section details the first two steps of the PT exercise. This includes firstly hypothesizing the causal mechanisms (based on the three causal combinations obtained from QCA)[74] and operationalizing its various parts, based on what can be the observable manifestations of such a mechanism (Mahoney, 2012). All the mechanisms are conceptualized based on the generic theory of policy development following the identification of anomalies presented in Figure 6.3. Section 6.5 then presents the empirical evidence available within the selected cases to support (or not) the hypothesized causal mechanism and its parts.

The most commonly seen process is that of Layering, wherein new policy ends and means are simply appended to current policies/programs without altering the current policy structure (Howlett and Rayner, 1995).

[74] Causal combinations are not the same as causal mechanisms. Causal conditions form the seed or initiating conditions that lead to the outcome via selected causal mechanisms (being hypothesized and operationalized in this chapter).

Layering can also lead to Conversion wherein the policy is directed towards new goals and functions (Falkenmark, 2004; Hacker 2004). Layering, though a common mode of policy development, is likely to lead to sub-optimal policies because of a mismatch between the means and ends (Howlett and Rayner, 2013).

Each of the three causal combinations are tested for underlying causal mechanisms using Theory-testing PT. Layering is found to be the main mechanism leading to scaling-up, except for the deviant cases in kind and coverage, WBCIS and NWDPRA respectively. However the forms of layering observed are different. The questions guiding the PT are:

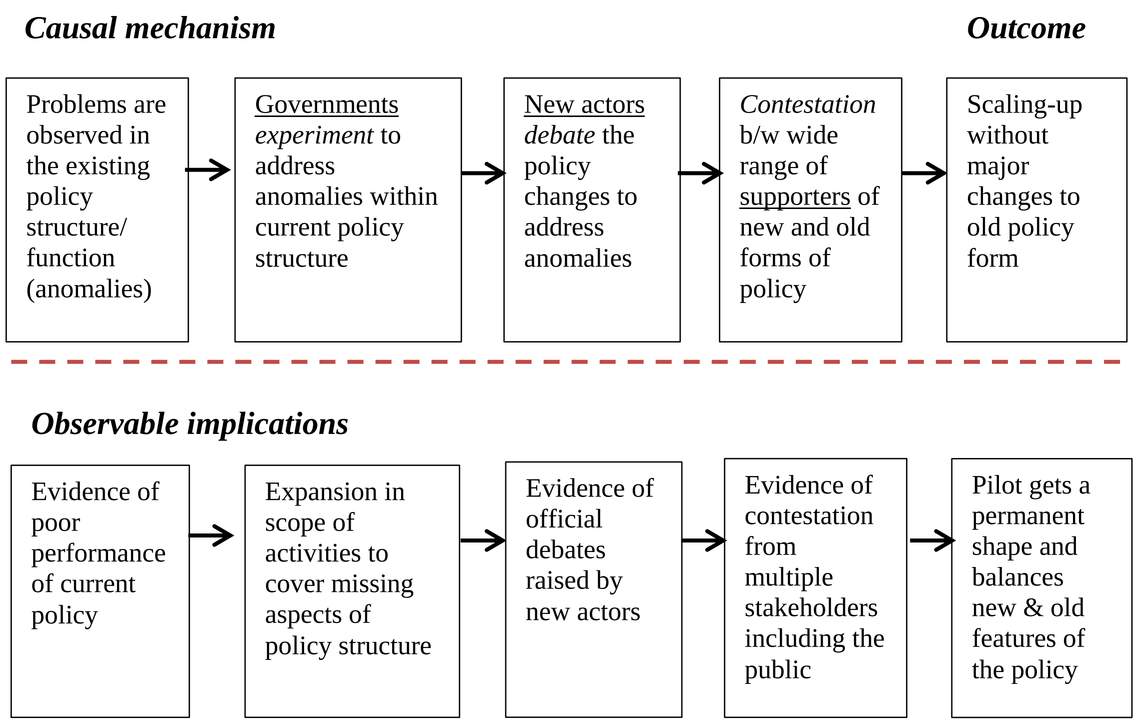
- *Are there different types of layering mechanisms leading to scaling-up? (discussed in Section 6.4.1)*
- *Why despite following a layering process of change, the pilot NWDPRA (deviant case in kind) did not scale-up substantially? (discussed in Section 6.4.4)*
- *Why despite following a substantial and paradigmatic process of change (redesign), the pilot WBCIS was a success in terms of scaling-up? (discussed in Section 6.4.5)*

6.4.1 'Smart layering' mechanism

The most important causal recipe that produced scaling-up [~objectives*~calibration] and [~objectives*~settings] can be considered to be a special form of the layering mechanism, in this case referred to as a 'Smart layering mechanism'. When anomalies arise within current policy mixes, policy makers can attempt to 'patch' or restructure existing policy elements instead of suggesting novel policy arrangements. Such patching can also be considered to be a case of 'smart layering' (Howlett and Rayner, 2013). The term 'smart' describes layering that is done to address specific observed anomalies in the current policy/program, without altering the current policy arrangements.

Figure 6.7 illustrates formulation of a hypothesized Smart layering mechanism. The top half of the figure illustrates the theorized parts of the mechanism while the bottom half presents observable implications that can be used to test with cases to ascertain whether the mechanism was present or absent in a case. The entities are underlined, and the activities they undertake are marked in italics.

Figure 6.7: A hypothesized 'Smart Layering' mechanism



As illustrated in the above Figure, the first part of the mechanism is the emergence of anomalies in the current policy structure, observable implications of which would be, evidence of poor or underperformance of the existing policy, for example in terms of quality and quantity of service provision to the beneficiaries. The second part of the mechanism involves experimentation by the Governments within the current policy structure, primarily in the form of extending current policy elements to address the anomalies.

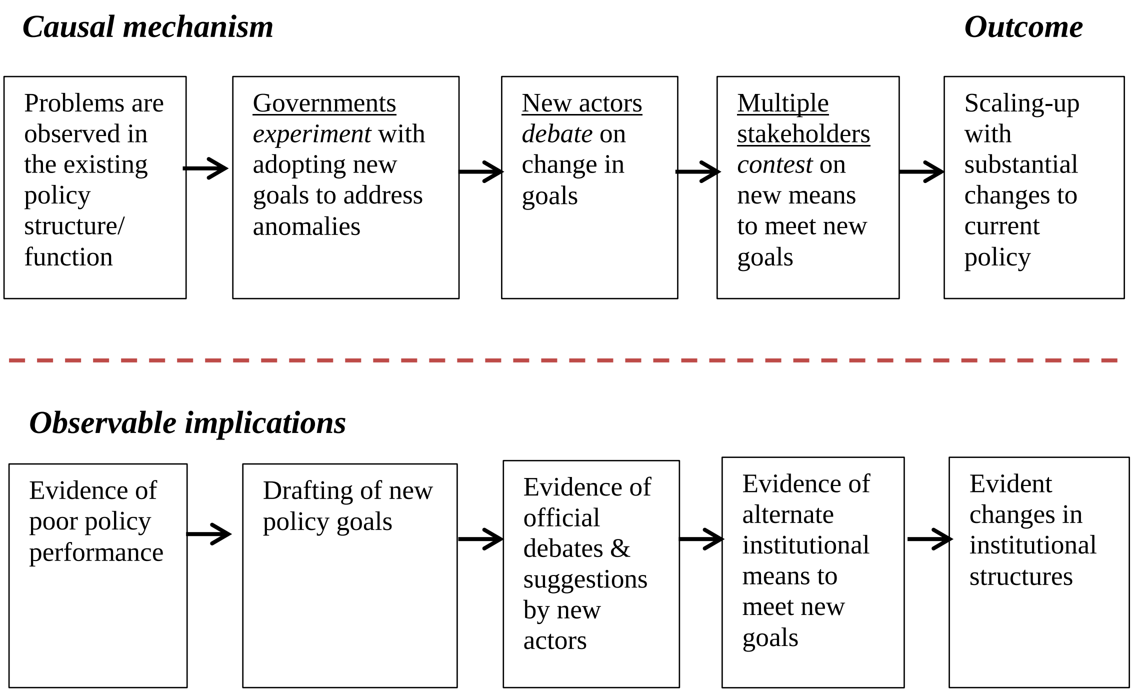
The third and fourth part of the mechanism broadly mark the fragmentation of authority and contestation phases respectively and new actors and larger set of stakeholders enter the policy arena debating and contesting the changes made to current policy structure and function. The evidence for these parts of the mechanism would be official documentation of the issues and suggestions raised by new actors and larger set of stakeholders in general. Proposals for layering mostly result in some level of permanent integration with current policies such that the old and new features of the policy are balanced.

6.4.2 'Policy Conversion' mechanism

The second pathway is what can be termed a form of 'Policy Conversion' mechanism, wherein most of the elements of the policy mix remain the same but are redirected towards serving new goals and functions (Beland, 2007; van der Heijden, 2010). Layering over time can also induce conversion as addition of new goals and means while preserving earlier ones can lead to new avenues for better matching of goals and instruments (Howlett and Rayner, 2013). The motivation behind a policy Conversion can be to match the policy structure to the changing policy environment, or it can be a reflection of changing power relations in terms of the actors implementing the policy (Beland, 2007).

Figure 6.8 illustrates formulation of a hypothesized policy 'Conversion' mechanism. The top part of the figure illustrate the theorized parts of the mechanism while the bottom section depicts observable implications that can be used to test whether the mechanism was present or absent in a case. In the figures entities are underlined, whereas activities are in italics.

Figure 6.8: A hypothesized 'Policy Conversion' mechanism



As illustrated in the above Figure, the first part of the mechanism is the emergence of anomalies in the current policy structure, observable implications of which would be evidence of poor policy performance. The second part of the mechanism involves experimentation within new goals, as evidenced by official drafting of new policy goals indicating a new policy direction for the governments. The third and fourth part of the mechanism broadly mark the fragmentation of authority and contestation phases respectively and involve new actors suggesting new means to help achieve the new goals and involvement of the larger set of stakeholders in the contestation.

The evidence for these parts can be reflected in official evidence of debates and suggestions for changes in the means to meet the new goals. Proposals for conversion result in formation of new institutional structures building on the existing ones (not simply adding on, like in layering). The main difference in the Conversion mechanism as compared to the Layering mechanism is that the changes in goals and means are new and additional to the current policy structure. Additionally, it is the change in goals that drives exploration for new means to meet the new goals. The existing policy structure is redirected towards meeting the new goals.

6.5 Typical and Deviant Case analysis

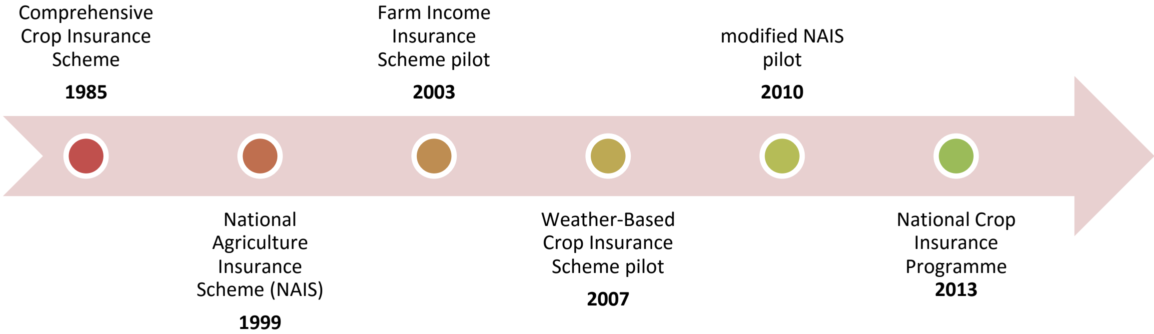
This section follows Steps 3 and 4 of PT that are done once the three causal mechanisms are conceptualized and operationalized. With a detailed assessment of the cases (Table 6.3), this section aims at deducing firstly, if there was evidence of each part of the causal mechanism (as operationalized in the last section), secondly whether one part lead to the other and thirdly, if the evidence is ‘strong’ i.e. considered unique and sufficient in the cases. The expectation is that all parts of the causal mechanism can be observed in the typical cases and to a significant extent in the deviant in degree cases. It is also expected that the mechanism is either missing or breaks down in the deviant in kind cases, and that a completely new mechanism is operational in the deviant in coverage case (high membership in Outcome but no membership in either of the three causal combinations).

The cases mNAIS and NAIP have high membership in the combinations 1 and 2 respectively, which comprised of incremental changes in various policy components. These cases are thus tested for the presence of a smart layering mechanism. The case NATP, the only pilot to have been completely institutionalized, comprised of changed objectives and changes in calibration to meet the new objectives, even though the settings and instruments deployed remained the same. Scaling-up of NATP thus fits the description of a Conversion mechanism. The deviant in kind case NWDPRA is tested to ascertain whether parts of the conversion mechanism were missing or broke down, while WBCIS being a deviant in coverage case is tested for indications of a new operational mechanism altogether.

6.5.1 Process tracing of 'Smart Layering' mechanism: The cases of mNAIS

Over the past three decades, the Government of India has introduced several crop insurance schemes. The timeline of the national level insurance schemes has been presented in Figure 6.9. The first nation-wide Comprehensive Crop Insurance Scheme (CCIS) was launched in India in 1985. CCIS was replaced by the National Agricultural Insurance Scheme (NAIS) in 1999 to overcome some operational issues. The NAIS was further modified and launched as a pilot modified NAIS (mNAIS) in 50 districts from *Rabi* of 2010–11, operational alongside the NAIS. The mNAIS introduced private players- a feature that was missing in the original NAIS.

Figure 6.9: Timeline of national-level crop insurance schemes (including pilots) in India



Other pilot schemes launched in public-private partnerships included a Farm-Income Insurance Scheme (FIIS) in *Rabi* 2003-04 and a Weather- Based Crop Insurance Scheme (WBCIS) launched in 2007–08[75]. With the objective of increasing the insurance coverage and creating competition for innovative insurance products private insurance companies such as ICICI Lombard, HDFC Ergo, Iffco Tokio and Bajaj Allianz were introduced into mNAIS design and implementation. Previously, only the state-owned Agriculture Insurance Company (AIC) and National Bank for Agriculture and Rural Development (NABARD) were the insurance providers[76].

Broadly they are four types of stakeholders involved in crop insurance in India[77]. Firstly, those who facilitate or influence crop insurance. This includes donor agencies such as World Bank that offer technical and financial support for design and implementation of some insurance schemes. There are

[75] Joint group report on crop insurance, http://agricoop.nic.in/imagedefault/Jointper cent_20Groupper cent_20onper cent_20cropper cent_20insu.-report.doc
[76] Private insurers may help farmers weather the storm, http://www.financialexpress.com/article/markets/commodities/private-insurers-may-help-farmers-weather-the-storm/30555/
[77] Agricultural Livelihoods and Crop Insurance in India Situation Analysis & Assessment, 2013. Published by: Deutsche Gesellschaft fürInternationale Zusammenarbeit (GIZ) GmbH.

also international agencies that ‘insure the insurers’ i.e. offer re-insurance with global standards for the claim settlements. The role of media and civil society groups such as NGOs and farmer organizations is also critical in influencing policy decisions related to crop insurance design, premium rates, coverage of beneficiaries and the claim settlement process. The second category includes those who directly benefit from the crop insurance schemes and includes the groups that are at risk due to yield loss or changes in market price.

Thirdly, the government bodies that actually regulate the crop insurance product design including determination of the premium and the claim settlement process. The regulators/ controllers operate in conjunction with the providers or implementers of the insurance such as government-owned and/or private insurance companies and state government departments.

The risk-taking attitude also differs between different stakeholders. For example, loanee and non-loanee farmers cannot be forced into adopting an insurance scheme as the farmers would go by choices that are rational in terms of covering their losses and generating income. Thus, while loanees can find avenues to bypass mandatory loan uptake, non-loanees have been found to participate in the insurance schemes “around cut-off dates when losses are known”. Secondly, banks are ‘client-driven’ and thus have no incentives to enrol non-loanees?

State Governments also tend to be risk-averse in choosing between insurance schemes and coverage of crops and regions within the state. Such biases can also result in higher actuarial premium rates especially when high risk areas and crops are identified for insurance. The insurance companies as well bring in a bias in terms of experience with specific products, business goals and differential pricing for their services[78].

Problems observed in existing policy structure

The Government of India set up a Committee to review various crop insurance schemes highlighted certain issues that plagued the development of crop insurance in India. Some of the major issues related to discrepancy in area insured in relation to area sown, delay associated with Crop-cutting experiments (CCEs) and the quality and reliability of such data, spread of granular weather data and its quality and standardization when these are recorded from private automatic weather stations, incidences of non-compliance and fraud (for e.g. no following the mandatory insurance for loanees, issuing multiple loans on the same land etc.), affordability of crop insurance premium and transparency in its estimation, need for more involvement national banks, strengthening technical capacities of agencies and officials working on crop insurance schemes, increasing awareness of farmers regarding various features of the schemes and improving product design (primarily to reduce the mismatch between product parameters and crop yield outcomes) (GoI, 2014a).

The linking of insurance schemes with agriculture loans from banks was done to enable a comprehensive coverage of insurance. However this arrangement makes the farmer worse-off when there is a bad crop year and the farmer defaults on his agriculture loan. In this case, his linked insurance policy becomes inoperative and he is no longer eligible to claim insurance. This has

[78] M K Poddar, Agriculture Insurance Company. Crop Insurance- Insurer's perspective. National Conference on Crop Insurance. Bhopal, 15th & 16 June 2015.

led to several farmers asking banks to delink the insurance component from their loans[79].

A number of problems started arising with NAIS over the years. The biggest concern for the Government was that the coverage of farmers under NAIS was extremely low 19per cent[80] . In addition, NAIS depended on Crop-Cutting Experiments (CCEs)[81] that were done to estimate yields, and were rather time-consuming and cumbersome and delayed the process of settlement of the insurance claims. NAIS was made available to both loanee (mandatory) and non-loanee farmers across all land-holding sizes. NAIS covers all the food crops (cereals, millets and pulses), oilseeds and annual commercial/horticultural crops. The premium ranges from 1.5per cent -3.5per cent of the sum insured for food and oilseed crops. For commercial/horticultural crops actuarial rates are charged. A 10per cent premium subsidy is provided for small and marginal farmers availing NAIS. Claims over and above 100per cent of premium collected for food crops and oilseeds, bank service charges and 20per cent of the administrative expenses are borne equally by the Centre and State governments.

[79] Why crop insurance schemes fail poor farmers when they are needed the most, 26 April 2015, http://articles.economictimes.indiatimes.com/2015-04-26/news/61542788_1_crop-insurance-scheme-insurance-fraud-kisan-credit-card

[80] Only 19 percent of farmers were insured, exposing vast majority to weather vagaries: ASSOCHAM-Skymet study, 12 April 2015, http://www.assocham.org/newsdetail-print.php?id=4923

[81] Crop cutting experiments refers to the technique of selecting random plot of a given size in the field of a specified crop and harvesting its produce by following specified methodology. Area and Crop production statistics. Central Statistical Organization, Government of India. http://mospi.nic.in/Mospi_New/upload/manual_area_crop_production_23july08.pdf

All claims in case of annual horticultural/commercial crops are paid by the implementing agency[82]. As the premiums were low and bulk of it was borne by the Central Government, the NAIS was in fact considered to be laden with the characteristics of a 'social-welfare scheme' rather than being a market-based insurance one[83], leading to high losses for the Government and paving way for experimentation with market-based insurance schemes.

Part 1 of hypothesized causal mechanism: Governments experiment to address anomalies within current policy structure

The NAIS was modified and launched as a pilot titled modified NAIS (mNAIS) in 50 districts in 12 states from *Rabi* of 2010–11, to be operational alongside the NAIS. With the overall objectives, instrument type, and calibration changing only incrementally from NAIS, the policy settings for mNAIS added new components to increase the scope of the insurance. The incremental changes were geared towards making the Scheme more farmer-friendly and thus increasing its coverage.

The change in settings involved making the unit area of insurance more fine-grained, by reducing it to village/village panchayat level for major crops. Additional risks such as post-harvest losses due to cyclones and prevented sowing/planting risk were covered. The evidence for these changes was both

[82] Annual Report 2014-15, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, March 2015, http://agricoop.nic.in/Annualreport2014-15/EnglishAR2732015.pdf

[83] Olivier Mahul and Niraj Verma, October, 2011. Making Insurance Markets Work for Farmers in India. International Finance Corporation Smart Lessons Program, http://www.gfdrr.org/sites/gfdrr.org/files/DRFI_India_mNAIS_Final_Oct12.pdf

unique and necessary and observed in the form of official release of the policy pilot's details by the Government of India[84].

The premium rates under mNAIS were on actuarial basis and thus the financial liability lay with the Insurance Company. Subsidy in premium was up to 75per cent to all farmers. A higher minimum indemnity level of 70per cent was provided instead of 60per cent in NAIS. To limit the liability to the Government, the premiums under mNAIS were capped (See Table 6.4)[22].

Table 6.4: Season-wise and crop-wise capping on premium under mNAIS

Season	**Crops**	**Capping on premium**
Kharif	Food and oilseeds	11%
	Annual commercial and horticulture crops	13%
Rabi	Food and oilseeds	9%
	Annual commercial and horticulture crops	13%

Premium subsidy was available to loanee farmers up to the amount of loan sanctioned/advanced or value of Threshold Yield (TY), whichever is higher. For non loanee farmers, subsidy is available up to the value of TY. TY was based on average yield of the preceding 7 years excluding up to 2 calamity years declared by concerned State / UT government/authority. No premium subsidy was available on sum insured above the value of TY. The Government provided only upfront premium subsidy ranging up to 75per cent to all farmers and this amount was shared by the Central and State Government on 50: 50 basis. All claims liability was on the concerned insurance companies.

[84] https://www.irda.gov.in/ADMINCMS/cms/Uploadedfiles/34..MNAISper cent20Policyper cent20Wordings.pdf

Whereas, under NAIS the financial liabilities towards claims beyond 100per cent of premium in case of Food Crops & Oilseeds and 150per cent of premium in case of annual horticultural/ commercial crops along with 10per cent premium subsidy to small and marginal farmers were on the governments. The liability of governments in the case of mNAIS is limited to the premium subsidy as compared to NAIS wherein the Government's liability can be unlimited[85].

Part 2 of the hypothesized causal mechanism: New set of actors debate policy changes to address anomalies

Marking a departure from the traditional mode of publicly-provided insurance service provision in the case of NAIS, the mNAIS engaged private insurance agencies in the process, including setting of premium rates. The introduction of the private players also helped in market-creation for insurance. The State governments however are often uncomfortable collaborating with private insurance companies as these completely operate on objective basis (of profits and market logic). The State Governments on the other hand emphasized what appears to be in public interest and consider the electoral repercussion of changes in policies[86].

Table 6.5 presents the total funds released by Government of India under various crop insurance schemes.

[85] Fixing Crop Insurance, http://www.skymetweather.com/content/agriculture-and-economy/ceo-talks-fixing-crops-insurance/
[86] Interview with Mr. M K Poddar, Agriculture Insurance Company, India

Table 6.5: Total funds released by Government of India under various crop insurance schemes

Plan/ Year	NAIS (since Rabi 1999-00)	WBCIS (since Kharif 2007)	MNAIS (since Rabi 2010-11)	Total (Rs. In crore)
IX Plan (1997-02)	811.49	-	-	811.49
X Plan (2002-07)	2626.84	-	-	2626.84
XI Plan (2007-12)	5851.88	1370.37	87.15	7311.35
XII Plan (2012-17)				
2012-13	700.00	655.00	194.18	1549.68
2013-14	1600.00	700.00	251.02	2551.52
2014-15*	1386.16	383.27	584.69	2354.12
Total	12976.37	3108.64	1116.87	17204.98

*as on 31.12.2014

Part 3 of the hypothesized causal mechanism: Contestation between supporters of old and new forms of the policy

Crop insurance schemes have been found to be more successful in terms of their adoption where the risk of crop failure is higher. This was found in states which are exposed to climatic extremes such as droughts and often less access to irrigation facilities such as Rajasthan (nearly 50per cent crop insurance coverage), Madhya Pradesh, Chhattisgarh, parts of Maharashtra, Bihar, Gujarat and Uttar Pradesh. Few states such as Gujarat, Maharashtra and Madhya Pradesh specifically objected to the rolling back of NAIS[87]. At the local level, NAIS still remained the insurance scheme preferred by the farmers as their premium was completely subsidized in this case.

The inter-state variation in terms of crops grown, procurement policies by the Government, capacities of farmers to invest in agriculture, climatic stress, soil types etc. make the design of a uniform and comprehensive national-level programme for crop insurance rather difficult. For example,

[87] Interview with Mr H P Verma, Ministry of Agriculture

when the Green Revolution started in India in the 1960s, the northern state of Punjab was one of the pioneers to boost the country's food security and rural incomes via the food procurement system. Major investments were seen in canal irrigation and wheat and rice production became increasingly important, as Punjab became a government mandated State as the country's primary source for grain reserves. With a geographical area of only 1.5 percent of India's total land, Punjab contributes to nearly 20 percent of India's total wheat and 12 percent of total rice production[88]. Crop insurance thus has a very different implication for Punjab.

It was thus not surprising that Punjab did not join any of the crop insurance schemes. The Punjab state agriculture officials demanded that any crop insurance scheme for the state should insure individual farmers instead of large farm lands. In addition, as Punjab has never faced a calamity year due to high access to irrigation round-the-year, however there have been increases in input costs to safeguard crops during extreme weather events[89]. Punjab is also covered by Minimum Support Price guarantee for its crops due to the government procurement scheme. The insurance premiums are higher than the expected returns from agriculture and thus remain an irrational proposition for the farmers[90]. Similarly, the government of the southern state of Tamil Nadu claimed that the NCIP was launched without any consultation with the

[88] http://water.columbia.edu/research-themes/water-food-energy-nexus/water-agriculture-livelihood-security-in-india/punjab-india/
[89] Mar 09, 2015. http://www.hindustantimes.com/chandigarh/rejecting-centre-s-crop-insurance-scheme-punjab-seeks-state-specific-plan/article1-1324175.aspx
[90] Interaction with an official from a leading agriculture insurance company in India

stakeholders. They primarily argued against the increase in the premium burden on the farming community[91].

Hence within the states there were contestations between existing mechanisms of crop insurance and security of minimum crop price remuneration and adoption of the new and modified NAIS.

Outcome of the hypothesized causal mechanism: Scaling-up without major deviations from previous policy

In 2013, the mNAIS was bundled along with a Weather Based Crop Insurance Scheme (WBCIS) and a Coconut Palm Insurance Scheme and brought under the purview of a National Crop Insurance Programme[92]. The states however have the flexibility to choose to follow whichever scheme they want to under the NCIP or the ongoing NAIS. Even though the premiums paid under NCIP were higher than the NAIS and claim liability as present was on the insurance company, the NCIP provided upfront subsidy up to 75per cent in the case of MNAIS and up to 50per cent under WBCIS[93]. Thus mNAIS did not end up being an extension of the NAIS even though its original intention was to replace NAIS. Instead it became part of a new suite of programmes aiming at comprehensive crop insurance.

The mechanism was seen to work in this case, and contestation did lead the government to rethink and give the states flexibility to choose whichever scheme they want. Thus, even though the Government opted for a

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91 States not consulted about new crop insurance programme: TN, 6 January 2014, http://wap.business-standard.com/article/current-affairs/states-not-consulted-about-new-crop-insurance-programme-tn-114010600094_1.html

92 http://agricoop.nic.in/imagedefault/whatsnew/ncipletter.pdf

93 Private insurers may help farmers weather the storm, 16 January 2015, accessed via http://www.financialexpress.com/article/markets/commodities/private-insurers-may-help-farmers-weather-the-storm/30555/

smart layering technique to address gaps in an earlier policy scheme, the preferences of many stakeholders remained with the earlier scheme. The outcome was thus the pilot being bundled as part of a suite of insurance schemes, without discontinuing the earlier scheme.

6.5.2 Process tracing of 'Smart Layering' mechanism: The case of NAIP

The National Agricultural Innovation Project (NAIP) was initiated as a pilot project in 2006 and was completed in 2014. The overall goal of NAIP was to promote agricultural Research and Development for improving agricultural productivity and increasing agricultural growth in India[94]. The total budget for NAIP was US $ 250 million, of which the World Bank funded US $ 200 million as credit and US $ 50 million was covered by the Government of India.

The NAIP aimed at strengthening institutional capacity within the National Agriculture Research System (NARS) which comprised of the Indian Council for Agriculture Research and other central agriculture research institutes. NAIP aimed at improving institutional coordination within and outside the NARS and foster partnerships among the national and state agricultural R&D institutions, private sector and the civil society organizations including NGOs and farmers' groups working in a consortia mode to enable competitiveness and productivity in the Indian agriculture sector (NAIP, 2014).

Problems observed in existing policy structure

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[94] Retrieved from http://siteresources.worldbank.org/INTARD/Resources/335807-1330620492317/8478371-1330712156366/Module4-IAP2.pdf

After the huge boost in agriculture technologies and research that followed from the Green Revolution period, there was a period of stagnation in the 90s in terms of large-scale development of agriculture research technologies. There was a felt need in the Government to revive the existing agriculture research system to boost agriculture productivity using technology[95]. The projects that featured under the NARS were largely oriented towards agriculture production and the market aspects of agriculture were missing. Introducing the market linkages was considered to be essential during this period to increase profitability for farmers. The NAIP aimed at designing projects that could help deploy technologies that addressed both productivity as well as marketability aspects of the agricultural produce.

Part 1 of hypothesized causal mechanism: Governments experiment to address anomalies within current policy structure

The specific objective of NAIP was to facilitate sustainable transformation of agriculture sector and foster collaborations between research institutes, private sector, farming communities and other stakeholders for the development and implementation of agricultural innovations, collaborating beyond the existing NARS group of research institutes.

As a large-scale innovation project, the NAIP operated with 653 partners through 203 sub-projects. A total of 203 consortia were financed, which comprised of 856 public and private partners, NGOs, and international research institutes implemented in 29 states and five Union Territories (NAIP, 2014).

[95] Interview with Dr. Rita Sharma, Government of India

The NAIP aimed at achieving the objective through four components: 1: Strengthening the role of ICAR for the Management of Change in the Indian National Agriculture Research System (NARS), 2: Research on Production to Consumption Systems, 3: Research on Sustainable Rural Livelihood Security and 4: Basic and Strategic Research in the Frontier Areas of Agricultural Sciences. NAIP was thus primarily geared towards institutional strengthening of ICAR and its research.

The NAIP also had an additional provision of sponsored or competitive grants component through which research proposals for three years, addressing critical gaps of national importance not covered under the strategic research component could be funded. Proposals were invited from identified institutions or selected on a competitive basis from institutions/individuals both within and outside NARS, including any scientist, research institutes and/or civil society organizations based in India.

Part 2 of the hypothesized causal mechanism: New set of actors debate policy changes to address anomalies

The key challenges that NAIP faced were in terms of selecting partners based on competence and alignment of objectives between the project partners. Even though clear contracts and benefit sharing arrangements, rules for procurement and implementation of research were developed as part of NAIP, the project faced some operational issues.

By embarking on a consortium approach engaging unconventional partners (outside NARS), the project faced some operational issues as the standard operating procedures in the public sector are not that friendly to the private sector and NGOs[96]. Private players were primarily engaged for NAIP Component 2 i.e. Research on Production to Consumption Systems and NGOs were engaged for NAIP component 3 i.e. Research on Sustainable Rural Livelihood Security. Of the 203 sub-projects, nineteen developed synergies with ongoing Government programs. Thirty seven percent of sub-projects in component 3 developed linkages with private organizations (NAIP, 2014).

Part 3 and 4 of the hypothesized causal mechanism: Contestation between supporters of old and new forms of the policy

Apart from operational challenges, there were no contestations observed in the case of NAIP. This could be attributed to the fact that the project had 203 sub-projects which were all small-sized innovations, and all were broadly geared towards propelling research and implementation of agri-innovations in the country in multiple forms rather than one single project.

At the local level, a sustainability fund was developed which was jointly managed by farmers to help them create a corpus for investment in technologies as per local needs. Private sector including agro-industries and farmer-producer organizations and NGOs took forward many of the sub-projects even beyond the official closure date of NAIP.

Outcome of the hypothesized causal mechanism: Scaling-up without major deviations from previous policy

There have been efforts towards mainstreaming some of the activities as part of NAIP into regular activities of development departments. In the Twelfth

[96] Interview with Dr A P Srivastava, Project coordinator NAIP

Five Year Plan (FYP) the idea of consortium research engaging non-NARS agencies was retained, with pooling of talent and resources from different agencies. As part of NAIP several business planning and development units had started involving private sector, with industries testing technologies at State Agriculture Universities. This idea was also expanded in India's Twelfth Five Year Plan through a special focus on entrepreneurship development in the agriculture sector. Specifically NAIP gave rise to changes in institutional structure and function of the Indian Council for Agriculture Research, the research arm of the Ministry of Agriculture. Specifically Key features of NAIP such as multi-stakeholder partnerships and consortium approach were adopted in new management projects of ICAR and Ministry of Agriculture.

In case of NAIP, the 'smart layering' mechanism is observed albeit in a fragmented manner. Being a research oriented project with several sub-projects the overall existence of the mechanism and its parts, especially in terms of contestation and debates between different stakeholders are not easily observed. Thus it is difficult to attribute the scaling-up to the presence of a strong smart layering mechanism.

6.5.3 Process tracing of Policy Conversion mechanism: The case of NATP

Among all cases and across all the three causal recipes, only one case National Agriculture Technology Project (NATP) was found to be a typical case. It follows the causal pathway 3 [~settings*~instrument type*calibration].

The NATP was initiated in 1998 as a five-year pilot with the overall goal of introducing reforms in Agricultural Research and Extension systems of India.

NATP was introduced as an alternative to the Training and Visit top-down, 'one-size fits all' mode of extension services (Raabe, 2008).

NATP was initiated by the Ministry of Agriculture with the financial assistance of World Bank and implemented with the assistance of the National Institute of Agriculture Extension and Management (MANAGE) in 28 districts covering 7 states, viz. Andhra Pradesh, Bihar, Jharkhand, Himachal Pradesh, Maharashtra, Orissa and Punjab[97]. In each state 4 districts were identified for the pilot (to cover a diversity of environmental constraints, topography, socio-economic conditions and governance).

Problems observed in the existing policy structure (anomalies)

Prior to the launch of the NATP, the initial extension system comprised of a Training and Visit (T & V) mode, conducted by village level extension workers identifying farmers with consolidated land-holdings. All farm-level demonstrations were geared towards improving production hence the system covered only those areas with good soil, irrigation, capacities to investment and was not inclusive to include small and marginal farmers. There was a need to introduce a new extension system that was inclusive, capable of addressing all types of farmers and a system that was not limited to agriculture or only a few crops but also included horticulture, animal husbandry and fisheries.

The individual farmer approach for extension as in T &V system was found to be impractical; instead a 'group approach' towards extension was envisioned. The T&V extension planning was top-down in approach and farmer's feedback was not getting duly incorporated. Extensive use of IT was

[97] http://agridr.in/tnauEAgri/eagri50/AEXT191/lec09.pdf

also needed for a strong extension network. In terms of activities, there was a need to promote diversification, and shift focus from production to productivity for agriculture, sustainability and to increase women's participation in agriculture. Additionally, fund flows were centralized and routed through government treasuries. Fund disbursement through this route involved a substantial time delay for funds to reach the allocated project sites and beneficiaries. This disbursement delay led to the idea of creating autonomous institutes which could receive extension funds directly and initiate implementation.

The T&V extension system worked well for simple transfer of technologies but it was not adequate for major diversification in rural areas, demand-driven agriculture extension and developing linkages with global economy.

Part 1 of hypothesized causal mechanism: Governments experiment with adopting new goals to address anomalies

NATP had both research and extension components. ICAR had weak linkages with extension activities so NATP was thought of as a means to strengthen these linkages. The idea of NATP was to test if new extension institutions could be developed at the district level (later to be called as Agricultural Technology Management Agency). When the NATP was launched, the T&V extension system was suspended. This indicates commitment on the part of the Governments in moving towards new goals for the extension system through the pilot.

The NATP focused on research and extension and on an integrated system of extension delivery (Raabe, 2008). NATP field-tested institutional innovations and decentralized program planning within the agriculture extension system (Sharma, Swanson and Sadamate, 2001). NATP sought to (1) improve the efficiency of the organization and management systems of the Indian Council of Agricultural Research (ICAR), (2) strengthen the effectiveness of research programs and the capacity of scientists to respond to the technological needs of farmers, and (3) increase the effectiveness and financial sustainability of the technology dissemination system with greater accountability to and participation by farming communities (Raabe, 2008).

The Innovations in Technology Dissemination component of NATP tested new approaches for technology transfer, organizational arrangements and operational procedures for integrating extension service delivery at the district level (changes at the calibration level).

Part 2 of hypothesized causal mechanism: New actors debate on change in goals

NATP brought a restructuring of existing actors to take up new roles towards meeting new policy ends. Organizational instruments were used to strengthening capacities of extension functionaries, restructuring public extension services, promoting NGOs and private sector participation in extension and imparting greater use of Information Technology (MoA, 1999). The same type of instruments deployed in earlier extension programmes i.e. organizational and nodality instruments were used in NATP.

Being a decentralized extension delivery model NATP led to a set of institutional reforms at the state, district, block and village levels. There was a shift in the way the organizational instruments were utilized, moving towards more bottom-up planning, striking strong linkages between research and extension agencies. This includes strong cooperation between Indian Council of Agricultural Research institutions, State Agricultural Universities, State Department of Agriculture and other line departments, public research organizations, NGOs and private R&D organizations[98].

Overall, the institutional changes included the formation of Inter-Departmental Working Groups at the state level; at the district level an agency called Agricultural Technology Management Agency (ATMA) was created with membership from all agriculture and allied sectors; at the block level, Information Advisory Centers for Farmers consisting of Block Technology Team were created and Farmers Advisory Committee and Farmers Interest Groups and Farmers Organizations were created at the village level[99].

Thus, organizational support upto the block level was provided through NATP. State level Inter-Departmental Working Groups reviewed extension activities of the respective states, depending on the criticality of the intervention and budget allocation. Block action plans were prepared. All activities for agriculture development of a block were shared in the block action plan with the objective of pooling and optimizing the use of resources at the block level by avoiding duplicity of efforts. Strategic research and

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[98] Monitoring and Evaluation Experience of Agricultural Projects in India
A comparative analysis of DASP and NATP in India, accessed 12 December 2015, http://info.worldbank.org/etools/docs/library/51025/zipagextension1/ag_extension1/materials/may7session2/r.p.singh.pdf

[99] Constitution and working of ATMA. Accessed 10 December 2015, http://agritech.tnau.ac.in/atma/atma_constitutionworking.html

extension programmes were designed at the district level involving multiple stakeholders including the KVKs, line departments, farmer groups, and scientists from State Agriculture Universities.

Development of ATMA was the most important institutional change that came by as a result of NATP. ATMA was introduced at the district level to integrate extension programs across the line departments, link research and extension activities within each district, and enable bottom-up and decentralized decision-making engaging the farmers in planning and implementing extension programs at the block and district-levels (Singh et al, 2009).

Part 3 of hypothesized causal mechanism: Multiple stakeholders contest on new means to meet new goals

There was contestation among stakeholders to different extents in different states. These were primarily related to operationalization of the new extension system. Each state had specific socio-cultural factors that enabled or challenged these changes. This includes factors such as higher group orientation in some villages (easier to initiate collaborative activities), manpower resources, literacy levels and technological awareness among others. States of Punjab and Maharashtra thus adopted the changes faster than the other pilot states.

A lesson from the pilot phase was that group approach to agriculture extension leads to higher success for example in the case of community oriented farmer groups. In such states farmer-producer organizations were found to be financially and technically empowered. It was easier to impart training and capacity building in such groups, including farmer to farmer learning and organization of farmer schools. Presence of technology dissemination centres and community radios were also found to be useful.

NATP brought KVKs (research wing through State Agriculture Universities) plus ATMA (development wing of Agriculture departments) together, demonstrating that the link between extension and research could be strengthened in a bottom-up manner. Research extension plans were made bottom-up from block and village agencies. ATMA could provide a platform for a new set of service delivery organizations outside the government. NATP also acted as a facilitator and enabler for public and private agencies and farmer collectives and help to regulate services.

Thus, there were no contestations as part of the institutional changes that NATP brought about. Rather a convergence of existing institutional structures and creation of new structures to localize existing ones took place.

Outcome: Scaling-up with substantial changes to current policy structure

Following the success of ATMA model, the Ministry of Agriculture started a new Centrally Sponsored Scheme on Support to State Extension Programmes for Extension Reforms, and announced the setting up of ATMAs in all 588 rural districts in India (Singh et al, 2009).

There was a 5 years impact evaluation by IIM Lucknow, and economic rate of return of project interventions was found to be increasing. Based on these positive results the Government of India decided to launch NATP as a national project. Initially 253 rural districts were covered and gradually the institutional changes spread to all the districts throughout India. By 2010 dedicated manpower was provided by GoI for extension systems upto the block level. State Governments supported the operation of State Agricultural Management and Extension Training Institutes (SAMETIs) at the State level to provide necessary extension reforms-oriented training to the ATMA functionaries and extension officers at the state level[100].

6.5.4 Process tracing of deviant in kind case NWDPRA

One deviant case in kind exists for both of the major causal combinations- the National Watershed Development Project for Rainfed Areas (NWDPRA). NWDPRA was found to undertake only incremental adjustments to all the four policy components. By meeting a high membership is both the major causal combinations, it would have been expected to see high membership in scaling up for NWDPRA. However, it is found to scale up only incrementally.

In 1986-87 a 'National Watershed Development Programme for Rainfed Agriculture (NWDPRA)' was launched for optimizing the production of important rainfed crops like pulses, oilseeds, coarse cereals, cotton, groundnut etc. The NWPDRA was restructured and launched in a pilot project mode for five years as National Watershed Development Project for Rainfed Areas (NWDPRA) in 1990-91. The Scheme was being implemented on the basis of Common Guidelines for Watershed Development Projects issued by the National Rainfed Area Authority, Government of India.

The overall goal of NWDPRA was integrated watershed development and sustainable farming. The outlay was increased from about Rs. 100.00 crore of actual expenditure in the VII Plan (to cover only 99 districts in 16

[100] Agriculture Technology Management Agency, accessed 15 December 2015, http://www.atma.ind.in/strategy/

states) to over Rs. 1000.00 crore in the VIII Plan to cover over 2500 blocks in all the states and UTs. The restructured NWDPRA followed a new set of guidelines issued by the Ministry of Agriculture called the Watershed Areas' Rainfed Agriculture Systems Approach (WARASA) Guidelines during the VIII plan period and increasingly had a participatory and farmer-centric approach to watershed development (GoI, 2001).

Part 1 of hypothesized causal mechanism: Governments experiment with means and goals

The restructured NWDPRA retained the objective of the earlier programme, which were to improve production and productivity in the vast rainfed areas and to restore ecological balance in these areas. The scope of NWPDRA however moved to social dimensions of watershed management, and thus increased focus on livelihood enhancement[101]. This was an incremental expansion towards strengthening the earlier objectives. At the ground level, the restructured scheme included conservation, development and sustainable management of natural resources, enhancement of agricultural production and productivity, restoration of ecological balance in the degraded and fragile rainfed ecosystems by greening these areas through appropriate mix of trees, shrubs and grasses, reduction in regional disparity between irrigated and rainfed areas and creation of sustained employment opportunities for the rural community including the landless[102].

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[101] The restructured programme was moving towards integration of social aspects, similar to the watershed programmes of the Ministry of Rural Development, Government of India. Based on interviews with Dr. C P Reddy; Dr. Rita Sharma, Government of India.

[102] NWDPRA. http://agricoop.nic.in/dacdivision/NWDPRA8410.pdf , accessed 20 February 2016

Part 2 of hypothesized causal mechanism: New actors debate on change in means and goals

To meet the overall goal and objectives, the restructured NWDPRA deployed participatory instruments such as partnerships with non-governmental organizations (Howlett et al, 2009) for soil and water conservation. This marked an addition to the earlier focus on direct provision of technological solutions for soil and water provision by the state and central governments. The instrument type was still organization-based i.e. through use of the formal organizations available to the governments.

NWDPRA emphasized on building upon local practices, knowledge and wisdom (GoI, 2001). Self-Help Groups such as *Mitra Krishak Mandals* were developed (Pande, 1998). Though NGOs were allowed to facilitate activities under the restructured pilot NWDPRA but their participation primarily served at increasing the level of engagement with the communities instead of becoming primary implementing agencies themselves. Such efforts enabled individual farmers to implement soil and water treatment activities on privately-owned land and local village organizations and farmer groups to implement community works (GoI, 2001). Thus, though the NWDPRA pilot introduced new actors, their roles were rather restricted.

Part 3 of hypothesized causal mechanism: Multiple stakeholders contest on means and goals

There were multiple stakeholders involved in watershed programmes for rainfed areas. There were two similar and parallel watershed programmes for rainfed areas operational in India around this time. One was the NWDPRA by the Ministry of Agriculture, another by the Department of Land Resources, Ministry of Rural Development (MoRD). The NWDPRA by the MoA was a very technical programme and social dimension of watershed development was missing. The MoRD project counterpart on the other hand was weak on the technical aspects and focused largely on social dimensions of watershed development.

Over a period of time there was contestation in terms of where the watershed programmes should be housed. In 2000s, the Ministry of Rural Development consolidated all watershed projects, even those from agriculture and combined into an Integrated Watershed Management Programme for streamlining all watershed management efforts in the country.

The NWDPRA continued to expand to different states and undergo changes to encourage higher community participation during the Eighth and Ninth Five Year Plan. As a similar initiative was running in parallel in another ministry hence the process of scaling-up of the pilot was delayed till consolidated guidelines were developed. Furthermore given the scale and type of pilot this was it was hard to clearly indicate progress in terms of scaling up to the national scale as compared to smaller scale pilots.

6.5.5 Process tracing of deviant in coverage case WBCIS

Weather Based Crop Insurance Scheme was found to be a deviant in coverage case for all the three combinations. Yet it was observed to be scaled-up substantially. WBCIS was piloted in India in 2007 to provide states an alternative to NAIS. WBCIS was initiated in 70 hoblis of the rainfed Southern state of Karnataka for 8 rain-fed crops. By 2010–11 WBCIS was being implemented in 17 States and covered more than 67 lakh farmers growing crops on 95 lakh hectares spread over 1,010 blocks in 118 districts (GoI, 2013).

The WBCIS was launched to take advantage of an innovation by the Indian Meteorological Department (IMD) in the Eleventh Five Year Plan and their experience with Automatic Weather Stations. An Integrated Agro-Meteorological Advisory Service (IAAS) was launched by IMD to issue regular weekly Agro-Met Advisory Bulletins up to the district level on field crops, horticulture and livestock. State Agricultural universities was involved in collecting and organizing soil, crop, pest and disease information and integrating it with weather forecasts to assist farmers in their farm-level decisions (GoI, 2015).

The objective of WBCIS was to provide insurance protection against losses in crop yield resulting from adverse weather incidences. WBCIS provides pay out against extremes of rainfall (both deficit and excess) during Kharif and adverse changes in weather parameters like frost, heat, relative humidity, un-seasonal rains etc. during rabi season. A score of 0.67 is given because, the scope of the insurance changed from a generic crop insurance (as in NAIS) to insurance for weather-based events only.

In terms of on-ground requirements to meet the objective, WBCIS follows an area approach, i.e. compensation is provided to a homogenous ‘Reference Unit Area (RUA)’. The RUA is notified before the start of the cropping (Kharif) season by the State Government and all the insured cultivators of a particular insured crop in that area are deemed at on par in the assessment of claims. Though an area based approach similar to NAIS, the area was determined on the basis of its coverage under a Reference Weather Station (RWS). This would further form the basis on which current weather data and the claims would be processed (GoI, 2014).

For the first time for a crop insurance scheme in India, public-private partnerships were established. In this case, the private players were instrumental in generating meteorological information and deployment of Information and Communication Technology (partnerships with private mobile service providers) to help disseminate the agro-met information at the local level. In addition, by introduction of the private players also helped in market-creation for insurance (another ‘organization instrument’).

In terms of calibration, the sum insured in WBCIS is the cost of inputs expected in raising the crop (pre-declared per unit area by the Agriculture Insurance Company before the start of each crop season in consultation with state Governments). The input costs may vary from crop to crop in different RUAs. Sum insured is further distributed under key weather parameters used in the insurance in proportion to the relative importance of the weather parameters. The claim settlement is automatic, based on weather readings at the RWS. Weather insurance pay-outs are assured within 45 days from the end of insurance period.

This is a complete shift from traditional crop insurances where pay-out is linked to yield estimates. Here the sum insured is the expected cost of inputs using weather parameters (used as a proxy for actual crop yields), hence it is a complete shift again from normal. So instead of deviations from historical yield estimates, claims are based on weather-triggers. Adverse weather incidences during the season entitle the insured a pay-out, subject to the weather triggers defined in the ‘Pay-out Structure’. Claims arise when there is a certain adverse deviation in actual weather parameter incidence in RUA as per the weather data measured at RWS.

For a loanee the sum insured per crop is calculated by multiplying per unit area value of inputs with crop specific acreage declared in the loan application form by the loanee cultivator for the purpose of maximum borrowing limit fixed for him by the lending bank. For the non-loanee the acreage figure is the expected area sown / planted under the particular crop as declared in the insurance proposal form. The actual losses incurred may be more or less than compared to what has been specified in the Benefit Table leading to crop losses. Irrespective of the actual crop loss, all the insured cultivators under a particular crop in a RUA and under the same RWS are deemed to have suffered the same adverse deviation and become eligible for claim subject to terms and conditions of the scheme.

Compared to NAIS, WBCIS was easy to administer as the settlements were based on variation of weather variables. Around 60per cent of variation in crop yield in India can be attributed to shifts in weather variables such as rainfall. Thus while WBCIS was crucial, it only offered partial protection to farmers against weather-based risks only. However WBCIS was prone to ‘basis-risk’, i.e. a mismatch between weather variables that were recorded at a particular weather station and the actual crop loss of the insured farmer. It is difficult to completely eliminate the basis risk as several others factors can influence crop yields, apart from weather, for e.g. water requirement of specific crops. Thus it was difficult to design a single reliable weather-based insurance product and this remains a challenge till date[103].

The public-private partnerships have explored the development of additional insurance products targeting specific crops and extreme weather events such as cloudburst to be combined along with WBCIS. A wider network of Automated Weather Stations throughout India was also planned through public-private partnerships. There were also plans to strengthen Crop-Cutting Experiments CCEs through the use of remote sensing[104]. Private agencies such as Skymet provided localized weather information and forecast to farmers and crop insurance agencies[105].

WBCIS is operating as full-fledged programmes under NCIP. However there are several challenges. For example, installation of automated weather stations faces citing issues. There are security issues (fencing needed) and 24 hour power backup is needed. In addition, the placement of these weather stations on the ground or rooftop can introduce errors in the estimation of temperature and windspeed.

State governments prefer NAIS as upfront premium is higher for WBCIS. With NAIS, governments were also able to estimate the expected liability in advance. In the case of WBCIS, upfront premium subsidy needed to be paid without knowing what stresses will eventually emerge.

Outcome

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[103] Agricultural Livelihoods and Crop Insurance in India Situation Analysis & Assessment, 2013. Published by: Deutsche Gesellschaft fürInternationale Zusammenarbeit (GIZ) GmbH

[104] Annual Report 2014-15, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, March 2015, http://agricoop.nic.in/Annualreport2014-15/EnglishAR2732015.pdf

[105] Interview with official from IFFCO-Kissan

In 2013, the WBCIS was bundled along with mNAIS and a Coconut Palm Insurance Scheme and brought under the purview of a National Crop Insurance Programme[106]. The states however have the flexibility to choose to follow whichever scheme they want to under the NCIP or the ongoing NAIS.

Despite making major changes to the objectives, and everything changing WBCIS was scaled up because the private service providers became the main operating mechanism. They also launched a lot of their own schemes and have shown good results even before launch of the WBCIS. Hence the government despite issues and despite them not following the normal mechanism, introduced this as a good measure into the suite of their activities.

As compared to mNAIS and WBCIS, if the two irrelevant cases, the Farm Income Insurance Scheme and the Experimental Crop Insurance Schemes are considered, these ended up challenging the complete insurance structure of the government, instead of attempting a revised or parallel line of insurance. For example FIIS threatened to remove the prevailing Market Support Price scheme and ECIS became a non-insurance type of programme (as it was open to non-loanees as well). These schemes did not have any benefits for the private insurance companies either hence were not picked up by private insurance providers, and thus failed to scale up completely.

6.6 Results and Discussion

The results of the PT exercise indicate that all the typical and deviant in degree cases indicate the presence of alternate forms of the 'layering' mechanism.

[106] http://agricoop.nic.in/imagedefault/whatsnew/ncipletter.pdf

The fragmentation of authority and Contestation part is not clearly observed because the duration for which a pilot is operational is usually very short compared to full policies, so as to study these parts of the mechanisms extensively.

In case of the ‘deviant in kind’ pilot NWDPRA, the layering mechanism did not break down as such but there were some exogenous factors such as inter-departmental functional overlaps that stalled the process of its scale-up. Furthermore the type of activities as part of this pilot was largely long-term in nature, geared towards natural resource management, land improvement and institutional strengthening to achieve these objectives. These factors along with institutional ‘turf’ issues prolonged the incubation period of the pilot which eventually got scaled up but after a longer time of replication and demonstration.

In the deviant in coverage case WBCIS, the pilot found an alternate mechanism towards scaling up. This alternate mechanism included insurance service provision by private actors. This alternate mechanism acted as a mode to supplement existing efforts by the Government and the pilot was thus bundled with other similar crop insurance schemes by the Government to provide a broader portfolio of services to the target beneficiaries.

6.7 Summary

Process-tracing reveals that policy layering with incremental changes to policy components over time forms the major mechanism operational behind policy change. However alternate forms of the layering mechanism such as smart layering and policy conversion are observed in pilots that lead to scaling-up.

When alternate non-governmental pathways for scaling-up are done, sometimes these may get adopted by governments eventually. Despite having all incremental changes some pilots might get stalled because of political reasons and simply having a longer incubation period. Despite being radical in nature, some pilots might get scaled up by finding alternate routes, such as via private service providers.

Chapter 7 Discussion and Conclusion

7.1 Implications for policy theory

Policymakers typically formulate policies to address a host of anticipated and unanticipated risks and uncertainties in relation to the policymaking context and how these may be expected to change and evolve over time. While operating under a variety of epistemic as well as other types of uncertainty, policymakers are sometimes not able to or hesitant to launch a new policy or programme owing to the impending uncertainty and instead launch policy pilots which are time and scope delimited.

In such cases, policy pilots can serve multiple purposes such as ex-ante policy evaluation, acting as a source of policy evidence, adaptive management, enabling socio-economic and other forms of transitions, generating alternative channels for policy change, exploring superior policy designs, introducing variations in responses under uncertainty and enabling social learning in the context of specific policy problems inter alia. While the importance of piloting and policy experimentation in general is acknowledged in theory, the empirical evidence on the nature of such pilots, their role in bringing about different types of policy change and the processes of their diffusion in practice is lacking (Vreugdenhil et al, 2009).

Policy piloting has been suggested as useful instrument for governments to test out new policies, by initiating them on a small scale first thereby testing acceptability by the beneficiaries and stakeholders at large followed by incremental changes or large-scale reforms to existing plans and schemes. The goal of such policy pilots is to guide future policy development.

The question whether and how these pilots scale-up and translate into policy eventually has been of interest to policy scholars and practitioners alike.

Predictive methods such as pilots are deployed by various agencies, including the government, to pre-test different programmes and policies for their likely impacts, process of implementation and stakeholder acceptability prior to launching these completely or on a large–scale. The underlying motivation while deploying these predictive methods is that these will provide results that are largely indicative of what outputs, outcomes and challenges can be expected when these programmes and policies are implemented in a full-fledged manner (Nair and Vreugdenhil, 2015).

This study demonstrated how policy piloting unfolds in a country like India in the agriculture sector. Agriculture in India is of high policy significance and has a huge population dependent on the sector for livelihoods and sustenance. Agriculture policies are constantly being formulated under conditions of production risk and uncertainty while considering the extreme diversity in the socio-economic, institutional, climatic settings across the wide expanse of the country. The objective of the study was to understand the mode of designing of policy pilots by the national government with the intention of scaling up throughout the country, not only geographically but also in terms of its translation into a permanent feature into national policies.

This thesis was guided by the overall research question: *Can design characteristics of policy pilots explain variations in their scaling-up and overall policy change?* Two sub-questions to investigate the overall research question were:

- Which are the necessary and sufficient factors for scaling-up of policy pilots?
- Are the mechanisms of scale-up similar for policy pilots that share similar characteristics?

The following propositions were set to guide the overall study:

Proposition 1: Scaling up is a political process

Proposition 2: Changes at the goals level are more deterministic for overall policy change than changes in the means level

Sub-proposition 2.1: Paradigmatic changes in goals lead to overall paradigmatic change in outcome

Sub-proposition 2.2: Incremental changes in goals lead to overall incremental change in outcome

Agriculture in India is highly risk-prone because it is largely rainfed and capacities of farming communities (largely small and marginal farmers) to deal with conditions of stress are low. Several policy pilots have been conducted in the agriculture sector in India to address risks and uncertainties to crop production. The fourteen pilots identified for the study were classified under four types: area development programmes, credit and insurance, extension including technological demonstration and schemes/programmes related to agriculture inputs for boosting crop productivity. The selected pilots represented models of pilot testing of policy elements with the intention of guiding agriculture policy development at the national level.

Answering the overall research question for the thesis, *Can design characteristics of policy pilots explain variations in their scaling-up?*, the case analysis reveals that design characteristics of policy pilots can account for variations in their scaling-up. Some deviations from expected theoretical findings on the nature of these variations are also observed.

The study reveals that there are multiple pathways to scaling-up. Three causal combinations of design characteristics are found to account for 84per cent of the observed instances of scaling-up (solution coverage is 0.84 and is high) (Ragin, 2008) indicating that the solution relates favourably to the outcome observed (Schneider and Wagemann, 2012)). The solution consistency (0.91) indicates that the solution is of relatively high empirical importance in reaching the outcome. This means that in 91per cent of the cases presence of either three causal combinations leads to scaling-up.

Answering the first sub-question, "*Which are the necessary and sufficient factors for scaling-up of policy pilots?"* three causal recipes are found to be sufficient to explain instances of scaling-up observed in the fourteen cases. This includes:

- [~obj*~calibration],
- [~obj*~setting] and
- [~setting*~itype*calibration]

The first causal combination ~obj*~calibration indicates a situation where there is no change in objectives and no change in instrument calibration. In cases of successful pilots where this combination was found, it can be inferred that as long as there is no change at the political level (goals) as well as operationalization level (state and sub-state level), pilots are found to scale up. Additionally, major shifts in the policy objectives are not observed, and at the local level major shifts in the current way the instruments are being used to meet the on-ground requirements of the policy are not observed.

The second sufficient causal combination [~obj*~setting] indicates a situation where there is no change in objectives and no change in settings. It again hints towards the political nature of scaling-up. So as long as the objectives and settings remain the same, scaling-up will happen irrespective of small or major changes at the operationalization level.

The third sufficient causal combination ~setting*~itype*calibration indicates a situation of scaling-up where there is no change in settings and Instrument Type but substantial or paradigmatic change in Instrument Calibration. This combination however explains a lesser proportion of cases compared to the earlier two.

Overall the solution Scaling Up= [~obj*~calibration] + [~obj*~setting] + [~setting*~itype*calibration] indicates the existence of multiple pathways to scaling up but which are rather conservative as opposed to undertaking paradigmatic changes. Changes in calibration are found to happen as long as there is no change in settings or instrument type.

Answering the second sub-question, "*Are the mechanisms of scale-up similar for policy pilots that share similar characteristics?*" the study reveals that policy layering with incremental changes to policy components over time forms the major mechanism operational behind policy change. Process Tracing of the selected cases of pilots that demonstrated the presence of the solution term identified earlier revealed finer details of the causal mechanisms at play.

Alternate forms of the layering mechanism such as smart layering and policy conversion are observed in pilots that lead to scaling-up. In addition, some deviant cases are observed. For example, when alternate non-governmental pathways for scaling-up are present, pilots can be scaled-up by governments eventually. Despite having all incremental changes some pilots might get stalled because of political reasons and simply having a longer incubation period. On the other hand despite being more than incremental in nature, some pilots might get scaled up by finding alternate routes, such as private service providers.

With respect to Proposition 1, the study reveals that piloting predominantly has a political nature, i.e. "scaling up is a craft not a science" Spicer et al (2014). The Process Tracing revealed that the design features of pilots do not independently govern the level of scaling-up; rather is it the interaction of these design characteristics with the current policy regime and its actors.Scaling-up in turn depends on acceptance of the changes brought about by the pilot and capacities for change, both at the political (goals) as well as implementation (means) level.

Even though the Ministry of Agriculture, Government of India may not consider piloting as a regular feature of policy formulation and change, piloting is leading to innovation and learning in order to improve current policy practice. Over time this does reveal several sub-optimal policy mixes (Howlett and Rayner, 2013) that the pilots eventually bundle into. This is an insight that policy scholars need to consider when they suggest crafting of policy pilots to bring about policy change.

Major changes introduced over a short period of time have not found support at the political as well as community level, as was seen in the case of two insurance schemes, Experimental Crop Insurance Scheme and the Farm Income Insurance Scheme that brought substantial changes in three of the four policy components. Both these pilots had to be terminated within a single cropping season.

With respect to Proposition 2, the study reveals that conservative pathways both at the goals and means level are associated with successful pilots, characterized by 'minor tinkering' (Majone, 1991) to current policy mixes. Between failed pilots and institutionalization lies policy bundling- where majority of pilots land up. Causal mechanisms primarily involve layering but this too can have various forms ('Smart layering' and Conversion). Rapid and major changes introduced in pilots can fail because of lack of support at the political as well as community level. 'Paradigmatic' pilots if launched at a politically favourable time (when reforms were due anyway) have a higher chance of scaling-up. When alternate non-governmental pathways for scaling-up are done, sometimes these may get adopted by governments eventually. Despite being rather radical, some pilots might get scaled up by finding alternate routes, such as private service providers. On the other hand, despite having all incremental changes some pilots might get stalled because of political reasons and simply having a longer incubation period.

The tendency to adhere to slow and gradual adjustments in policy components also indicates towards the need to be judicious with current resource investment profile in the agriculture sector. While major overhauls in policy design at the national level might seem unlikely, sometimes pilots are launched at critical junctures where reforms are already being considered. This was seen in the sole case of full scaling-up found in this study, the National Agriculture Technology Project led to major extension reforms in the country. Between these two extremes, a majority of all cases studied lie in the mid-zone of 'policy bundling' wherein pilots merge with other ongoing policies and programs to increase their scale and scope.

The results of the study highlights the disconnect between the theoretical importance bestowed on pilots as one of the suggested approaches towards risk management, investments in policy alternatives and innovations, and design of pilots in practice. Despite theoretical acknowledgment as an approach to facilitate 'risk-taking' under uncertainty, the study reveals that the primary function of pilots in practice might be to operate as avenues for periodically 'updating' existing policies and programmes through 'marginal' changes to their current scope. The highly political nature of policy piloting in Indian agriculture context result in treatment of policy pilots as mini-policies in themselves.

While it is encouraging to see that policy piloting in India is accompanied with substantial investment of financial and human resources, infrastructure and more importantly political commitment, this also indicates the high stakes that are associated with the performance of the pilot and its larger implications for the incumbent political regime. While technical aspects of policy pilots are recognized in scaling-up the most promising pilot schemes and programmes, the study indicates that technical factors by themselves are not the determining factors influencing scaling-up. Rather it is the level of compliance or synergy of the design features of the pilot with the incumbent policy regime, especially at the goals level.

Though different types of initiatives have been launched by Ministry of Agriculture to increase food production in the country, it is a political risk to launch rapid changes via experimental schemes for an issue such as food production. Piloting thus in many instances may not indicate active experimentation but rather act as demonstration instruments for policymakers (Mei and Liu, 2013).

Policymakers thus remain wary of investing in unpopular policy pilots. At the same time they need to be innovative and think about new ways to deal with problems of food insecurity and declining soil productivity, increasing contribution of agriculture to GDP, addressing climate risks etc. Agriculture being a state subject means that the Central government also has to balance the expectations for national agriculture growth with state sensitivities and priorities.

In terms of implications for Indian agriculture, the thesis concludes that policy piloting in Indian agriculture is accompanied by substantial resource investment and political commitment. High stakes and political risks are associated with the pilot's performance and its popularity among the citizens (rural vote banks). Political decisions on pilots, especially in the agriculture sector can have long-term and cascading effects on farming communities and the economy. Policymakers are cautious of investing in risky/unpopular initiatives, while exploring innovative ways to address food security issues. National pilots are to be devised while balancing expectations for national agriculture growth along with diverse state contexts and priorities. Non-governmental actor networks are also found to be instrumental to scaling up.

While the findings are robust in the Indian agriculture context, this method can also be extended to other sectors that operate under high risk and uncertainty in the policy context. The factors chosen as causal conditions for the QCA-PT model however can differ if the case context moves to a different sector, or different country context. In India, policymakers at the national and state level hold the final decision-making power in approving or impeding a pilot's scaling up, even though other stakeholders are also consulted in the process. Other countries and sectors can potentially have other significant variables apart from fit to an existing policy regime, and other stakeholders that hold equal or more decision-making power. These variables would thus need to be considered in an adapted form of the policy mix framework and policy change model considered in this thesis.

7.2 Insights from combining QCA and PT

QCA aims at identification of causal patterns using the set-theoretical approach. Results of the QCA indicate that only pilots involving marginal changes to the status quo were successfully scaled up in the agriculture sector in India. For governments it may not be very appealing to appear in a mode of active and 'constant experimentation' for certain policy issues as it runs the risk of the public not taking the specific program seriously or trying to influence the outcomes to suit their interests, especially if it calls for investments (Peters, 1998).

The results of the PT exercise indicate that all the typical and deviant in degree cases indicate the presence of alternate forms of the ‘layering’ mechanism. In terms of the causal mechanism, the fragmentation of authority and Contestation part is not clearly observed because the duration for which a pilot is operational is usually very short compared to full policies, so as to study these parts of the mechanisms extensively.

In case of the ‘deviant in kind’ pilot NWDPRA, the layering mechanism did not break down as such but there were some exogenous factors such as inter-departmental functional overlaps that stalled the process of its scale-up. Furthermore the type of activities as part of this pilot was largely long-term in nature, geared towards natural resource management, land improvement and institutional strengthening to achieve these objectives. These factors along with institutional ‘turf’ issues prolonged the incubation period of the pilot which eventually got scaled up but after a longer time of replication and demonstration.

In the deviant in coverage case WBCIS, the pilot found an alternate mechanism towards scaling up. This alternate mechanism included insurance service provision by private actors. This alternate mechanism acted as a mode to supplement existing efforts by the Government and the pilot was thus bundled with other similar crop insurance schemes by the Government to provide a broader portfolio of services to the target beneficiaries.

All the parts of the layering mechanism observed in the cases are found to be individually insufficient but necessary parts of the mechanism. Additional number of cases would be needed for generalization of the mechanisms and further theorizing of the causal mechanism. Pilots however being an irregular policy activity, it would be rather difficult to obtain a similar set of cases spread over time and space.

Though the Central Ministry of Agriculture designs policies for the entire country, these are implemented at the state level. The settings component of the policy change model, both at the ends and means level was intended to capture any state level variations in receptivity and implementation of the pilot.

This analysis has few implications for research and action in the agriculture sector. Much of the experimentation and piloting for major transitions and transformations in the agriculture sector in India is occurring in a fragmented manner at a micro-scale, supported by a variety of stakeholders including the governments, international donors, NGOs and private sector. However for change to occur at the national level, the pilot initiatives need to embed and place themselves within the broader current policy portfolio of the central and state governments.

A challenge with small-n QCA is the issue of limited diversity- a feature of several social phenomena. This means that it is difficult to find a case of every combination that is logically possible as part of a QCA. This study used the complex solution that does not consider any remainders or counterfactuals. The reason for the same was that to include counterfactuals in the analysis, it needs to be backed by substantive and theoretical justification of why these counterfactuals could possibly lead to the outcome (Ragin and Sonttnett, 2005; Legewie, 2013). In this study, the counterfactual combinations that were observed (the ones for which there were no cases) largely portrayed combinations of radical changes at the goals and means level. Given the rather conservative nature of policy piloting in India, there was no theoretical or case-based justification for including these in the analysis.

The finding that incremental changes seem to be characteristic of pilots that scale up does not necessarily reflect that if a pilot does not introduce anything new, it will scale up. Instead it is indicative that as the pilot is in sync with the current policy regime, resources can get shared and the political buy-in for the pilot's implementation and scaling up is already there. It also indicates that that there are no barriers which would stop the scaling up, even though there are no new factors pushing it, it benefits from being similar to an ongoing policy regime.

The quality of a Fuzzy-set QCA heavily relies on the quality of coding or calibration of the fuzzy-sets. Krippendorf (2004) highlights that having a single coder for the study (as in this thesis) can potentially bias the coding scheme and understanding of the concepts. Owing to limitations of time and resources, while multiple coders could not be engaged in the fsQCA process to address inter-coder reliability issues, this problem was addressed by following a transparent documentation process of the entire coding logic, substantiated by theory, key informant interviews as well as policy document analysis. This coding logic can be easily interpreted and replicated for any future analysis with a similar theoretical framework and model.

As discussed in Chapter 5, the application of QCA in this thesis is to provide indicative results and identifying patterns on comparative analysis of the pilots, while acknowledging the limitations of working with a small-n dataset. Better reporting of pilots (including failures) can avoid case bias towards successful cases. Piloting can contribute to diverse policy bundles or packages over time which can be further studied for optimality of policy design. Pilots can also be classified based on types of actor networks and their relation to scaling-up pathways and mechanisms. The policy mixes framework can be extended to other sectors subject to piloting e.g. energy security, transport. Integrating alternative pathways (and explanatory conditions) towards scaling-up can further enrich the QCA-PT model. The challenge however will be to capture diversity in state capacities, resources, state-priorities, agriculture context, risk-taking attitude of the Governments etc.

The second method, Process tracing can be strengthened with different types of tests such as ‘straw-in-the-wind’ tests, ‘hoop’ tests, ‘smoking gun’ tests and ‘doubly decisive’ tests (Bennett 2010; Collier 2011) to test the validity of each part of the mechanism. These tests were not conducted in this study because the evidence for each case was very unique and certainty of the evidence was very high. However these tests would be pertinent if all the cases were dealing with a similar aspect of agriculture risk management, for example insurance.

Combining QCA and PT in a multi-method research was found to be useful for the current study, primarily because it allowed both for a macro pattern-finding among the fourteen cases, followed by a more in-depth analysis of specific typical and deviant cases. An extension of the current analysis can allow for insights from the PT to feed back into the QCA model to refine it and include other aspects relevant for scaling-up, for example the role of non-governmental actors.

The quality of analysis of both QCA and PT are also heavily dependent on granular information obtained for each case in order to appropriately capture all relevant variation between the cases. Multiple interactions with the case respondents and substantiating interview responses with independent evaluation reports and document analysis was found to enrich the quality of analysis substantially. This was particularly relevant for this study as pilots are not reported in as much detail as full policies, especially if these are politically sensitive or failing in terms of public acceptance and performance.

7.3 Limitations and avenues for future research

Agriculture is a complex sector so related policies launched by other line Ministries can also play an important role in influencing agriculture productivity. For example rural development policies in general, water resource management policies, trade policies and Information and Communication Technology initiatives among others. Many initiatives launched for rural development have a bearing on the agriculture sector and farmer well-being in general, so to consider a smaller section of pilots as the best representation of policy efforts towards improving agriculture productivity was a challenge.

Within the scope of this study however it was difficult to compare these multiple overlapping initiatives by different Ministries within the Government of India with differences in institutional style and approach of policy formulation. The efforts were thus streamlined to focus on the pilot initiatives conducted directly by the nodal central Government agency responsible for agriculture development and research in the country, the Ministry for Agriculture.

As pilots operate over a limited period of time, it was difficult to observe any incidences of incremental changes leading to overall paradigmatic change over time as is sometimes observed in the case of long-term policies. Another limitation of any study on pilots is that these are rarely reported in sufficient level of detail as compared to fully operational policies. This is especially so in cases where the pilots have performed less than expected or have been a complete failure. This limitation was overcome to a large extent by obtaining interviews with as many key informants as possible and triangulating the information with different sources of policy information.

As the study dates back to pilots as early as 1990, it was initially a challenge to obtain the contact of policy officials who worked on these pilots during those years. In some cases, these officials had retired or moved on to other Ministries as part of the rotation of duties. However with the help of current officials in the Ministry of Agriculture and experts from various Agriculture Committees in India, these officials were able to be traced and contacted for the interviews.

Construct validity: This study draws from policy change theory to conceptualize the causal conditions driving scaling-up and policy change. The phenomenon of scaling-up has been interpreted in several ways but the current study focused only on institutionalization of the pilot in terms of scaling up. Scaling-up can also be conceptualized in other forms such as organizational, financial scaling-up etc. (Gillespie, 2004) to reveal differences between the different forms of scaling-up itself that pilots give rise to. For example do some expand geographically with no change in function or scope?

Endogeneity: The six policy components identified in the model capture all aspects of policy change brought about by a pilot. Hence maximum care has been taken to avoid the issue of omitted variables that may influence the outcome within the model considered. Interviews with key informants on the pilot design, implementation and outcome also helped in capturing all aspects relevant to the scaling up of the pilot within this model, to avoid endogeneity issues.

In a limited number of cases however this study revealed the presence of alternate scaling-up pathways and deviance from expected results. The role of different non-governmental actors and actor networks including the role of epistemic communities can also influence scaling-up and can be included in an alternate QCA model to specifically understand the influence of actor-oriented and network variables on scaling-up.

Internal validity: Both QCA and PT together help to get deeper insights of the cases and allow consideration of nearly all explanatory factors in the analysis. These studies therefore provide high internal validity and can help check alternative theories and generate new hypotheses.

External validity: Scaling-up studies are highly localized and context-specific, hence addressing external validity issues remains a limitation. The objective of conducting a QCA on all the cases is to combine different policy pilots and then identify common characteristics that could have led to similar or dissimilar outcomes and in the process help alleviate external validity concerns. The cases considered in this study focus only on the Indian agriculture sector. Consideration of additional cases and extension of the model to other sectors and regions however can further strengthen the external validity of the model of policy change and generalization of the results.

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Appendix I: Invitation letter and Participant Information Sheet

Email for first round of consultations

Dear Dr./Shri/Mr./Madam,

I am a PhD student of Public Policy at the National University of Singapore. Previously I have worked in India for over seven years on the impacts of climate change on agriculture. For my thesis I will be comparing different agriculture policy experiments (including pilots) in India. To this end, I am initiating consultations with institutes and government departments undertaking related research and projects in dryland areas in India. I am writing to you to request a date in <month>2015 to interact with you as part of the expert consultations.

The purpose of these consultations is to identify key policy experiments and pilot projects that have been initiated by the central and state governments in India to deal with risks to agriculture especially in rainfed areas.

I will be in India starting January 2015 and I would greatly appreciate if you could indicate your availability for a short meeting in the week of <dates> 2015. In case this does not suit, kindly advice on an alternate date / time.

I look forward to hearing from you.

With kind regards

Sreeja Nair

Email for interviews specific to pilots

Dear Dr./Shri/Mr./Madam,

I am a PhD researcher (Indian national) from the National University of Singapore. I am studying the role of pilot initiatives in the agriculture sector in India. As the <Name of the pilot> is a major pilot initiative by the Ministry of Agriculture, it would be extremely valuable to this research if I can schedule an interview with you between <proposed date> 2015 regarding the design and implementation of the <Name of the pilot>.

Please find attached a brief project description and a letter from my university for your reference.

I thank you in advance for your kind consideration.

With kind regards

Sreeja Nair

National University of Singapore

469C Bukit Timah Road | Oei Tiong Ham Building | Singapore 259772

Participant Information Sheet and Consent Form

1. **Project title**
   Study of Indian agricultural policy experiments: lessons for policy formulation under uncertainty
2. **Principal Investigator and co-investigator(s):**
   Sreeja Nair (Principal Investigator)
   Lee Kuan Yew School of Public Policy, National University of Singapore
   Email: sreeja.nair@u.nus.edu
   Phone: +65-81632623 (Singapore); +91-9810383830 (India)

   Prof. Michael Howlett (Co-Investigator)
   Yong Pung How Chair Professor
   Lee Kuan Yew School of Public Policy, National University of Singapore
   Phone: +65 6601 1180
   Email: howlett@sfu.ca; sppmph@nus.edu.sg
3. **What is the purpose of this research?**
   You are invited to participate in a research study. This information sheet provides you with information about the research. The Principal Investigator (Ms. Sreeja Nair) will also describe this research to you and answer all of your questions. Read the information below and ask questions about anything you don't understand before deciding whether or not to take part.

4. **Who can participate in the research? What is the expected duration of my participation? What is the duration of this research?**
   The respondents should be involved in research or deployment of the policy pilot or be part of the beneficiaries of the pilot. The minimum age of the participants should be 18 years. There is no maximum age limit. Interview time with each key informant would be 30-35 minutes. The duration of the research is March- August 2015.
   All respondents must provide informed consent. The respondents should be involved in research or deployment of the policy pilot or be part of the beneficiaries of the pilot. There are no specific exclusion criteria.
   While semi-structured interviews will be conducted with Government officials, research institutes, NGOs and subject experts, focus-group discussions (FGDs) will be done with beneficiaries at selected pilot sites. All your identifiable information and research data will be coded (identified with a code number) at the earliest possible stage of the research. The interviews will be conducted in English/ Hindi. In case the respondents can only interact in a regional language, a translator would be hired.
5. **What is the approximate number of participants involved?**
   Approximately 5-6 respondents for each pilot project. This number may increase if additional respondents are to be considered following the snowball method.
6. **What will be done if I take part in this research?**
   You will participate in a semi-structured interview. During the interview you are welcome to share information and your opinion on the design, implementation and diffusion of specific agricultural policy pilots and the

outcomes. The interview will be audio-taped with your consent. If you do not consent to being audio-taped, field notes will be taken instead. In this case your name and personal details will be on a separate sheet that can be detached from the data sheet and kept in a separate file or database by the PI at an appropriate time.
Fields for your name and personal details will be on a separate sheet that can be detached from the data sheet and kept in a separate file by the PI.

7. **How will my privacy and the confidentiality of my research records be protected?**
Personal information like your name, contact number and personal/ official address will be collected. Only the Principal Investigator and co-investigator will have your identifiable information and this will never be used in a publication or presentation unless consent is granted.
Your anecdotal accounts may be published if you agree. These however will not include detailed personal information other than your name and organization. You are free to decline consent to include your anecdotal account.
All data collected will be kept in accordance to the University's Research Data Management Policy. Research data used in publication will be kept for a minimum of 10 years before being discarded. This includes personal identifiers and anecdotes provided written consent has been received from the respondents.
8. **What are the possible discomforts and risks for participants?**
There are no risks or discomfort involved for you.
9. **What is the compensation for any injury?**
No injury is expected and hence there is no compensation.
10. **Will there be reimbursement for participation?**
There will be no reimbursement for participation.
11. **What are the possible benefits to me and to others?**
There is no direct benefit to you by participating in this research. We hope that the knowledge gained through this study will benefit the target group of these policy experiments (pilots) and help the governments draw lessons for improving the design and implementation of these pilots. We also hope this study will help policy scholars and students to better understand the design and implementation of policy pilots and the influence of specific causal conditions on the observed outcomes.
12. **Can I refuse to participate in this research?**
Yes, you can. Your decision to participate in this research is voluntary. You can also withdraw from the research at any time without giving any reasons, by informing the principal investigator and all your data will be discarded.

13. **Whom should I call if I have any questions or problems?**
Please contact the Principal Investigator, Ms. Sreeja Nair at +91-9810383830 and sreeja.nair@u.nus.edu or Prof. Michael Howlett at howlett@sfu.ca regarding any concerns or research-related matters.
For an independent opinion regarding the research and the rights of research participants, you may contact a staff member of the National University of Singapore Institutional Review Board (Attn: Mr Chan Tuck Wai, at telephone (+65) 6516 1234 or email at irb@nus.edu.sg).

Consent Form

Project title: Study of Indian agricultural policy experiments: lessons for policy formulation under uncertainty

Principal Investigator with the contact number and organization:

Sreeja Nair (Principal Investigator)
Lee Kuan Yew School of Public Policy, National University of Singapore Phone: +65-81632623 (Singapore); +91-9810383830 (India)

I hereby acknowledge that:

1. My signature is my acknowledgement that I have agreed to take part in the above research.

2. I have received a copy of this information sheet that explains the use of my data in this research.

3. I can withdraw from the research at any point of time by informing the Principal Investigator and all my data will be discarded.

4. I will not have any financial benefits that result from the commercial development of this research.

5. I agree / do not agree* to have the coded data made available for future research.

6. I agree / do not agree* to be re-contacted for any clarifications or follow-up interviews related to this research project.

7. I agree / do not agree* for my anecdotal accounts and the following personal identifiers to be disclosed in any publication or presentation related to this research, if any.

   ☐ Surname ☐ First name ☐ Organisation Name ☐ Position/Designation ☐ Disagree (I wish to remain anonymous and only agree to be known as _______________).
8. I agree/ do not agree* to be audio-recorded.

**please delete as appropriate*

** This research has been explained to me in English, which I understand, by Sreeja Nair (name of translator) on ________ (date).

____

Name and Signature (Participant) Date

____

Name and Signature (Consent Taker) Date

Appendix II: Semi-structured Questionnaire

Study of Indian agricultural policy pilots: lessons for policy formulation under uncertainty

To be read out to the respondent first:

- You are invited to participate in a research project that aims to study the design and implementation of selected policy pilots in the agriculture sector conducted by Governments, research institutes, developmental agencies and NGOs in India. **The objective is to assess the merits and value of these pilots as a tool to facilitate future policy formulation. This project is being conducted across selected states and districts in India studying specific cases of agriculture pilots.**
- Semi-structured interviews will be conducted with Government officials, research institutes and NGOs; FGDs will be done with beneficiaries at selected pilot sites.
- **All your identifiable information & research data will be coded. Wherever relevant it would be helpful if you could also guide me to published data that I can use.**
- During the interview you are welcome to share information and your opinion on the design, implementation and diffusion of specific policy pilots and the outcomes.
- **The interview will be audio-taped with your consent. I will be grateful if audio recording is permitted so that the rich information that you are sharing is not missed or written incorrectly.**
- If you do not consent to being audio-taped, field notes will be taken instead. In this case your name and personal details will be on a separate sheet that can be detached from the data sheet and kept in a separate file or database by the PI.
- **I hope that the knowledge gained through this study will benefit the target group of these policy experiments (pilots) and help the governments draw lessons for improving the design and implementation of these pilots. I also hope this study will help policy scholars and students to better understand the design and implementation of policy pilots and the influence of specific causal conditions on the observed outcomes.**

SECTION A: Content of the pilot

1) Why was this project launched as a pilot (political vs. technical reasons)?
   a) What was being piloted?

2) What are the different stages the pilot has gone through and where is it currently (did it jump technical stages, moved faster/ slowly due to political reasons etc.)?
   a) Was there a pre-pilot stage (experimental)?

3) Have the goals of the pilot changed over time? If yes, when and how?

4) At what unit was the pilot initiated? How was this unit selected? Political basis or technical basis? (elaborate indicators)
   a) Has this unit changed? If yes, how (new units added etc.)?

5) Does this pilot have synergies (or conflicts) with any ongoing Government schemes and programmes? What kind?
   a) Does/ did the pilot receive any support from these schemes and programmes? What kind?
   b) At what stage (s) of the pilot was this support provided?

SECTION B: Stakeholder arrangements

6) What was the coalition of actors/agencies involved in a) conceptualization of the pilot and b) implementation of the pilot? (Govt. vs non-Govt). What were their roles?

7) Were there other types of stakeholder coalitions that emerged during the course of the pilot?

8) What has been the acceptance of the pilot by different stakeholders? How can this be quantified? Has this changed over time?

9) Is there any record of how many beneficiaries have adopted the pilot over time?

SECTION C: Implementation and Diffusion of the pilot

10) Has the pilot changed considerably in its form (expanded/ downsized in scope, split into other pilots, merged etc.)? What was the pattern of development of the pilot?

11) Have there been spatial (some districts/ regions performed better) / temporal differences (time lapse for some outcomes to take shape) in the diffusion?

12) Have the outcomes or experience of the pilot been adopted onto any existing plans/ policies/ pilots? If yes, how?
    a) Have/Will some features of the pilot been/ be retained as new policies and programmes are launched following the pilot phase? Which ones?

13) What have been the factors that influenced the diffusion of the pilot (positively and negatively)? Can these be categorized into technical and political factors?

14) What were some anticipated and unanticipated challenges encountered in the implementation stage? What future challenges are anticipated (for ongoing pilots or new policies/programmes based on the pilot outcomes)?

SECTION D: Evaluation mechanism

15) Was/ is there any monitoring and evaluation system?
    a) What are the indicators and have these changed over time?
    b) How are the impacts and outcomes of the pilot being captured?
    c) What determines success of this pilot?
    d) Are/were there any control groups?

16) Did/Has the pilot provide (d) adequate proof of principle technically? How? What kind of evidence is available?

17) Were there enough capacities to implement the pilot and are there enough capacities to scale-it up further?
    a) Has the diffusion kept pace with 1) capacity building, 2) evidence base generated by the pilot?

SECTION E: Learning mechanism

18) What have been the lessons learnt through the design and implementation of this pilot?

19) Were there learning mechanisms that were considered/ incorporated in the pilot design (mechanisms to incorporate feedback etc.)?

20) What type of learning has occurred at the community level owing to the pilot?

Thank you for participating in this interview and providing detailed responses. I will get in touch with you again if I need further clarifications or more details. I will be transcribing these notes and coding the information. Once the interview transcript is ready I will share this with you for your review. Thank you again for sparing your valuable time for this study.

Could you please suggest other people with whom I can further interview in relation to this pilot?

Appendix III: List of interviewees

Preliminary consultations

Type of agency	*Details of respondents**
Central/state Government department	Shri.R B Sinha Joint Secretary, Rainfed Farming Systems Division, Ministry of Agriculture, Government of India, New Delhi
	Dr. Subrata Nath** Former Director, Natural Resource Management, Ministry of Agriculture & Coordinator of the National Mission for Sustainable Agriculture, Government of India, New Delhi
	Dr. S. Ayyappan Secretary, Department of Agriculture Research and Education; Director General, Indian Council of Agriculture Research (ICAR), New Delhi
	Dr. A K Sikka**, Deputy Director General, Natural Resource Management, ICAR, New Delhi
	Dr. Vijay Kumar Thallam, Special Chief Secretary of Agriculture and Cooperation, Government of Andhra Pradesh
Government agriculture research institute	Dr. I P Abrol** Chairman, Center for Advancement of Sustainable Agriculture, New Delhi
	Dr. C Sreenivasa Rao, Director, Central Research Institute for Dryland Agriculture, Hyderabad
	Dr. Rajeswari Raina** Scientist, National Institute of Science, Technology and Development Studies, New Delhi
	Dr. Venkateshwarlu** Vice-Chancellor, Vasantrao Naik Marathwada Krishi Vidyapeeth (agriculture university), Parbhani, Maharashtra
National and International agriculture research institutes	Dr. Ashutosh Sarkar Regional Coordinator & Food Legume Breeder, ICARDA (International Centre for Agriculture Research in the Dryland Areas) South Asia & China Regional Program, New Delhi
	Dr. Anthony Whitbread Director, Resilient Dryland Systems Program, ICRISAT (International Crops Research Institute for the Semi-Arid Tropics), Hyderabad
	Dr. P K Aggarwal Regional Program Leader (South Asia), CGIAR (Consultative Group on International Agricultural Research) Research Program on Climate Change, Agriculture and Food Security, International Water Management Institute, New Delhi
	Dr. Anand Patwardhan Professor, School of Public Policy, University of Maryland, USA

Type of agency	*Details of respondents**
International donor agencies	Dr. Priti Kumar Senior Environmental Specialist in the South Asia Disaster Risk Management and Climate Change Unit, World Bank, New Delhi
	Dr. Divakaran Unnikrishnan Senior Adviser, Natural Resource Management, GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit), New Delhi
NGO	Dr. A Ravindra* Director, WASSAN (Watershed Support Services and Activities Network), Hyderabad

* Designations during the time of consultations

** Also Member of the Working Group on Natural Resource Management and Rainfed Farming Ministry of Agriculture, Government of India

Interviews for Qualitative Comparative Analysis

Pilot	*Details of interviewees**					
National Agriculture Technology Project	Dr. Rita Sharma, former Secretary, Ministry of Rural Development, Government of , India, New Delhi	Dr. V P Sharma, Director (IT, Documentation & Publication), National Institute of Agriculture Extension Management (MANAGE), Hyderabad	Dr. R. K Tripathi Director, IT and Extension Management, DAC, Extension Division, New Delhi	Dr. B. Renuka Rani, Assistant Director, MANAGE, Hyderabad		
National Agriculture Innovation Project	Dr. V P Sharma, MANAGE, Hyderabad	Dr. Mruthunjaya, National Director, NAIP, Indian Council of Agriculture Research, New Delhi	Dr. Sanjoy Bandyopadhyay, Principal Scientists, Centre for Environment Science and Climate Resilient Agriculture, Indian Agriculture Research Institute, New Delhi	Dr. Rita Sharma, New Delhi	Dr. A P Srivastava, Former National Coordinator, NAIP, ICAR, New Delhi	
Modified National Agriculture Insurance Scheme	Dr. H P Verma, Chief Director (Crop Insurance), Credit Division, DAC New Delhi	Dr. M K Poddar, General Manager, Agriculture Insurance Company (AIC) of India Ltd., New Delhi	Dr. Raghvendra Singh, Insurance Consultant, International Fund for Agriculture Development, New Delhi/ Ahmedabad			

Pilot	*Details of interviewees**					
Weather Based Crop Insurance Scheme	Dr. H P Verma, DAC, New Delhi	Dr. M K Poddar, AIC, New Delhi	Dr. K K Singh, Head (Agromet), Indian Meteorological Department, New Delhi	Dr. Raghvendra Singh, Ahmedabad	Dr. B Bapuji Rao, Principal Scientist (Agri. Meteorology), CRIDA, Hyderabad	Dr. G C Shrotriya, National Head (Value Added Services), IFFCO-Kissan, Pune
National Project on Organic Farming	Dr. Krishan Chandra, Director, National Centre of Organic Farming, Ghaziabad	Dr. Ravindra Kumar, Deputy Director, National Centre of Organic Farming, Ghaziabad				
Indo-German Watershed Development Programme	Mashar Velapurath, Deputy General Manager, National Bank for Agriculture and Rural Development (NABARD), Mumbai	Dr. B G Mukhopadhyay, Chief General Manager, NABARD, Mumbai	Mr. Sachin Kamble, Manager, Adaptation Fund, NABARD, Mumbai	Dr. Divakaran Unnikrishnan, GIZ, New Delhi	Dr. Crispino Lobo, Co-founder, Watershed Trust Organization (WOTR), Pune	Dr. Marcella D'Souza, Executive Director, WOTR
National e Governance Plan for Agriculture	Dr. R. K Tripathi Director, IT and Extension Management, DAC, Extension Division, New	Mr. P K Gupta, Director (IT), DAC, New Delhi				

Pilot	*Details of interviewees**					
	Delhi					
Rainfed Area Development Programme	Dr. A K Sikka, Deputy Director General, Natural Resource Management, ICAR, New Delhi	Dr. Subrata Nath, Former Director, Natural Resource Management, Ministry of Agriculture, New Delhi	Dr. Manda Verma, Assistant Commissioner, Rainfed Farming Systems, DAC New Delhi	Mr. Bisweswar Rath, Additional Commissioner, Rainfed farming systems, DAC, New Delhi	Dr. M. V. Ramachandrudu, Executive Secretary & Director (WASSAN), Hyderabad	
National Watershed Development Project for Rainfed Areas	Dr. Rita Sharma, New Delhi	Dr. BVN Rao, Assistant Commissioner, Rainfed Farming Systems, DAC, New Delhi	Dr. C P Reddy, Deputy Commissioner, Department of Land Resources, Ministry of Rural Development, New Delhi	Dr. A. Ravindra, Director, WASSAN, Hyderabad		
Experimental Crop Insurance Scheme	Dr. H P Verma, New Delhi	Dr. M K Poddar, AIC, New Delhi				
Farm Income Insurance Scheme	Dr. H P Verma, New Delhi	Dr. M K Poddar, AIC, New Delhi				
National Initiative for Climate	Dr. C Sreenivasa Rao, Director, Central Research	Dr. M. Maheshwari, Principal Investigator, NICRA, CRIDA,	Dr. A K Sikka, ICAR, New Delhi	Dr. Y G Prasad, Coordinator, Technology	Dr. R B Sinha, Joint Secretary, Rainfed Farming	

Pilot	*Details of interviewees**					
Resilient Agriculture	Institute for Dryland Agriculture, Hyderabad	Hyderabad		dissemination component, NICRA, CRIDA, Hyderabad	Systems, Ministry of Agriculture	
Sujala watershed development project	Dr. Suhas Wani, ICRISAT Development Center, Hyderabad	Dr. B. K. Dharmarajan, Director, Department of Watershed Development, Karnataka State Government, Bengaluru	Mr. Shivaraj, Joint Director, Department of Agriculture, Karnataka State Government, Bengaluru	Dr. K. Krishnappa, Scientist & Liaison Officer – Karnataka, ICRISAT Development Centre, ICRISAT, Bengaluru	Dr. C P Reddy, Deputy Commissioner, Department of Land Resources, Ministry of Rural Development, New Delhi	Mr. Yallappa, Field-staff, ICRISAT, Bengaluru
Accelerated Fodder Development Programme	Dr. Subrata Nath, Former Director, Natural Resource Management, Ministry of Agriculture, New Delhi	Dr. Dharm Pal Malik, Additional Commissioner, National Food Security Mission, DAC, New Delhi	Dr. Subhas Ram, Assistant Commissioner, DAC, New Delhi			

DAC- Department of Agriculture and Cooperation
* Designations during the time of consultations

Interviews for Process Tracing of selected cases

Case	*Details of interviewees**
National Agriculture Technology Project	Dr. Rita Sharma Dr R K Tripathi
	Dr. V K Sharma Dr. Renuka Rani
Modified National Agriculture Insurance Scheme	Dr M K Poddar Dr H P Verma
National Agriculture Innovation Project	Dr. Mruthyunjaya Dr. A. K. Srivastava Dr. V K Sharma
National Watershed Development Project for Rainfed Areas	Dr. C. P. Reddy Dr. Rita Sharma Dr. BVN Rao
Weather Based Crop Insurance Scheme	Dr. M K Poddar Dr. H P Verma

* Designations during the time of consultations. These respondents were also interviewed earlier for the QCA.