



Katalyst's Contribution to Systemic Change

– The Adopt, Adapt, Expand, Respond Cases



Systemic Change in Vegetable

Case Study number 8

Dr. Ben Taylor

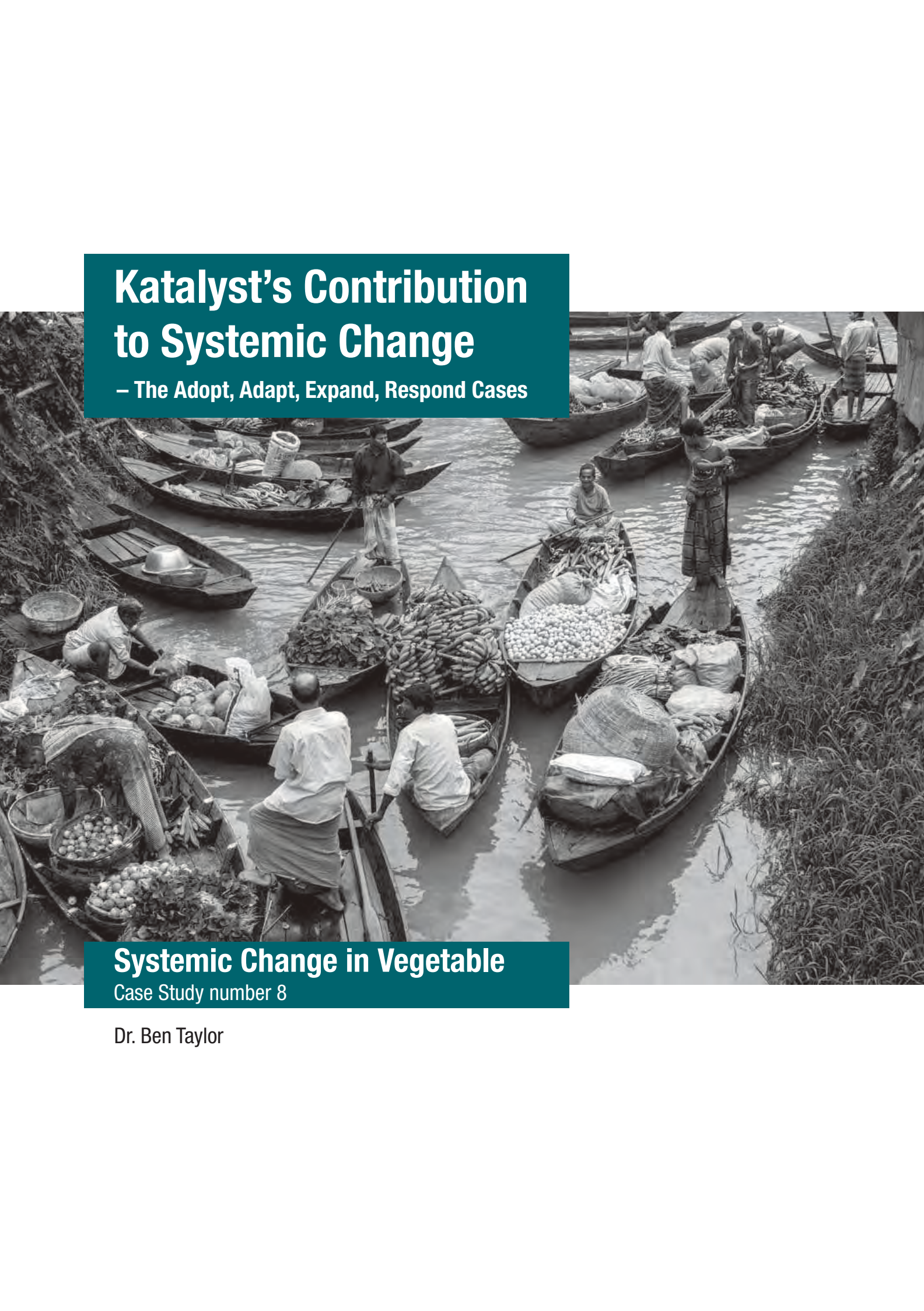


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A photograph showing three men in a rural setting harvesting green eggplants. They are standing under a large trellis of eggplant vines. One man is holding a green eggplant, another is placing one into a cardboard box, and the third is holding one. The ground is covered with harvested eggplants and dry leaves. In the background, there are trees and a clear sky.

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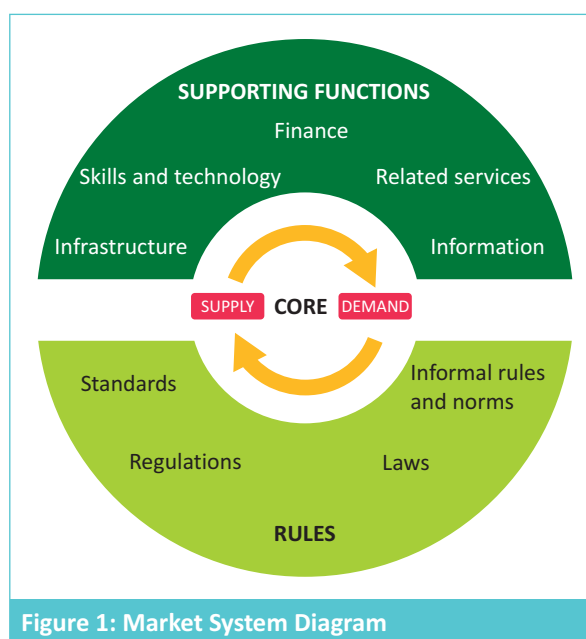
**Katalyst's Contribution
to Systemic Change**

Introduction

Development programming is temporary in nature. External entities intervene in a system and change it with the aim of benefiting poor people. Throughout the history of development there have been temporary impacts on small numbers of people as, when funding stops, so does the impact of the change in the system. Katalyst's approach is different in that it explicitly targets large scale, sustainable – or systemic – change. This case represents a significant milestone in the implementation of market development programmes. Katalyst, with the Springfield Centre, has played a leading role in developing thinking around what systemic change means. This case examines this concept across one sector, demonstrating how a system can be changed to create sustainable impact at scale. Before engaging in the case material, however, it is important to clarify the *Adopt, Adapt, Expand, Respond* (AAER) framework as a means for identifying and defining systemic change so that this can be employed to understand how it has been facilitated in this sector through the work of Katalyst.

What systemic change means

The first key concept defining systemic change is the identification of a system. M4P provides a useful framework for understanding a system which is seen as a series of interconnected supply-demand transactions which are supported by functions and governed by formal and informal rules (see Figure 1). **The supporting functions and rules are components of a system which affect the price, level, or quality of supply, demand or exchange in the core transaction.** The target group, which in the case of Katalyst is poor people, will always play the role of either supply or demand – as producers, consumers, rights holders, or



employees – in the core transaction of the principal market system, i.e. the system where the programme aims to improve outcomes for the target group.

The performance of the supporting functions and rules dictates the outcomes of the transaction. In order to change the way the system works for the benefit of the poor, one must change how these supporting functions and rules work.

The performance of each of the supporting functions or rules is, in turn, dictated by its own system – the supporting market system – which has its own supporting functions and rules.

The objectives of systemic change are defined relatively consistently as sustainable, large-scale change. However, while these goals are clear, consensus and clarity on what systemic change is, how to recognise it, and when intervention might be required, is notably absent. The Merriam-

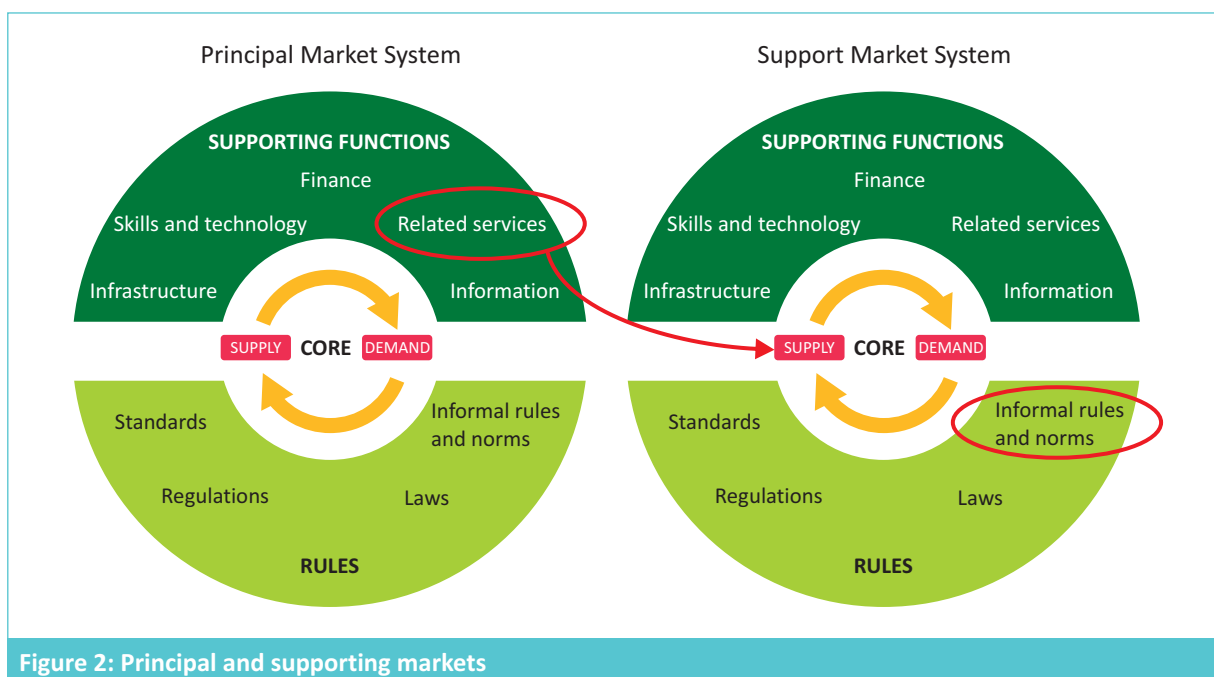


Figure 2: Principal and supporting markets

Webster dictionary defines 'systemic' as *of or relating to an entire system* and 'change' as *to make someone or something different*. New Philanthropy Capital's 2015 handbook introduces concepts of sustainability and the different components of a system, defining system[s] change as:

...an intentional process designed to alter the status quo by shifting the function or structure of an identified system with purposeful interventions...Systems change aims to bring about lasting change by altering underlying structures and supporting mechanisms which make the system operate in a particular way. These can include policies, routines, relationships, resources, power structures and values.

The M4P Operational Guide makes this more specific to development, using the objective of the change as part of its definition:

A change in the way core functions, supporting functions and rules perform, that ultimately improves the poor's terms of participation within the market system.

Definitions are inherently limited when they have to be applied in context and the real question that development programmes need to address is *what*

does systemic change look like and how do I know if it has happened?

Based on the goals of sustainability and scale of impact, the changes in performance of supporting functions and rules identified above must demonstrate:

- Uptake, ownership, and investment by relevant players within the system, in the absence of external involvement; a sustainable change in behaviour.
- Increasing impact over time; more benefits to more people in the target group.
- Changes in other supporting functions and rules to stabilise or augment the impact of the initial change.

Cognisant of the concept of systemic change, the Springfield Centre and Katalyst developed a simple conceptual framework which aims to capture these different dimensions. The framework, known as the Adopt, Adapt, Expand, Respond (AAER) framework or the Systemic Change Framework, can be used by a programme to monitor whether systemic change has happened, is happening, or requires further programme action in order to take hold. This case study is presented through the lens of this systemic change framework, the four key components of which are explained here.

Adopt

In the first instance, the role of a programme is to identify what change is needed – which of the supporting functions and rules within a system are underperforming, how they might perform better, and what actions should be taken to bring that change about. The system is not generating this solution of its own accord and so programme intervention to instigate an innovation is necessary.

Adopt is a process whereby an innovation in the operation of one or more supporting functions or rules of the market system is introduced and ownership over it is gradually institutionalised within the relevant players in the system. This will involve different roles for different actors. In this phase, a programme will be testing and refining an innovation in partnership with one or more players whose incentives are similarly aligned should the innovation be successful. It may be the case that multiple models of innovation fail at this stage – constraints may be intractable or the barriers to opportunities being realised too significant to warrant further programme investment.

For example, a programme might want to change the way that farmers receive information – changing the way the function of ‘information’ operates. To do this, they might need to partner with radio stations, journalism training institutions, research institutions, and private advertisers. All of these players, whether they are programme partners or not, need to change their behaviour in some way in order for the new model to work.

By the end of the *Adopt* phase, a programme will no longer be providing support to the initial

partner or partners in the same way. However, as documented below, changes required to further expand or stabilise the impact of the initial innovation will require actor level institutionalisation among relevant players. Further programme involvement may be required and so that this transferal of ownership takes place.

Adapt

The *Adapt* component of the systemic change framework refers to sustained behaviour change by relevant actors. The players involved in the innovation – both those that were supported by the programme and those that weren't – must have accepted the different changes in their behaviour necessary for the model to work and incorporated them into their standard operations, in the absence of programme involvement, with independent investment of time, money, or other resources.

The process of institutionalisation – moving from *Adopt* to *Adapt* – needs to happen at the system level i.e. the functions which comprise the innovation need to continue to operate in this novel way after external intervention has ended. However, in practical terms, functions are comprised of a wide range of actors adopting a wide range of behaviour changes. Whether an initial partner, or an actor involved in the expansion or response component of the change, any shift in behaviour has to be institutionalised in order for it to be sustainable.

Expand

Expand is about pushing the boundaries of the innovation – more benefits for more people.

Change		Mechanisms
More People	More Benefits	
• New geographies • New segments of target group ▪ Income groups ▪ Marginalised segments: women, minorities etc.	• Lower costs • Higher incomes from produce • Greater health or quality of life benefits • Better protection of future incomes through disease resistance or genetic diversity	• Existing actors ▪ Roll-out • New actors ▪ New geographies ▪ Competition • Lower prices • Further innovation

The competition mechanism also has a dividend on sustainability, as an innovation becomes less dependent upon individual actors. If others are not imitating or emulating innovations that are seemingly successful and aligned with incentives to do so then it is indicative of a more fundamental problem with how the system operates including the information transmission mechanisms.

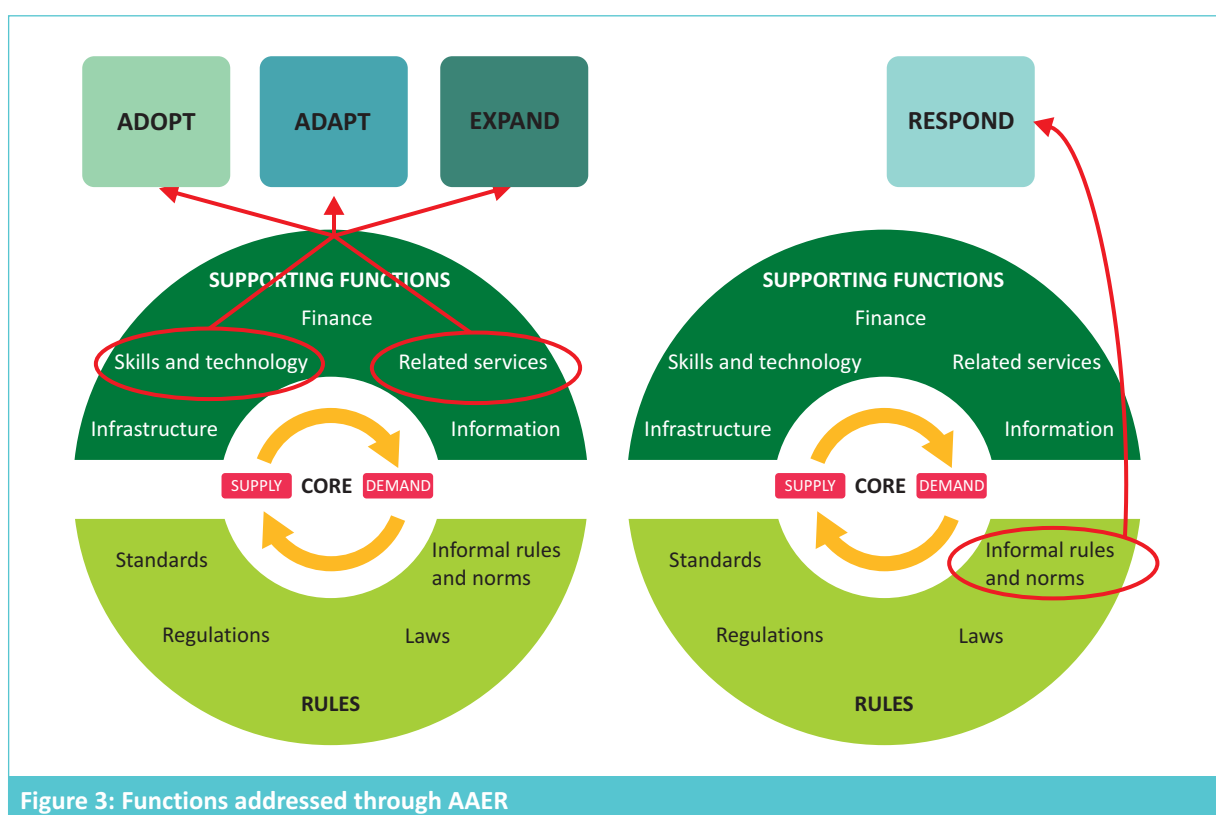
Having monitored the adoption and adaptation of a change in behaviour, a programme might need to re-engage in order to include new players or new areas in an innovation. It may be that the concept is proven and so the risk for a private sector partner is lower, or it may be that the programme initially targeted easier to reach areas and so heavier programme involvement is required in order to push impact into more marginal areas. Different partners also have different needs determined by their capacities, and so the type of programme support might also differ from that in the initial innovation.

Referring again to the earlier example of intervention in the information function, a behaviour change may have been sustainable with the programme partners – for example a radio

station and a research institution – and with all of the other players who needed to change their behaviour, such as journalists, training providers, and advertisers. However, the impact from that single radio station might not be reaching as many people as it could and so it might be necessary to partner with other players – whether they are radio stations and research institutions or perhaps other relevant players – in order to expand the benefits of the model to more people.

Respond

The *Respond* component of the systemic change matrix examines whether other supporting functions and rules are changing in response to the behaviour change that has been assessed through other components. It assesses what changes are happening and the degree to which they are supportive of or obstructive to the desired impact. If impact could be increased by responses within supporting functions and rules that are not happening organically then this represents an opportunity to increase the scale of impact. As such Respond is an important aspect of systemic change for both sustainability, through creating resilience of change, and scale, through realising opportunities for increasing impact.





Adopt, *Adapt*, and *Expand* represent changes in the operation of one or more initial supporting functions or rules which are part of a programme's vision for how a sector might work better to improve outcomes for the target group. *Respond* represents changes in other supporting functions or rules which reinforce or enhance the changes from the initial innovation.

In the example here, a range of players altered their behaviours and have helped to change the *skills* and *technology* and *related services* functions. However, if the growth in benefits to and numbers of the target group are to continue to expand from these changes, it may be that informal rules and norms need to change the way they work too.

Employing AAER

In summary, then, there are two roles of the AAER framework. Firstly, it is an articulation of the programme's vision. If a programme aims to bring about systemic change and the AAER framework helps articulate what it looks like, then a programme should be able to articulate how they can realistically expect the system to change in each of these components, before intervening.

However, systems are dynamic and complex and plans are rarely borne out in reality. As a second and on-going use of the framework, then, the systemic change matrix is used by the programme as a tool for monitoring, reflection and guidance to action.

Structure of the cases

The cases are structured as follows. In this introductory chapter, the two key concepts necessary for defining and articulating systemic change are outlined; the nature of the market system and the dimensions of change necessary to ensure sustainable, large-scale impact. This is then employed to examine Katalyst's work across three components of one sector. Focus is put on the vegetable sector. Katalyst's work here has been extensive over 13 years and so the case study will concentrate on the inputs market, with a full case study on seed followed by mini-cases on crop nutrition and crop protection. These are analysed to draw some lessons from Katalyst's work in the sector, which has wider relevance to the development field.

8 CHANGING THE VEGETABLE MARKET SYSTEM





CHANGING THE VEGETABLE MARKET SYSTEM

Introduction

Vegetables are important to poor people. They form a vital part of people's diets as the key source of much of their vitamin intake. As such, vegetable production is a longstanding part of the agricultural production landscape in Bangladesh. As incomes have increased and with changing tastes, there is an increasing opportunity for poor people to participate in the vegetable market in a way that can significantly improve their incomes. However, there are multiple barriers to the participation of the poor in the sector and to the benefits they extract from it.

Since 2003, Katalyst has been working in the vegetable sector in order to improve the position of poor people within it. As with other sectors of the programme, Katalyst's mandate in vegetables began in the north on limited crop varieties, expanded during Phase 2 to a nationwide mandate and more cross-cutting issues with all vegetables, and in Phase 3, has begun to deepen this impact into more marginal areas. After having outlined the market as a whole and how Katalyst sought to address constraints in multiple areas, this case

study focuses on two of those constraints; the marketing and distribution of agricultural inputs. Using the AAER framework which guides these case studies, a lasting impact is shown which is embedded in the system.

The case is structured as follows. The overall market for vegetables is described briefly before focusing in on features and constraints of the inputs market for the vegetables sector. The symptoms and underlying causes of underperformance are identified, and narrowed down to marketing and distribution functions. The major case of seeds is then developed. In seeds, the functions developed through interventions in Adopt, Adapt, Expand, and Respond components of the framework are described together with results at each stage. This is followed by mini-cases on crop nutrition and crop protection which are less mature as sub-sectors, but in which similar constraints in marketing and distribution have been tackled. Specific lessons from the three vegetables cases are then documented together with a timeline of overall interventions.

The overall market

There are both supply side and demand side issues which impact on the profitability of vegetable farming in Bangladesh. On the supply side, Bangladesh exhibits very low productivity in comparison with other countries with similar climatic factors. Both production and productivity have been increasing in recent years and vegetables now account for around 4.5% of gross

value added (GVA) in agriculture (BBS, 2012). Approximately 12% of the rural population is involved in vegetable production (BBS, 2013). Nevertheless, vegetable productivity in neighbouring India is 81% higher than in Bangladesh (Vanitha et al., 2013) and so it is clear that there are still issues constraining the growth of the sector¹. On the demand side, there are issues with post-harvest losses which impact on prices and incomes from sale and the transaction costs involved in the marketing of produce for farmers.

Following an M4P approach, Katalyst began to map the supporting functions and rules that determine the terms of the main transaction involving poor people in the vegetable sector. The focus was put on the role of the poor as producers, rather than as labourers or consumers, and the underperforming elements of the system were determined. There were clear problems with information for farmers on how best to market their products; standards to certify quality of produce; agricultural skills and practices of farmers; post-harvest handling of produce; and with the inputs market in terms of quality, price and availability.

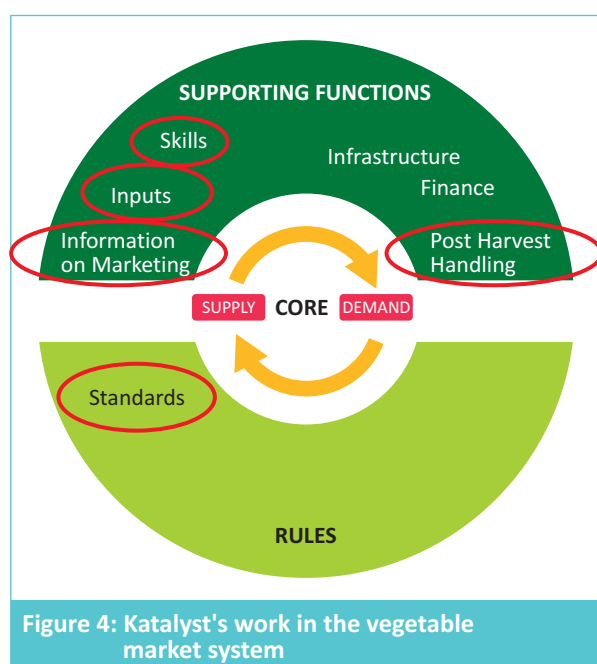


Figure 4: Katalyst's work in the vegetable market system

As outlined in the M4P approach, change is affected by altering the underlying causes of underperformance and, as such, Katalyst's analysis took them into a range of supporting systems. Over its 13 years of work in the vegetable sector, Katalyst has developed interventions designed to address a great number of these constraints. This case study, and the two mini cases which follow, will focus in particular on the inputs market system, a supporting market of the core vegetable market system, as this system has been of vital importance in the recent improvements made in the productivity of vegetable farmers.

Inputs market performance

Provided the pre-requisites of adequate land and water are in place, all agricultural commodities require four main things at the production stage: the raw materials – seed or breed; nutrition to make them grow – fertiliser or feed; protection from damage – crop protection or veterinary services; and finally the knowledge of how to utilise all of these things to ensure productivity. In Bangladesh, there are clear issues caused by the latter of these factors and Katalyst has facilitated a range of interventions to address this constraint, including the successful retailer training which has been represented in a previous case study in the vegetables sector (Gibson, 2006).

Vegetables are a more technically challenging crop than staple crops and their cultivation is more input intensive. The major inputs necessary for vegetable production are seeds, crop protection inputs such as pesticides and integrated pest management (IPM) procedures, and crop nutrition which includes macro, micro, and compost fertilisers. While demand for and usage of inputs in Bangladesh has been gradually increasing over the past three decades, the fundamental problem remains – in the inputs market for vegetables, farmers are not using them enough or at all, and those which they are using are of poor quality. There are three interlinked aspects to this underperformance: lack of access; lack of quality; and lack of use.

¹ The 2006 case study went into depth on the broad features of the market which remain largely unchanged. As such, this case will focus on Katalyst's work in the sector in overcoming the constraints it experiences.

Symptoms

Lack of access

Bangladesh is the most densely populated large country² in the world. In fact, the population density is three times that of India. Despite this, only a small proportion of the population have access to high-quality inputs and many have no access to retail inputs at all.

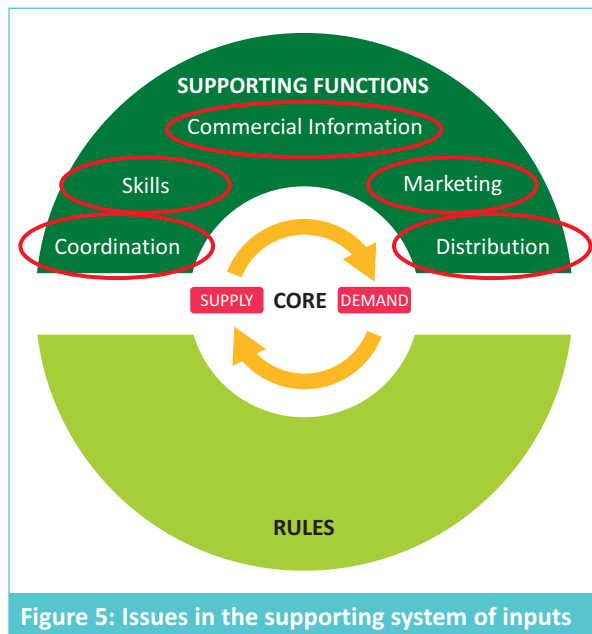


Figure 5: Issues in the supporting system of inputs

There are many places where farmers might acquire inputs from. As with many developing countries, the government of Bangladesh has traditionally played a significant role in the distribution of agricultural inputs. The Bangladesh Agricultural Development Corporation (BADC) is a parastatal entity which is charged with delivery of agricultural inputs to farmers. It has seed, horticulture and fertiliser management wings, as well as a minor irrigation wing. It produces and distributes seed and fertiliser but also has a remit to transfer seed production technologies to the private sector. Production and distribution of vegetable seed has been a relatively recent endeavour for BADC and remains at a very low level of 40,000 tonnes per year. While this is insufficient to have any real impact on the demand for seed, it can have a negative impact on the incentive for private companies to perform the functions of production and marketing. Fertiliser manufacturing and distribution is a more far-

reaching public function with up to 50% subsidies for certain types of fertiliser provided by the government (Bangladesh Bureau of Statistics, 2012).

From seed production companies, the most common distribution relationships are arm's length, with often inputs going through multiple levels of dealers (8,000 registered) or wholesalers before reaching retailers. Retailers, generally multipurpose retailers, sell seeds and sometimes fertilisers and pesticides in many rural areas. In reality, however, these retailers are likely to be located in small towns rather than villages and many people have no access at all to these inputs.

Access is also, to some degree, a function of price. Inputs are only accessible if they are affordable. The gap between best quality seeds and farm-saved seeds has not been bridged by locally appropriate and affordable varieties, so poor farmers are prohibited from climbing the ladder of productivity.

Another driver of the low levels of access is the lack of awareness amongst private sector input providers of the potential business opportunity presented by smaller farmers. In a market that is growing despite underutilisation by poor people, the incentives to enter this unknown market are reduced.

There are some inputs which, until recently, it was simply not possible to buy in Bangladesh. Tight controls regulating which inputs can be sold together with the absence of demonstrable demand has meant that, for example, numerous IPM products which could improve productivity have not been made available to farmers.

Lack of quality

The inputs that are available in Bangladesh, particularly in remote areas, are of poor quality. There are over 100 listed seed companies in Bangladesh, only 20 of whom are selling good quality seed. The majority of these companies are new and are still developing their products and their offer. Unpackaged seed accounts for at least around 70% of seed sales.

² Countries with a population of greater than 10 million people.

Adulteration of seeds, for example, is a common practice and so the productivity of what is supposedly an improved variety will not live up to expectation. Storage of inputs, too, is poor and causes the products to degrade and their efficacy to decrease.

Lack of use

Beyond access and quality, there are also areas where the inputs market is underperforming despite adequate quality and availability. Particularly in less remote and more commercially-oriented areas, inputs of a genuine high quality are available but they are still not utilised to the degree one would expect, given the potential productivity gains.

One reason for this is a lack of awareness of both the products' existence and their potential benefits.

In terms of the potential productivity gains, an important factor is a lack of trust in the products. The origins of this lack of trust can include: improper usage resulting in lower yields and higher losses; previous experience with poor quality inputs meaning people see a risk in investing in genuine high quality inputs; or poor communication of the potential benefits of using improved inputs. These factors are compounded by established norms of agricultural practices and a lack of willingness to change.

Underlying causes

The input supply market had many supporting functions which were not operating to their full potential. Some of these problems required short-term solutions to generate momentum within the sector. Within seeds, the industry association (BSA) was simply not adequately skilled to perform the coordination function necessary, advocating on behalf of the seed industry and bringing members together to pursue common interests. As such, Katalyst intervened to build the capacity of the BSA. Further, seed suppliers were not taking advantage of the opportunities to introduce higher quality seed and to market this to the potential customers, representing a failure in the transmission of market information from

manufacturers to producers and then on to consumers. Here, Katalyst engaged in joint ventures with seed suppliers to source higher quality imported seed varieties, inputs such as germplasm and breeder seed and technical knowledge in order to build the capacity of the seed producing companies.

IPM represented an opportunity to introduce low-cost crop protection solutions which also had a positive environmental effect and catered to a new market in low-residue produce. However, the skills to provide information and training on these inputs which were new to Bangladesh did not exist within the inputs system.

Two interlinked and crucial functions were identified as the underlying causes of the underperformance of the inputs market system documented above – marketing and distribution – and it is those which will be examined in the remainder of this case on seeds and the two mini cases on crop protection and crop nutrition.

Distribution and marketing

These two supporting functions to the effective operation of the inputs market are intrinsically linked. It is important to bear in mind that use of improved inputs is very low in the rural communities targeted by Katalyst. This includes inputs which would allow for participation in the markets for higher-value varieties. Within the inputs market, it is this low level of use that is at the core of low productivity, while general agricultural practices and other demand and supply side drivers are addressed through other components of the programme.

Lack of access, lack of quality, and lack of use are all largely attributable to deficiencies in marketing and distribution. Poor and inappropriate distribution practices meant that many people who had the willingness and ability to pay for quality inputs were not able to buy them. The inputs weren't stocked at the outlets used by these farmers. Supply was also unreliable and so no brand loyalty could be built. On the marketing side, farmers weren't aware of the potential benefits so there was a perceived lack of quality which

reduced usage. Lack of use was also a result of the affordability of inputs; they weren't being marketed in a way that was appropriate for poor consumers. It was these underlying causes which

Katalyst sought to address in the markets for three separate inputs – seed, crop protection, and crop nutrition – to create systemic change.



Systemic change in seed

Seed has been a key area of interest for Katalyst for over a decade. The problems of lack of access, lack of quality, and lack of use were all clear. However, the reasons for this were complex and required both detailed analysis and experimentation. Would simply taking seeds to farmers who previously had no access increase usage? Were farmers not buying seeds because they had doubts about the quality? Were farmers not buying seeds where they were available, because of price, because of the availability of appropriate markets for their products, or because of lack of information on the potential benefits? In addition to work in other aspects of the vegetables market system, Katalyst began working in the marketing and distribution supporting functions in the seed market in 2008.

From analysis to intervention

Defining the innovation: Changing the way poor farmers access seed

Analysis led Katalyst to determine a number of interconnected factors behind the low levels of

access, quality, and usage of improved seeds. Firstly, on the demand side, farmers did not see the benefits of using improved seed. The primary reason for this was determined to be that for those entrepreneurial farmers in an area who had experimented with improved seed, they did not have the knowledge or skills necessary to extract the maximum benefits from it. A good seed improperly used may not deliver any yield improvements at all. Due to the mechanisms for the transmission of information in communities, which typically involve word of mouth and imitation of lead farmers, consensus quickly develops that improved seeds are not worth investing in.

Secondly, and to compound the perceived low quality of seeds due to misuse, there is an actual reduction in quality due to poor marketing practices. As often detached and remote retailers of seeds are general retailers without specialist skills, storage practices can result in degradation. Further, these unspecialised and unregulated retailers commonly practice adulteration of seed, which limits the productivity impact.

Thirdly, the input companies themselves don't see the market in poor and remote areas. In a rapidly growing market, the incentives to take risks in expanding to new markets are significant.



Information on demand is poor. Further, companies are not aware of how best to reach these remote areas which had high transaction costs, making experimentation with new models expensive.

In summary, the risks on both sides of the seed transaction were perceived to be too great. The costs of investment in changing behaviour to new business models – as growers of high value vegetables or as distributors and marketers of high value seeds to new markets – were perceived to be too high.

Katalyst recognised that the functions of marketing and distribution in the seed market had to work differently if these constraints were to be overcome. A vision of the future was developed whereby seed companies would actively develop rural markets by both raising awareness of their products and ensuring that they were used correctly in order to maximise productivity. This would lead to repeat custom and develop the market further. In order to make this viable from an economic perspective for the seed companies, but also to ensure that it had a pro-poor impact, the market had to be of sufficient size and so Katalyst envisaged an integrated distribution model, combined with new marketing practices, which grew the market by expanding into more rural areas.

This new configuration of better performing functions within the seed system represented an innovation by Katalyst that would improve the performance of the inputs market so that the productivity, prices, sales, and ultimately incomes of poor farmers would increase in a sustainable way. Katalyst set about the challenge of identifying partners with the right capacities and incentives to bring the change about, and developed interventions in order to facilitate this behavioural change.

ADOPT: Piloting

The initial changes envisaged in the seed market had two components. Firstly, in seed marketing, seed companies needed to overcome the negative perceptions of improved seed in poor communities by showing that they actually worked

in increasing productivity. In order to do this, in mid-2008 Katalyst identified five seed companies with whom they would partner to set up demonstration plots in poor communities to show that the seeds worked.

This tactic had multiple purposes. Demonstration plots have been shown to be effective in both increasing awareness amongst farmers and also transferring knowledge on cultivation practices which have then been implemented and resulted in improved productivity. Further, attending a demonstration has been shown to be as effective as running the demonstration plot in the adoption of practices (Duflo et al., 2004; Khan et al., 2009). Demonstration plots also give the programme assurances about the quality of the technology, in this case seed, in this specific context. These factors justify the use of demonstration plots as a tactic but the challenge consistently faced by demonstration plots is scale up. Scale being one of three key objectives in M4P programmes along with effectiveness and sustainability, the continuous replication of demonstration plots is not a way to address systemically the problem of marketing in seeds. As such, Katalyst decided to engage a number of partners in this initial pilot.

There were multiple reasons why Katalyst simultaneously engaged five partners, none of whom were the market leader. Such a strategy is not common in an M4P programme where it is generally assumed that one or two partners, often a lead firm, will demonstrate a new model to the market and other players within the market will begin to emulate and develop the model. In this case, mindful of the potential limitations to scale-up, Katalyst began with five companies who could all operate their own demonstration plots. This provided greater coverage but more importantly, in this nascent market, it would help reveal the competencies of various partners and develop competition amongst the firms. This was a relatively low risk and low cost intervention for Katalyst, and so the potential returns from involving multiple partners at this stage were greater than the costs.

However, as has been shown in other contexts, the impact of improved marketing through demonstration plots will have little sustained impact if the distribution system is inadequate:

[T]he low rate of adoption of the inputs was due to non-availability (Khan et al., 2009; 313)

Aware of the interactions between marketing and distribution functions, Katalyst recognised that seed distribution to remote regions was inadequate. Even if the awareness and knowledge were present, farmers wishing to buy improved seeds would have to walk for several kilometres in order to buy them.

Katalyst's market analysis revealed that informal mobile seed vendors (MSVs) were being used to bridge this gap. These MSVs would buy bulk amounts of seeds from towns and then travel to villages, usually on a bicycle, to sell the seeds. This function was nascent and informal in the market. Problems remained of a lack of quality control and knowledge of these seed vendors. The seeds they bought were often adulterated and poorly stored. Katalyst attempted to overcome these challenges, at the same time as capitalising on the benefits of the marketing intervention in demonstration plots, by formalising these MSVs and linking them directly with seed companies.

There were many potential advantages to this formalisation. One of Katalyst's most successful interventions in vegetables was the retailer training programme (RTP), whereby seed companies invested in the information function of the system. For Katalyst this overcame productivity problems caused by agricultural practices while for seed companies, it institutionalised retailers as a reliable source of knowledge and increased sales of their products accordingly. This model has been replicated across Katalyst sectors and in many other countries, by Katalyst partners, other companies, and other development programmes. Within the remote areas which were the subject of the seed interventions, contact with retailers as providers of information was limited. Hence, Katalyst saw an opportunity to synthesise the RTP and MSV aspects of intervention by utilising MSVs as a provider of information.

For seed companies, this would spread the benefits they had seen through the RTP into previously unreachable markets and consequently increase their sales. It would effectively lower the risk in entering these markets by increasing the probability of productivity gains from the use of their products being realised. For MSVs, they stood a chance of significantly increasing their incomes as a result of increased sales and increased margins on their products. For farmers, the core target of Katalyst's intervention, they would now have access to inputs which were previously unavailable to them which would increase productivity and incomes if the marketing interventions were successful in creating demand.

For this intervention, Katalyst partnered with two seed companies, of which one did not pursue the intervention beyond the very early stages owing to an internal capacity issue. The remaining company was the market leader and was not involved in the marketing intervention. The nature of the distribution problem was such that it was too risky to undertake as an initial venture but was, in theory much easier to emulate once the concept had been proven – particularly for competitors whose seeds had already established a presence in some remote regions. In the initial stages, then, Katalyst needed an established partner who was willing and capable of shouldering this risk. There was an obvious theoretical risk in creating a monopoly by contributing to first mover advantage for the market leader. However, Katalyst's analysis saw this risk to be minimal due to the nature of the intervention which was not technologically intensive, and the ownership of the information on how the model worked, which remained in Katalyst's hands.

Results – Proof of concept

The goal here was to test that the pilot worked. Partners were willing to sign up and continue to engage in the activities throughout the pilot period. Projections on the number of demonstration plots, the number of people attending demonstrations and the number of MSVs trained were all assessed, together with a basic test of the theory of change; if actors change their behaviour in the ways envisaged (and at this

point facilitated by the programme), would this improve the functioning of the seed system and consequently improve productivity and incomes?

On the marketing side, between the five partners, over 400 demonstration plots were established and over 150 field days for the sharing of learning in strategic locations were conducted over a period of two seasons. Almost 12,000 farmers were exposed to demonstration plots with many more involved in field days over this period and programme calculations show around 22,000 to have used the seed to their benefit. For two of the companies for whom data is available, sales increased by 13 – 14% in those areas of the country, although there is no clear attribution to the demonstration plots. This was achieved despite environmental problems of droughts and floods in several areas.

On the distribution front, 55 MSVs participated in a residential training programme which was co-funded by Katalyst and the seed company and was then followed up by regular meetings between the MSVs and the seed company. The MSVs mirrored the role of retailers under the RTP and so 180 lead farmers were supervised by the newly trained MSVs to develop demonstration plots. These were complemented by 1000 smaller demonstration plots within homesteads which were customised for these remote areas and more appropriate to that context. A small programme study of MSVs reported an increase in sales of 20% overall, and an increase in sales of improved seed of 50 – 70%. Farmers using the seeds have reported an increase of 10% in yields.

As defined in the opening section of these case studies, the components of systemic change are non-linear. The subsequent sections, therefore, do not necessarily follow chronologically or in isolation. In attempting to broaden the impact of a change in a sector, new partners will have to transition through adaptations of the original model and in increasing the resilience of a change by observing and facilitating the response of other supporting functions and rules.



ADAPT: Institutionalisation of change

Intervention design is always a collaborative effort between a programme and their partner and attempts to align incentives behind a shared vision. However each partner will always have their own objectives, and realities frequently change as new ideas are introduced, the programme reduces support, and market realities evolve. A sign of a robust change in the functions of a system is when partners continue to invest in and develop a model after the programme has exited.

By definition, in *Adapt*, Katalyst looked for evidence that change was institutionalised rather than taking actions to institutionalise change within partners. With the Expand and Respond components of systemic change, at the actor level, each new actor to become involved in the innovation will have to firstly adopt and then institutionalise the change. These actor level changes are addressed separately within the relevant section.

Results

On the marketing side, three of the five pilot companies continued to utilise demonstration plots in the areas tested with the programme at the time of last measurement in 2012. Most of these have been adapted from the exact model conducted with Katalyst to suit the company's needs. One company found the process too expensive for the returns generated and ceased to use demonstration plots. This, in part, justifies the use of a multi-partner approach to piloting in a nascent market. The other partner seed companies have invested further in these marketing methods, adding other marketing tools such as promotional materials and signboards to the demonstration plots to increase their effectiveness in attracting farmers. One firm has moved to crop specific promotion and, through new marketing techniques in these rural areas, has effectively created a market for a new variety of cucumber.

In terms of distribution, MSVs have now become an integral part of Katalyst's partner's business model. Fourteen of the MSVs trained with Katalyst were incorporated as dealers of the seed company

Katalyst's major partner in MSVs reports that over 1000 MSVs have now been through their formal training programme and they see it as a vital part of their business strategy for reaching small farmers. They are continuing to expand the model to reach new geographies.

Abul Baki from Shibgong is a mobile seed vendor who has formalised his business through Katalyst's partner. He is now delivering embedded services and has attracted a wider and more loyal customer base of farmers who are increasingly buying higher quality seed and increasing their profits. His business has expanded and he too is experiencing increased profits, tripling the number of farmers buying quality seed.

and a further four as sub-dealers, all targeting seed sales in rural areas. The partner continues to offer training to MSVs and sees them as a part of their distribution network to expand into rural areas. Further, the more successful of the two partners has developed a model specific to MSVs which was not part of the original innovation. MSVs have a different pay and commission structure than other distribution outlets which has been seen to incentivise greater professionalism. Other actors required to sustain their behaviour change include the MSVs themselves. Katalyst data suggests that all MSVs have increased their profitability as a result of the shift in business model, and the proportion of higher quality seeds in total sales has increased.

EXPAND: Greater benefits to more people

AAER is a framework for analysis of existing impact, and for planning around how to increase it or make it more resilient to shocks. *Expand* can happen in many ways as documented in the opening chapter of these cases, and Katalyst continued to monitor the extent of impact from their interventions beyond the pilot period. The gains from the initial marketing and distribution interventions were strong. MSVs have grown significantly and there are now an estimated 4,500 operating in Bangladesh, supplying an average of 125 farmers each. That provides a total of 700,000 farmers who



now have access to seed who previously did not, and the emulation of formalisation and the delivery of embedded services through MSVs means that more and more of these people have access to improved seeds and skills in how to use them.

From the interventions in product development (see *Respond*), it can be seen that mini-packs are now the predominant form of vegetable seed retail by seed companies and, without Katalyst intervention, this has become mainstreamed within the market.

Nevertheless, Katalyst recognised that there was still scope for penetrating further into poor communities. There were evidently some farmers for whom the demonstration plots did not deliver sufficient incentive to purchase seeds, did not deliver sufficient knowledge to realise productivity impacts from improved seed, or who were not reached by demonstration plots. Further development of the marketing mechanism was necessary in order to target these farmers.

Two years after the end of the initial marketing intervention, when it was clear that practices had

been institutionalised within some of the initial partners but that there was still potential for further penetration of improved seeds into remote areas which the market was not realising, Katalyst developed an intervention with two of the initial partners from the demonstration plots intervention. These partners clearly exhibited an interest in reaching poor and remote markets but did not possess the knowledge of how to reach them nor sufficient risk appetite for experimentation. Katalyst developed new marketing methods, with the help of technical expertise, which were piloted by the partner. These were as simple as flipcharts and videos but were locally appropriate and new for the sector. However, these flipcharts contained vital information which had not previously been delivered but provided a vital incentive for farmers to invest in new seed technologies – cost benefit analysis of switching to new seed varieties. While this may have been verbally relayed by some extension agents or other information providers, this was displayed in a relatable format so that farmers could easily understand the potential benefits of investing more in improved seeds.

By Phase 3 of Katalyst, in 2014, gains from marketing and distribution interventions, together with the further refinement of the product development function, were significant. Katalyst had learned a great deal about the requirements of poor people and how businesses could cater to their needs to improve the seed system. However, a country with the size and diversity that Bangladesh has, requires different approaches for different regions. Poor farmers in vulnerable and peripheral regions of Bangladesh were still not able to access or use the required quality of seed to boost their incomes.

For seed companies that were still growing significantly, in part because of accessing the poorer markets which Katalyst had targeted previously, entering into these peripheral markets was not a priority despite the potential commercial gains. Katalyst partnered with the same company that had been successful in both the MSV and mini-packs (see *Respond*) interventions, to synthesise the MSV, mini-packs, and marketing interventions for implementation in the Chars – river islands with marginal land highly susceptible to flooding – region. This area had not, to date, seen any benefit from previous interventions due to its low income levels, geographical isolation and the climatic difficulties it experiences.

Here, Katalyst partnered with the market leader, owing to the significant risk involved in targeting this region, to implement simultaneously all of the marketing, distribution, and product development innovations in the Chars region. Owing to the risk involved, Katalyst had to bear a larger proportion of the total cost, but in investing a quarter of the total cost, the partner clearly saw potential in the market and was willing to commit to experimentation. This activity finished at the end of 2015 and so results are limited and provisional.

Results

Actor level institutionalisation

In marketing, the two partner firms continued to invest in the new techniques after Katalyst support had ended. They each continued to experiment with a mix of tools to establish which were most appropriate for their own use.

Further, beyond the partner firms, there is evidence of uptake of these tools to access new market segments by other firms in the market. One major seed company has developed their own range of flip charts, videos and presentations in line with those trialled by Katalyst, with a view to improving their marketing in rural areas to increase the size of the market.

In distribution, MSVs have spread organically throughout the sector and their formalisation is becoming the norm.

Impact level change – contribution to poverty reduction

As ever with this component of systemic change, there are multiple dimensions which affect the overall impact, and quantification is challenging. There are those affected by the direct interventions in order to facilitate expansion of the impact of the original innovation. There are those impacted indirectly, such as farmers within the networks or the farmers who attend a training or workshop and improve their productivity as a consequence. There are also farmers who benefit because they are reached by the firms that imitate and emulate the intervention of Katalyst who then, in turn, have a cascade effect within their networks.

A competitor to Katalyst's partner in MSVs reports how proliferation of knowledge is occurring through staff turnover and they are now incorporating formal MSV training in order to attempt to reach 40 – 45% of small farmers through MSVs.

One firm now focusing on MSVs describes skilled MSVs as...

“the market penetrator...they are in the door of the end users”

Katalyst's partner in the expansion of minipacks and MSVs to the Chars reports that since the partnership ended in 2015, they have extended the model to new Chars stating that there is a...

“huge opportunity. Vegetable cultivation has been more accepted after we started selling in the Chars”



Katalyst measured two of these levels, with further measurement prohibited by the lag between intervention and emulation. Overall, 1,011 farmers were seen to have received increased income in the year following Katalyst intervention through their exposure to the new marketing methods used in the events facilitated by Katalyst and their partners. An additional 2,865 within their networks were seen to have realised a total income increase of USD1m based on a Katalyst investment of USD25,000. If the uptake by competitors of these firms continues and is successful in increasing penetration of seeds into more marginal areas, the true impact figures are expected to be far greater.

In terms of accessing more people through the geographical expansion to the Chars, a total of over 15,000 mini-packs (see below) had been sold in the first year of the intervention, with many of them sold by MSVs. Interestingly, in addition to an income increase for farmers purchasing seed, there was also a decrease in cost owing to reduced losses and better agricultural practices.

RESPOND: Making change stick

With the performance of the marketing and distribution functions having improved in the areas targeted by the programme, Katalyst realised that uptake was not as high as had been hoped. Market analysis revealed that the price of seeds and capital requirements for farmers were so high as to make repeated purchase unfeasible for many at this time. It did not appear, based on this analysis, that it was an information problem, or an issue caused by the informal rules around purchasing of inputs as many farmers were aware of the potential benefits. It was merely a question of affordability for what were very poor farmers.

Two potential reasons for this were a lack of suitable financial products including pre-financing of inputs and a lack of appropriate products to cater to poor consumers. Credit markets do function in rural areas of Bangladesh. Typically, loans are taken from informal sources and used for consumption smoothing. Formal credit providers, which are sparse in the poorer rural areas, tend to be for larger production investments such as

livestock or land (Duong and Izumida, 2002). Given that the target group are those who have little or no experience in growing higher yielding, more technically demanding varieties, pre-financing was likely to be difficult and connection to potential providers limited. Katalyst saw flaws in the product development and market information functions of the system i.e. potential providers of seeds were not aware of the existence of a potential market and had not developed appropriate products to explore it. These functions had failed to respond to the growth and potential of poor³ rural seed markets and product offering remained largely undifferentiated. Aware of experience elsewhere in miniaturisation allowing access to products for low income consumers, Katalyst sought to introduce a smaller, more affordable packet size of quality seeds to the market which was more appropriate to poor consumers. In integrating this with the gains already made in marketing and distribution methods, Katalyst were able to increase the penetration of these higher yielding seed varieties into new markets.

³ Katalyst define 'poor' as earning less than USD2.5 per day or holding less than 2.49 decimals of land.

Katalyst selected two partners with whom to pilot the intervention, one of whom had been involved in the marketing intervention and one of whom was involved on the distribution side. Both practices had now spread within the sectors and so were now part of the business model of both partners. Seeds were initially made available for 35 varieties of vegetable in packets around one tenth of the previous standard size, costing USD0.13 – 0.25. These seeds were distributed through the mobile seed vendors meaning they were targeted at the poorest and most remote communities who had both limited access to seed and limited ability to pay. Structuring the deal with partners is always important but here, it was necessary to ensure that learning from the intervention belonged to the programme and could be disseminated sector wide as quickly as possible. The Katalyst commitment of USD45,000 was directed at the technical elements of the intervention, leaving the companies to pay for all capital and human resource expenditure. This meant that Katalyst retained the learning from the intervention. In order to expand the impact of the intervention,



Katalyst facilitated a workshop with a wide range of stakeholders including potential competitors who then, recognising the returns available, began to offer mini-packs independently.

By 2014, gains had been realised from the compound impact of marketing and distribution as well as the response in terms of product development. These gains had begun to be expanded through tailoring the models to new regions with different challenges. Katalyst's ongoing analysis revealed an opportunity to expand impact further. Certain small, low capacity farmers were still not maximising productivity gains from using improved seeds. For seed companies, this risked damaging the reputation they had worked to build through better marketing and distribution. There were also potential sales that were being missed through not properly catering to these segments of the market. Even amongst those who continue to buy, they might buy more if they realised bigger gains through proper use.

Not all MSVs were part of formalised training provision schemes and some were of a very low technical capacity. There was also an issue in that different people learn differently. An MSV who tells a farmer how to plant and care for a crop at the time of seed sale might not be as effective for some farmers as having something they could refer back to. Here, then, Katalyst partnered with a new seed company, one that had begun to implement many of the innovations within the market that had been introduced through their competitors, demonstrating their entrepreneurship. The idea here was to address the remaining problems around skills in the input market through the function of marketing, in order to increase sales and usage of seed and ultimately increase incomes. Katalyst and their partner redesigned seed packaging so that it contained detailed but accessible information on use and care in local languages.

Results

Actor level institutionalisation

The intervention in product development has been transformative for the sector. The two partner



Bibi Julekha Khatun, a homestead vegetable farmer from Char Bhuta, reports how minipacks have helped her engage in commercial production, selling excess produce at market where she had previously only produced for subsistence. She has continued to buy minipacks after the Katalyst support to the seed company ended as they are increasingly available in the local area.

Mini-packs have allowed poor people who would not have engaged in commercial farming to participate and supplement their income using marginal land.

"I never thought that I would get 3,000 taka from cultivating the aisle" – Nibaron Sarker, a landless day labourer from Pirgacha.

Montaz Ali Fokir, a poor landless day labourer bought a seed mini-pack from an MSV who had received training from a competitor of Katalyst's partner. Sharecropping marginal land from his employers, he made USD45 profit within two months by growing pumpkins.

companies have now made mini-packs part of their core business model. Indeed, 71% of the seeds sold by these companies are now in the form of mini-packs. Between them, the companies now produce 127 varieties of seed and have produced almost 2 million packets in total. They have further developed the packaging so that it is customised for the mini-packs which should increase the appeal. All this has occurred while sales of regular pack sizes have been maintained.

Evidence on institutionalisation within non-partner seed companies is not yet quantifiable, but is nevertheless clear. Mini-packs are now the



predominant form of seed retail in rural areas of Bangladesh, available from a wide range of seed companies. Some of this was demand driven. Seed dealers approached seed companies asking for mini-packs having seen their competitors benefit from their sale. There were, therefore, additional dimensions to the expansion of impact.

In terms of the agricultural skills within the inputs market, the intervention to improve marketing is still in progress and so results are limited and provisional.

Impact level change – contribution to poverty reduction

None of the interventions undertaken by Katalyst can be isolated from the context of the systemic constraint they addressed. The interventions in marketing and distribution put in place the foundations for outreach to be increased

significantly, but the introduction of a new product, which addressed problems of product development and market information, built on this foundation to change the sector, and resulted in huge increases in access to seed for poor farmers. Within three agricultural seasons of introduction, almost half a million households had purchased mini-packs, resulting in an additional USD14m of vegetables produced. This resulted in both increases in sales and decreases in purchases of vegetables for consumption which amounted to an average of USD15 per farmer per season. Further, the changes in industries offering related agricultural inputs which now also offer mini-packs means the impact level changes on poor farmers are magnified significantly.

Summary of impact

Katalyst have indisputably changed the seed system and therefore increased the productivity

and incomes of hundreds of thousands of poor farmers. They have done so in a sustainable manner where the system is robust and the

changes they have facilitated will continue to adapt to external factors.

Figure 6: Timeline of interventions in the vegetables sector

COMPONENT	INTERVENTION	Year									
		08	09	10	11	12	13	14	15	16	
ADOPT	Seed marketing - demo plots										
	Seed distribution – MSVs										
EXPAND	Seed marketing - innovative marketing tools										
	Seed marketing and distribution - MSVs and Mini-packs in Chars										
RESPOND	Product development – Mini-packs										
	Skills - information dissemination through packaging										

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MINI CASES



MINI CASE

SYSTEMIC CHANGE IN CROP NUTRITION

Crop nutrition is the second element of the trinity of crucial factors in growing vegetables. The crop nutrition system experiences very similar problems to that of crop protection, in that most farmers have some knowledge, but the limitations to that knowledge mean it can actually harm rather than increase productivity. The impact of problems in this aspect of the inputs market for vegetable production are severe. In terms of the underlying causes, Katalyst's analysis saw them as threefold.

The first two interlinked problems, in line with the problems seen in seed and in crop protection, were that the functions of marketing and distribution were not working effectively. Good agricultural practice for the growing of vegetables stipulates specific ways in which to use different elements of crop nutrition. Three categories are identified as macro (major chemical fertilisers such as NPK – Nitrogen, Phosphorus, and Potassium), micronutrients (zinc, boron, etc. sold in different mixes), and compost. As with pesticides, farmers default to simple solutions and so used as much macro fertiliser as they could afford. If problems with crops arose they simply used more,

particularly of macro nutrients, in tandem with the additional pesticides they were using. There were products, particularly micronutrients and higher quality compost, available in the market at a national level but, for the reasons outlined in detail for the seed sector, they were not getting out to the areas that would benefit from their use and, if they did, inefficient marketing meant that they were not valued accurately and demand was low.

In addition to marketing and distribution problems, a related but separate constraint was in the technology itself, or the research and development function of inputs companies. Compost is the most traditional and still widely used form of crop nutrition in the majority of developing countries. However, low quality compost by itself does not provide adequate nutrition for most vegetables. The decomposition of manure or food waste affects soil fertility and there is very little knowledge among farmers of the determinants of this nutritional value. Poor farmers do purchase compost commercially. However, the cost is generally high and the quality low by the standards in comparable countries.

Even more commercial farmers, some of whom employ many workers, do not have access to high quality compost. Commercial compost producers also engage in low technology methods of production which are slow and therefore increase costs significantly.

At all three levels of the crop nutrition spectrum, the functions of marketing and distribution were underperforming which was resulting in reduced productivity for farmers. At the macro-level, failure to deliver proper advice as part of a marketing strategy was damaging a brand through overuse and crop failure. At the micro-level, dealers – often the same companies as those that market macro fertilisers – were not delivering information on balanced fertiliser usage and so uptake was low. As a consequence, these products were not reaching areas where potential markets existed. In the compost market, even once the issue of the research and development function itself had been overcome, the marketing and distribution functions for both commercial and smallholder farmers were not developed. Katalyst saw an opportunity to transform the crop nutrition market.

Defining the innovation

Katalyst envisaged a crop nutrition market where farmers were aware of, and had a greater choice of, products across the crop nutrition spectrum. Marketing of products would incorporate greater product support to increase competence of farmers in their application, while the market would grow through increased confidence of producers increasing demand in low-income markets.

The first area for experimentation to change the operation of the marketing and distribution functions was in altering the behaviour of different types of companies so that they would begin to embrace some new marketing techniques. These would educate customers as to the proper use of their products. This was a sensible place to start as it required a relatively low level of investment from fertiliser companies and could, in fact, save money for farmers. This was not about new products or new investment but largely about a behaviour

change using current tools at the disposal of all stakeholders.

There is a complexity here in that companies might sell one or multiple micro-nutrients, macro fertilisers, or compost or they may be integrated with a combination of these products, as well as performing a number of other roles such as seed suppliers in the target communities in some cases. The Katalyst view was that all parties could benefit from advocating balanced use, but that personal incentives and a lack of coordination might lead some to give counterproductive advice. For example, it is difficult to see the incentive for a producer of a single micronutrient to tell potential customers to use less of that and more of another product. As such Katalyst experimented with a range of different types of partners. Two of the partners were producers and marketers of micronutrients, one was a mixed fertiliser company selling products from micro to certain macro, and the other partner was a compost producer and marketer.

Katalyst played the same role as in other marketing interventions; assisting companies to see the benefit of accessing new markets and helping them to reach new customers through the development of innovative marketing techniques. In this case, one of the main methods was a docudrama, which was shown to draw the interest of the community but also to result in greater adoption of practice than direct advice. Other techniques included dealer training, farmer meetings and demonstration plots. Signs of impact from this intervention were positive at both the market performance and beneficiary level. There was significant growth in sales of all types of fertiliser but particularly in micronutrients. Networks and the number of permanent employees within the firm have also spread significantly, and they continue to scale up the model, showing actor level institutionalisation. At the farmer level, a limited scope study by Katalyst showed notable increases in purchases, yields and profits of farmers in the target areas.

However, while successful, it was clear that the envisaged gains in fertiliser usage would not be

realised by changing behaviours alone based on existing products, due to the underdeveloped nature of the market. Just as with IPM, the market for higher quality compost – or the technologies to create it – did not exist in Bangladesh prior to Katalyst. After one year of the marketing intervention, Katalyst saw the potential benefits of the introduction of technologies to improve the quality and decrease the cost of compost as being of great value to some of the other work that was being done in vegetables, and indeed in other crops. As such it was seen as a necessary introduction to the compost component of the fertiliser market system before the more systemic constraints of marketing and distribution could begin to be addressed. In this related system for the supply and demand of the technology – Trichoderma, which is a biological agent which accelerates and improves the compost quality – there were two constraints in which Katalyst sought to play a more direct role. Firstly, there was the question of whether the technology worked in the context of Bangladesh. Here, Katalyst partnered with an inputs company who saw an incentive in that, if Trichoderma were eventually to become a valuable product, they would have first

mover advantage and a more developed understanding of the product than their competitors. Katalyst and their partner tested the product and found it to be successful, raising awareness of the product's potential. It was at this point that Katalyst decided to move to the next level in both Trichoderma, and in the broader marketing and distribution interventions.

In Trichoderma, Katalyst now had a key ally in advocating for the potential benefits of the product from the private sector. The task now was to address the formal and informal rules around regulation and government buy-in. Katalyst partnered with the government's Rural Development Academy (RDA), both to refine further the product's applications for the local market and to secure buy-in from key stakeholders. The public nature of the partner was also important to ensure ownership of knowledge from testing remained in the public domain. The intervention was successful in generating both knowledge and buy-in. However, it had been hoped that a solution would be generated as to how to scale up the production of Trichoderma to a commercial level. It was clear that RDA could not



be this partner and it would be necessary for commercial actors to invest if the products were to become available on any scale in Bangladesh. Importantly, though, the benefits of Katalyst's work here were already beginning to spread with one inputs company having begun testing on Trichoderma in its own laboratory.

In marketing, based on the success of the pilot, it was felt that the market would benefit from increased competition and a more diverse range of stakeholders becoming involved in providing these products. This had the potential to utilise the existing distribution networks of firms already selling multiple agricultural inputs and as such, expand the drive to a more balanced use of fertiliser into more rural areas. As such, Katalyst partnered with a further five firms to accomplish these goals. Exact intervention methodologies were modified slightly based on early learning from the pilot. This intervention modality has proven low-cost and effective at the farmer level.

In both Trichoderma and in marketing and distribution of micronutrients, Katalyst's focus since 2014 has been on increasing the number of farmers impacted by the interventions developed and refined earlier in the programme. Through Katalyst's work in marketing and distribution, the system has clearly changed in the way that farmers are accessing information on the availability of different fertiliser products and those products are now available to them. However, the lag between when this would impact on the majority of the

population and the current rate of growth is something that Katalyst feels it can shorten and thus deliver benefits to people more quickly whilst maintaining sustainability. The partners in the new phase are larger companies who might have the capacity to reach scale more quickly.

In Trichoderma, both commercial farmers and commercial producers of fertiliser have begun to utilise the product to produce higher quality, lower cost compost. However, as Katalyst begins to look towards impacting more specifically on poorer farmers rather than attempting to demonstrate the technology, the focus has shifted away from providing better and cheaper compost for farmers to buy in the market, to allowing homestead farmers to produce their own compost through the purchase of Trichoderma. Here, Katalyst have partnered with one of the firms who have demonstrated their interest and capability in catering to new markets and directly to poor farmers through partnerships with Katalyst in both the seed and crop protection sub-sectors.

The expansions in outreach that have occurred, both through Katalyst facilitation and independently, have been expedited by an independent response by the regulatory function of the system. The Department of Agricultural Extension (DAE) has begun to formalise the use of Trichoderma by granting licences for its manufacture.



MINI CASE

SYSTEMIC CHANGE IN CROP PROTECTION

Crop protection products and services act as inputs to the production of vegetables that many farmers are aware of but few have a detailed understanding of. It is the most technical element of crop production with entire crops lost to both under and overuse. In general, chemical pesticides have proven to be transformative in protection against pests, weeds, and diseases. The potential loss from these factors is estimated at 80% with actual losses at around one third of total production globally. Effective crop protection – pesticides, herbicides, and fungicides together with manual measures – can reduce losses by up to two thirds (Oerke, 2006).

Evidence from many developing countries has shown that once pesticides are introduced to an area, their use spreads rapidly and they quickly become the sole source of action for treatment and protection of all pests and diseases (Ntow et al., 2006; Ngowi et al., 2007).

The negative impacts on farmers' livelihoods created by this are many and are often underestimated. Firstly, there is the damage to the crop. Crops which are over-treated with chemical pesticides can easily be damaged or destroyed. Secondly, humans too can be severely affected by

exposure to pesticides. The first element of this is in direct exposure as a farmer to harmful chemicals. A great number of production days are lost and medical costs are incurred due to illnesses caused by exposure to pesticides. Another impact on human health and the third impact on farmers' livelihoods is through consumption. Pesticide residues in developing countries often reach dangerous levels and in recognition of this, produce which is seen as potentially over-treated will sell for a lower price in the market. Finally, the cost of pesticides is high and the more you use, the more it costs. Overuse of pesticides can, therefore, substantially increase the overall cost of production (Abhilash and Singh, 2009).

Crop protection in Bangladesh experiences the same problems of lack of access to appropriate technologies, lack of use, and lack of quality seen in other agricultural inputs. Katalyst recognised these issues and began to address them on several fronts. Unlike with seeds, there was a clear and basic problem with the knowledge and skills of farmers. While perceptions in seeds prevented farmers from using certain products, the origin of the problem here was not in the product but in the practice. In fact, in many cases the objective was to

get farmers to use less chemical pesticide and not more. The programme therefore approached that issue as part of a wide ranging approach to tackle agricultural skills through information. Indeed, Katalyst recognised this as an issue as early as 2006, when a retailer training programme was developed which aimed to utilise retailers as a conduit for information on appropriate products and dosages. This was not as successful as had been hoped as there remained a fundamental incentives problem, as advising reduced usage was not in the best interests of the retailer, particularly in the short term.

Another strategy adopted by Katalyst was at a national level. There was a problem with the skills of actors in the sector which were needed as a prerequisite to improving the sector's performance. Here, Katalyst saw the need to address this in a direct manner as a one-off activity which would secure the potential for other interventions to succeed. As such, Katalyst supported the Bangladesh Crop Protection Association (BCPA) to develop a training curriculum for its members so that they could participate in an informed discussion about the sector and begin to play the appropriate coordination and advocacy role.

While other interventions relevant to the vegetable sector sought to address a knowledge gap regarding good agricultural practice, Katalyst recognised that there was an opportunity to create a market where providers of products had the incentive to deliver this embedded service directly in the crop protection area. While it may have been effective to reduce the usage of chemical crop protection products, it was difficult to perceive of an actor with the incentive to do so. From the regulatory side, the government actors who might have an interest from a public health perspective were weak, and from the programme's pro-poor perspective, reducing chemical pesticide use without proper guidance towards an alternative would potentially open up poor farmers to further crop damage. As such it was decided that this had to be a product focused push strategy; there had to be a commercial actor with the incentive to promote the reduction in chemical pesticide use in order for the

change to be sustainable. As such, Katalyst decided to focus on the introduction of Integrated Pest Management (IPM) technologies which have the potential to replace chemical pesticides.

Defining the innovation

Katalyst identified three related and underperforming supporting functions or rules to the IPM system in Bangladesh. The first was a structural one; the regulatory framework was not in place to allow IPM products to be offered commercially. Other than this, the problems displayed in seed were similarly evident here. Within this IPM products market, marketing and distribution functions were not operating effectively. People in poor and rural areas did not have access to IPM products because potential distributors did not see the market, but the market did not exist as there was no effective marketing to demonstrate the potential cost-effectiveness of the products.

On the first issue, Katalyst set about bringing all of the key stakeholders in the sector together in order to begin dialogue on what was a relatively new sector. This was an activity that was required to secure buy-in for future work and was necessary if the sector as a whole was to have any chance of developing. The IPM forum, as it was known, featured discussions on research on appropriate IPM products, legislation, potential conflict between the objectives of companies in the sector, and finally the perspectives of farmers. The product was a policy recommendation in 2010, the release of which coincided with an amendment to the "The Pesticide Rule 1985" allowing for the commercial marketing of IPM products.

After a brief period of evaluation where it appeared the market was not responding to this driver of change, Katalyst actively sought to intervene in the underperforming marketing and distribution functions. The innovation here was to change farmers' crop protection practices through making alternative technologies both available and attractive to them.

The purpose of Katalyst here, unlike in seeds, was market creation as there was very little private

provision of IPM products. As such, Katalyst sought a partner who had the appetite to enter the space and create the market. The dangers of monopoly creation, while real, were outweighed by the fact that the market leader was the only potential partner with the capacity in terms of skills, capital and entrepreneurship to create this market. The skills that the partner did not possess, and the reason they had not entered the market in any significant way to date, were knowledge of the exact products appropriate to rural audiences and how to market them.

Katalyst built on the learning from the seed sector to develop appropriate marketing materials to be used by their partner, who committed financial and personnel resources. Almost 20 cluster demonstration plots were set up in different parts of the country on a limited basis, focusing on a limited range of pheromone-related products. An innovative and very positive tactic used in this intervention was the inclusion of extension agents or sub-Assistant Agricultural Officers (SAAOs). These government employees have significant outreach and credibility among farmers. The private firm demonstrating the benefits of IPM to the SAAOs, both those techniques using commercial products and those which do not, allowed for significant awareness raising which was aligned to the incentives of the SAAOs – to increase productivity at a low cost to farmers. At that time, no commercial licence was available for IPM products and so the potential for further promotion was limited.

While initially positive, the results at the firm level have proven challenging, with low profit margins.

However, the firm did see potential in the market and so the intervention was valuable in raising the awareness in the private sector of the market potential. This was partially as the intervention also served a technical purpose; the partner was able to see that proper use of IPM actually delivered increases in yield, in addition to all the health, soil quality, and sales benefits which might be realised in the long run by farmers.

By this point, Katalyst had confidence that the business model made sense and this partner had both the incentives and capacities to overcome marketing and distribution constraints. However, this innovation, as a trial, was focused on more accessible areas and more commercially-oriented poor farmers. So nascent was the market that, although Katalyst felt that the market leader they had assisted would encourage others to the market and ensure increased access and use of IPM products in the overall market, the registration, marketing and distribution challenges in more peripheral areas were more significant and would take far longer to overcome. As such, Katalyst began to develop the innovation further to ensure that the benefits were expanded to new groups.

This intervention involved using the same combination of innovative marketing techniques but having a nationwide approach. Here, the same partner who was already engaged in IPM was once again part of the intervention. However, to avoid monopoly creation and to encourage innovation, another partner was engaged on different terms. This intervention is in its very early stages and only the activities themselves have been recorded.

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Lessons for Policy and Practice

The vegetable cases on seed, crop protection and crop nutrition have helped to develop, articulate or in some cases reinforce a number of important lessons which should be useful in helping to improve systemic change programming.

1. Functions, not firms or fixes: it's about asking the right questions not preconception of the answers

In approaching systemic constraints, Katalyst adopted a fairly simple set of principles: analyse the system; determine priority constraints; pilot different ways of addressing these constraints; and monitor and measure whether the constraint has the desired impact on both the system and on the target group. What is not included in that vision is exactly who will do what to address that constraint or exactly what the model has to be. So, there was no preconception of:

- What the necessary 'fix' for a systemic constraint was.
- Which players, in terms of both nature – public, private, CSO – and characteristics – large firm or SME, foreign or local – should be involved in providing a solution.
- The exact terms of an agreement with a partner – the type and level of Katalyst support.

As such, Katalyst's analysis has been its most important asset over the last decade, not only having a vision of the change that needs to happen but in having something to offer to partners. This view of the system means that programme intervention is led by neither the particular desires of prominent firms, nor by the allure of technological fixes.

In vegetables, Katalyst understood how the market system and the supporting system of inputs worked. It was from there that they recognised that the reasons for a lack of access, lack of quality, and lack of use which were producing poor yields for farmers, were deeper seated and lay in the performance of marketing and distribution functions. Katalyst's success in improving this performance demonstrates that the 'how' is important. Miniaturisation such as the seed minipacks, is a simple technology focused intervention and many programmes have attempted to introduce the concept in a number of different contexts. Some have been successful but others have not. In many cases, making something affordable will not increase positive outcomes as the true problem might be in a product's application or its availability. Indeed, often farmers can afford larger packets of seed and other inputs, but it is a question of production decisions and opportunity cost and the degree to which they think they will benefit from the investment. For Katalyst, addressing problems in marketing and distribution set the framework within which this simple technology could be successful, having identified that affordability was, at that point, a key constraint to uptake.

Katalyst adopted a range of different tactics in deciding on their partners in order to change different supporting functions at different times, and this proved vital to success. The structure of the market in terms of number and size of firms, the micro political economy of different government and private sector actors, and the risk profile involved in facilitating the desired change were all vital parts of Katalyst's analysis which allowed for a bespoke negotiation of deals. Analysis revealed incentives and capacities, and experimentation was employed where these were not clear.

Market leaders were useful where there was a high technical requirement and higher level of risk in engaging in a pilot, and a portfolio approach was used where there were no clear capacities within the sector, so that these capacities would be revealed through the short pilot period. In partnering with market leaders, Katalyst had a clear view of how this model could be drawn upon by other firms and emulated, usually through an information or technology transfer function.

Part of deciding on appropriate partnership models is knowing which type of actor is best placed to perform a function, which can vary over time. In many cases, it was necessary to engage government to play a role in the early stages of the process, to perform a function which they may not eventually be best placed to perform. This helped secure the buy-in and generate the learning necessary to give the interventions a chance of future success. It is necessary in doing so to look beyond commercial incentives to incentives around power and social incentives in order to make strong propositions to partners.

2. Making markets and breaking markets: The challenges of starting from scratch or reducing core transactions

Katalyst faced an interesting challenge in crop protection and crop nutrition. It wasn't about better or increased use of an existing product, getting a product out to new areas, or getting people to change to an improved version of a product as in the seed case. Here, the challenge was to create a market from scratch with no supply and no demand, at least within the vegetable production system of Bangladesh. The logic for intervention here was based on solid analysis of how the growth of these markets had real potential to deliver significant benefits to the programme's target group. However, the process of market creation is slow which increases the incentive for a programme to take more direct action, rather than rely on facilitation. There is an inevitable risk in doing so; a trade-off between speed of impact and distortion of the market system.



Katalyst's work in crop protection and crop nutrition demonstrates that, if a technology has the potential to be transformative, based on solid analysis of how realistic its uptake might be – according to criteria of availability, affordability and ease of use – then there is no reason a market development programme cannot be directly involved in its introduction during the early stages. Too often it is the technology that is seen as the solution, but without adequately addressing marketing and distribution functions of the system, it is unlikely to have a transformative impact.

Time is also a crucial factor in market creation. In crop protection and crop nutrition, the pace of market creation and the impact that has on activities was notable, as a greater number of supporting functions and rules have to respond to the introduction of a technology. It is five years since the process of consensus building and establishing early linkages in the fertiliser sector began and the scale up targeting poor farmers has only begun relatively recently. There are likely to be further issues which arise as the market grows in size, with other supporting functions and rules jeopardising the stability of changes and the realisation of further opportunities.

An interesting and unusual feature of both the crop nutrition and crop protection cases, is that one of the primary objectives was to reduce the transaction in the core of the market system; to persuade people to use less of a product, service, or behaviour rather than more. This has more in common with health and security related sectors rather than agriculture, and is something that is conceptually underexplored. In IPM for example, it is possible to view the system as an input supply system where there are underperforming market information, marketing, distribution and regulatory components. It is also possible to view the system as an IPM system in which, in essence, none of the supporting functions or rules existed, which was the strategy opted for by Katalyst.

The fundamental difference in such markets is the nature of incentives. Where firms stand to increase sales from changing practice, there is a clear

incentive for them to do so. Even where the desired changes will result in neutral economic returns, there can be strong incentives around social returns or reputational benefits. However, when the objective is specifically to reduce use of a product, identifying actors with an incentive to do so is more difficult.

In crop protection and crop nutrition, the situation was slightly different. In crop protection, firms wanted to sell their product and that was harming the crops long-term. Developing and promoting an alternative product in IPM gave companies – either those that sold the chemical pesticides or others – an incentive to market that product instead, which could be complementary to their existing business. In crop nutrition, the problem was different as, by and large, products which are actually complementary are seen as competitive, as they are sold by different companies. There is a typical market failure as it should be in everyone's interest for companies to promote balanced fertiliser usage as, in the medium term, it will be detrimental to all firms if soil fertility is damaged. Katalyst's strategy here was to introduce a new product which would improve the quality of one of the three components of crop nutrition so as to make it more competitive and more likely to lead to balanced usage.

3. Interventions to increase resilience

In crop protection and crop nutrition, there was a challenge in attempting to change behaviours which would not realise a gain but minimise a potential loss in the medium or long-term. Considering not only interventions which are seen to increase productivity but also decrease losses requires different tactics as the potential advantages to a target group are less obvious. People do not, by and large, have an accurate perception of risk nor the information to improve decision making around risk taking behaviours. How can a farmer justify an expenditure on a pesticide without knowing how likely it is that they will be affected by the pest, and the impact on productivity if they are.

In addressing these challenges, Katalyst were able to leverage local trust networks and

demonstrations in order to change these longer run behaviours.

4. Understanding systemic change

Finally, the cases have demonstrated the utility of AAER in understanding systemic change. Programmes are organised in different ways and even within Katalyst, the definition of an intervention is not always equivalent between sectors or across phases. Nevertheless, AAER shows how a range of different supporting functions and rules are changing, the sustainability of that change and whether it is impacting on

sufficient numbers of the target group. AAER should not be used, then, for the assessment of whether a product, a service, or a pre-determined behaviour is changing and being replicated. It's about understanding what change needs to happen for your target group and changing the functions and rules in different ways so that it can have a greater impact on more of them. These functions and rules may change independently but observing these changes and the impact they have on the system is a key role of a market development programme.





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