

Regoverning Markets

Small-scale producers in modern agrifood markets

Innovative Practice

India

Connecting small-scale farmers with dynamic markets: A case study of a successful supply chain in Uttarakhand

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Centre for Sustainable Development

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A case study of a successful supply chain in Uttarakhand, India**

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Prepared for Component 2 of Regoverning Markets

September 2007

Regoverning Markets

Regoverning Markets is a multi-partner collaborative research programme analysing the growing concentration in the processing and retail sectors of national and regional agrifood systems and its impacts on rural livelihoods and communities in middle- and low-income countries. The aim of the programme is to provide strategic advice and guidance to the public sector, agrifood chain actors, civil society organizations and development agencies on approaches that can anticipate and manage the impacts of the dynamic changes in local and regional markets.

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Acknowledgments

Funding for this work was provided by:

UK Department for International Development (DFID)

International Development Research Centre (IDRC), Ottawa, Canada

ICCO, Netherlands

Cordaid, Netherlands

Canadian International Development Agency (CIDA)

US Agency for International Development (USAID).

The views expressed in this paper are not necessarily those of the funding agencies.

This paper is based on research supported by the International Institute of Environment and Development (IIED), which is gratefully acknowledged. The paper has benefited from comments by Dr. Sajid Kazmi of SDPI, Pakistan.

The authors would like to acknowledge the contribution of M/S Anil Kumar, Brij Mohan, Hari Mohan and Prem Lal, who assisted the authors in carrying out the field work. The study would not have been possible without the active support of Mr. Mahender Singh Kunwar, Secretary, HARC and his colleagues Ms. Chaya Kunwar, Mr. Kuldip Unnyal and Mr. Vinod Srivastva. We are grateful for their help and encouragement. We would also like to thank Mr. D.P.Singh, Dr. V. Kathuria and Mr. S.N.Upadhya of Mother Dairy for very useful discussions. Most of all the authors are grateful to the farmers and office bearers of the federations who spent many valuable hours to provide us with the information and insight on which this study is based. The authors are solely responsible for the views expressed here.

Citation: Alam G and D Verma (2008). *Connecting small-scale farmers with dynamic markets:*

A case study of a successful supply chain in Uttarakhand, India, Regoverning Markets Innovative Practice series, IIED, London.

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Published by:

Sustainable Markets Group

International Institute for Environment and Development (IIED)

3 Endsleigh Street

London WC1H 0DD

www.iied.org

Tel: +44(0)20 7388 2117, email: sustainablemarkets@iied.org

Cover design: smith+bell

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1 Introduction

Food markets in developing countries are undergoing important changes. In the past retailing, particularly in the food sector, consisted of a large number of small outlets. This is now changing. The large players, including corporate business, are becoming increasingly involved with food retailing activities in developing countries. These changes are accompanied by the adoption of new institutional and organizational innovations. They also involve the use of new technology (especially information technology and food processing) and lead to consolidation (see Reardon and Huang, 2005; Berdegue et al, 2006). These changes are expected to have a profound effect on the functioning of food markets and on small-scale farmers, who are particularly vulnerable to market changes.

As in other developing countries, India's retail food sector is undergoing major changes. Although their implications are being widely debated, very little empirical information to assess the impact of these changes is available. This study is aimed at filling some of the gaps; it examines a vegetable supply chain in the Indian state of Uttarakhand in order to understand the functioning of food markets involving both small-scale farmers and a large retailer.

One of the newly created states, Uttarakhand, is located in the Central Himalayas. Agriculture plays a crucial role in the state as about 80 per cent of its working population depends on it as the main source of livelihood.¹ A large majority of the farmers are smallholders and produce mainly to meet their own needs (see Saxena et al, undated). Commercial crops are unimportant in most districts, as the proportion of land for commercial crops is less than 5 per cent (see Teli, undated).

The supply chain studied here involves the supply of tomatoes by farmers from a number of villages situated in the Naugaon block of Uttarakashi district in Uttarakhand to Mother Dairy, a large retailer. These villages are about 400 kilometres from Delhi and 100 kilometres from Dehradun, the state capital. The nearest wholesale grain and vegetable markets are in Dehradun. As in other areas of Uttarakhand, 98 per cent of the population in Naugaon is engaged in agricultural activities. The most distinguishing characteristic of these villages is the importance of cash crops in their livelihood activities. A large number of farmers have adopted cash crops (mainly vegetables) to replace traditional food crops.

¹ See <http://mountaintechnology.tripod.com/intro/mtnfarmsys.html>

The study focuses on farmers belonging to two areas in the Naugaon block: Naugaon and Dhari-Kafnaul. The Naugaon villages are located on or near motor roads and are comparatively well connected with markets both in Naugaon town and bigger cities. The farmers in these villages were the first ones to adopt tomatoes as cash crops. Beginning in the middle of the 1980s, tomato cultivation had become an important agricultural activity by 2000. Almost 90 per cent of the farmers in our sample had adopted tomato production before 2004.

The Dhari-Kafnaul villages, on the other hand, suffer from poor access to roads and, therefore, markets. Therefore the adoption of tomatoes and other vegetables as cash crops began late in these villages. In fact, almost 75 per cent of the farmers in our sample had started tomato cultivation in or after 2004.

2 Methodology

The study is based on data collected from both secondary and primary sources. The secondary sources include: newspaper reports, articles in research journals and reports of companies and NGOs working in the area. Primary data has been collected from a large number of farmers through a detailed survey. The survey was carried out with the help of a questionnaire, which was completed through discussions with farmers. A total of 273 farmers were surveyed including 174 farmers who supply vegetables to Mother Dairy and 94 vegetable producers who sell only to private dealers. This was done in order to a) identify the drivers of inclusion in the supply chain involving a large retailer and b) compare the economic benefits to farmers supplying to a large retailer compared to those supplying to private wholesalers. Additional information was collected through detailed discussions by the lead researcher with 48 farmers to understand various issues in greater depth.

The farmers who are part of this supply chain are organized into four federations. These are: Rawain, Purola, Kamal Ghati and Dewrana. Our study focuses on farmers belonging to two federations, namely Rawain and Dewrana. These federations include farmers from villages in the Naugaon and Dhari-Kafnaul areas respectively. They were selected as they represent farmers living in very different geographical areas, with important differences in their linkages with markets.

The selection of farmers was carried out randomly in consultation with the federations. The main criterion for inclusion in the survey was the size of the landholding; the sample consists of groups of farmers representing small, medium and large landholdings. As shown in Table 2.1, the sample covers 22 per cent of the farmers belonging to the federations selected for detailed study.

Table 2.1: Sample of farmers included in the study

Number of members (Rawain and Dewrana Federations)	Number of farmers included in the study	Proportion of total members [%]
787	174	22

The rest of the paper is divided into the following sections:

- Section 3 – A description of the changes taking place in India’s retail sector in general, and the food retail sector in particular.
- Section 4 – The situation before the innovation.
- Section 5 – The nature of the innovation and the supply chain.
- Section 6 – A discussion of issues concerning the supply chain.
- Section 7 – Conclusions.

3 India's retail sector

India's retail sector is large and is growing rapidly: it is estimated to be worth Rs. 14000 billion (US\$350 billion). A very large proportion of it consists of small shops. Organized retail accounts for only Rs. 320 billion (US\$8 billion), which is a mere 3 per cent of the total. However, this situation is beginning to change. There is a structural shift from small, family-run shops to larger, organized retail outlets. The presence of the organized sector has seen a sharp increase in recent years. It is growing at 30 per cent annually and its share is likely to reach 8-10 per cent in the next five years (EIU, 2006).² The corporate sector is planning to invest about Rs. 16500 billion (about US\$412 billion) during the period 2006-11.³ This includes proposed investments by Reliance Retail and the Aditya Birla Group of Rs. 250 billion (about US\$6.25 billion) and Rs. 150 billion (about US\$3.75 billion) respectively.⁴ As large Indian companies move into the retail sector, there is pressure from foreign companies to be allowed entry (The Economic Times, Nov 2006). It is expected that foreign companies will also play an increased role in the near future. As with other the sectors, food retailing is also experiencing rapid growth and structural changes. Sales, which are estimated at about Rs. 6,720 billion (US\$168 billion), are growing at about 5 per cent per annum (Singh, 2006).

At present the sector is largely unorganized and is made up of over 6.5 million small shops. The share of large, organized food retailing is less than 1 per cent. Attracted by its size and growth potential⁵ plus changes in the law, the corporate sector is in the process of investing heavily in food retailing.⁶ For example, India's largest business house, Reliance, is reported to be considering an investment of Rs 100billion (about US\$2.2billion) over the next two years to establish more than 1,500 retail outlets (EIU, 2006). Other companies planning large investments in the sector include the Aditya Birla Group, Bharti, ITC and the Tata Group. With the entry of large companies, the share of organized retailing in the food sector is expected to increase from 3 to 20 per

² <http://www.india-reports.com/retail/nov06.aspx> ; <http://www.just-food.com/store/product.aspx?ID=43343&lk=sup>

³ <http://www.india-reports.com/retail/nov06.aspx>

⁴ <http://www.india-reports.com/retail/nov06.aspx>

⁵ The sector is expected to grow by 30% during the next five years to become a Rs 110 billion industry. See Economic Times 13, Friday, April 07, 2006.

⁶ The entry of big business in the food sector has become possible due to a number of policy changes. One of the most important of these is the recent change in the Agricultural Produce Marketing Committee Act, which prevented the entry of large private companies in the purchase and retail of agricultural produce. The new Revised Act, which has been implemented by a number of states in India, removes these restrictions.

cent by 2010. ⁷ Furthermore, many of these companies (Reliance, ITC and the Tata Group) are setting up operations to control the complete supply chain from farmers to retail stores. ^{8,9}

The entry of the corporate sector on a large scale is expected to change the food retail sector significantly. Its impact on small-scale farmers, private dealers and small retailers in cities and towns is likely to be particularly important.

⁷Ibid.

⁸The Economic Times, New Dehli, November 09. 2006.

⁹Ibid.

4 The situation in Naugaon before the innovation

In the past, farmers in the area practiced subsistence agriculture. They produced traditional crops, which included wheat, rice, pulses and millets. Although some farmers grew vegetables for personal consumption, markets played little role in their agricultural activities.

The situation began to change in the mid 1980s when farmers began to cultivate tomatoes and other vegetables. The drive towards the commercialization of agriculture was helped by a Dehradun based NGO, called Himalayan Action Research Centre (HARC).¹⁰ An important element of HARC's work in the area has been to promote agricultural diversification through the cultivation of vegetables, including tomatoes. It facilitated farmers' training in cultivation and pest/disease control techniques and also introduced new seed varieties and other agricultural inputs. This led to a sharp rise in the production of tomatoes during the early 2000s.

This large increase in production created its own problems. These included: a) the small size of local markets, which were unable to absorb tomatoes being produced in ever-increasing quantities; b) a lack of linkages with larger wholesale markets, such as in Delhi; c) the inability of small-scale farmers to transport their produce to large wholesale markets; and d) a shortage and high cost of wooden crates, which were needed to transport tomatoes to distant markets.

HARC and the farmers were not prepared to manage such a large increase in production. In the absence of a market, farmers suffered large losses as dealers, and commission agents took advantage of the situation. In fact, during the peak period, a large proportion of the production had to be destroyed because of the lack of a market.

The challenge for HARC and the farmers was how to find a market to absorb this increasing production. It was in this situation that the innovation described below played a crucial role.

¹⁰ According to the HARC, its main objectives are to empower small-scale farmers through building and strengthening local institutions and increase farmers' income through improved productivity, greater market access and enhanced technical capabilities. Its interventions are also aimed at making small-scale farmers more market orientated and to overcome major supply chain challenges that are specific to small-scale farmers. See Baptista (undated).

5 Nature of the innovation and the supply chain

5.1 The innovation

The innovation consisted of building a successful supply chain; linking small-scale farmers producing tomatoes and other vegetables with Mother Dairy.¹¹ This work began in 2001. The farmers are organized into federations, which supply off-season vegetables (mainly tomatoes) to Mother Dairy through a purchasing agreement. The NGO HARC has played a critical catalytic role in setting up the supply chain and ensuring that farmers' capabilities are enhanced so that they can receive maximum benefit from the chain. The federations organize the collection of produce, receive and distribute payment, organize farmers' training and, increasingly, provide farmers with market information.

The farmers see an opportunity in this arrangement to receive higher prices and to benefit from a secure market. Mother Dairy benefits as the arrangement enables it to source vegetables from hill areas during the summer season, when they can not be grown in the plains.

A number of factors were responsible for Mother Dairy's interest in procuring tomatoes from the Naugaon area. These include:

1. Mother Dairy's reliance on mountain areas for its supply of vegetables during summer months, when production in the plains is not possible. Tomatoes are one of the most important vegetables Mother Dairy requires from the mountains during this time. Until 2000, it used to meet all its off-season (summer) vegetable requirements from an area called Solan in Himachal Pradesh (another mountainous area, neighbouring Uttarakhand). As farmers in Solan grew in confidence, and their federations developed links with private dealers in large wholesale markets, they began to demand an increase in price. Mother Dairy decided to counter this by developing alternative sources. Around 2001, when tomato producers in Naugaon were experiencing difficulties due to a lack of a

¹¹ With a turnover of Rs 17,000 million (about USD\$350 million) in 2005, Mother Dairy is among the leading cooperatives in India. Formed in 1988, it is one of the largest players in the dairy and vegetable retail market. It markets fresh and frozen fruit and vegetable products under the brand name SAFAL through a chain of more than 350 owned fruit and vegetable shops and more than 20,000 retail outlets in various parts of India.

market, Mother Dairy was looking for a large group of off-season tomato farmers, who could meet its demand.¹²

2. HARC, under pressure from farmers, approached a senior State Government official responsible for rural development, to help Naugaon tomato farmers to find suitable markets. This official had previously worked with the cooperative sector and was aware of Mother Dairy's need to procure large volumes of off-season vegetables from the mountains. He invited HARC and Mother Dairy to a meeting, to explore the possibility of Mother Dairy purchasing tomatoes from farmers in Naugaon.

Mother Dairy agreed to buy from the Naugaon area as it fitted with its interest in diversifying suppliers of off-season vegetables and reducing its dependence on Solan farmers for tomatoes. It also agreed to provide plastic crates to farmers to reduce losses during transportation and bring down the high cost and difficulties associated with the use of wooden boxes. The use of plastic crates has reduced the cost of packaging by 70 per cent (HARC, 2006).

As Mother Dairy always works with farmers' organizations, it helped farmers to form two Farmers' Associations in the area.¹³ Later, as farmers' interest increased, four more federations were formed. Both Mother Dairy and HARC have played important roles in the formation of these federations.

When the first federation was formed, many farmers were skeptical and did not join. But when the benefits of becoming part of the supply chain became apparent, federation membership increased rapidly. The federations include more than 1,500 farmers belonging to about 80 villages (see Table 5.1). There are no specific rules governing the membership of the federations, and all farmers in the area are eligible to join.

¹² Once the farmers in Solan realized that Mother Dairy has developed a new source of supply, they agreed to supply on the previously agreed terms and conditions. Mother dairy now purchases 70% of its off-season tomatoes from Naugaon area and 30% from Solan area. Farmers in Solan have developed strong links with various wholesaler buyers and their dependence on Mother Dairy is now small.

¹³ Mother Dairy is working with 36 federations in Uttarakhand and about 300 in the whole country.

Table 5.1: Farmers federations

No	Name of the Association	Number of villages	Year of formation	Number of self help groups	Number of members
1	Rawain Valley Fruits and Vegetables Growers Association,, Naugaon	36	2001	36	685
2	Devrana Fruits and Vegetables Growers Association Dhari Kafnol	08	2004	8	102
3	Kamal Valley Fruits and Vegetables Growers Association	11	2004	6	126
4	Fruits and Vegetables Growers Association, Purola	13	2001	13	141
5	Upper Yamuna Organic Growers Association	10	2002	10	376
6	Rawain Women Multipurpose Autonomous Cooperative Society Ltd. 211	14	2003	17	211
7	Raghunath Organic Growers Cooperative Society		NA	11	126

Source: Three Year Impact Analysis Report of the Institutional Project 2003-06 “Promotion of rural agro enterprise for the betterment of livelihoods by strengthening civil society, economically viable organization and promotion of sustainable agro-ecological management system in Uttaranchal region” Project No.317/2491-D and HARC Status Report (2003-2005), Himalayan Action Research Centre, Dehradun, Uttarakhand.

In their formative years, the federations were helped both by Mother Dairy and HARC. As Mother Dairy had previous experience of working with farmers’ organizations, it provided the basic framework of the federations. In particular it helped with the preparation of the aims and objectives of the federations. HARC provided the legal and organizational support needed in the beginning. It trained members in organizational matters (such as elections of the office bearers) and the maintenance of business records. It also provided federations with opportunities to visits various wholesale markets and developed capability to gather marketing information. Most importantly, HARC’s training sessions made the federation leaders confident in dealing with both buyers of vegetables and suppliers of agricultural inputs.

The federations provide the following services to their members:

1. Preparation of an annual production plan and negotiation of supply targets with Mother Dairy.
2. Organization of the procurement of vegetables at their collection centres.
3. Monitor the grading of produce before it is packed at the collection centres.
4. Act as a mediator between farmers and Mother Dairy.
5. Provide packaging crates on rent.
6. Sell agro inputs to members.
7. Receive payment from Mother Dairy and distribute it to farmers.
8. Arrange for farmers' training.
9. Arrange to sell farmers' surplus vegetable production to private dealers. This is very useful when Mother Dairy is unable to purchase farmers' production during peak season.
10. In addition to these services, the federations are also setting up a relief fund, which will provide help to farmers in case of losses due to natural causes such as landslides on the road. The federations charge Rs 2 for every 10 kilograms of produce sold through them for the relief fund.

5.2 Description of the supply chain

The tomato supply chain involving tomato farmers and Mother Dairy follows the below:

Tomatoes are harvested by farmers according to production plans prepared by the federations and accepted by Mother Dairy. These are brought by farmers to designated collection centres, which are manned by an employee/volunteer of the federation. The farmers are expected to grade tomatoes at the collection centre according to the quality parameters provided by Mother Dairy.¹⁴ In the case of federations with a small number of members, this does not pose serious problems. The federation representative is able to monitor the grading carried out by the farmers. In federations with a larger number of members, on the other hand, monitoring of the grading is a serious problem.

After grading, tomatoes are packed in plastic crates provided either by Mother Dairy or the federations. These are loaded into trucks and transported to Mother Dairy's Central

¹⁴ Farmers and their federations have little say in the fixing of quality criteria. These are fixed by Mother Dairy according to customer preference.

Distribution Facility (CDF) in New Delhi.¹⁵ On arrival at CDF, the tomatoes are again checked for quality. Based on the quality of a sample of tomatoes, the whole truck is either accepted or rejected. If accepted, the whole truck is sent to Mother Dairy's retail booths. If rejected, the tomatoes are graded again by Mother Dairy employees. Those which meet the quality criteria are sent to the Delhi wholesale market and the rest are rejected and destroyed.

There were serious difficulties in the beginning. These included:

1. Opposition from the established private dealers and their agents. The dealers and their agents created many problems, rumours and physical obstructions. They also used violence to frighten the truck drivers. The situation improved after the Uttarakhand government provided police and administrative support to protect Mother Dairy's operation.

2. Farmers' lack of confidence in Mother Dairy. Farmers were not ready to trust Mother Dairy as it was new to the area. HARC played an important role in removing farmers' doubts about Mother Dairy. In the first year (2001) it also participated directly in the supply chain by procuring tomatoes on behalf of Mother Dairy and taking responsibility for payments.

3. Resistance to grading and quality control. Farmers were unhappy as the Mother Dairy fixed the quality parameters unilaterally. They were also [and continue to be] unhappy that Mother Dairy accepts only the best quality produce. It is difficult for farmers to sell the tomatoes left over after grading in the market.

In spite of these difficulties and an early reluctance to supply to Mother Dairy, the retailer was successful in attracting a number of farmers. Apart from the high price paid, support from a section of community leaders also contributed to the initial success. Some local politicians and community leaders were very active in their support to Mother Dairy and the federations. For example one of the farmers, who was very active in the formation of the federation, stopped plying his truck which used to transport tomatoes to private dealers. He also stopped selling the wooden packing boxes used by farmers to send tomatoes to private dealers.

It must be emphasized that although the farmers' federations and Mother Dairy have a legal relationship, the farmers are not contractually obliged to sell to Mother Dairy. In fact, many farmers sell to both Mother Dairy and private buyers. For example, the

¹⁵ This is a large facility, spread over an area of 25 acres. It includes large storage facilities, refrigerators and a deep freeze.

farmers included in our survey sold only about 30 per cent of their tomatoes to Mother Dairy in 2006; the rest was sold to private dealers. Similarly, Mother Dairy is not obliged to buy a fixed quantity of tomatoes from the farmers. The quantity to be purchased is determined every year through negotiations between the federations and Mother Dairy.

6 Description of the issues concerning the supply chain

6.1 Drivers of inclusion

What determines a farmer's ability to be part of a supply chain involving a large retailer, operating in dynamic markets? We have considered a number of factors as the possible drivers of inclusion. These are:

6.1.1 Size of landholding

The size of landholding may have an important influence on a farmer's ability to be part of a dynamic market. For example, a large retailer may prefer to deal with a few farmers with large holdings, rather than a large number of small-scale farmers. Again, large – scale farmers may have greater resources which are needed to meet the requirements of a large retailer. We find that the farmers who supply to Mother Dairy have a tendency (albeit small) to have larger landholdings. For example, the average landholdings of Mother Dairy and non Mother Dairy farmers are 3.25 acres and 2.8 acres respectively. Again, while 17 per cent of the Mother Dairy farmers have more than 5.5 acres, only 5 per cent of the non Mother Dairy farmers have more than 5.5 acres. However, the proportion of farmers with small landholdings (up to 2.25 acres) is similar in both groups of farmers (see Table 6.1). As the difference in the landholdings of the two groups is very small, it is difficult to assess its role as a driver for inclusion.

Table 6.1: Distribution of farmers according to landholding

Group of Farmers	Size of Landholding		
	Up to 2.5 acres	2.6-5.5 acres	More than 5.5 acres
Farmers who supply to Mother Dairy	84 (48)	61 (35)	29 (17)
Farmers who supply to private whole-sellers	46 (49)	43 (46)	5 (5)

Source: CSD survey (2007)

Number of farmers: Mother Dairy: 174; Non Mother Dairy: 94

6.1.2 Level of education

A farmer's level of education can affect her/his chances of participating in dynamic markets. For example, it can increase a farmer's ability to meet a large retailer's various requirements by adopting new cultivation and post-harvest management techniques. Also, the retailer could find it more convenient to deal with educated farmers.

Table 6.2: Level of education

Group of farmers	Level of education			
	0	Up to class 5	Up to class 12	Graduate
Farmers who supply to Mother Dairy	58 (33%)	46 (26%)	62 (36%)	8 (5%)
Farmers who supply to private wholesalers	36 (38%)	20 (21%)	35 (37%)	3 (3%)

Source: CSD survey (2007)

Note: 1) Number of farmers: Mother Dairy: 174; Non Mother Dairy: 94

We find that almost one third of the farmers in both groups are illiterate. Furthermore, there is no significant difference in the level of education of farmers supplying to Mother Dairy and those selling to private wholesalers (see Table 6.2). This suggests that the level of education has not been a driver of inclusion in this chain.

6.1.3 Experience of having worked with an NGO, and ability to become organized

This is found to be the most important driver of inclusion in this chain. As we mentioned earlier, Mother Dairy works only with organized farmers. In the Naugaon

area it took HARC's help to form farmers' federations. As a number of farmers were already working with HARC, they account for the bulk of federation members. These farmers trusted HARC, and were therefore prepared to trust Mother Dairy. Also, having worked with HARC, they were used to working as part of a farmers' group.

6.2 The changes required for successful inclusion

Farmers interested in supplying to Mother Dairy have to fulfill two major requirements. Firstly, they have to belong to a farmers' organization and, secondly, they have to grade their produce according to norms provided by Mother Dairy.

We find that farmers have had no difficulty in forming farmers' federations. As they were already working with HARC they were familiar with the idea of farmers' groups and were able to form federations. However, the functioning of these federations has not always been smooth, and the sense of collective good is still missing in many members. This is shown most clearly by the difficulties being faced in the grading.

Grading is a new condition for farmers, as private dealers do not require produce to be graded. They accept all the produce, though the price depends on the overall quality of the lot. The success of Mother Dairy's system depends on farmers behaving in a socially responsible manner and grading honestly. We find that this is still a problem and many farmers (especially in the large federations) try to cheat the system by including poor quality tomatoes. As Mother Dairy itself conducts a sample-based quality check at its facility, this sometime leads to the rejection of a whole truckload because of the action of a few farmers. Mother Dairy and the federations have failed to find a workable solution to this problem and it is one of the most important problems faced by the chain.

6.3 The sustainability of inclusion

The supply chain was set up without any subsidies from the government or Mother Dairy. However, HARC provided vital support during the formative years of the chain. In particular, it financially supported the formation and functioning of federations. It has also facilitated the training of farmers in various aspects of cultivation and marketing. HARC also finances the cost of certification of farmers in two of the federations, which have become completely organic.¹⁶ The cost of certification, which works out to be about Rs. 300/hectare, is being born by HARC at the moment. HARC

¹⁶ Only one of these, Dewrana Federation, supply to Mother Dairy.

also finances an internal control system, run by five people.¹⁷ HARC has spent about Rs. 2.6 million on supporting the vegetable supply chain in Naugaon area during 2001-06.

HARC's activities, in turn, are supported by the state government and a Dutch donor (Cordaid). In this sense, the supply chain has been supported by public money. The federations are now self-supporting, so HARC's support is less important. However, it is still important as it provides training to farmers and organizes and finances the certification of organic farmers.

The following table shows how the nature and extent of support provided by HARC has changed since 2001. It also shows that the role of HARC has decreased over the years, suggesting that the farmers and their federations have become increasingly more competent and confident in organizing the supply chain.

¹⁷ HARC's employees supervise and monitor the documentation carried out by the farmers. This reduces the work required to be done by the certifying agency. Consequently, the cost of certification is reduced significantly.

Table 6.3: Changes in the nature and extent of services provided by HARC

Period	Services provided by HARC		
	Individual farmers	Federation	Mother Dairy
Period 1 (Before 2001)	Introduced the idea of crop diversification and importance of cash crops to farmers; Facilitated farmers' training; introduced new varieties of vegetables, particularly tomatoes.		
Period 2 (2001)	Provided farmers with marketing assistance; introduced Mother Dairy to the area; continued with training of farmers in improved cultivation techniques.	Facilitated the formation of the first farmers' federation. Provided legal and organizational support.	Helped Mother Dairy set up the supply chain. Also collected tomatoes and made payments to farmers on Mother Dairy's behalf.
Period 3 (2002-2005)	Continued with farmers' training. Expanded the training area to marketing. Arranged farmers' visits to whole sale markets. Hosted an annual fair to bring together farmers and suppliers of agricultural inputs.	Helped in the formation of other federations. Trained federation members in legal, organizational and business matters to make them independent.	Helped the federations and Mother Dairy by removing various bottlenecks in the supply chain.
Period 4 (after 2005)	Reduced emphasis on farmers' training. Greater focus on improving infrastructure, such as collection centres and ropeways.	Federations have become self-sufficient. They deal with Mother Dairy directly. HARC helps only when a new activity is to taken up, such as the certification of organic farmers.	Very little involvement with Mother Dairy.

The federations have become self sufficient through a number of income generation activities. They receive income from the following activities:

- a. A one-time membership fee of Rs.250 (about US\$6.0).¹⁸
- b. A 1.75 per cent transaction fee charged to Mother Dairy.
- c. A service fee (5 per cent of transaction) charged to members for bulk purchases of seeds, fertilizers, pesticides and other inputs from agri-input companies.
- d. Renting of plastic crates at Rs.1/crate per day to members during the harvest season. The fee is Rs.2 for non-members.

The chain has also benefited from various government schemes to help farmers, through improved infrastructure. For example, money from the state government is being used to build covered collection centres. This will enable farmers to collect and pack their produce without suffering damage from the rain and sun. The most important addition to the infrastructure is a ropeway built to transport produce from high altitude villages (with no road access) to a metal road. The ropeway has been financed by the Indian government as a result of HARC's efforts to link farmers with markets.

As public funds do not play an important role in sustaining the chain, its survival does not depend on the availability of subsidies and other financial support from public sources. However, the organic farmers will require HARC's support for some more time to come.

6.4 The costs and benefits of inclusion

6.4.1 Costs to farmers

The literature suggests that selling to a large retailer could involve a number of costs for small-scale farmers. These costs could be financial as well non financial, including:

- a) an increased use of chemical inputs such as fertilizers, pesticides and fungicides to meet the quality norms set by the buyer. Apart from increasing the cost of cultivation, this could seriously damage farmers' health and cause deterioration of the quality of water bodies;
- b) a greater need for credit to purchase costly inputs, leading to perpetual debt;
- c) an obligation to purchase agricultural inputs from the buyer; and
- d) contractual obligations to sell only to the buyer.

¹⁸ The federations also have casual members who do not pay any fees. They can send their products only if the permanent members cannot meet the requirement.

We find that the farmers participating in the chain have experienced a large increase in the use of pesticides and fungicides to meet the quality requirements imposed by Mother Dairy. While the Naugaon area as a whole has experienced an overall increase in the expenditure incurred on pesticides, the increase has been particularly large in the case of farmers supplying to Mother Dairy.

As shown in Table 6, the farmers supplying to Mother Dairy spend about Rs.3780/acre on the use of pesticides. Compared to this, non Mother Dairy farmers spend about Rs. 2050/acre. Furthermore, in spite of the large number of applications and high expenditure, the damage caused to tomatoes from pests and diseases is reported to have increased.¹⁹ Farmers face a serious problem of pesticide resistance and are unable to limit damage from pests and diseases. There is no incentive to farmers to employ organic methods, or reduce the use of pesticides, as Mother Dairy does not differentiate between organic and non-organically cultivated products. The organic tomatoes produced by Dewrana Federation members are purchased by Mother Dairy at the same price as non-organically grown ones produced by farmers belonging to Rawain federation.

Table 6.4: Increase in the expenditure on pesticides (2000-2006)

Group of farmers	Area under tomato cultivation (acre)	Pesticide expenditure (Rs.)	Pesticide expenditure per acre (Rs.)
Farmers belonging to Rawain federation	27	102050	3780
Non Mother Dairy	21	45150	2050

Source: CSD survey

Note: Farmers belonging to Dewrana federation are not included as they practice organic farming and do not use chemical pesticides.

We did not find any evidence to suggest that the large expenditure on pesticides has led to an increase in debt among farmers supplying to Mother Dairy. Also, the farmers do not have any contractual obligation to purchase inputs from, or sell their produce to, Mother Dairy.

¹⁹ According to our survey, farmers apply an average of five sprays of pesticides on tomato crops during a cropping season, which is considerably more than the recommended amount.

6.4.2 Benefits to farmers

6.4.2.1 Increased profits

The most important and immediate benefit of Mother Dairy's entry into the market was that farmers supplying to it received higher prices. Before Mother Dairy entered the market, farmers could sell in the Dehradun wholesale market only. The price for produce in Dehradun was low; it ranged between Rs. 3-6/kilogram. At the same time, farmers incurred high transportation and packaging costs. For example, the cost of packaging and transporting 12 kilograms of tomatoes (contained in a standard container) to the Dehradun market was Rs. 32. The sale price of a container of tomatoes varied between Rs. 36-72. From this farmers paid a commission of 6 per cent. After deducting various costs, farmers received a maximum of Rs. 4/kilogram. Sometimes, when there was a surplus of tomatoes and the price was very low, farmers could not even cover the costs of packaging and transportation.

Compared to this, Mother Dairy guaranteed to pay a minimum price of Rs. 6/kilogram during the first year of its operation. The actual payments were even higher; after deducting the cost of transportation and packaging, farmers received Rs. 8.50/kilogram.

We carried out a detailed analysis on the economics of tomato cultivation of farmers who are supplying to Mother Dairy and those who are not (see Table 6.5).

Table 6.5: Profitability of tomato cultivation Mother Dairy

Group of farmers	Yields (Kg/acre)	Cultivation cost (Rs./Kg)	Marketing cost (Rs./Kg)	Total cost (Rs./ per Kg)	Rate/Kg	Profit/Kg	Profit (Rs./acre)
Farmers who supply to Mother Dairy	11635	2.82	0.14	2.96	5.71	2.75	31996
Farmers who supply to private dealers	13592	2.59	1.83	4.41	5.91	1.50	20388

Source: CSD survey

The farmers supplying tomatoes to Mother Dairy were found to get higher profits per acre compared to those who sold to private dealers. While the former earned Rs. 31,999/acre during 2006, the latter group earned only Rs. 20,388/acre. The difference in profitability is not due to a difference in the price given to farmers by Mother Dairy and private dealers; it is primarily due to the lower cost of marketing incurred by farmers supplying to Mother Dairy. These farmers spent only Rs. 0.14/kilogram to market tomatoes to Mother Dairy. Compared to this, farmers supplying to private dealers spent Rs.1.83/kilogram on marketing. The difference in the marketing costs is largely due to high transportation costs and commissions paid by the non Mother Dairy farmers. Farmers supplying to Mother Dairy do not pay commission, and the price given to them is post transportation-cost deductions.

It must also be pointed out that because of Mother Dairy the prices offered by private dealers are much higher now than they were before the retailer's entry. This is because the private dealers have to match Mother Dairy's rates in order to remain in business. This has therefore increased the options available to farmers. In fact, many farmers now prefer to sell either to both Mother Dairy and private dealers, or just to private dealers.

6.4.2.2 Availability of low cost and non-wood packaging material

An important problem faced by tomato growers in the area was the high cost of the wooden crates used for packaging and transportation. Mother Dairy introduced plastic crates, which are reusable. Following Mother Dairy, private dealers also now provide farmers with plastic crates. This has improved the economics of tomato cultivation considerably, and reduced the demand for forest wood.

6.4.2.3 Increase in land use

With the increased availability of markets for cash crops, land utilization has increased. In the past about 30 per cent of the land in this area was un-cultivated, as farmers did not have a market for their crops. With greater access to markets, use of improved farming technologies and proper crop cycle planning, this land is now being cultivated.

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6.4.2.4 Technical support provided by HARC and Mother Dairy

76 per cent of the farmers felt that their tomato cultivation techniques have improved as a result of their association with Mother Dairy and HARC. As seen in Table 6.6, our

20 See: HARC (2006)

survey shows that HARC is considered by a large majority of the farmers to be the most important source of new technology and information. More than 60 per cent of the farmers reported it to be the most important source of technical inputs. Government departments followed HARC. Mother Dairy was the third important source of technical inputs. Private dealers and sellers of agricultural inputs were considered by most farmers as the least important.

Table 6.6: Sources of technical inputs

Source of technical input	Number of farmers reporting		
	Most important	Important	Least important
HAARC	107 (61.49)	26 (14.94)	37 (21.26)
Government Agencies	52 (29.89)	34 (19.54)	67 (38.51)
Mother Dairy	8 (4.60)	52 (29.89)	87 (50.00)
Private companies	1 (0.57)	7 (4.02)	111 (63.79)
Others	3 (1.72)	6 (3.45)	121 (69.54)

Source: CSD survey

Note: Total number of farmers: 174.

The technical support includes information on new crops and varieties, training in the cultivation of new crops and information on agro-inputs, especially seeds and plant protection methods. As a result of this support, the yields of most cash crops have grown in recent years. For example, the production of tomatoes has increased from 8,000 kilograms/hectare to 20,000 kilogram/hectare. It must, however, be pointed out that the level of training and transfer of information activities has decreased in recent years.

Finally, as a result of the above mentioned benefits, the farmers' household incomes have increased. For example, a sample survey of 163 families by HARC found that in 2005 135 (82.82 per cent) have experienced increased incomes.²¹

²¹ Ibid.

6.5 Problems faced by the supply chain

Although the entry of Mother Dairy has provided farmers with a number of benefits, the supply chain is faced with a number of problems. These include:

6.5.1 High rejection rates

A large proportion of the tomatoes supplied are rejected by Mother Dairy. This is perhaps the most common cause of resentment among farmers, and one of the major challenges faced by the chain. The rejection rates are particularly high in the case of tomatoes supplied by the farmers of the Rawain and Dewrana federations, the two federations we studied in detail. According to the data provided by Mother Dairy (see Table 6.7), more than half (by volume) of the tomatoes supplied by farmers of these federations failed the quality parameters and were rejected in 2006.

Table 6.7: Rejection rates (2006)

Federations	Rejection rate
Rawain	59%
Dewrana	56%
Kamal Ghati	31%
Purola	13%

Source: CSD survey

There are a number of reasons for the high rates of rejections:

a) The quality of tomatoes being produced by the farmers is poor. This is particularly true during the early and the later parts of the season, resulting in the highest rates of rejection during these periods. The reasons for poor quality include a high incidence of pest and disease attacks, and small size. The effect of pest attacks is made more serious by the fact that the pest (borer) is not seen at the time of grading at the collection centre, as it is already inside the tomato. However, it matures very fast during transportation due to the high temperature and damages the tomatoes during transportation to Delhi.

b) Poor road conditions and the long distance to Delhi (about 300 kilometres), plus high temperatures in summer and a lack of cold chains results in considerable damage to the produce during transportation. As the farmers are paid on the basis of quality checks carried out by Mother Dairy on arrival at the CDS, this contributes to high rejection rates. Quality could be improved if a cooling chain was used, but Mother Dairy does not plan to introduce one as it considers it too costly.

c) The self-grading by farmers is not always carried out according to the norms laid down by Mother Dairy. The problem is particularly serious in the case of large federations (Rawain and Dewrana Ghati) as a large number of farmers bring their tomatoes to the collection points and supervision of grading of all produce is difficult. Dishonest or careless grading by some farmers leads to the rejection of a whole truck.

The federations are expected to ensure that the grading is done strictly according to the criteria fixed by Mother Dairy. In practice, the federations are unable to enforce these norms. This is mainly due to a lack of social responsibility among members and lack of influence of the federation leadership. The importance of strong leadership is shown by the example of Purola federation. The average rejection rate of this federation was only 13 per cent during 2006. This is because the President of the federation, who is highly respected, personally supervises grading and does not tolerate any deviation from the norms.

The issue of grading has also led to disputes among farmers belonging to the same federation. For example, the Kamal Ghati and Purola farmers used to belong to the same federation. They had a very high rejection rate in 2005 (96 per cent). This caused a dispute between the farmers of the two areas, leading to the formation of separate federations. The rejection rates of both federations improved in 2006.

The failure of the federations to incubate social responsibility among its members and to practise honest grading for the greater good of all the members is considered by many farmers to be one of the most important failures of the chain.

d) There is a widespread feeling among farmers that the quality control procedures used by Mother Dairy are arbitrary in nature. It uses lenient norms when it is in need of vegetables and on days when it has sufficient supplies, it employs strict norms and rejects many trucks.

A simple solution to this problem is that the produce sent by each farmer is identified at the collection centre. Once individual farmers are responsible for the quality of their products, they are likely to produce better quality products and be more careful in grading. But Mother Dairy feels that it can not deal with each farmer individually as this will increase its administrative costs prohibitively. It prefers to deal with the whole truck as a unit. This system works without problems when procuring from large-scale farmers from the plains. Each of these farmers supplies a complete truckload to Mother Dairy and is responsible for the quality of produce in that truck. The system is not suitable for a situation where the suppliers are small-scale farmers who send their produce collectively. Mother Dairy is simply using the same system, which was

developed for large-scale farmers in the plains. It has failed to evolve a system suitable for small-scale farmers in the mountain areas. Unless this issue is resolved, high rejection rates will continue to cause resentment among farmers.

6.5.2 Weak organization, leading to transportation bottlenecks

There is a general feeling that the organization of Mother Dairy has deteriorated over the years. This is shown particularly in poor transportation arrangements. 43 per cent of the farmers surveyed reported that Mother Dairy's inability to provide transportation and packaging crates in sufficient numbers is one of the most important problems they face. There is a feeling that there is no fixed time for the arrival of Mother Dairy trucks and farmers have to wait a long time. Farmers also feel that Mother Dairy employees took more interest in the area when they were developing the chain. Now that the chain is established, they are beginning to take the farmers for granted.

6.5.3 Favouritism within the federations

There is a feeling among some farmers (and villages) that the federations are dominated by groups of people who use their control to benefit themselves and their friends/relatives. For example, some feel that federation leaders get Mother Dairy to procure first from their villages. Only when they cannot meet Mother Dairy's demand are trucks sent to other villages. Many of these villages have now decided to stop sending vegetables to Mother Dairy and have gone back to the private dealers. In many of these villages, the agents of the dealers have been active and have succeeded in influencing a large number of farmers to move away from Mother Dairy. Mother Dairy's weak organization plus the failure of the federations to unite all farmers benefited private dealers, who have taken full advantage of the situation.

Table 6.8: Satisfied with Mother Dairy?

Satisfied		Total number of farmers
Yes	No	
79 (45%)	95 (55%)	174

Source: CSD survey

We find that as a result of these problems, more than half of the farmers are dissatisfied with Mother Dairy (see Table 6.8). This is likely to have serious detrimental effects on the long term sustainability of the chain. In fact, these effects are already apparent in a number of villages, where farmers have stopped supplying tomatoes and other

vegetables to Mother Dairy since 2005.²² As a result, the value of tomatoes sent has come down from Rs. 6.0 million in 2005 to only Rs. 1.3 million in 2006.

At the same time, many farmers who are unhappy with Mother Dairy will continue to be part of the chain. This is because they realize that Mother Dairy's presence in the market exercises a check on the practices of the private dealers. They are afraid that if the supply chain is damaged and Mother Dairy leaves, the dealers will be free to exploit farmers and the situation will become as bad as it was before the entry of Mother Dairy.

Farmers have made a number of suggestions of ways to remove some of the problems they face. The most common suggestions are: Mother Dairy should fix the price in advance (39 per cent); the grading norms should be relaxed to reduce rejection rates (35 per cent); and Mother Dairy should purchase all the produce (34 per cent).

A variety of options are being tried by farmers, their federations and HARC to solve some of the problems. These include: organic cultivation; growing exotic vegetables; and contract farming to reduce risks. The most successful of these efforts is the conversion to organic farming by a large number of farmers in the area. For example, farmers belonging to the Dewrana federation began the conversion to organic cultivation two years ago. Today, all the members of this federation are organic farmers. It is hoped that this will help the farmers to find new buyers and reduce their dependence on Mother Dairy. The federation, with the help of HARC, has already found a new buyer who is prepared to buy their vegetables at a small premium.

This shows that the farmers and their federations have grown in confidence and competence to find ways to solve some of their problems.

6.6 Impact of structural changes in the food retail sector on the supply chain

As mentioned in Section 3, India's food retail sector is undergoing major structural changes. These changes include the entry of the corporate sector, which is making large investments. The impact of these changes is likely to be felt by the chain we studied. As the Naugaon area has become known as an important source of off-season vegetables,

²² These include the following villages: Sonara, Manjali, Thali, Kansola, Kutyal, Pletha, Uroli. In 2005, all the farmers in Sonara sold to Mother Dairy. None did in 2006. In Naini only 10 out of 28 households sold (part of the production) to Mother Dairy. This year they have not sent production plans to the federation, which suggests that they do not plan to sell to Mother Dairy.

these retailers are expected to procure from there on a large scale. Reliance Fresh, one of the largest emerging companies in the food retailing business in India, is already considering the possibility of procuring tomatoes from the area. What will be the impact of the entry of private retailers on the farmers, Mother Dairy and private wholesale dealers? Some farmers are happy that, with the entry of other large retailers, competition will increase and they will get a better price. While they would like Mother Dairy to continue to procure from the area (as a check against any exploitative practices of private buyers) they feel that competition will also stop Mother Dairy from becoming complacent. A majority of farmers, however, feel that the entry of large private retailers will not benefit farmers (see Table 6.9). These include both farmers, which belong to the supply chain (58 per cent) and those who do not (68 per cent). While agreeing that the entry of large private retailers may benefit farmers in the short run, they are concerned about the long term effect.

Table 6.9: Will the entry of large private retailers benefit farmers?

Group of farmers	Will the entry of large private retailers benefit farmers?		Number of Farmers
	Yes	No	
Farmers belonging to the supply chain	73 (41.95%)	101 (58.05%)	174 (100%)
Farmers not belonging to the supply chain	26 (26.65%)	68 (72.35%)	94 (100%)
Total	99 (36.94%)	169 (63.06%)	268 (100%)

Source: CSD survey

As Mother Dairy procures less than 10 per cent of the total tomatoes produced in the Naugaon region, the entry of other large buyers will not have a serious effect on its supply. Private dealers have been in the area for a long time and have shown great resilience in meeting the challenge from Mother Dairy by offering farmers competitive prices and other attractive terms. They are expected to adapt to the entry of other large retailers by matching their terms, as they previously did with Mother Dairy.

While the situation is extremely unpredictable, it is likely that in the short term the farmers will benefit from the entry of large private retailers. However, the long term impact of their entry is difficult to assess.

6.7 Replication of the supply chain in other areas

The supply chain studied has a number of distinguishing characteristics, which has contributed to its success. Firstly, the large retailer in the chain belongs to the cooperative sector, with a mandate to increase farmers' access to markets. Secondly, an important objective of HARC is to increase farmers' income through crop diversification and increased access to markets. Thirdly, the farmers have been able to form federations. Although there are some difficulties, these federations are able to act as farmers' representatives.

Therefore, the most important condition for the replication of this chain is that the large retailers should be prepared to work with organized farmers. This would be in the interest of both the farmers and the retailers. The farmers will be able to negotiate the best possible terms, and the transaction costs incurred by the retailer will be reduced. The chain will also be helped by the presence of NGOs such as HARC whose objectives include building farmers' linkages with the market.

The farmers and their organizations should not enter into exclusive selling contracts with large retailers. In the chain studied, the farmers are not contractually obliged to sell to Mother Dairy exclusively. Many of them have benefited from this freedom by selling to wholesalers at a higher price. This freedom is an important way of strengthening farmers' bargaining power and will be especially useful when a number of large-scale buyers compete for produce from areas such as Naugaon.

The case study shows that government subsidies are not necessary to build a successful supply chain. Limited public funding may be necessary to support farmers' organizations in their formative years; however, it must be an objective of these organizations to become self-sufficient by providing paid services to farmers and the retailer. Wherever possible, the government and donor agencies should consider supporting farmers' organizations in their formative years. Financial support should also be made available to improve the infrastructure, particularly collection and transportation facilities in the area.

7 Conclusions

- i) The supply chain has functioned successfully for six years. Farmers have become highly organized; six farmers' federations with about 1,500 farmers from more than 80 villages have been set up. The federations organize the collection of produce and delivery of inputs, training and information to farmers.
- ii) Farmers' links with an NGO (HARC) and the experience of working with farmers' groups are found to be the most important drivers of inclusion in this supply chain. The case study shows that the farmers' ability to form groups can be an important attraction for a company considering building direct links with small-scale farmers. This could significantly reduce the cost of linking them with dynamic markets and thus reduce the need for public funds. Also, the example suggests that strong farmers' organizations (federations in this case) can take control of the supply chain in due time, giving farmers a greater say in the functioning of the chain.
- iii) The supply chain was set up without the use of subsidies. Public funds were used to support the federations in the past, but this support is not needed now. The federations are now financially self-supporting. Their income comes from providing services to the buyer and farmers. A withdrawal of public funds will not affect the survival of the supply chain.
- iv) The farmers belonging to the supply chain have received a number of benefits. These include: higher profits, technical support and increased land use. The household income of farmers belonging to the chain has seen a significant increase during the last six years.
- v) The high prices offered by Mother Dairy have had an important influence on the behaviour of private commission agents and dealers from wholesale markets. They have been forced to match Mother Dairy's prices and other terms and conditions. Moreover, as farmers have become more confident in working with markets, many of them are no longer content to accept the prices offered by Mother Dairy. Instead, as their options have increased, they actively look for the best prices and terms.
- vi) Many farmers are unhappy with Mother Dairy and the federations as they face a number of problems. These include: high rejection rates; transport difficulties; and favouritism within the federations. These problems may threaten the

survival of the chain, as some farmers have already stopped supplying to Mother Dairy. However, many farmers see the presence of Mother Dairy as an important competitive force, putting pressure on private dealers to behave.

vii) The farmers' ability to respond to changing market demands has increased. For example, many farmers are diversifying to exotic and off-season (high value) vegetables, crops and fruits. They are also positioning themselves to take advantage of the emerging market for organic products.

viii) The success of the chain has also led to some serious costs to the farmers and environment. During the last six years, the use of chemical pesticides and fertilizers has increased manifold, causing serious environmental and health concerns. Efforts should be made to ensure that when such chains are set up, special care is taken to curtail the use of chemical pesticides. All stakeholders especially the retailer, farmers' organizations and NGOs working with farmers must ensure that farmers are able to meet the required quality without increasing the use of chemical pesticides.

ix) The supply chain can be replicated in other areas if large retailers are prepared to work with organized farmers, and farmers are successful in forming efficient organizations. These organizations may require financial support from governments and donor agencies in their formative years but should aim at becoming self-sufficient by providing income-generating services. When replicating, the negative aspects of the chain, such as an increase in the use of pesticides, should be avoided.

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Regoverning Markets

Regoverning Markets is a multi-partner collaborative research programme analysing the growing concentration in the processing and retail sectors of national and regional agrifood systems and its impacts on rural livelihoods and communities in middle- and low-income countries. The aim of the programme is to provide strategic advice and guidance to the public sector, agrifood chain actors, civil society organizations and development agencies on approaches that can anticipate and manage the impacts of the dynamic changes in local and regional markets. The programme is funded by the UK Department for International Development (DFID), the International Development Research Centre (IDRC), ICCO, Cordaid, the Canadian International Development Agency (CIDA), and the US Agency for International Development (USAID).

Innovative Practice

Innovative Practice is a series of case studies from the Regoverning Markets programme providing examples of specific innovation in connecting small-scale producers with dynamic markets at local or regional level. Based on significant fieldwork activities, the studies focus on four drivers of innovation: public policy principles, private business models, collective action strategies by small-scale farmers, and intervention strategies and methods of development agencies. The studies highlight policy lessons and suggest working methods to guide public and private actors.

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